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Research Article

Public Acceptance of Disturbance-Based Forest Management: Factors Influencing Support

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Growing emphasis on ecosystem and landscape-level forest management across North America has spurred an examination of alternative management strategies which focus on emulating dynamic natural disturbance processes, particularly those associated with forest fire regimes. This topic is the cornerstone of research in the Blue River Landscape Study (BRLS) on the Willamette National Forest in the McKenzie River watershed of western Oregon. As scientists and managers work to unravel the ecological and economic implications of disturbance-based forest management, they must also consider public acceptance for such an approach. In this study, citizen opinions from the local attentive public in McKenzie River watershed communities are examined. Results suggest the attentive public has moderate to low levels of knowledge about landscape-level disturbance processes and terms. Further, public confidence in agencies and the information they provide appears to be low, though respondents indicated a somewhat higher level of trust for local agency personnel than agencies as institutions. Overall, respondents display cautious support of disturbance-based management (DBM), but many are still undecided. Findings also demonstrate support may be improved through transparent and inclusive decision-making processes that demonstrate the use of sound science in project planning, frank disclosure of risks and uncertainties, and clear management objectives.

1. Introduction

In recent decades, federal forest management in the Pacific Northwest has shifted from a focus on sustained-yield timber harvest through dispersed and aggregated patch clearcutting to a system of management based on static land allocations laid out by the 1994 Northwest Forest Plan. However, growing emphasis on ecosystem and landscape management has spurred interest in alternative management strategies that focus on dynamic natural processes [1–3]. One such method is the use of historical disturbance as a guide for ecosystem management, which involves applying information about past natural disturbances to inform practices such as timber harvest, prescribed burning, or wildfire suppression [4]. This coarse-filter approach to conservation—known variously as disturbance-based management (DBM), emulation of natural disturbance, and management guided by a historical range of variability—is based upon the principle that plant and animal communities that evolved under dynamic ecosystem conditions will be most resilient and productive under management scenarios which emulate natural disturbance regimes [5, 6].

As scientists and managers examine the ecological and economic implications of disturbance-based management, they must also consider public acceptance for such an approach. Social acceptability, also referred to as public acceptance or cultural adoptability, is defined as the public's willingness to tolerate the use of specific management practices at least occasionally and in carefully selected areas [7–9]. Numerous studies have demonstrated the importance of understanding the role of citizen values and attitudes in ecosystem management [10–12]. Decisions based solely on biological science can lead to policy failures; for this reason, ecological research must be supplemented with investigations into relevant social perspectives of forest management processes and practices [13]. Indeed, recent examination of

the increased implementation of disturbance-based management in North America suggests that the greatest barriers to its success may be associated with public acceptance [14].

This research examined attitudes of the local attentive public toward disturbance-based management and the agencies applying it. For purposes of this study, local attentive public was defined as citizens in the McKenzie River watershed who had demonstrated past interest in local forest issues to local land management agencies through attendance at agency planning meetings, participation in field trips, submission of input during public comment periods, or requested additional information from federal land management agencies. The local attentive public was targeted with the expectation that knowledge of and interest in ecosystem management would be higher in this cohort, an assumption supported by previous research in the region [15, 16]. These individuals are often more involved in citizen participation activities than the general public [17, 18] and thus are the first to respond to these initiatives. They represent an important stakeholder group in that they have a prominent role in social networks within the region.

This study encompassed three main objectives: (1) examine attentive public knowledge of and acceptance for disturbance-based management and the forest agencies that implement these practices, (2) explore public concerns pertaining to the risk and uncertainty inherent to a disturbance-based approach, and (3) examine potential barriers to future implementation of this approach.

1.1. Study Area. The study area includes communities in the McKenzie River watershed on the western slope of the Cascade Mountains in Oregon (Figure 1), where historical disturbance regimes are used as a model for forest management activities as part of the Blue River Landscape Study (BRLS) [19]. The BRLS is an area designated for joint experimentation by the Willamette National Forest and the Bureau of Land Management, Eugene district, and the stated purpose is to achieve the objectives of the Northwest Forest Plan (late-successional habitat, aquatic ecosystems, and sustainable timber production) by modeling management activities using historical disturbance patterns [19]. Cissel et al. [1] suggest that the BRLS is well suited for the fire regime emulation approach, where it has potential to produce positive impacts on ecosystem health and diversity and can be particularly useful in informing reserve design for habitat protection and species conservation.

Research in innovative ecosystem management approaches has a long history in the McKenzie River watershed. The H. J. Andrews Experimental Forest was established in 1948, on one of the tributaries to the McKenzie River. Pioneering research on the structure and function of old-growth forest ecosystems has been going on at the Experimental Forest for over forty years [20, 21]. The BRLS is one example of this research [22].

The McKenzie River watershed is home to a number of small communities as well as many popular outdoor recreation sites along the river and on upland forests. At the confluence of the Willamette and McKenzie Rivers lies Eugene/Springfield, with a combined population of over

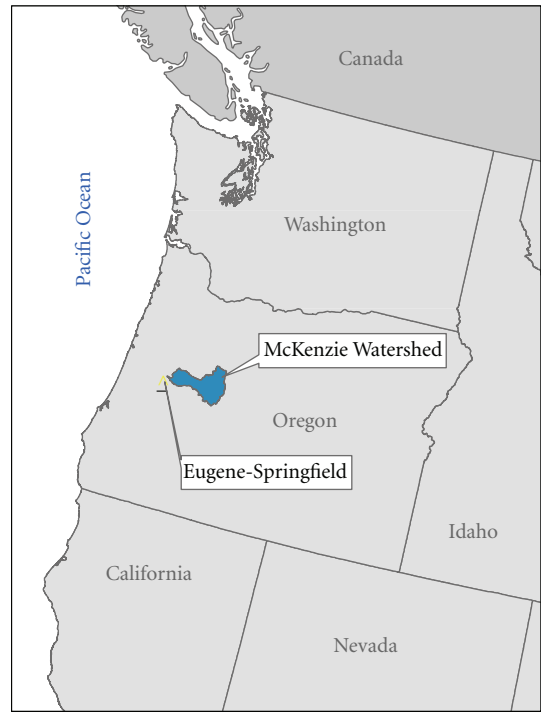

Figure 1

200,000 people. The upriver population of the watershed is generally comprised of people employed in either recreation or extraction based natural resource economies, residents who commute to jobs in the Eugene/Springfield area, and a growing number of retirees. Residents use the Willamette National Forest and Bureau of Land Management lands frequently for recreation purposes—particularly the nationally acclaimed McKenzie River Trail—and a majority claims to pay a moderate or great deal of attention to forestry issues [23]. Furthermore, studies of citizen perspectives in the area have shown residents greatly value participation in planning processes undertaken by the two federal forest management agencies [15, 16].

Experiments and projects on federal lands within the watershed have benefited from collaborative efforts and positive relationships between scientists and managers working in the Andrews Forest, Bureau of Land Management, the nearby McKenzie River Ranger District, and the Willamette National Forest headquarters in Eugene. Public support for such research has been demonstrated in a previous study of citizens in the McKenzie River Watershed [23], where two-thirds of the participants agreed with scientific experimentation in forest ecosystems. However, support for the theoretical phases of project planning does not automatically translate into support for on-the-ground implementation.

Although research suggests numerous ecological benefits to a disturbance-based management approach in the McKenzie watershed [1], whether or not this specific approach is acceptable to citizens is largely unknown. Research has shown that other management paradigms, particularly clearcutting, are unacceptable to a large portion of the public across the US and in the Pacific Northwest [24, 25]. More

recently, a study from British Columbia on citizens' preferences for harvest patterns suggests that the public generally supports large contiguous harvest blocks with even, green-tree retention (a pattern consistent with some disturbance-based management techniques) over small, dispersed blocks but does not specifically inquire about public acceptance of disturbance-based management strategies [26]. Duncan et al. [27] contend that historic range of variability together with future range of variability—the estimated effect of biophysical forces on future ecological conditions—may be useful in framing the discussion about which land management decisions are socially acceptable and which are to be avoided.

1.2. Related Research. The concept of social acceptability was first defined by Firey [28] as one of the three pillars of natural resource management, sharing equal importance with economic feasibility and ecological possibility as critical characteristics of long-term, sustainable resource management policies. Many managers see value in working towards increased public acceptance of management strategies today, but how this is done is a complex pursuit, as it is based upon a number of contextual factors under which ecosystem management takes place. Shindler [29] identifies three such factors which influence public acceptability, all of which have relevance to a DBM approach: how citizens relate to spatial context (e.g., attention to specific places such as popular recreation sites, scenic vistas, or the forests where people work), their view of temporal context (e.g., changes over time to familiar places, how soon until a potential risk is likely to occur, and time until results of management activities are known), and social context (e.g., quality of decision-making processes, perceived risks, and uncertainties of management activities).

Knowledge of ecological problems and potential solutions (management practices) is another factor that previous studies suggest influences overall public acceptance [30, 31]. In what is sometimes called the knowledge-deficit model, an increase in knowledge is correlated with an increase in attitude or support across most fields [32, 33]. Research indicates that when public knowledge of management approaches is low, it is critical to spell out the intended objectives and potential outcomes, cast management practices in the appropriate context, be explicit about the specific actions to be taken, and identify exactly where and when activities will be undertaken [12]. With respect to strategies intended to emulate natural conditions, McCool and Guthrie [34] point out that a greater level of knowledge about ecological processes is necessary among citizens who are poised to evaluate these strategies. Most often, this group is local citizens.

Another critical element in public acceptance of ecosystem management programs is the level of trust in agency managers as well as experiences the public has with these individuals [35–38]. Steel et al. [39] found that rural residents dependent upon the timber industry displayed more trust in agencies such as the Forest Service and BLM, while urban residents generally displayed less trust in these organizations. Other research has indicated that citizens often display more trust in local managers and agencies than they do in these institutions at the regional or national level [40]. Research has also found that trust is linked to citizens' perceptions of the risks, uncertainties and potential benefits associated with specific management approaches [38], or experiences with management practices gone awry, such as escaped prescribed burns [41].

Public acceptance and trust are also related to local communication processes. Confidence in agency information often depends less upon the content of the information itself and more on the credibility of the information provider [42, 43]. Peters et al. [44] assert that public trust in information sources hinges upon a perception of agency care for and commitment to citizens' needs and priorities as well as the perception that information providers are knowledgeable and credible. Olsen and Shindler [45] maintain that such trust and confidence is most likely to evolve over the long term, suggesting that meaningful interactions with the local public need to be developed well before proposed projects are implemented.

In the context of new and innovative management approaches such as disturbance-based management practices, public confidence in an agency's ability to manage effectively will be essential to implementation. Liljeblad et al. [46] assert that a key element to building trust between citizens and agencies is not just the outcome of management decisions but commitment to a fair and open decision-making process and the perception that managers can be effective at implementing the chosen range of outcomes. Recent studies from Oregon show that most of the attentive public desires a greater role in federal forest management decision-making [45]. Learning how to create and sustain positive interactions with citizens has become a primary directive of federal forest agencies. Successful interactions might be defined in a number of ways, including the creation of opportunities for open give-and-take discussions, giving credence to local concerns about particular places and practices, a commitment to ongoing relationships between agencies and the public, and managers following through on their word [34, 47]. The formation of long-term relationships can provide the foundation for future successes in project planning and decision-making [45].

2. Methods

The results presented in this paper represent the second phase of research in this community. The first phase included focus group field trips in the study area [48]. Field trips took place on two days during spring 2005. The first field trip included 19 personnel (15 managers, 4 researchers) from the Willamette National Forest, Eugene District BLM, and H. J. Andrews Experimental Forest. Participants visited three sites that had harvesting treatments designed to emulate various fire regimes.

The second field trip included nine members of the attentive public from McKenzie River communities, with eight agency personnel along to describe treatments of each site. Citizen participants were selected based on their status as leaders within their communities or as individuals interested in forest issues in the McKenzie River watershed. These individuals included business leaders, private landowners,

and members of the McKenzie Watershed Council. Forest Service personnel who were familiar with communities in the McKenzie helped to identify and recruit participants for the tour. Participants on this trip visited two sites demonstrating the disturbance-based management approach.

Themes identified during the focus groups were used to develop the 8-page mail questionnaire examined in this paper. Survey questions addressed respondents' knowledge of forest management in general and disturbance processes in particular, opinions about management practices, support for disturbance-based management, and interactions with federal agencies for implementation of this approach. The survey instrument was pretested on several experts in the field of forest social science and revised prior to administration based on feedback.

The survey was distributed to the local attentive public in the McKenzie watershed according to a modified "tailored design method" [49], including three waves of a survey packet with cover letter, questionnaire, and stamped addressed return envelope enclosed. The attentive public was chosen as a population because it is characterized by a higher level of citizen participation in government than the general public [17, 18], a characteristic that was important for this study because the subject matter of the survey required a respondent audience with a sophisticated level of knowledge on the topic. While the attentive public does not represent the general public, it can be a meaningful population for agency personnel to understand because these are the individuals who are likely to pay attention to or participate in agency programs. To achieve as broad a sample of the attentive public as possible, names and addresses were drawn from three different sources: (1) an existing Forest Service list of individuals who requested information about management activities or attended public meetings or field trips; (2) the newsletter mailing list for the McKenzie Watershed Council; a (3) mailing list developed by Oregon State University researchers studying public perceptions across the region. Only residents of the McKenzie watershed and Eugene/Springfield were included in the sample.

Overall, 312 surveys were delivered and 230 were returned, resulting in a response rate of 74%. Market research analysis indicates this level of response to be sufficiently high to make inferences to our larger study population of the local attentive public in the McKenzie River watershed [50]. Therefore, no nonresponse bias check was completed.

3. Findings

Survey results confirm that citizens who participated in this study are members of the attentive public—94% reported they pay a moderate to great deal of attention to forest issues. Study findings are presented in the following sections: (1) knowledge of DBM-related terms and ecosystem processes, (2) concerns with and support for DBM, (3) citizen-agency interactions and trust, (4) and factors influencing support for management. In some cases categories have been collapsed for presentation purposes (i.e., *agree* and *strongly agree* combined into a single category, *agree*).

3.1. Knowledge of DBM-Related Terms and Ecosystem Processes. Participants' knowledge of DBM terms was assessed by asking whether they knew the meaning of a term, had heard the term but did not know the meaning, or if they had never heard it. Knowledge of ecosystem processes related to DBM was assessed through a series of true/false statements. Results for these knowledge questions are presented in Table 1. At this point in the survey, subjects had received no introduction to the concept of DBM. Findings indicate that the majority of respondents are not familiar with most DBM-related terms. Indeed, nearly 30% of respondents indicated that they had never heard the term "disturbance-based management." Demonstrated knowledge about disturbance events was correct for nearly all respondents, but fewer respondents were sure about the reliance of plant and animals on disturbance, and almost half (47%) of respondents were incorrect or not sure about the use of management techniques to emulate natural events in a DBM approach.

3.2. Concerns with and Support for DBM. Prior to asking questions about support for DBM, survey participants were given the following definition of how DBM would be applied in the local forest.

> "*The BRLS proposes managing large forest areas (such as an entire watershed) by planning at a landscape level. Under this approach, managers base their plans on natural disturbance events like wildfire, landslides, wind, and floods that have occurred over time. The idea is to use harvesting techniques to create openings of various sizes similar to those created by historical events*."

After receiving this definition, respondents were asked about potential risks or concerns they might associate with the use of disturbance-based practices in the local watershed (Table 2). The largest number of respondents (88%) expressed concern that national politics would continue to change forest management priorities, suggesting that managers may not have sufficient time to implement DBM. Other prominent concerns included the following: (1) the possibility that disturbance-based management could lead to harvesting in old-growth stands (70%), (2) trusting agencies to make good decisions (69%), and (3) it might be used as an excuse to justify over harvesting (61%). Over half of respondents also worried that not enough science would be incorporated into decisions, and that this management approach would lead to additional road building in forests.

Respondents were also asked to indicate their level of agreement with a series of support and confidence statements about management plans and managing agencies in the context of emulating historical disturbance over large blocks of federal forest land (Table 3). Three-quarters of respondents indicated they would tend to support disturbance-based management plans that were adequately reviewed by scientists and also that their support would hinge upon the type of harvesting techniques that were planned.

When asked specifically about disturbance-based management (third statement), 58% of respondents indicated

Table 1: Knowledge of DBM-related terms and ecosystem processes (percent).

Term	Know term	Heard term, do not know meaning	Never heard term
Fire return interval	59	27	14
Disturbance-based management	41	31	29
Range of historic variability	40	30	31
Disturbance regime	32	30	38
Ecosystem process statement	Correct	Incorrect	Not sure
Disturbance events (fires, flood, wind) have played a significant role in shaping natural forests in the local watershed for thousands of years (true)	98	1	1
Plant and animal species depend on disturbance events for survival (true)	80	6	14
Natural disturbance-based forest management involves using harvesting techniques and prescribed fire to emulate past events like floods, wildfires, windstorms, and landslides (true)	53	10	37

Table 2: Perceived risks or concerns associated with DBM (percent).

Risk or concern	High/moderate risk or concern[a]
National politics will keep changing the priorities	88
Potential for harvesting in old-growth stands	70
Trusting the agencies to make good decisions	69
Agencies will use this new language to justify excessive harvesting	61
Not enough science in decisions	56
Will lead to additional road building in forests	56
Not enough public involvement in decisions	50
Visual impacts on forests	45
The long-term nature of this strategy	43

[a]Response options range from *1 = no risk or concern* to *4 = high risk or concern*.

Table 3: Support for and confidence in management plans and managing agencies (percent).

Statements	Strongly agree/ agree[a]
I would support this approach if management plans are critically reviewed by scientists.	76
My support will be based on knowing the type of harvesting techniques planned.	75
I support the landscape-level historical disturbance approach described above.	58*
I have confidence that agency managers know enough about forest and stream ecosystems to carry out disturbance-based management.	53
I am concerned about economic losses from timber sales that leave live and dead trees.	31

[a]Response options on a 4-point scale from *strongly disagree* to *strongly agree* with an option to indicate *not sure*.
*More than 20% of respondents indicated *not sure* for this statement.

support for this approach; overall, more than a one in five also expressed uncertainty about this same question. Slightly more than half expressed confidence that managers have sufficient knowledge of ecosystems to carry out this approach. Nearly one-third of respondents expressed concern about economic losses from management choices that leave live and dead trees behind.

3.3. Citizen-Agency Interactions and Trust. Respondents were also questioned about the nature of their interactions with federal forest managers on a 4-point scale from *strongly disagree* (1) to *strongly agree* (4). They were also given the option to indicate that they had *no basis for opinion*. Results are displayed in Table 4 in two thematic areas: (1) citizen-agency communication and (2) openness and relationship building.

Overall, opinions about interactions in both categories are generally unfavorable. For all but one of the communication category elements, less than half of respondents reported a satisfactory experience. In two cases, a substantial number of individuals were unable to render an opinion about interactions with the agencies. In the area of openness and relationship building, the single statement garnering the most agreement (64%) was about trusting local Forest Service personnel, but believing national-level politics may inhibit their ability to do their job—on balance, not a particularly positive response. Perhaps most striking is that only 34% of respondents believe that forest managers effectively build trust and cooperation with local citizens.

Survey participants were also asked to rate their level of trust in natural resources management agencies on the scale from *1 = no trust* to *4 = full trust*, with a *not sure* response option. Results are displayed in Table 5. Respondents displayed the greatest trust in local Forest Service personnel at the local ranger district (71%). A majority (59%) felt the US Forest Service was trustworthy, while respondents displayed the least trust in the Bureau of Land Management (46%). These findings on trust in the Forest Service and BLM are lower than those found by Williams [15] in a similar survey of the attentive public in the same watershed.

3.4. Factors Influencing Support for Management. Respondents were asked how important a variety of factors were to

Table 4: Interactions with Forest Service and BLM (percent).

Statements	Strongly agree/ agree[a]
Communication	
Agency information about forest projects usually provides a good explanation of options and consequences.	51
I look at forest management information skeptically because I do not trust the agencies.	47
The information provided by forest agencies is up to date and reliable.	43*
Federal forest managers do a good job of explaining their management activities.	39
Agency personnel provide a consistent message on project plans.	32*
Openness and relationship building	
I trust local Willamette national forest service personnel, but I do not trust government at the national level to let them do their job.	64
I feel the average citizen has no way to influence the agency planning processes.	57
Federal forest managers are open to public input and use it to shape forest management decisions.	43
Forest managers effectively build trust and cooperation with local citizens.	34

[a] Response options on a 4-point scale from *strongly disagree* to *strongly agree* with an option to indicate *no basis for opinion.*
*More than 20% of respondents indicated *no basis for opinion* for these statements.

Table 5: Trust in natural resource agencies (percent).

	Full or moderate trust	Limited or no trust	Not sure
Local Forest Service staff	71	17	12
US Forest Service	59	37	5
US Bureau of Land Management	46	48	6

their support for forest management actions and decisions on a scale from 1 = *not important* to 4 = *very important*. The list of factors was developed based on prior interviews in the area. Results are displayed in Table 6. Understanding management objectives of the proposed action, the environmental consequences of an action, and knowing that the decision was based on scientific information were all *important* or *very important* to over 90% of respondents. Of slightly less but still quite high importance to respondents was the specific place where an action is planned, understanding how the decision was made, and consideration of knowledgeable people in the community. Of the list provided, only personal beliefs and the length of time before outcomes of an action could be evaluated were *important* or *very important* to less than three-quarters of respondents.

To further assess influences on public judgments about disturbance-based management, a bivariate correlation analysis was used to measure the relationship between citizen support for DBM and relevant factors identified from related studies: (1) respondent knowledge of forest management terms [30, 31], (2) past interactions with agencies [36, 45], and (3) trust in agencies [35, 37, 38]. Results are reported in Table 7. Support for DBM was measured using responses about agreement with the statement in Table 3 ("I support the landscape-level historical approach described"). The knowledge of DBM terms variable was created using an index with responses in Table 1 (Cronbach's alpha = 0.871) and the past interactions (Cronbach's alpha = 0.864), and trust scale (Cronbach's alpha = 0.826) variables were created using additive scales with responses from Tables 4 and 5, respectively. Questions were reverse coded when appropriate, and *not sure* or *no basis for opinion* responses were excluded.

Table 6: Importance of factors influencing support for forest management actions and decisions (percent).

Statements	Very important/ important[a]
Understanding management objectives of proposed action	95
Environmental consequences of an action	94
Decision based on scientific information	92
Specific place where action is planned	89
Understanding how decision was made	87
Opinions of knowledgeable people in my community	81
Citizens had meaningful opportunities for input	79
My knowledge of past agency actions	76
Economic consequences of an action	76
My personal beliefs	71
Length of time before outcomes can be evaluated	66

[a] Response options on a 4-point scale from *not important* to *very important*.

Table 7: Correlations between support for DBM and respondent characteristics.

Factor	"I support the landscape-level historical approach described"[a]
Knowledge of DBM terms index[b]	0.086
Past interactions scale	0.349*
Agency trust scale	0.242*

* Correlation is significant at $P < 0.01$.
[a] Range *1* = strongly disagree to *4* = strongly agree with not sure responses excluded.
[b] Index of responses coded *1* = know the term and its meaning and *0* = else.

Ratings of past interactions with agency personnel and agency trust were positively correlated with support for disturbance-based management, meaning that as the value of these variables increases, so does support for disturbance-based management. Knowledge of DBM terms was not significantly correlated with support.

4. Discussion

The purpose of this study was to improve understanding of public acceptance for disturbance-emulating forest

management techniques among an important group of stakeholders—the local attentive public. Several findings are noteworthy.

First, findings from this study suggest a substantial proportion of respondents are not well versed in common disturbance-based management terms and concepts, presenting a challenge to agencies working to increase understanding about this approach. For example, the term range of historic variability, often used by managers to refer to disturbance-emulating management approaches, is not familiar to the majority of these attentive public respondents. It is further likely that even fewer general public citizens will have knowledge of this term or the approach it describes. Respondents in this study also indicated that their understanding of the objectives of a proposed action were very influential to their support for a project. These findings support an analysis by Reeves and Duncan [51] which asserts that citizens who have difficulty understanding the dynamic nature of ecosystems or visualizing what disturbance-based management will look like will have lower tolerance for the risk and uncertainty inherent in this approach. Furthermore, a lack of clarity may cause citizens to doubt why disturbance-based management is appropriate or necessary. For this reason, scientists and managers will need to find more direct means to tell the story of disturbance-based management and explain the circumstances under which it may be appropriate. This will be particularly important in the contexts of shifting land use patterns or climate change discussions, as research has suggested that the uncertainty and knowledge gaps prevalent with these topics may detract from public support of disturbance-based management [52].

While low levels of understanding can certainly be a hurdle, results from this study also suggest an opportunity in the large percentages of respondents who simply were not sure about an item or had not heard of the term. Targeted outreach efforts that seek to increase awareness and understanding about DBM may lead to a more informed public. At the same time, the correlation results do not support the knowledge-deficit theory, even though respondents suggested understanding was important to them. Therefore, while increasing awareness of and understanding about DBM may result in a more informed public that is easier to engage on the topic, managers should take caution that this alone will not automatically translate into increased support and acceptance of DBM plans [12].

Second, these findings show a substantial association between support for disturbance-based management and positive interactions with and trust in agency personnel among the respondents, suggesting attempts to increase knowledge of this approach be preceded and accompanied by more collaborative activities among community stakeholders. However, it is clear that trustworthy relations between the public and agency personnel remain problematic. While previous research shows gains have been made elsewhere in the region by focusing attention on public outreach and partnership arrangements [15, 16, 47], citizens in this survey rate agency efforts to foster trust and communication in a less positive light. Moreover, respondents expressed skepticism about the openness of forest managers, use of public input, and their ability to provide reliable information to the public. Citizens' levels of trust in both the US Forest Service and the BLM are relatively low. Perhaps even more noteworthy is the substantial number of respondents who had no basis for opinions about interactions with agency personnel, suggesting that even citizens who pay attention to forest issues actually have had few occasions to meet or communicate directly with local Forest Service and BLM staff. This offers managers an opportunity to reach out to the "undecideds" by engaging them in meaningful educational opportunities about disturbance-based management while simultaneously fostering relationships.

Overall, the low trust ratings found in this study suggest the need for a more inclusive planning process. This means treating trust building as a central, long-term goal, not simply as an activity that is pursued on a per-project basis to smooth the way for controversial management objectives [45, 53]. For disturbance-based management to succeed, an atmosphere of learning together through face-to-face interaction among stakeholders seems essential [54]. This will necessarily include managers, researchers, and members of the attentive public who represent numerous points of view and can carry the message (positive or negative) to a wider group of constituents.

Results from this local sample of citizens also suggest that establishing and maintaining positive interactions within the community will also be critical to addressing public concerns about risks and uncertainties associated with a disturbance-based approach. The public's willingness to accept forest management practices is determined in part by their understanding of the risks and uncertainties associated with those practices—especially those which, like disturbance-based management, are unfamiliar or untested [31]. In this effort it will benefit agencies to be forthcoming about difficult decisions and the choices involved. An open discussion about risk creates a chance for managers and scientists to clarify the seriousness of a specific threat and the tradeoffs of available options.

A third point is a potential barrier to future implementation of disturbance-based management—respondents indicated a high level of concern that national politics will influence agency policies towards this approach. Citizens' concerns correspond with the sentiment frequently expressed by agency scientists and managers that it is difficult to manage forests for the long term when political priorities sometimes change every four years. These findings concur with past research showing that while citizens may trust their local Ranger District to design plans and projects, they may not trust the federal government to let personnel make good on these decisions [40, 55].

A related point is that any timber harvest is a prominent concern for these respondents, and the potential for excessive thinning, increased road building, and fear of harvesting in old-growth stands will have to be addressed. Research scientists potentially have an important role in addressing citizens' concerns here, as survey participants expressed a high level of support for projects that demonstrate the use of sound science. Although many scientists are reluctant to join debate in the public arena, the strong research presence

at experimental forests across the country presents a unique opportunity for scientists to interact with the local public, where they may help to frame discussions about risk and uncertainty associated with disturbance-based management.

5. Conclusions

Local attentive citizens in this study have yet to take a definitive position of support for disturbance-based management, yet results indicate support will be the product of several factors. One contributing factor identified in this research is that participants may be hesitant to express support if they feel that agencies cannot be trusted. Lack of communication from an agency on a particular issue could be interpreted as an indication that there is something to hide [35]. Improving these circumstances will involve inclusive and worthwhile outreach activities that demonstrate agency credibility and the science supporting disturbance-based management. A second contributing factor is that these respondents do not have a full understanding of the approach on which to base their judgments, revealing a big opportunity for engaging and informing those who are undecided. However, we know it is not simply a matter of "educating the public," rather attempts to increase awareness need to be thoughtfully developed to allow relationship building and possibly increase some of that trust which this and many other studies suggest is lacking. Third, these respondents may simply be waiting to see the outcomes of further DBM experiments before deciding. It could be worthwhile for managers and scientists to communicate research results widely among local citizens, providing critical information the public may feel is lacking.

As is the case for many natural resources issues, a two-level approach could be useful here. General information dispersal can help address the apparent lack of knowledge about DBM that many have expressed, while also demonstrating that the managing agencies have relevant scientific information guiding planning and decision-making. At the same time, focused information programs that provide greater opportunity for interaction, relationship building, and trust building can keep engaged those citizens who wish to be. Together, the end result of this two-level approach may be a more knowledgeable public and a greater level of acceptance and support for disturbance-based management.

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