

Forest values and management preferences of two stakeholder groups in the Foothills Model Forest

B.L. McFarlane and P.C. Boxall

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The Northern Forestry Centre is one of five centers of the Canadian Forest Service, which has its headquarters in Ottawa, Ontario.

The Foothills Model Forest is one of eleven Model Forests that make up the Canadian Model Forest Network. The Foothills Model Forest is located in Hinton, Alberta and is a non-profit corporation representing a wide array of industrial, academic, government, and non-government partners. The three principal partners/sponsors representing the agencies with vested management authority for the lands that comprise the Foothills Model Forest include Weldwood of Canada Limited (Hinton Division), the Alberta Department of Environmental Protection, and Jasper National Park. The Model Forest lands encompass a combined area of more than 2.75 million hectares under active resource management.

The Canadian Forest Service of Natural Resources Canada is also a principal partner in each of the eleven Model Forest organizations and provides the primary funding and administrative support to Canada's Model Forest Program.

The Foothills Model Forest is a unique community of partners dedicated to providing practical solutions for stewardship and sustainability of our forest lands.

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Le Centre de foresterie du Nord correspond à l'une des cinq centres du Service canadien des forêts, dont le bureau principal est à Ottawa (Ontario).

La forêt modèle de Foothills est l'une des onze forêts formant le réseau canadien des forêts modèles. Basée à Hinton en Alberta, la forêt modèle de Foothills est une corporation à but non lucratif représentant une large gamme de partenaires provenant des milieux industriels, éducatifs, universitaires et gouvernementaux. Les trois principaux partenaires ou commanditaires qui détiennent une responsabilité sur l'aménagement des terres comprises dans le territoire de la forêt modèle sont Weldwood of Canada Ltd (Division de Hinton), le ministère de la protection de l'environnement de l'Alberta et le parc national de Jasper. Les terres de la forêt modèle s'étendent sur plus de 2,75 millions d'hectares faisant l'objet d'un aménagement actif.

Le Service canadien des forêts de Ressources naturelles Canada est également partenaire principal de chacune des onze forêts modèles, et il fournit l'essentiel du financement et de l'appui administratif au programme des forêts modèles du Canada.

La forêt modèle Foothills est un partenariat extraordinaire dévoué à fournir des solutions pratiques envers la gestion durable de nos forêts.

Cover photo:

Photo of western wood lily (*Lilium philadelphicum* var. *andinum*) courtesy of Bonita McFarlane.

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ABSTRACT

This report provides a descriptive analysis of forest values, attitudes toward forest management, knowledge of basic forest-related facts, and socioeconomic characteristics of two stakeholder groups of the Foothills Model Forest in Alberta: campers and hunters. Data were collected by mail surveys in 1997. Results show that campers and hunters were more bio-centered than human-centered in their forest value orientations. A minority of respondents agreed with attitude statements that reflect successful sustainable forest management in Alberta, a minority agreed with most economic development and timber-oriented forest management objectives, and a majority agreed with most protection-oriented management strategies. A cluster analysis, based on forest values, identified three segments: Bio-centered, Human-centered, and Moderates. The Bio-centered Group differed from the others on socioeconomic characteristics and management preferences. Generally campers and hunters were found to support a holistic approach to natural resource management that considers multiple values, suggesting that a sustainable forest management philosophy is consistent with these stakeholders' values and preferences.

RÉSUMÉ

Le rapport présente une analyse descriptive des valeurs forestières, des attitudes envers la gestion des forêts, de la connaissance des faits de base reliés aux forêts et des caractéristiques socio-économiques de deux groupes d'intérêt fréquentant la forêt modèle Foothills en Alberta, soit les campeurs et les chasseurs. Les données ont été recueillies par sondages postaux en 1997. L'enquête montre que les valeurs forestières des campeurs et des chasseurs étaient plus biocentriques qu'anthropocentriques. Une minorité de répondants était d'accord avec les propositions laissant croire au succès de la gestion durable des forêts en Alberta, une minorité était d'accord avec la plupart des objectifs de développement économique et de gestion des forêts axée sur la récolte du bois, et une majorité était d'accord avec la plupart des stratégies de gestion axées sur la protection. Une analyse typologique basée sur les valeurs forestières a déterminé trois tendances : le biocentrisme, l'anthropocentrisme et le modérantisme. Les biocentriques se distinguaient des autres par leurs caractéristiques socio-économiques et leurs préférences en ce qui concerne la gestion. En général, les campeurs et les chasseurs soutenaient une approche holistique de gestion des ressources naturelles qui tient compte d'une multitude de valeurs. Il semble donc qu'une philosophie de gestion durable des forêts soit en accord avec les valeurs et les préférences de ces groupes d'intérêt.

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DISCLAIMER

The views, statements, and conclusions expressed and the recommendations made in this report are entirely those of the author(s) and should not be construed as statements or conclusions of, or as expressing the opinions of the Canadian Forest Service, the Foothills Model Forest, or the partners/sponsors of the Foothills Model Forest. The exclusion of certain manufactured products does not necessarily imply disapproval nor does the mention of other products necessarily imply endorsement by the Canadian Forest Service, the Foothills Model Forest, or the partners/sponsors of the Foothills Model Forest.

INTRODUCTION

The philosophy of the Foothills Model Forest (FMF) is to develop approaches to resource management that include a diversity of social values.¹ This requires identification of stakeholder groups, their values, and assessments of how they will be affected by natural resource management decisions. This study examines forest values, management preferences, knowledge of forest-related facts, and socioeconomic characteristics of two stakeholder groups; categorizes stakeholders based on forest values; and compares the characteristics and preferences of the resulting categories (segments). This study is also a pilot project to develop forest values and attitude scales for use in future studies of the general Alberta population.

Changes in Forest Values

From the arrival of the first Europeans, forest management in North America focused primarily on timber production and economic development (Kimmins 1995). Initially, forests were exploited for their timber and cleared for agricultural and urban development with little regard for other uses or future timber supply. By the beginning of the twentieth century, the concept of sustainable timber production was introduced to ensure a continued timber supply (Nash 1982; MacKay 1985; Kimmins 1995). More recently, the increased demand for a diversity of forest products and services has led to the introduction of a new forest management paradigm. This paradigm has been referred to by many names, but sustainable forest management and ecosystem management seem to be the most common terms (Bengston 1994). In this paradigm, the emphasis is not simply on sustainable timber production; rather, it purports to be responsive to other social values so that biological and social systems are managed sustainably (Bengston 1994). However, traditional economic values, particularly as they relate to the value of timber production, have been the dominant values in sustainable forest management (e.g., the number of jobs and economic impact of forestry activities). To be responsive to societal values and to sustain social systems, management must formally incorporate a diversity of values and be responsive to changing values.

In Canada, the Model Forest Program was initiated in 1991 to help define and implement the concept of sustainable forest management. The Model Forest Program recognizes that, to be successful, sustainable forest management must include a variety of forest values. Broadening the range of values considered in forest management is a major challenge facing natural resource managers and is an integral component of the Model Forest Program. To broaden the range of forest values, managers and policy makers must address the following four fundamental questions:

1. What values should be included?
2. Whose values should be considered?
3. How can these values be used in natural resource management decisions to enhance the sustainability of Canada's forest resources?
4. How can conflicting values and preferences be accommodated in natural resource management decisions?

What are Forest Values?

Every academic discipline uses different definitions and takes different approaches to studying values. Bengston (1994) suggests that values should be examined using several approaches because each has a unique contribution to make in understanding the diversity of values. This multidisciplinary approach has been taken in the FMF socioeconomic program. Previous socioeconomic studies in the FMF involved economic valuation (market and nonmarket) (McFarlane and Boxall 1998; Alavalapati et al. 1999) and sociological approaches to valuing natural resources. The current study takes a social-psychological approach in examining forest values associated with the FMF.

As used in this study, forest values represent general beliefs about forests. They have been referred to as held values and defined as relatively enduring conceptions of the good related to forests and forest ecosystems (Bengston 1994). These values form the basis of an individual's attitudes and forest

¹ Foothills Model Forest. 1997. Foothills Model Forest Phase II Proposal. Hinton, Alberta. Unpublished manuscript.

management preferences. Aggregating individual values and tracking these over time provide an indication of changing societal values.

Held values reflect a philosophical view of how forests should be managed. They provide an indication of the acceptance of the management approach taken by natural resource managers (Steel et al. 1994). Two basic types of held forest values have been distinguished in the literature (Fig. 1). They have been referred to as instrumental and intrinsic (Bengston 1994), instrumental and non-instrumental (Xu and Bengston 1997), and anthropocentric and biocentric (Steel et al. 1994). Instrumental or anthropocentric values refer to those values associated with the use of forests for products and services that satisfy human wants and needs. Values that lead to forests being defined in terms of the resources they provide for humans, such as forest products, employment, and life support functions, are referred to in this study as human-centered values. Intrinsic, noninstrumental, or biocentric values refer to the worth of something as an end in itself, regardless of its usefulness to humans. Nature is recognized as having inherent worth and a right to exist for its own sake, and,

therefore, human uses and benefits are not necessarily the most important uses of the forest (Steel et al. 1994). Included in these are spiritual, aesthetic, and existence values. In this study we refer to this group of values as bio-centered values.

Historically, bio-centered values have received much less attention and legitimacy in forest management than human-centered values; however, it is the bio-centered values that are increasing in importance in society (Xu and Bengston 1997). This has led to conflict between land managers and other stakeholders (e.g., Kennedy 1985; Cramer et al. 1993). People whose value orientation is primarily bio-centered can become more involved in forest issues because of the threat of loss of something for which they perceive as there being no substitutes (Xu and Bengston 1997). The failure of forest management to incorporate an understanding of bio-centered values has resulted in public protests against traditional forms of management and legal actions against the forest industry.

The held forest values discussed above have been used to categorize stakeholders. These stakeholders have been classified based on having more

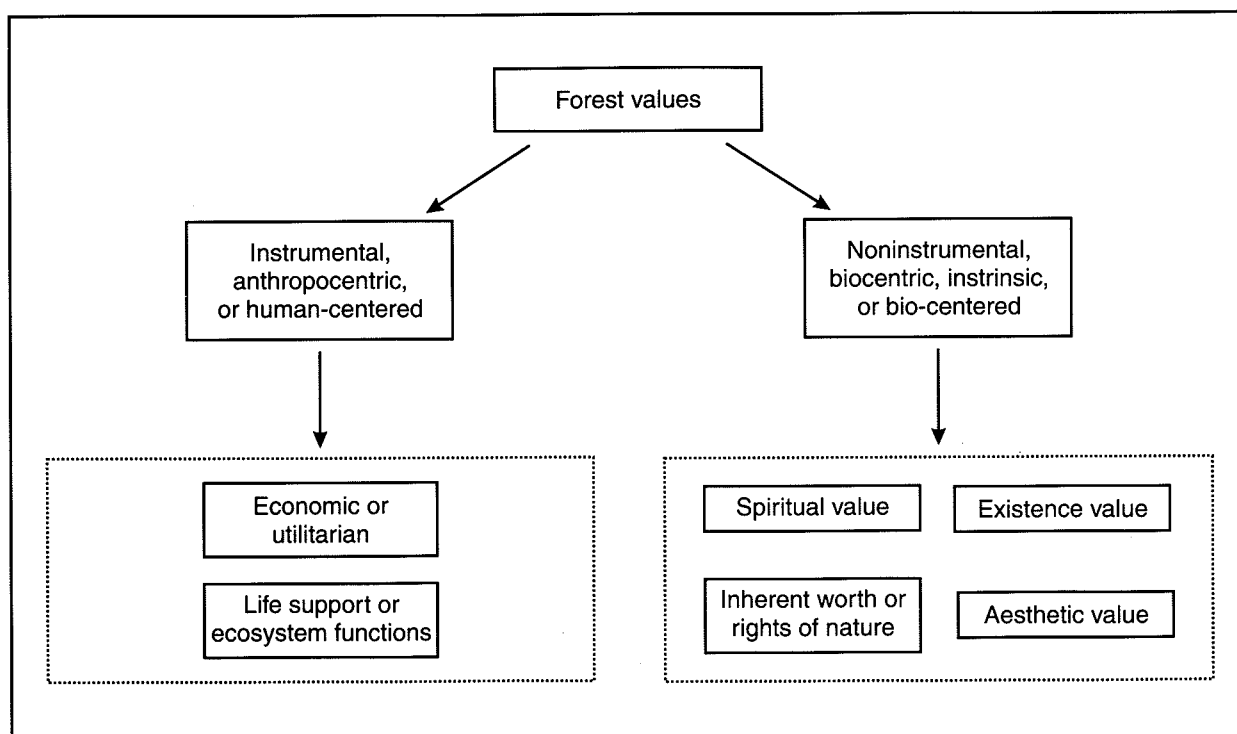


Figure 1. Classification scheme for held forest values (adapted from Xu and Bengston 1997).

of a human-centered or bio-centered orientation towards forests (Steel et al. 1994). Value orientations have been associated with forest management and policy preferences. Bio-centered individuals are more likely to oppose traditional timber management objectives than are human-centered individuals (Steel et al. 1994). Certain segments of society have been associated with particular value orientations. For example, some studies show that women, younger individuals, and those with higher levels of education hold stronger bio-centered values than others (Steel et al. 1994). People associated with interest groups are likely to hold forest values common to their group. For example, people who rely on the forest sector for their economic livelihoods are more supportive of providing commodities for human use and managing forests for timber production, while people belonging to environmental organizations value forests for their intrinsic worth and are more supportive of management strategies that emphasize resource protection (Steel et al. 1994). This suggests that socioeconomic characteristics might be associated with forest value orientations and can be used to predict how segments of society or individual stakeholder groups will react to forest management activities and policies, and to identify target audiences for communication programs.

Relevance of Values Information

While scientific information can influence natural resource management decisions, it is the values of society that guide which scientific facts are relevant and important (Steel et al. 1994). Bengston (1994) outlines three ways in which values information can guide management decisions. First, values information helps managers establish forest management goals and strategic guidelines. By understanding the relative importance of the values of stakeholders, managers can develop goals that satisfy or support social values and justify goals and guidelines. Second, knowing values of various stakeholder groups will help managers predict how stakeholders will react to management practices and what groups will be affected by changes in management. Third, values information can help in dealing with conflicts over forest management through an improved understanding of the nature of the conflict. For example, managers can examine if there are differences in the fundamental values of

the stakeholders involved or if the conflict is over something that is more easily resolved, such as differences in how to manage for a particular forest value. Values information does not provide a right answer. It is a tool that helps guide management decisions by suggesting which management actions are socially acceptable, which stakeholders will agree or disagree with these actions, and the potential impact of actions on stakeholder groups.

Importance of Recreationists' Values

A sustainable forest management approach includes public involvement to determine the values of importance to society and acceptable forest management strategies to achieve or support those values (Bengston 1994). Traditionally, natural resource managers within government and the forest industry were the primary stakeholders who determined which forest values would predominate. In Alberta, as in much of Canada, however, most forested land is publicly owned, giving each citizen a legitimate voice in its management. There are many potential publics and stakeholders with an interest in the management of public lands. Whose values should be considered in forest management requires an understanding of who these stakeholders are. Some common mechanisms for public involvement have included advisory committees, open houses, petitions, personal letters, form letters, and workshops. These mechanisms have been criticized because they often elicit input from elite members of society or interest groups who might not be representative of other stakeholders (Heberlein 1976; Dennis 1988; Force and Williams 1989).

One group of stakeholders whose values should be considered are recreationists. Understanding recreationists' values is important because they often use forested areas that are in close proximity to industrial activities and they can hold divergent views on natural resource management. For example, people in Alberta who prefer nonconsumptive activities such as hiking tend to be more supportive of resource preservation than people who prefer mechanized activities such as snowmobiling or consumptive activities such as hunting (Jackson 1987). Thus, recreationists represent an important stakeholder group whose values and preferences should be included in natural resource management decisions.

The Study Site

The Foothills Model Forest is one of 11 model forests established across Canada. The FMF consists of 2.75 million ha located in the foothills of west-central Alberta (Fig. 2). The area is managed for a variety of uses and includes a mix of protected areas (Jasper National Park, Willmore Wilderness Park, William A. Switzer Provincial Park, and several provincial recreation areas and natural areas),

industrial uses (e.g., Weldwood's Forest Management Agreement area, oil and gas activity, and several coal mines), and the communities of Jasper and Hinton.²

The Samples

Campers were chosen as one recreational user group because of their numbers and distribution

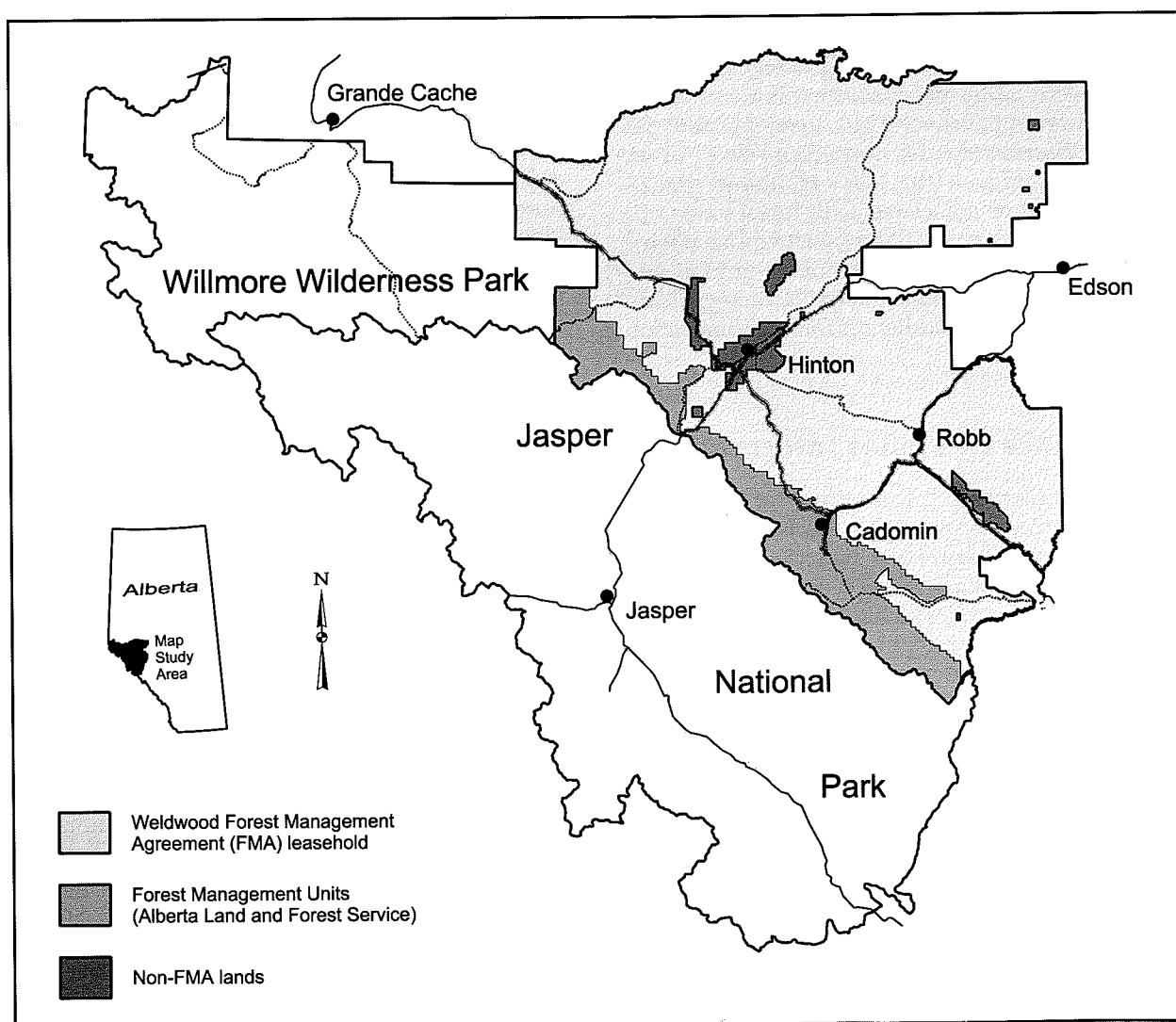


Figure 2. Map of the Foothills Model Forest.

² Foothills Model Forest. 1997. Foothills Model Forest Phase II Proposal. Hinton, Alberta. Unpublished manuscript.

throughout the model forest. Previous studies showed that over 24 000 people camped at managed campgrounds and that camping parties spent over 16 000 nights in the FMF during 1995 (McFarlane and Boxall 1998).

The sample of campers was obtained from personal interviews with Alberta residents at campgrounds and random camping sites. Interviews were conducted at 13 of the 17 campgrounds and 29 random camping sites in the FMF during the summer of 1996 (see McFarlane et al. 1999 for sampling details). The 13 campgrounds were the sites of 92% of the total nights spent at managed sites in the area. The interviewer collected information on camping characteristics and activities, and collected names and addresses of campers for a follow-up mail survey. Of those interviewed, 91% agreed to participate in the mail survey, resulting in a total sample of 1439 individuals.

Another obvious and traditional recreational user group of the forest are big-game hunters. Hunters were chosen because they often hunt close to industrial forestry activities and hunting opportunities can be affected by forestry's impacts on wildlife habitat and access to hunting areas.

A sample of 3000 Alberta residents who held moose, elk, or black bear hunting licences in 1996 was drawn at random from the hunting licence data base maintained by Alberta Environmental Protection. The data base contains a record of everyone who holds a hunting licence in Alberta. A total of 87 592 Alberta residents held big-game licences in 1996. Although the hunter sample did not target users of the FMF, most big game hunters hunt on forested public land. Thus, the authors believe that hunters' values and management preferences are relevant to natural resource management in the Foothills Model Forest.

Questionnaires were mailed to campers in May 1997 and hunters in June 1997. About 1 week after each mailout, reminder postcards were sent, and about 4 weeks after the initial mailing a second questionnaire was sent to those who had not yet responded. In the hunting sample, 1731 questionnaires were returned. Adjusting for questionnaires that could not be delivered, this represents a 61% response rate. In the camping sample, 853 were returned for a 63% response rate.

The Questionnaire

The questionnaire collected information on forest values, attitudes toward forest management knowledge of forest-related facts, and socioeconomic characteristics.

Forest Values

Two broad categories of held forest values were used to measure value orientations. Based on the work of Steel et al. (1994) and Xu and Bengtson (1997), statements were developed to reflect bio-centered and human-centered orientations toward forests. The bio-centered statements included items on the rights of nonhuman species, existence value, and spiritual significance of forests. The human-centered statements included items on the use of forests to benefit humans. Respondents rated a series of 15 statements on a five-point scale ranging from strongly disagree to strongly agree (Table 1).

Attitudes toward Forest Management

A scale to measure attitudes toward forest management was developed based on a scale used previously in Alberta (McFarlane and Boxall 1996). Items were developed to measure an individual's preferences for forest management by using statements about the protection of forest resources, economic development and timber-oriented management, and beliefs about the sustainability of current forest management in the province. Respondents rated a series of 15 statements on a five-point scale ranging from strongly disagree to strongly agree (Table 2).

Knowledge of Forest-related Facts

Respondents' familiarity with basic forest-related facts was measured based on questions contained in *treevia*, a forest trivia game produced by the Canadian Council of Forest Ministers, and questions developed by consulting experts in forest management. Respondents answered 13 statements as true, false, or not sure (Table 3). A composite knowledge score was calculated for each respondent by adding up the number of correct responses. The maximum score possible was 13.

Socioeconomic Characteristics

Information was collected on respondents' age, gender, number of people living in the household, education, and level of total household income. Interest group affiliation was measured by membership in a conservation-related organization and

Table 1. Distribution of forest values scores

Statement	Amount of respondents that agree or strongly agree (%) ^a
Biocentered statements	
It is important to maintain our forests so that future generations will enjoy the same benefits that we enjoy	98.9
Whether or not I get to visit the forest as much as I like, it is important to know that forests exist in Alberta	98.5
Forests let us feel close to nature	96.9
Forests give humans a sense of peace and well-being	94.8
Humans should have more respect and admiration for our forests	92.5
Forests rejuvenate the human spirit	81.3
Wildlife, plants, and humans have equal rights to live and develop	73.2
Forests have a right to exist without being managed by humans	52.8
Forests are sacred places	48.0
Human-centered statements	
Forests should be managed to meet the needs of as many people as possible	73.5
If forests are not threatened, we should use them to add to the quality of human life	63.9
As many uses (e.g., forestry, wildlife habitat, recreation, oil and gas) should be made of as much forested public land as possible	33.2
Forests exist mainly to serve human needs	11.3
The primary use of forests should be for products that are useful to humans	9.3
Forests that are not used by humans are a waste of our natural resources	6.9

^a Rated 4 or 5 on a scale of 1 to 5, where 1 = strongly disagree and 5 = strongly agree.

Table 2. Distribution of attitude scores

Statement	Amount of respondents that agree or strongly agree (%) ^a
Sustainability statements	
Our forests are being managed successfully to meet our present and future needs	24.6
Enough harvested trees are being replaced by planting new ones or by natural seeding to meet our future timber needs	17.3
Forestry practices generally produce no long-term adverse effects on the environment	10.8
Protection statements	
Forest management should emphasize a variety of plants and animals	89.4
Legislation should be established to protect endangered species of plants and wildlife in our forests	84.6
Typical examples of Alberta's forest regions (for example boreal and aspen parkland) should be excluded from development such as forestry, oil and gas, and tourism	42.2
Some existing protected areas such as parks should be opened for logging	7.0
Economic development statements	
Logging forests is acceptable if the forest is not harmed	68.7
Clear-cut logging should be banned on public land	62.5
When making forest decisions, the concerns of communities close to the forest should be given a higher priority than other communities	56.9
Setting aside forests from logging is not desirable if it means lower wages or fewer jobs	13.4
Economic stability of communities is more important than setting aside forests from logging	11.7
The economic benefits from forestry practices usually outweigh any negative consequences	11.2
Providing jobs and economic development is more important than setting aside forests from logging	8.2
Forests should be managed mainly for timber and lumber products	5.7

^a Rated on a scale of 1 to 5, where 1 = strongly disagree and 5 = strongly agree.

Table 3. Distribution of forest-related knowledge

Statement	Correct response	Number of correct responses (%)		
		Campers	Hunters	Total sample
Forest companies are required to follow government guidelines when harvesting timber	True	92.9	89.8 ^a	90.8
Insects such as caterpillars can cause severe damage to forests	True	84.1	83.5	83.7
There are no old-growth forests in Alberta	False	82.6	83.4	83.2
The number of bull trout have decreased in Alberta	True	83.8	73.1 ^b	76.6
Most of Alberta's forested land is owned by the provincial government	True	74.4	76.8	76.0
Forest fires help lodgepole pine open its cones and shed its seeds	True	59.7	76.4 ^b	70.8
Over time, there is a natural replacement of the kinds of trees in a forest	True	69.4	66.3	67.3
Clear-cutting is the most common method of harvesting trees in Alberta	True	65.8	66.8	66.4
Alberta has more softwoods than hardwoods	True	62.9	67.4 ^c	65.9
The seedlings planted after harvesting are usually hardwoods	False	57.5	64.3 ^b	62.0
Chemicals are commonly used to control weeds in Alberta's forests	False	62.3	54.0 ^b	56.7
All areas where trees are harvested must be replanted in order for the forest to return	False	42.0	50.4 ^b	47.6
The woodland caribou prefers old growth forest but can survive in areas that have been cleared by logging	False	31.2	33.5	32.6

^a $p \leq 0.05$.^b $p \leq 0.001$.^c $p \geq 0.01$.

by dependence of any household members on the forest sector for their economic livelihood.

Segmentation Analyses

Respondents were categorized based on their forest values. To reduce the number of forest value variables to a manageable size for cluster analysis, the 15 value statements were factor-analyzed using

principal factor analysis with varimax rotation. The factor analysis identified two factors corresponding to bio-centered and human-centered orientations. Factor scores were calculated for the two factors and a discrete cluster analysis was performed on the factor scores (FASTCLUS procedure, SAS Institute Inc. 1989). The cluster analysis grouped individuals into clusters or segments that share similar forest values.

RESULTS

Distribution of Forest Values Scores

Campers and hunters tended to be more bio-centered than human-centered in their forest value orientations (Table 1). Most respondents agreed or strongly agreed with the bio-centered statements and disagreed with most human-centered statements. Virtually all respondents supported statements related to the existence of forests, regardless of whether they used them. About 99% agreed or strongly agreed that it is important to know that forests exist and that future generations may enjoy the same benefits from forests that the current generation enjoys. It is also evident that forests represent a means of spiritual renewal and that respondents feel forests have a right to exist independent of human needs. An overwhelming majority supported statements relating to the spiritual aspects of forests, such as forests let people feel close to nature, forests give humans a sense of peace and well-being, forests rejuvenate the human spirit, and forests are sacred places. While a majority agreed with statements relating to the rights of nature, respondents were more divided on these statements. About 73% agreed or strongly agreed that wildlife, plants, and humans have equal rights to live and develop, and 53% agreed or strongly agreed that forests have a right to exist without being managed by humans.

An examination of the human-centered statements suggests that campers and hunters are not opposed to forests being used for human needs. For example, the majority agreed or strongly agreed that forests should be managed to meet the needs of as many people as possible (74%), and that if forests are not threatened, they should be used to add to the quality of human life (64%). It appears, however, that respondents do not agree that human

needs should be the only goal of forest management. For example, few agreed or strongly agreed that: forests exist mainly to serve human needs (11%); forests that are not used are a waste of our natural resources (7%); the primary use of forests should be for products that are useful to humans (9%); and that as many uses should be made of as much forested public land as possible (33%).

Distribution of Attitude Scores

The distribution of attitude scores (Table 2), which reflect beliefs about current forest management, shows that a minority of respondents agreed or strongly agreed with the statements that: forests are being managed successfully to meet our present and future needs (25%); forestry produces no long-term adverse effects on the environment (11%); and enough harvested trees are being replaced to meet future timber needs (17%). This suggests that campers and hunters do not view current forest management practices as meeting future timber needs. These results are consistent with qualitative interviews conducted with representatives from various stakeholder groups in the FMF and with public-opinion polls. In personal interviews, only 7% of representatives from recreation groups thought that forest management was definitely being done sustainably in the model forest (T.M. Beckley, 1998, as presented at the Seventh International Symposium, Society and Resource Management, May 27-31, 1998, University of Missouri, Columbia, Missouri, in a presentation entitled Local Perceptions of Sustainable Land Use: Analysis of Qualitative Survey Results from Hinton, Alberta). In a public opinion poll, Canadians identified over-cutting and mismanagement as the greatest threats to Canada's forests.³

³ Corporate Research Associates Inc. 1997. Tracking survey of Canadian attitudes towards natural resource issues. Prepared for Nat. Resour. Can., Halifax, Nova Scotia. Unpublished manuscript.

Only a minority of respondents agreed or strongly agreed with several of the preference statements relating to economic development and timber-oriented management: providing jobs and economic development is more important than setting aside forests from logging (8%); setting aside forests is not desirable if it means lower wages and fewer jobs (13%); forests should be managed mainly for timber and lumber products (6%); economic benefits outweigh negative consequences from forestry (11%); and economic stability of communities is more important than setting aside forests from logging (12%). Sixty-three percent agreed that clear-cut logging should be banned on public land; however, a majority agreed that logging forests is acceptable if the forest is not harmed (69%) and that communities close to the forest should be given a higher priority in forest decisions than other communities (57%).

The majority agreed or strongly agreed that legislation should be established to protect endangered species (85%) and that forest management should emphasize a variety of plants and animals (89%). Only a minority agreed that some existing protected areas should be opened for logging (7%) and that typical examples of Alberta's forest regions should be excluded from resource development, including tourism (42%).

Distribution of Knowledge Scores

Scores on the forest-related knowledge items indicate that most respondents seemed to have basic knowledge of some forest-related issues (Table 3). For example, 57% knew that chemicals are not commonly used to control weeds in Alberta's forests, 91% knew that forest companies must follow government guidelines when harvesting timber, 67% knew that there is a natural replacement of the kinds of trees in a forest, 77% knew the number of bull trout have declined, and 84% knew that insects can cause severe damage to forests. Only 33% of respondents, however, knew that woodland caribou require old-growth forest, while 48% knew that areas do not have to be replanted after harvesting in order for the forest to return.

Comparison of Campers and Hunters

Campers were better educated than hunters, with 20% and 12%, respectively, having at least some university education (Table 4). No significant difference occurred between camper and hunter

incomes (Table 5). Campers and hunters were similar in the number of people living in their households (Table 6), while age distribution indicates that campers tended to be younger than hunters; 32% of campers were less than 35 years of age compared to 23% of hunters (Table 7). Twenty-four percent of campers belonged to conservation-related or hunting organizations; 11% of hunters belonged to conservation-related organizations and 30% belonged to hunting organizations. Nineteen percent of campers and 11% of hunters had a household member dependent on the forest sector for economic livelihood.

A comparison of the scores on the forest value statements suggests that hunters are slightly more human-centered than campers (Table 8). Hunters scored slightly higher on human-centered statements, indicating they were more supportive of these statements. On the bio-centered statements, hunters scored higher than campers on statements relating to existence values and lower on statements relating to the rights of nature. Hunters scored higher than campers on two of the statements relating to spiritual aspects and lower on two of these statements.

Few differences occurred between campers and hunters on forest attitudes (Table 9). Hunters tended to agree less that current management is sustainable, scoring lower than campers on all three sustainability statements. Hunters were less supportive of protection management statements, scoring lower on three of the four statements. Hunters differed from campers on only one of the economic development and timber-oriented management statements; hunters were more supportive of logging if the forest is not harmed.

Hunters and campers were about equal in their knowledge of forest-related facts (Table 3). A higher proportion of hunters had correct responses on four of the knowledge statements. More campers than hunters, however, knew that the number of bull trout have declined in Alberta, that chemicals are not commonly used to control weeds in Alberta's forests, and that Alberta has more softwoods than hardwoods.

Forest Values Segments

The cluster analysis identified three segments based on the forest value factor scores. Analysis shows that one segment had higher bio-centered and lower human-centered scores than the others

Table 4. Distribution of education levels (%)^a

Education level	Campers (n = 840)	Hunters (n = 1692)
High school or less	38.5	48.1
Trade or other nonuniversity	41.5	40.2
Some university	20.0	11.7

^a $\chi^2 = 38.649$, df 2, $p = 0.001$.

Table 5. Distribution of total household income (%)^a

Annual household income (\$)	Campers (n = 759)	Hunters (n = 1492)
Less than 40,000	21.5	24.1
40,000–69,999	43.3	42.0
70,000 or more	35.2	33.9

^a $\chi^2 = 1.991$, df 2, $p = 0.370$.

Table 6. Distribution of people living in the household (%)^a

Number of people	Campers (n = 836)	Hunters (n = 1661)
1 or 2	40.8	39.3
3 or 4	43.5	44.1
5 or more	15.7	16.6

^a $\chi^2 = 0.645$, df 2, $p = 0.724$.

Table 7. Age distribution (%)^a

Age category (years)	Campers (n = 828)	Hunters (n = 1709)
15–34	31.8	23.4
35–54	55.4	58.4
55 and over	12.8	18.2

^a $\chi^2 = 26.064$, df 2, $p = 0.001$.

(Fig. 3); thus, this group was named the Bio-centered Group. The segment with the highest human-centered scores was also the only segment to have a mean human-centered score >3.0; it was named the Human-centered Group. The final segment had the lowest bio-centered score but scored between the Bio-centered and Human-centered groups on the human-centered factor. This group was named Moderates. The Bio-centered Group comprised about 39% of respondents and Human-centered and Moderates about 31% each.

On average, respondents in the Bio-centered Group were younger than those in the other groups, had a higher proportion of women, and more lived in Edmonton or Calgary (Table 10). The group had a smaller proportion with a household member dependent on the forest sector for economic livelihood. No differences occurred among the groups in level of education, household income, or the proportion with membership in conservation-related organizations.

Differences occurred among the segments on all forest management preference statements (Table 11). Although the groups did not differ in the direction of the scores (i.e., all groups either agreed or disagreed with the statements), they differed in the magnitude of the scores. All three segments disagreed (mean <3.0) with statements related to the sustainability of current management and most statements related to economic development and timber management, and agreed (mean >3.0) with protection management statements. The Bio-centered Group consistently rated statements on

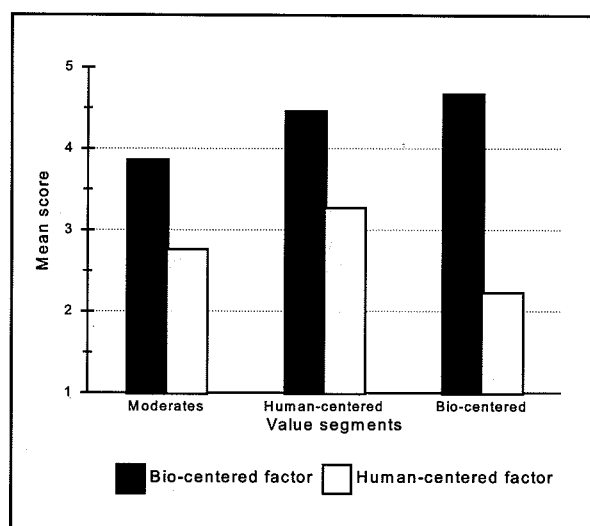
**Figure 3. Forest values scores of segments.**

Table 8. Comparison of camper and hunter forest values scores

Statement	Mean ^a (standard deviation)		
	Campers	Hunters	Total sample
Biocentered statements			
Whether or not I get to visit the forest as much as I like, it is important to know that forests exist in Alberta	4.72 (0.51)	4.80 (0.46) ^b	4.77 (0.48)
It is important to maintain our forests so that future generations will enjoy the same benefits that we enjoy	4.70 (0.49)	4.75 (0.49) ^c	4.73 (0.49)
Forests let us feel close to nature	4.46 (0.55)	4.53 (0.58) ^c	4.51 (0.57)
Forests give humans a sense of peace and well-being	4.45 (0.58)	4.53 (0.65) ^c	4.50 (0.63)
Humans should have more respect and admiration for our forests	4.45 (0.70)	4.46 (0.73)	4.46 (0.72)
Forests rejuvenate the human spirit	4.14 (0.67)	4.07 (0.81) ^d	4.09 (0.77)
Wildlife, plants, and humans have equal rights to live and develop	3.93 (0.97)	3.84 (1.09) ^c	3.87 (1.05)
Forests have a right to exist without being managed by humans	3.59 (1.08)	3.39 (1.25) ^b	3.46 (1.20)
Forests are sacred places	3.59 (1.00)	3.35 (1.16) ^b	3.43 (1.11)
Human-centered statements			
Forests should be managed to meet the needs of as many people as possible	3.80 (1.13)	4.00 (1.17) ^b	3.93 (1.17)
If forests are not threatened, we should use them to add to the quality of human life	3.53 (0.99)	3.61 (0.99) ^d	3.59 (0.99)
As many uses (e.g., forestry, wildlife habitat, recreation, oil, and gas) should be made of as much forested public land as possible	2.70 (1.15)	2.92 (1.24) ^b	2.85 (1.21)
The primary use of forests should be for products that are useful to humans	2.04 (0.89)	2.14 (0.96) ^d	2.11 (0.94)
Forests exist mainly to serve human needs	1.98 (0.96)	2.13 (1.06) ^b	2.08 (1.03)
Forests that are not used by humans are a waste of our natural resources	1.72 (0.93)	1.74 (0.98)	1.73 (0.96)

^a Rated on a scale of 1 to 5, where 1 = strongly disagree and 5 = strongly agree.

^b Significantly different using t-test at $p < 0.001$.

^c Significantly different using t-test at $p < 0.01$.

^d Significantly different using t-test at $p < 0.05$.

Table 9. Comparison of camper and hunter attitude scores

Statement	Mean ^a (standard deviation)		
	Campers	Hunters	Total sample
Sustainability statements			
Our forests are being managed successfully to meet our present and future needs	2.85 (0.95)	2.62 (1.05) ^b	2.70 (1.02)
Enough harvested trees are being replaced by planting new ones or by natural seeding to meet our future timber needs	2.56 (1.05)	2.39 (1.02) ^b	2.44 (1.04)
Forestry practices generally produce no long-term adverse effects on the environment	2.18 (0.95)	2.10 (0.97) ^c	2.12 (0.96)
Protection statements			
Legislation should be established to protect endangered species of plants and wildlife in our forests	4.23 (0.80)	4.15 (0.88) ^c	4.18 (0.86)
Forest management should emphasized a variety of plants and animals	4.12 (0.59)	4.13 (0.65)	4.13 (0.63)
Typical examples of Alberta's forest regions (for example boreal and aspen parkland) should be excluded from development such as forestry, oil and gas, and tourism	3.37 (1.00)	3.19 (1.13) ^b	3.25 (1.09)
Some existing protected areas such as parks should be opened for logging	1.53 (0.78)	1.74 (1.03) ^b	1.67 (0.96)
Timber management statements			
Clear-cut logging should be banned on public land	3.72 (1.11)	3.77 (1.20)	3.75 (1.17)
Logging forests is acceptable if the forest is not harmed	3.45 (0.98)	3.65 (0.39) ^b	3.58 (0.95)
When making forest decisions, the concerns of communities close to the forest should be given a higher priority than other communities	3.38 (1.02)	3.42 (1.10)	3.41 (1.08)
Economic stability of communities is more important than setting aside forests from logging	2.35 (0.90)	2.39 (0.95)	2.38 (0.93)
Setting aside forests from logging is not desirable if it means lower wages or fewer jobs	2.40 (0.95)	2.36 (0.97)	2.38 (0.97)
The economic benefits from forestry practices usually outweigh any negative consequences	2.26 (0.93)	2.21 (0.98)	2.23 (0.97)
Providing jobs and economic development is more important than setting aside forests from logging	2.11 (0.87)	2.09 (0.93)	2.10 (0.91)
Forests should be managed mainly for timber and lumber products	1.94 (0.80)	1.89 (0.82)	1.91 (0.82)

^a Rated on a scale of 1 to 5, where 1 = strongly disagree and 5 = strongly agree.

^b Significantly different using t-test at $p < 0.001$.

^c Significantly different using t-test at $p < 0.05$.

Table 10. Characteristics of forest value segments

Characteristic	Forest value segment			Statistics	
	Moderates (<i>n</i> = 721)	Human-centered (<i>n</i> = 725)	Bio-centered (<i>n</i> = 922)	F/ χ^2	<i>p</i>
Women (%)	16.0	11.3	17.5	12.45	0.002
Some university education (%)	19.1	23.7	23.1	5.32	0.070
Household income $\geq$ \$70,000 (%)	31.6	31.9	28.6	2.58	0.276
Membership in conservation organization (%)	28.7	32.6	31.3	2.63	0.269
Dependent on forest sector (%)	16.0	14.5	11.6	6.74	0.034
Edmonton or Calgary residents (%)	24.1	27.3	30.5	8.19	0.017
Mean age (years)	42.1	44.9	39.8	36.60	0.0001

sustainability of current forest management and economic development and timber management lower than the Human-centered and Moderate groups and rated statements on protection types of management strategies higher than these groups. The Human-centered and Moderate groups did not differ from each other on most statements.

The proportion among groups with the correct answers on the forest-related knowledge items differed on only one item: more of the Bio-centered Group knew that woodland caribou need old-growth forest. This suggests that the groups do not differ significantly in their knowledge of basic forest-related facts.

DISCUSSION

This study is among the first analyses of held forest values and management preferences of stakeholder groups focusing on the Foothills Model Forest. Campers and hunters were primarily bio-centered, agreeing with spiritual and existence values and the rights of forests and other species to exist for their own sake. Although respondents agreed with some of the statements related to human-centered values, they did not generally agree that human needs should be the only consideration in management. This is reflected further in forest management preferences, where respondents disagreed with managing primarily for timber and economic development and agreed with managing for a variety of species, and protecting endangered species and existing protected areas.

Overall, these results suggest that the campers and hunters do not view current forest management as being adequate to meet future timber needs and they are not in favor of some timber-oriented management goals. They are not opposed to logging,

but appear to be opposed to forest management strategies that emphasize timber production and economic development and exclude other values. While respondents were in favor of some protection-oriented management strategies, the majority were not in favor of excluding public land from all development such as oil and gas, forestry, and tourism. These results suggest that a holistic management approach to resource management would be acceptable to campers and hunters in the FMF. This approach would be one that considers nontimber uses, manages for a variety of species (e.g., biodiversity), employs alternative harvest methods to clear-cutting, involves communities in decision-making, and provides some protection, especially for endangered species. These are often cited as elements of sustainable forest management (Bengston 1994) and are cited as integral components of current forest management strategies in Alberta (Alberta Environmental Protection 1999). Thus, campers and hunters seem to support the philosophy of sustainable forest management

Table 11. Mean attitude scores of forest value segments^a

Statement	Forest value segment			ANOVA	
	Moderates	Human-centered	Bio-centered	F value	p
Sustainability statements					
Our forests are being managed successfully to meet our present and future needs	2.99a	2.92a	2.37b	85.39	0.0001
Enough harvested trees are being replaced by planting new ones or by natural seeding to meet our future timber needs	2.71a	2.62a	2.09b	91.80	0.0001
Forestry practices generally produce no long-term adverse effects on the environment	2.44a	2.33a	1.78b	105.90	0.0001
Protection statements					
Legislation should be established to protect endangered species of plants and wildlife in our forests	3.84a	4.11b	4.52c	146.47	0.0001
Forest management should emphasized a variety of plants and animals	3.88a	4.14b	4.34c	120.29	0.0001
Typical examples of Alberta's forest regions (for example boreal and aspen parkland) should be excluded from development such as forestry, oil and gas, and tourism	3.09a	3.02a	3.63b	96.52	0.0001
Some existing protected areas such as parks should be opened for logging	1.86a	1.88a	1.36b	86.99	0.0001
Timber management statements					
Clear-cut logging should be banned on public land	3.45a	3.69b	4.04c	55.22	0.0001
Logging forests is acceptable if the forest is not harmed	3.59a	3.82b	3.37c	46.80	0.0001
When making forest decisions, the concerns of communities close to the forest should be given a higher priority than other communities	3.45a	3.51a	3.28b	9.80	0.0001
Economic stability of communities is more important than setting aside forests from logging	2.57a	2.55a	2.07b	81.45	0.0001
Setting aside forests from logging is not desirable if it means lower wages or fewer jobs	2.56a	2.57a	2.06b	80.22	0.0001
The economic benefits from forestry practices usually outweigh any negative consequences	2.48a	2.43a	1.87a	110.94	0.0001
Providing jobs and economic development is more important than setting aside forests from logging	2.32a	2.32a	1.73b	131.72	0.0001
Forests should be managed mainly for timber and lumber products	2.14a	2.07a	1.56b	132.18	0.0001

^a Rated on a scale of 1 to 5, where 1 = strongly disagree and 5 = strongly agree.

Note: Any two means that are not followed by the same letter are significantly different using Tukey's HSD test.

being undertaken in Alberta. Although forest management in Alberta is taking such an approach, it appears these stakeholders do not believe that forests are being managed successfully to meet future needs, nor that forestry has no long-term adverse environmental effects. This could be a result of campers and hunters not being aware of sustainable management strategies or believing that sustainable management is not being implemented successfully. The belief that forests are not being managed sustainably occurred despite the fact that virtually all respondents knew that the forest industry must follow government guidelines when harvesting. This suggests that campers and hunters either think the guidelines are not adequate to provide for future needs or that the guidelines are not being followed or enforced.

While most respondents (69%) were not opposed to logging if the forest is not harmed, most (63%) agreed that clear-cutting should be banned on public land. Continued clear-cutting, particularly in areas visited by campers and hunters, might result in these stakeholders not believing that forest management includes multiple values, and could foster resistance to industry initiatives. Enhancing recreational opportunities away from industrial forestry activities and communicating new harvest methods and strategies (e.g., partial cuts, snag retention, minimal residual material requirements) might help alleviate potential conflict between recreational and industrial stakeholder groups. The reasons campers and hunters are opposed to clear-cutting were not explored in this study. It could be that they are not aware of new harvest strategies that are based on concepts of biodiversity, include smaller cutblock designs, irregular-shaped cuts, and harvests that emulate natural disturbances such as fire.

Demonstrating research activities and innovative management techniques in areas accessible to recreationists and providing information at campgrounds might help communicate new forest management strategies and the role of the FMF in achieving sustainable management of multiple forest values. The FMF provides an excellent opportunity to demonstrate such practices to recreation users. The FMF consists of a mosaic of protected areas (some of which are large, such as Jasper National Park and Willmore Wilderness Park), recreational opportunities, and industrial development that is managing for a variety of species; it is experimenting with new harvest methods, has an extensive research program, and has undertaken

efforts to conserve species that are endangered or at risk (e.g., woodland caribou) within its boundary. These types of activities are important elements in a sustainable forest management paradigm and the sustainability of multiple forest values (Kimmins 1995), and need to be communicated to the recreation constituent. Communication messages that emphasize the importance of human-centered values such as industrial development based primarily on jobs and economic development might not be very successful with these users. Development initiatives and communications will have to demonstrate incorporation of ecosystem functions and inclusion of a variety of benefits to be acceptable to these stakeholders.

The forest values scale seems to be a promising tool for examining held forest values. Segments of forest users were identified using the scale and the segments differed in their management preferences and socioeconomic characteristics. The Bio-centered Group had more women, younger individuals, more urban residents, and fewer who were economically dependent on the forest sector. Individuals in the Bio-centered Group were more supportive of protection-oriented management strategies than the other groups. This suggests that the scale is useful in helping managers define their management philosophy, develop goals and strategies that are socially acceptable, be able to predict how certain segments of society will react to management practices, and determine which groups will be affected by management activities. However, the values scale should be administered to a broader range of stakeholders such as the general Alberta population to determine if the public can be segmented based on value orientations, if certain socioeconomic segments of society are associated with value orientations, and if campers and hunters differ from other stakeholders.

While this report provides information on what people think about certain aspects of forests and forest management, it does not examine the mix and levels of values and uses that are acceptable to these stakeholders. This would require an examination of the trade-offs people are willing to accept in order to manage for particular values and preferences. For example, if protecting endangered species is important to campers and hunters, then are they willing to forgo recreational opportunities in endangered species habitat, or are they willing to incur a surcharge on recreation equipment to raise funds for habitat protection programs? Trade-offs represent the types of questions involved in actual

policy making and management decisions. They reflect realistic management scenarios and provide stakeholders with the same types of decisions that managers, planners, and policy makers face on a

daily basis. Examining trade-offs by stakeholders can be used as a means of getting public input into natural resource management decisions and should be addressed in future research.

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