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Value Orientation and Forest Management: The Forest Health Debate

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ABSTRACT / Among both forest practitioners and the general public, "forest health" has become an issue of contention. Whereas the debate over which treatments will best achieve healthy forests has been framed largely by the popular media and politicians as a struggle between industry and environmentalists, the views of the general public remain unexplored. Survey results from Oregon and Washington residents were used to assess the relationships between respondents' self-described environmental or economic priorities and the following two variables: (1) acceptability of forest management practices and (2) perceived threats to forest health. Findings indicate that active management was generally accepted by a majority of respondents regardless of their environmental or economic orientation. Disagreement emerged, however, when the appropriateness of specific management practices within specific forest conditions was examined. Additionally, strong evidence was found for a relationship between self-described environmental or economic orientation and perceived threats to forest health. Those with an environmentally oriented viewpoint tended to perceive human-caused factors as the largest threats, whereas those with an economic orientation saw naturally occurring processes as the greatest threats. These findings suggest that the issue of contention is not active management per se. Rather, the major divisions in the forest health debate are defined by specific contexts and circumstances, as well as the management practices used.

Recent national debates over forest health have illuminated a range of viewpoints regarding desirable forest practices and conditions. Two major end points of this ideological continuum have been clearly delineated by interest groups representing environmentalism on the one hand and resource extraction interests on the other. Whereas the national debate has been framed largely by these interest groups, the forest health perspectives of the general public have been less visible. It is not clear to what degree public perspectives have been adequately represented by the groups at these polarized end points. There is clearly a range of natural resource value systems among members of the public (Brown and Harris 1992), with nuances that may not be reflected in the arenas of interest group pluralism (Baker and Kusel 2003). The interests and demands of the public will ultimately affect how forest health policies are implemented and accepted. Thus, there exists a compelling need to understand citizens' expectations and desires regarding forest health policies (Shindler and others 2002a), and to explore factors that may help explain public perceptions.

KEY WORDS: Forest health; Values; Social acceptability; Public opinion; Active management; Value orientations

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High-profile wildfire seasons throughout the 1990s and 2000s have brought the issue of forest health to the public's attention. In the autumn of 2002, the Bush administration introduced the Healthy Forests Initiative as a means of addressing forest health on public lands. Elements of the President's plan were passed by Congress as the Healthy Forests Restoration Act of 2003 (H.R. 1904). The purpose of the Act is to reduce fuel loads on public forestlands considered to be at high risk for "catastrophic" wildfires. Treatments to reduce these fuel loads involve "active management" of forests, including mechanical thinning, prescribed fires, and other interventions designed to manipulate forest structure to achieve management objectives. Both the Presidential Initiative and the Congressional

legislation have sparked public debate over the very definition of a healthy forest, and how healthy forest conditions can (or cannot) be met through management.

The forest health controversy appears to be a microcosm of the larger debate over the purposes and management of federal forestlands, and ultimately the role of humans in the forest. Much of the politics and rhetoric surrounding the forest health concept have involved normative judgments about human manipulation of federal forestlands. This has encompassed such topics as the land management role of the federal government, the fate of rural forest-dependent communities, and commercial logging on public lands (Shindler and others 2002a).

Because of the importance of including public values in land use decision making (Bliss 2000; Kennedy and Thomas 1995; Shindler and others 2002b), there is a need to examine public opinions about forest health. In this study, we focus on the Pacific Northwest of the United States, specifically Oregon and Washington (Figure 1). This region has been a major battleground for federal forest policy conflicts, most recently over forest health issues. Shindler and others (2002a) have examined differences in the Pacific Northwest between rural and urban residents' perspectives on forest health conditions and management practices. In this article, we draw on the same study to examine differing forest health and management viewpoints and their relationship to respondents' self-described economic or environmental orientations. There is reason to believe that differences within this range of natural resource values translate into different perspectives regarding forest health conditions and the appropriateness of management practices. Public concerns about forest health may not be as simple as being "for" or "against" a specific practice. Rather, more thoughtful deliberation by land management professionals that reflects the nuances and range of public opinion is probably warranted.

Background and Framework

Previous research has established strong evidence of links between value orientations, defined as "patterns of basic beliefs relative to a particular topic," and forest management preferences (Vaske and Donnelly 1999). In the context of forest management issues, the most important value orientations can be arranged along a continuum from biocentric to anthropocentric perspectives (Vaske and Donnelly 1999). The biocentric perspective considers the natural world to be inherently valuable, besides any material benefits it might provide to humans. It extends ethical considerations to nonhuman entities and life forms. The anthropocentric perspective, on the other hand, measures the value of the natural world in terms of its ability to provide tangible benefits, including economic gains, to humans. From this viewpoint, human wants and needs, including economic interests, are primary considerations, and take precedence over most environmental concerns (List 1996; Steel and others 1994; Vaske and Donnelly 1999).

There is reason to believe that value orientations may influence not only forest health management preferences, but also forest health perceptions (Jenkins 1997; Kolb and others 1994). Differing understandings of forest health may relate to notions of what are and what are not appropriate human–nature interactions. The value orientations of individuals have been found to vary according to a number of demographic variables such as gender, age, size of a respondent's community, and levels of education and income. More environmental or biocentric orientations have been found to correspond with people who are younger (Jones and Dunlap 1992; Lowe and Pinhey 1982; Steel and others 1994), those who come from larger towns (Shindler and others 2002a), and those who have higher income and education levels (Vaske and others 2001). In addition, women have been found to have more biocentric views of nature than men (Fortmann and Kusel 1990). Logically, economic orientations have been found to correspond with the following demographic factors: higher age, residence in smaller towns, and lower income and education levels.

Previous research has explored the relationships between broadly defined belief systems and perceptions regarding forest management issues (Brown and Harris 1992; Shindler and others 1993; Tarrant and Cordell 2002). Tindall (2003) pointed to differences between individuals with ecologically oriented perspectives and those with economically oriented perspectives regarding the visual acceptability of clear-cutting and other management practices, with economically oriented individuals showing more support for clear-cutting. Steel and others (1994) found that respondents with a biocentric perspective were more likely to support policies that minimized human intervention in the landscape, such as banning clear-cutting, establishing more wilderness areas, and protecting old-growth forests. The anthropocentric respondents in this study favored economic uses of federal land, including logging in wilderness areas, emphasizing timber production and setting aside environmental laws that conflict with resource-based

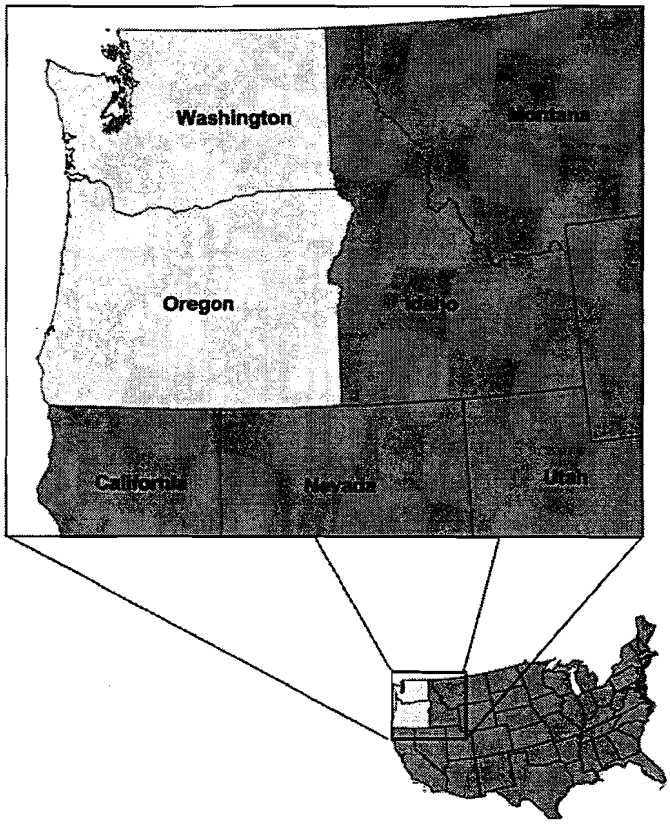

Figure 1. Survey respondents reside in Oregon and Washington, in the United States of America.

employment. Brown and Reed (2000) found that respondents with an "economic" perspective showed more support for human uses of the forest such as commercial logging, mining, drilling, and motorized recreation, whereas those who believed the natural world has "intrinsic" value had negative attitudes toward commercial mining and logging and positive attitudes toward wilderness designation.

Because identification of a forest as "healthy" or "unhealthy" involves a normative evaluation of forest conditions, we would expect value orientations such as "biocentrism" and "anthropocentrism" to affect forest health perceptions and management preferences. An individual's evaluation of a forest's health involves more than just the forest itself. It entails the projection of that person's values, beliefs, and understandings onto the landscape (Greider and Garkovich 1994).

Research on perceptions of forest health has pointed to a discrepancy in understandings of the concept. Kolb and others (1994) described two primary understandings of forest health: (1) a "utilitarian" view, similar to anthropocentrism, in which the health of a forest is measured by its ability to provide material benefits to humans or meet specified management objectives, and (2) an "ecosystem view," which uses information on historic ecologic patterns and processes as a template for measuring forest health. Jenkins (1997) expanded on this conceptual divide as a means for interpreting social and political responses to the "forest health crisis" of the mid-1990s, concluding that "the real crisis in our forest is that we cannot agree on what constitutes a healthy forest" (p. 14). As evidence, Shindler and others (2002a) found differences between urban and rural residents of the Pacific Northwest in their opinion concerning the health of Northwest forests and, to some degree, their selection of appropriate forest health indicators.

Environmentalist perspectives, which can be described as biocentric (Brown and Harris 1992), often are believed to include a "nature knows best" philosophy (Hull and others 2001), suggesting a preference for a "passive management" approach to achieving forest health. This has often led to a characterization of environmentalists as advocating a "hands-off" management approach to federal forests, and this characterization has been a common element in policy debates surrounding forest health. For example, in 1992, U.S. Oregon Senator Bob Packwood opined during a subcommittee hearing on forest health:

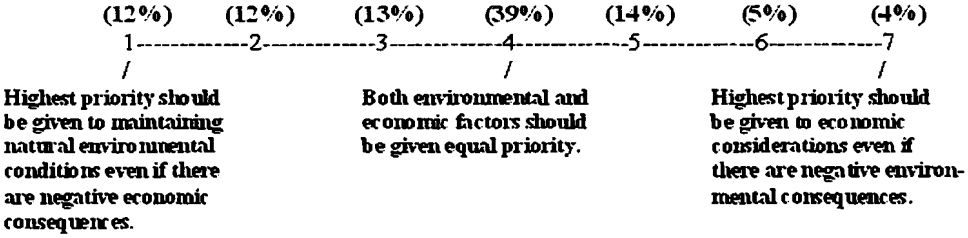

Figure 2. The Environmental-Economic Priority Scale (EEP) as presented to respondents in the survey. The percentage of respondents in each category is indicated in parentheses.

Many in the environmental community believe people are incapable of good work where nature is concerned. They also believe the natural world is very fragile and that hands-off is the best policy. [But] this could not be farther from the truth. . . . We cannot walk away and leave these forests. We are going to have to do something to restore their health (Subcommittee on Public Lands, National Parks and Forests of the Senate Committee on Energy and Natural Resources 1992 p. 80).

More recently, Arizona Representative Jeff Flake complained of "so-called environmentalists who want nothing more than to stop all forest thinning" (Little 2003 p. 45).

At the same time, timber industry advocates, who tend to be more anthropocentric or utilitarian (Brown and Harris 1992), have been portrayed as focused on the economic value of trees, often to the exclusion of all other forest uses. Bernard Zaleha, of the Idaho Sporting Congress, argued: "Private corporations, and their servant, the Forest Service, are not in the business of protecting forests, but of logging, period" (Task Force on Salvage Timber and Forest Health of the House Committee on Resources 1995 p. 11).

Much of the recent controversy surrounding forest health—and the Healthy Forests Restoration Act—has been portrayed as a battle between environmentalists, who desire a passive management approach to forest health, and timber industry advocates, who simply want to increase the amount of commercial logging on federal lands. This characterization may overlook the views of the general public, and it is the public that ultimately owns federal forest lands (Stankey 1995). For example, Shindler and others (1993) found that more than 40% of randomly sampled Oregonians and citizens nationwide favored a balance between natural conditions and economic considerations. A thorough examination of the forest health issue must necessarily include the perspectives of the general public and their opinions regarding specific elements of managing for forest health. This investigation uses data on the environmental and economic priorities espoused by citizens of the Pacific Northwest for a better understanding of their views on forest health.

Methods

A forest management survey was distributed to 949 rural and urban households in Oregon and Washington in 2001–2002. Questionnaires from 482 respondents were completed and returned, for a 51% response rate. Researchers used a stratified random sampling technique, with rural households oversampled to ensure that this important demographic was included in adequate numbers. This survey was developed on the basis of pilot studies involving focus groups in 14 communities and research objectives provided by the Region 6 Ecosystem Health team of the U.S. Forest Service (Shindler and others 2002a).

This study used a Likert scale to assess environmental or economic priorities (Figure 2). Respondents self-selected along a 7-point scale ranging from 1 (highest preference for natural conditions) to 7 (highest preference for economic considerations). We refer to this scale as the Environmental–Economic Priority (EEP) scale. We used this continuum approach with the intention of capturing a more accurate reflection of public opinion than is commonly attained using dichotomous environmental or economic orientation measures.

The EEP scale provides a simple, intuitive means of measuring an individual's preferences regarding common trade-offs between economic and environmental benefits. The EEP scale has been used in 19 studies since 1991 (Shindler and others 1993, Smith and others 1997) as a means of representing public attitudes toward environmental and economic concerns. Scores across settings (seven states and a national survey) are sufficiently consistent to suggest that the EEP scale is a reliable survey instrument.

Two indices were developed to test respondents' perceived threats to forest health. An index is a single

Table 1. Demographics of the environmental–economic priority scale[a]

	Pearson's R
Gender (M = 0, F = 1)	−0.097[b]
Age	0.155[c]
Size of town (from rural to city of >500,000)	−0.235[c]
Education level (from some high school to graduate/professional degree)	−0.180[c]
Income	−0.098[b]

EEP, environmental or economic priorities
[a] Scale for the dependent variable (EEP scale) ranges from 1 (environmentally-oriented) to 7 (economically oriented).
[b] significant at $P < 0.05$
[c] significant at $P < 0.01$

variable created from a composite of separate, logically related variables (Babbie 2001). Each of the indices in our study includes elements that fit logically together in a forest health paradigm. The NATURE-THREAT index measures agreement with the notion that naturally occurring forest disturbances coupled with a lack of human intervention are the greatest threats to healthy forest conditions. This index includes potential forest health threats such as insect outbreaks, wildfires, and overcrowded stands. The HUMAN-THREAT index measures agreement with the idea that human interventions in natural systems and processes are themselves the greatest threats to forest health, and thus includes factors such as overharvesting, forest fragmentation, and fire suppression.

We tested respondents' EEP scores against their opinions regarding

- the acceptability of active management generally
- the appropriateness of particular management practices
- perceived threats to forest health.

We investigated the notion that the value orientations of people, as represented by their EEP scores, relate to their assessment of forest health conditions and management practices. Anthropocentric and biocentric perspectives correspond to the end points of our continuum, with low EEP scores reflecting biocentric perspectives and high EEP scores indicating anthropocentric perspectives. Specifically, we explored the following hypotheses:

- Hypothesis 1: Respondents with lower EEP scores (a more environmental orientation) will show less support for active management generally than those with higher EEP scores.
- Hypothesis 2: Respondents with different EEP scores (different economic or environmental orientations) will report different levels of acceptability regarding specific management practices to achieve forest health.
- Hypothesis 3: Respondents with different EEP scores will have different perceptions of threats to forest health. Specifically, those with lower EEP scores (environmentally oriented individuals) will perceive human factors as larger threats, whereas those with higher EEP scores (economically oriented individuals) will perceive naturally occurring processes as larger threats.

Results

Demographics and the EEP Scale

The distribution of respondents across the EEP scale showed a relatively bell-shaped pattern (Figure 2). The largest single group indicated having equal priorities for economic and environmental concerns. Overall, more respondents identified with an environmental orientation (37%) than with an economic orientation (23%) on the EEP scale. These patterns are consistent with results found both nationwide and in the state of Oregon in previous studies (Shindler and others 1993; Wright and Shindler 2000). The EEP scale, when used as a dependent variable and tested against demographic information (Table 1), yielded the following findings. Respondents' EEP scores correlated significantly, but not strongly, with factors such as gender, age, educational attainment, and income, and correlated somewhat more strongly with the size of the town where the respondent resides. In our sample, women tended to be slightly more environmentally oriented than men. Higher EEP scores (more economically oriented) correlated positively with older respondents, people from smaller towns, and those with lower levels of education and income. Lower EEP scores (more environmentally oriented) correlated positively with: younger respondents, people from larger towns, and those with higher levels of education and income.

EEP as an Independent Variable

For the remainder of our analyses, we use respondents' EEP scores as the independent variable to investigate how well economic or environmental orientations correlate with various opinions surrounding the forest health concept.

Acceptability of Management in General. Respondents were asked for their level of agreement on a 5-point scale of options ranging from "strongly agree" to "strongly disagree" with the following statement:

Table 2. Overall acceptance levels and correlation between the environmental–economic priority (EEP) score[a] and approval of various forest management activities[b] under two forest conditions: overstocked and healthy

	Forest Condition % Acceptance (correlation)	
Management practice	Overstocked	Healthy
Trees thinned selectively	88 (0.134[c])	50 (0.279[c])
Prescribed fire used to control forest fuels	39 (0.176[c])	27 (0.210[c])
All forest fires extinguished	24 (0.178[c])	29 (0.186[c])
Clear-cut logging used	12 (0.251[c])	7 (0.249[c])
Nature left to take its course	8 (−0.170[c])	37 (−0.264[c])

Note. Positive correlation scores represent higher levels of support from economically oriented respondents; negative scores represent higher levels of support from environmentally oriented respondents.
[a] The EEP score ranges from 1 (environmentally-oriented) to 7 (economically oriented).
[b] Respondents were asked to indicate what practices from a supplied list were acceptable under different forest conditions.
[c] Significant at $P < 0.01$

"sustaining healthy forests requires long-term active management." A test of correlation between respondents' EEP scores and their response to this question showed no significant difference (Pearson's $R = .039$, one-tailed, $P = .211$), showing a lack of support for hypothesis 1. Respondents across the EEP scale showed high levels of support for active management. At least 82% of the respondents in each of the seven categories answered that they agreed or strongly agreed with the statement. This finding contradicts the view that people with environmental orientations accept only a passive management approach to forest health.

Acceptability of Particular Management Practices. Respondents used a 5-point scale to rate whether particular practices were acceptable or unacceptable for purposes of achieving or maintaining forest health under two different forest conditions: overstocked and healthy (Table 2). An overstocked forest was defined in the survey as "one with dense stands of trees where tree growth and other vegetation is inhibited. May be subject to disease and insect infestation as well as wildfire." A healthy forest was defined as "one with sufficient numbers of green trees and plants, native wildlife habitat, stable soil, little disease or insect damage, and opportunities for recreation."

For both conditions, selective thinning received the most support among respondents, with 88% supporting the practice in an overstocked forest, and 50% expressing support for thinning of healthy forests. Very few respondents supported the practice of clear-cutting as a management option for either overstocked or healthy forests. The practice of extinguishing all fires and using prescribed fire were supported by 24% to 39% of the respondents, depending on the condition (overstocked or healthy). Whereas 8% supported letting an overstocked forest "take its course," 37% agreed with this approach for a healthy forest.

For all management practices for both forest conditions, levels of acceptance correlated significantly with EEP scores (Table 2), although degrees of correlation varied. The strongest correlations emerged between the EEP score and acceptance of selective thinning for a healthy forest, letting a healthy forest "take its own course," and clear-cut logging under either healthy or overstocked conditions. In other cases, correlations were statistically significant, but not particularly strong.

Acceptance levels for all active management approaches (clear-cutting, selective thinning, extinguishing all fires, and the use of prescribed fire) were correlated with higher EEP scores (more economically oriented). Acceptance of "letting nature take its course" was correlated with lower EEP scores (more environmentally oriented). Our findings support hypothesis 2. We have illustrated these patterns graphically in Figure 3 by reporting scores for each activity across the EEP spectrum. Note that the graphs in Figure 3 are not sufficient for statistical comparisons (recall that group 4 contains nearly 10 times more respondents than group 7). Rather, they are provided here for visual reference.

In the context of a healthy forest, there was considerable disagreement over both selective thinning and letting nature take its course, with relatively large correlation coefficients indicating strong relationships with the EEP score (Table 2). The practice of thinning was supported much more strongly by economically oriented respondents, whereas letting nature take its course showed greater support among environmentally oriented respondents.

On the other hand, support for clear-cut logging was low among all respondents for both overstocked and healthy forest conditions. Economically oriented respondents were more supportive of the practice for both conditions, but Figure 3 shows that support was consistently low among all the EEP groups. There was a lack of general agreement on the use of prescribed fire and the practice of extinguishing all fires, and support for these practices showed relatively lower correlations with the EEP score.

Although a majority of respondents in all seven EEP categories agreed that maintaining healthy forests requires long-term active management, there clearly was

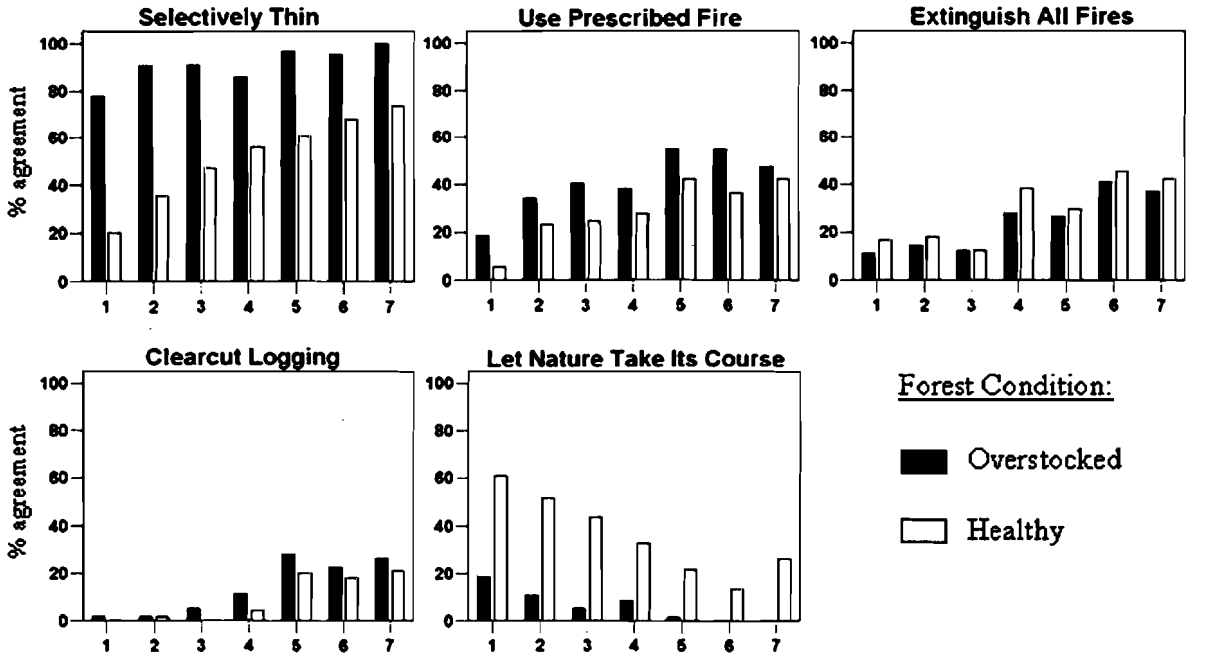

Figure 3. Percentage of respondents (y-axis) agreeing with particular management practices for two forest conditions ("overstocked" and "healthy"). Respondents are grouped (x-axis) on a continuum from 1 (environmentally oriented) to 7 (economically oriented).

disagreement regarding the specific types of management that are appropriate under different forest conditions.

Perceived Threats to Forest Health. Respondents were asked to indicate perceived threats to forest health from a provided list (Shindler and others 2002a). Selected items were subsequently grouped on the basis of two general approaches to viewing factors threatening forest health (Table 3). The HUMAN-THREAT index measures threats arising from human intervention and activity. The NATURE-THREAT index consists of naturally occurring threats or those that result from a lack of human intervention. We found strong relationships between both indices and respondents' scores on the EEP scale (Table 3). Specifically, respondents with lower EEP scores (environmentally oriented) were more likely to perceive human activities as threats to forest health. Conversely, the EEP score correlated positively with the NATURE-THREAT index. Economically oriented respondents were more likely to view natural disturbances and a lack of human intervention as threats to forest health. These findings support hypothesis 3.

According to respondents' ratings overall, it is clear that some factors are widely viewed as threats. Insect and disease outbreaks (90%), overharvesting (82%), overcrowded stands of trees (73%), impacts from motorized recreation (72%), and wildfires (70%) were the factors most commonly cited as threats. These represent both the HUMAN-THREAT and NATURE-THREAT approaches. Large numbers of respondents, regardless of orientation, viewed both human-caused and naturally occurring factors as threats to healthy forests.

Discussion

A number of interesting patterns emerged from this investigation. Although respondents across the EEP spectrum showed high levels of support for active management generally, specific questions revealed sharp differences in the kinds of management considered appropriate under different conditions. Furthermore, respondents across the EEP spectrum disagreed on what kinds of threats to forest health (naturally occurring or human-caused) were the most pressing.

Our results demonstrate that the residents of Oregon and Washington can make distinctions between different forest health conditions and management practices, and that their evaluations of these are related to value orientations, as measured by the EEP scale. A central finding of this study is that a divide between anthropocentric and biocentric forest health conceptions exists and can be useful for explaining many of

Table 3. Indices created to assess perceived threats to healthy forest conditions[a] and percentage of respondents answering "agree" or "strongly agree" that the factor is a threat to forest health

Factors constituting the HUMAN-THREAT index	
Overharvesting	82%
Impacts from motorized recreation	72%
Road-building in forests	54%
Fire suppression	48%
Too much forest fragmentation	43%
Cronbach's alpha	.72
N	229
Correlation with EEP scale[b]	−0.523[a]
Factors constituting the NATURE-THREAT index	
Insect/disease outbreaks	90%
Overcrowded stands of trees	73%
Wildfires	70%
Too little harvesting	52%
Too many areas being set aside and "locked up" from management	48%
Cronbach's alpha	.69
N	300
Correlation with EEP scale[b]	0.564[c]

EEP, environmental or economic priorities

[a]Respondents were asked indicate 1 (strongly disagree) to 4 (strongly agree) that the stated factor was a threat to forest health. Respondents who answered "no opinion" were excluded from this analysis.

[b]The EEP scale ranges from 1 (environmentally oriented) to 7 (economically oriented).

[c]Significant at $P \leq 0.01$

our results. At the same time, large numbers of respondents fall somewhere in the middle along the EEP continuum, and cannot be said to espouse strictly anthropocentric or biocentric perspectives.

Although there appears to be a consensus among respondents that active management is a necessary element in the maintenance of healthy forests, this agreement breaks down when respondents are asked to evaluate specific forest conditions and practices. Our results underscore the notion presented by previous researchers (Jenkins 1997; Kolb and others 1994; Shindler and others 2002a) that, at least among the general public, "forest health" is not a singular, coherent concept, but rather includes multiple, contrasting social perspectives.

Much of the disagreement over appropriate practices may be explained by the contrasting management objectives of individuals with anthropocentric and biocentric outlooks. Brown and Reed (2000), Steel and others (1994), and Tindall (2003) reported that anthropocentric individuals see resource extraction as an appropriate and desirable use for forests, so it follows that their views of forest health include a place for management activities that produce useable and salable goods. Under this view, factors such as wildfires, insects, and disease are considered to be forest health threats because they harm or devalue harvestable timber. As Kolb and others (1994) have pointed out, the utilitarian view measures forest health primarily by assessing the health of individual trees.

Biocentric individuals, who often value forests more as natural ecosystems than as sources for human commodities, tend to assess forest health in terms of natural ecosystem functioning, often at larger spatial and temporal scales. Human activities that interfere with natural processes (e.g., fire suppression) or alter natural conditions (e.g., fragmentation or overharvesting) are considered as threats to overall forest health. Furthermore, naturally occurring disturbance factors (e.g., disease and insects) are not necessarily indicative of poor forest health. Kolb and others (1994, p. 14) have pointed out that a "dead tree is not healthy, but [under an ecosystem perspective] it may be part of a healthy stand."

Individuals who indicated a preference for balancing economic and environmental priorities perceived a variety of forest health threats (both naturally occurring and human-caused), and appeared to favor management intervention in some, but not all, circumstances. Their assessments of forest health tend to fall midway between the biocentric and anthropocentric perspectives. Individuals near the "middle" of the biocentric–anthropocentric continuum may represent a silent majority, and a need exists for further examination of their forest health perceptions.

It would be oversimplification to suggest that the entire forest health debate falls on either side of the environmental–economic divide. The widespread support for thinning of overstocked stands, the broad agreement on a number of forest health threats, and the rejection of both clear-cutting and letting an overstocked forest "take its own course" suggests the beginnings of a region of accord among those with differing value orientations. Specifically, there appears to be agreement that forest health will not be achieved through industrial style timber production, nor will it result from a lack of response to disease and insect infestations or overstocked conditions. By and large, people in the Northwest expect managers to apply active management to forests in poor health, but they do not believe traditional commercial forest management approaches are appropriate when the desired outcome is a healthy forest. These "sidebars" may be useful as a

beginning for building a broader societal vision of how to manage for healthy forests.

Levels of support for specific management practices are clearly contextual. Treatments widely judged to be appropriate for an overstocked stand (e.g., selective thinning) were not necessarily appropriate for a healthy stand. This suggests that respondents make distinctions between the restoration of degraded forests to a healthy condition and the maintenance of forests that are already healthy. There appears to be much greater agreement regarding appropriate actions for managing to restore an unhealthy forest (thinning is strongly supported; passive management is strongly rejected) than for managing a healthy forest.

Vast disagreements regarding appropriate management practices for a currently "healthy" forest point again to the notion that contrasting management objectives (e.g. managing for economic outputs vs managing for "naturalness") lead to contrasting assessments of appropriate practices (Brown and Reed 2000). Specifically, anthropocentric individuals may not perceive a forest as "healthy" unless it provides some economic returns (such as would occur through thinning), whereas biocentric individuals may see such commercial activity as degrading a healthy stand that should essentially be "left alone." This disagreement over how to manage healthy forests indicates an area of contention that land managers and policymakers will have to address with the public.

The relationship between an economic or environmental orientation and attitudes toward the role of fire is likewise complex. Whereas most respondents believed that wildfires are a threat to forest health, a division emerged over whether fire suppression is an appropriate response, or whether suppression itself constitutes a greater threat. Environmentally oriented respondents pointed to past and current fire suppression as a cause of poor forest health, and likely saw a place for "catastrophic change in vegetation composition" (Kolb and others 1994, p. 13) in a healthy forest. The greater support for fire suppression by economically oriented respondents fits well into a "utilitarian" view of forest health, wherein humans are expected to prevent natural forces from causing tree mortality and the loss of economic potential. The support for prescribed fire by economically oriented individuals indicates a positive attitude toward fire so long as it is controlled (rather than wild) and applied to meet management objectives. Prescribed fire, then, is seen as a management tool rather than a "natural" part of a forest ecosystem. It should be emphasized, however, that acceptability of prescribed fire and fire suppression were not strongly correlated with EEP scores. There are likely other more important factors that influence public opinions on this important subject (Brunson and Shindler 2004; Loomis and others 2001; Winter and others 2004).

Conclusions

The findings of this study underscore the notion that the term "forest health" has important social dimensions, and that beliefs and opinions regarding forest health management must be made explicit. Members of the public possess a wide variety of views about what forest health threats are the most pressing and what actions are appropriate for achieving forest health. These views may differ widely from the forest health perceptions of land managers. Unless these various understandings are specifically explored, we can expect continued miscommunication as people use the same term, "forest health," in reference to vastly different goals and expectations.

Portraying the forest health debate as a simple choice between active and passive management fails to address important elements of public opinion. Rather, major divisions appear to include differing perceptions of forest health threats and the appropriateness of specific practices within specific contexts. The findings point to the need for more clarity regarding the components of a healthy forest and how specific practices contribute to maintaining these conditions, as opposed to the question of whether or not management should occur at all. Because it appears that forest health perceptions are related to management objectives, there is also a need for greater clarity regarding expectations for individual forests (Shindler and others 2002a). Whether a stand is managed primarily for timber, wildlife, recreation, or fire protection (all of which could be components of a "healthy forest") will undoubtedly affect people's views of appropriate treatments.

Justifying a management action solely on the basis that it promotes "forest health" does little to address the complexities of public understandings of the term. Land managers will need to engage the public about the meaning and specific uses of "forest health." For example, discussion about the current condition of the forestland in question (e.g., overstocked, fire-prone, "healthy"), the presumed threats to forest health and sustainability, and the benefits and risks of using proposed management practices is essential to reaching agreement about appropriate actions. In particular, managers will need to clarify the context within which forest health determinations are made. Distinguishing between management actions intended to restore de-

graded stands and management aimed at achieving other forest health objectives will help temper the debate.

Because more accord exists regarding the management of "unhealthy" than "healthy" forests, managers dealing with a divided contentious public may find it easier to concentrate on restoration activities where agreement on problems already exists. Projects that focus on reducing fuel loads at the wildland–urban interface or thinning diseased and insect-infected stands are more likely to meet with approval (Shindler and Toman 2003). The trust built by working together on relatively uncontroversial projects can provide a starting point for addressing more contentious forest management issues. Managers should also be aware that forest health management which addresses some forest health threats (e.g., insects or disease) but not others (e.g., high forest road densities) is not likely to be widely supported. Citizens take a broad, ecosystemic view of forest health which recognizes the damage that can stem from both natural and human sources.

Too often, the nuances of public opinions are oversimplified, misrepresenting the complexity of the forest health issue. Managing for healthy forests will be an increasing concern among all stakeholders. Therefore, participants in the debate will need to address the lack of universal agreement about the concept and come to a common understanding of desired forest conditions and how to achieve them.

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