

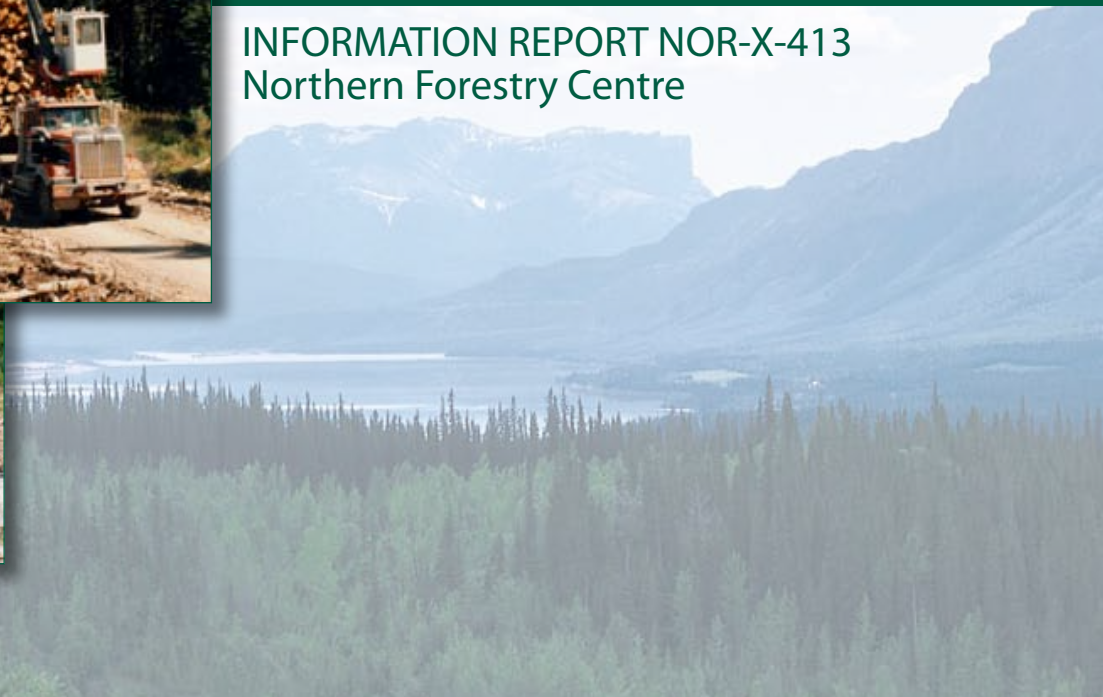


PUBLIC PERCEPTIONS OF CONSERVATION OF GRIZZLY BEARS IN THE FOOTHILLS MODEL FOREST: A SURVEY OF LOCAL AND EDMONTON RESIDENTS

B.L. McFarlane, D.O.T. Watson, and R.C.G. Stumpf-Allen



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Northern Forestry Centre



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La forêt modèle de Foothills est un partenariat unique qui se consacre à la recherche de solutions pratiques pour la gestion durable de nos forêts.

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ABSTRACT

The Foothills Model Forest (FtMF) initiated the Grizzly Bear Program in 1999 to examine the biological and ecological aspects of grizzly bear conservation. In 2004, the research was expanded to include some of the human dimensions of grizzly bear conservation. A study was undertaken to determine public perceptions of the sustainability of grizzly bear populations, perceived threats to grizzly bear populations, knowledge of grizzly bear biology and ecology, attitudes toward grizzly bears, preferences related to grizzly bear management, and views on public involvement in grizzly bear management. Data were collected by mail survey in 2004 from residents of Jasper ($n = 388$); residents of other FtMF communities and nearby towns ($n = 660$); and residents of Edmonton ($n = 652$). Generally, respondents were not informed about grizzly bears, they had a positive attitude toward them, they thought the grizzly bear population in the FtMF was somewhat or very sustainable, and they thought that industry, poaching, and human use of grizzly habitat were potential threats to the grizzly bear population. Support for management to conserve grizzlies was highest for options relating to control and communications such as public education and bear-proofing settlements, but there was also support for restrictions on industrial development, access to public lands, and hunting. All groups supported the public having a role in decision-making about grizzly bear management and indicated that Parks Canada, provincial government departments, environmental organizations, and local residents should have the most influence. Respondents in FtMF communities were more optimistic about the sustainability of grizzly bear populations in the model forest, perceived less risk to grizzly bears from industrial activities, and were not as receptive to restrictions on public access and industrial expansion in grizzly bear habitat as the other groups.

RÉSUMÉ

En 1999, la forêt modèle de Foothills a entrepris un programme d'étude biologique et écologique sur la conservation des ours grizzlis. En 2004, cette étude a été élargie à la dimension humaine de l'enjeu et un sondage a été effectué pour cerner la perception du public concernant la viabilité des populations de grizzlis et les menaces qui pèsent sur ces populations, sur la connaissance de la biologie et de l'écologie du grizzli, sur les attitudes par rapport à ces animaux et

les préférences concernant la gestion de leurs populations, ainsi que sur les vues concernant la participation du public à ces mesures de gestion. Les données ont été recueillies en 2004 par un sondage postal auprès des habitants de Jasper ($n = 338$), des résidents d'autres collectivités de la forêt modèle de Foothills et de villes environnantes ($n = 660$), et des résidents d'Edmonton ($n = 652$). L'étude a montré qu'en général les répondants n'étaient pas bien informés sur les ours grizzlis, ils avaient une attitude positive à leur égard et ils pensaient que les populations de grizzlis de la forêt modèle de Foothills avaient un taux de viabilité moyen ou élevé, et que l'industrie, le braconnage et l'activité humaine dans les zones d'habitat du grizzli constituaient une menace pour ces populations. Parmi les moyens de gestion proposés pour conserver les populations de grizzlis, les plus populaires étaient ceux axés sur le contrôle et les communications — campagnes de sensibilisation du public, protection anti-ours des zones habitées —, mais certains répondants étaient également favorables à la restriction des activités industrielles, de l'accès aux terres domaniales et de la chasse. Tous les groupes de répondants se sont dits favorables à ce que le public participe aux décisions et se sont dits d'avis que Parcs Canada, les ministères du gouvernement provincial, les organisations écologiques et les résidents locaux devraient avoir une influence prédominante. Par rapport aux autres groupes, les répondants des collectivités de la forêt modèle de Foothills étaient plus optimistes sur la viabilité des populations de grizzlis dans la forêt modèle, percevaient moins de risques liés à l'activité industrielle et étaient moins favorables à la restriction de l'accès aux terres du domaine public et de l'activité industrielle dans l'habitat du grizzli.

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■ INTRODUCTION

The Foothills Model Forest (FtMF) established the Grizzly Bear Program in 1999 to conduct research aimed at ensuring the sustainability of the grizzly bear (*Ursus arctos*) population in Alberta. Initially the program focused on biological and ecological research aimed at developing models to identify important grizzly habitat and areas for grizzly bear movement across the landscape, techniques for monitoring grizzly bear health, and DNA census techniques for monitoring population levels (Foothills Model Forest 2005).

In 2004 the program was expanded to address some of the social science research needs for grizzly bear conservation. A study was undertaken to help identify and bridge any gap between what is needed ecologically to achieve grizzly bear conservation and what is socially acceptable. The objectives of the study were to examine public's knowledge of grizzly bears, attitudes toward grizzly bears, preferences regarding grizzly bear conservation in the FtMF, and the role of the public in grizzly bear management. This report presents a descriptive summary of the study results and compares the attitudes of residents of rural communities dependent on natural resource extractive industries with residents of a tourism-dependent community, and with urban residents.

Grizzly Bears in Alberta

Approximately 6000 grizzly bears once ranged across Alberta, but grizzly populations have dwindled during the past century, mainly due to conversion of land to agriculture and to unrestricted hunting (Kansas 2002). Although grizzlies were first given legal protection in 1927, hunting and poisoning continued (Alberta Sustainable Resource Development 2002). Since then, the scope of protection has increased, for example, by eliminating the fall hunting season and increasing fines for poaching. In 2004 (the year of this study), the Alberta government closed the hunt in part of the model forest and other areas where mortality was highest, shortened the spring hunting season by two weeks, and decreased the

number of hunting licenses to 73. In 2006, the Alberta government suspended the grizzly bear hunt in the province.

In Alberta, grizzly bears are found primarily in the Rocky Mountains and higher elevations of the foothills and western boreal forest. Although there are no reliable estimates of the size of the grizzly bear population, it is generally agreed that the population is less than 1000 animals and is likely declining (Alberta Sustainable Resource Development 2002; Kansas 2002). The province has sufficient habitat to increase the grizzly bear population and a recovery plan has been developed with a goal of achieving a self-sustaining population in the long term (Alberta Grizzly Bear Recovery Team 2005).

West-central Alberta, including the FtMF, is considered to provide the greatest opportunity to increase grizzly bear populations in Alberta through intensive management and conservation programs (Stenhouse and Munro 2002). However, this area is also used extensively for human activities, including forestry, mining, oil and gas development, hunting, tourism, and transportation corridors. As human activities and developments increase so does the likelihood of habitat loss and fragmentation and bear mortalities. Managing for a sustainable population of grizzlies may require society to make choices between these activities and conservation of bears. Therefore, it is important for land managers and policy makers to have knowledge not only of the biological and ecological factors required for a sustainable grizzly bear population, but also of the social acceptability of potential management options.

Grizzly Bear Biology and Management

Several aspects of grizzly bear biology have important implications for management of the species and frame the economic and social trade-offs in grizzly bear management. These include habitat preferences, large home ranges, and a low reproductive rate.

Grizzlies are primarily adapted to open environments such as grasslands and river shorelines (Alberta Sustainable Resource Development 2002). In mountainous regions, the best and most contiguous habitat is along valley floors (Parks Canada 2004). These habitat preferences often bring the bears close to human settlements, roads, railways, and other human activity, resulting in human–bear conflicts. Protecting grizzly habitat and populations, particularly near human communities, may require intensive management of recreation, industry, and settlements (McLellan et al. 1999).

Grizzlies move through their home ranges in response to seasonal changes and the location of preferred foods (Kansas 2002). The dietary needs of grizzlies result in very large annual home ranges, varying from a low of 165 km² for females to ten times or more that size for males (Stenhouse and Munro 2001; Kansas 2002). Habitat loss and fragmentation are major threats to grizzly bear populations in Alberta (Alberta Grizzly Bear Recovery Team 2005). Avoidance of roads and trails can affect the ability and willingness of bears to use high-quality habitat or to maintain genetic continuity across populations, resulting in effective habitat loss and population fragmentation (McLellan and Shackleton 1988; Gibeau et al. 2002; Kansas 2002). Certain types of activity, such as motorized recreation and 24-hour activity, are more likely to disturb grizzlies (Kansas 2002). Fire suppression and the subsequent reduction of natural forest openings has negatively affected grizzly habitat and many of the preferred foods that are associated with early stages of fire succession (Nielsen et al. 2004a, 2004c). The limited dispersal of young grizzlies from their natal range also reduces opportunities for grizzly populations to move into suitable habitat when it becomes available, reducing the functional connectivity between fragmented populations (Weaver et al. 1996).

In addition to quality habitat and connectivity, grizzlies need security areas, comprising about two-thirds of their home ranges, where they can seek refuge from humans and human activity (Parks Canada 2004). The presence of humans

can cause bears to leave preferred food sources. Habituation to humans, particularly in adolescent bears and adult females, can increase the likelihood of a human-caused death.

Some human activity can have a positive effect on grizzly habitat. Temporary habitat changes such as clearcutting can increase the diversity of plant and animal food sources, resulting in selection of clearcuts over surrounding areas (Nielsen et al. 2004a). Although clearcuts can provide quality habitat, grizzly bears avoid these areas during the day when the area is likely to be disturbed by human activity. Prescribed burns, as carried out recently by Parks Canada, would likely have a similar effect.

In addition to pressures associated with habitat loss and fragmentation, grizzly bears have low reproductive rates. Female grizzly bears begin reproducing between four and eight years of age and usually give birth to two cubs every three to four years (Alberta Sustainable Resource Development 2002). The late onset of reproductive ability, small litters, and long inter-birth intervals lower the capability of grizzly bear populations to compensate for the loss of individual animals (Weaver et al. 1996; Alberta Sustainable Resource Development 2002).

Reducing or controlling grizzly mortality, and female mortality in particular, is vital to successful grizzly conservation (McLellan et al. 1999). In Alberta and neighboring jurisdictions, human-caused mortality is the single largest cause of known grizzly deaths and is closely tied to human access to grizzly habitat (McLellan et al. 1999; Kansas 2002; Nielsen et al. 2004b). Examples of human-caused deaths include legal and illegal hunting, control by wildlife officers when bears and humans come into conflict, and highway and railway mortalities. Enhanced grizzly bear conservation may be achieved through a variety of management actions such as increased enforcement of anti-poaching laws, public education to reduce human–bear conflicts (Augustyn 2001; Nielsen et al. 2004b), and changes to transportation activities. It may also be necessary to limit access to public land in grizzly habitat through permanent or temporary

closures to recreational users and by limiting new industrial development and adjusting existing operations to take into account grizzly bear needs (McLellan and Shackleton 1988; McLellan 1990; Ciarniello et al. 2005).

Human Dimensions of Wildlife Management

In the 1970s, wildlife management agencies began the now widely accepted practice of integrating human dimensions research into wildlife management decision-making (Decker and Enck 1996). By developing a better understanding of stakeholders' perspectives on management issues, land managers have been able to make more widely accepted decisions. To traditional interest groups, such as hunters and farmers, have been added non-consumptive users, environmental groups, and others. The social sciences can help land managers better understand these diverse stakeholders (Decker and Enck 1996). Information on public attitudes can also help managers determine the extent to which management practices will be accepted and supported (Bright and Manfredo 1995). As well, identifying differences, commonalities, and disputed facts can help managers provide information to increase the effectiveness of public participation in decision-making (Lauber et al. 2002; Patterson et al. 2003). Finally, social scientists can help managers weigh the input of disparate stakeholders in natural resource management issues, using information such as the size of the stakeholder population and the nature and intensity of their interest (Decker and Enck 1996).

The importance of sound human dimensions research is magnified by the fact that land managers may not be representative of the public or the stakeholders they are serving, and thus managers' attitudes and preferences cannot be equated with those of a broader public (Phillips et al. 1998; Kaltenborn et al. 1999).

Although a wealth of literature about human dimensions of wildlife management is available, we found few studies that deal specifically with

public knowledge, attitudes, and preferences for grizzly bear conservation. Therefore, we draw upon a larger literature on large carnivore conservation in North America and Europe. Wolves and other large carnivores are similar to grizzly bears in their role as keystone species, their historical and cultural significance, and large home ranges. However, Manfredo et al. (1998) suggested that preferences for large carnivore conservation may be context-specific and therefore human dimension studies of other large carnivores elsewhere in North America and Europe might not reflect the FtMF context for grizzly bear management. One particular grizzly bear case study (Primm and Murray 2005) shows directly the dynamics involved in western Wyoming and why the situation there could not be used for management elsewhere.

Attitudes

We adopted the definition of "attitude" as a favorable or unfavorable assessment of an "attitude object" (Vaske and Donnelly 1999). For this study, the attitude object is grizzly bears. Typically, attitudes are expressed as positive or negative evaluations such that individuals are described as having a positive attitude toward an object if the object is assessed favorably and a negative attitude if it is assessed unfavorably. For example, positive attitudes toward large carnivores have included a favorable assessment of their right to exist, that their numbers should be increased, that they are symbols of the greatness of nature, and that it is important to know that they exist. Negative attitudes have included assessments that they should be hunted, that they should be restricted in their range, and that they should be eliminated from areas with livestock (Ericsson and Heberlein 2003; Kaczensky et al. 2004). Attitudes are important in human dimensions research because they are often cited as precursors to the formation of management preferences. Differing attitudes can be a source of conflict among stakeholder groups, and understanding stakeholder attitudes can provide guidance to public education programs.

Few studies have examined public attitudes toward grizzly bears. One study found that, in Slovenia, land owners and hunters have very posi-

tive attitudes toward brown bears (Kaczensky et al. 2004) despite a recent policy of bear protection that resulted in a sharp increase in sheep predation in the study area. The literature on attitudes toward large carnivores such as wolves and black bears suggests that the public tends to have positive or neutral attitudes toward these potentially harmful species (Bath 1989; Pate et al. 1996; Miller et al. 1998; Brooks et al. 1999; Kaczensky et al. 2004). In a review spanning 28 years of literature, Williams et al. (2002) found that most studies reported positive attitudes and support for wolf restoration. Among some stakeholder groups such as farmers and hunters, however, negative attitudes toward large carnivores are common, though not universal (Kellert 1985, 1991; Bath 1989; Brooks et al. 1999; Kaltenborn et al. 1999; Kaczensky et al. 2004). Negative attitudes among these groups were attributed to potential predation of livestock and big game.

Attitudes may be affected by such factors as knowledge, demographics and socialization, and cultural influences.

Although some studies show a positive relationship between knowledge and attitudes, it is not universally so (Bath 1989; Brooks et al. 1999). Kellert (1985) found that members of animal-related organizations, such as birdwatchers, backpackers, hunters, and environmentalists, tended to have more knowledge and a more positive attitude toward predators than the general public. It is often assumed from such positive relationships that educating the public about natural resource management issues will result in greater understanding and reduced conflict between stakeholders and natural resource managers. However, Ericsson and Heberlein (2003) found that hunters living in rural areas of Sweden were most knowledgeable about restored wolves, but also had the most negative attitude. In other cases, knowledge showed little relationship to attitudes (Kellert 1991; Kaczensky et al. 2004).

Demographics, such as age, gender, and education also influence attitudes (e.g., Kellert 1985; Bath 1989; Bath and Buchanan 1989; Czech et al. 2001). Women, younger individuals, and

people with higher levels of education tend to have more positive attitudes toward contentious wildlife issues such as large carnivore conservation.

Social groups can influence member responses to natural resource management issues. These socialization influences can structure the mindset of individuals such that members adopt the organizational values, beliefs, and norms. For example, environmental organizations represent alternative environmental views that are transmitted to their membership (Brulle 1996). Similarly, individuals employed in a natural resource sector are subjected to organizational standards, work to achieve common goals, and view natural resource issues in a manner consistent with organizational values and their professional interests (Dietz et al. 1998).

In wildlife management issues, the characteristics of the species under consideration can have an impact on attitudes. More positive attitudes and increased support for costly management options have been found to be related to species characteristics such as attractiveness, higher taxonomic classification, and familiarity to respondents (Kellert 1996). This may be particularly relevant in examining attitudes toward grizzly bears, a high-profile species that has been adopted as a symbol of the North American wilderness (Kellert et al. 1996). In other words, given the cultural and symbolic meaning attached to grizzly bears, public attitudes are expected to be very positive.

Perceived Threats

Perception of the severity of a threat, such as habitat loss, may be an important factor in public support for conservation policies (Czech and Krausman 1999). For example, studies that found habitat loss was perceived as a threat to wildlife have also found support for programs to address habitat loss. Similarly, lack of support to ban hunting is associated with the perception that hunting does not pose a significant threat to the animal population (Cook and Cable 1996; Czech and Krausman 1999).

Most studies of public perceptions of the threats to wildlife have focused on endangered species. Cook and Cable (1996), for example, found that the public in Kansas rated pollution, agriculture chemicals, and urban growth as the greatest causes of species endangerment. Hunting, fishing, trapping, oil development, and conversion of land to agricultural production were also perceived as threats. In a nation-wide survey in the United States, most respondents identified habitat loss due to human development as the most important cause of species endangerment (Czech and Krausman 1999), whereas harvesting activities (such as hunting, fishing, and trapping) were perceived as threats by less than 10% of respondents. This finding is in contrast to the Illinois public who attributed the endangerment of species to hunting rather than habitat loss (Mankin et al. 1999). Similarly, the most commonly cited threat to the California condor by the American public was hunting, followed by lead poisoning, pollution, power lines, and finally, habitat loss (Responsive Management 2004). Public input on the management of grizzly bears in the Bitterroot area of Idaho and Montana revealed public concern over habitat availability, the impact of resource extractive industries such as forestry, road building in wilderness areas, and potential human–bear conflicts (USDA Forest Service 1998).

Management Preferences

Despite the potential for serious injury or death to humans and their pets, and potential economic impacts (e.g., loss of livestock), the public tends to support the conservation of large carnivores. Studies in the United States, Europe, and Canada have shown that the public is in favor of management options that protect large carnivore populations. One of the most studied and potentially contentious large carnivore management issues is the reintroduction of populations into areas where they have been extirpated. In a review of the literature on wolf reintroduction, Williams et al. (2002) found wide support for this option. Similarly, Casey et al. (2005) found public support for maintaining mountain lion populations in national parks and adjacent areas in Tucson, Arizona, despite recent

attacks on humans in the western United States. In terms of specific options, the public did not support shooting or trapping mountain lions that were near human developments but preferred relocating lions that were potentially dangerous. In Colorado, Manfredo et al. (1998) also found support for relocating problem mountain lions and for public education. However, the Colorado public supported destroying mountain lions that killed or injured humans but did not support hazing (e.g., rubber bullets or fireworks) to frighten lions away. In contrast to these studies, the public of Slovenia was not in favor of expanding brown bear populations into new areas of the country (Kaczensky et al. 2004).

Support for large carnivore conservation is not universal; rather, it appears that some groups are not supportive and that support may depend on situational factors. For example, farmers and ranchers and rural residents who live in close contact with carnivores tend to be less supportive of reintroduction and protection-oriented management (e.g., Taylor and Clark 2005). In addition, younger individuals, the well educated, and women tend to be more supportive of conservation (e.g., Teel et al. 2002; Williams et al. 2002; Ericsson and Heberlein 2003). Manfredo et al. (1998) concluded that preferences for carnivore management depend on the specific circumstances of the situation. For example, the type of human–carnivore encounter, the location (density of human development), and the history of a particular animal may affect public preferences in dealing with specific human–carnivore encounters. Clark and Rutherford (2005) suggest that we should be framing the discourse as one of managing the activities of diverse human groups, once the goal of bear conservation is accepted.

Public Involvement in Wildlife Management

A key component of sustainable resource management on public lands is engaging the public in effective decision-making and policy development. Effective public involvement should include input from a representative public, a two-way flow of information, flexibility, openness

to new participants and new input, and open discussion (Beckley et al. 2006). Parkins et al. (2001) cite several reasons for undertaking public involvement in wildlife management issues: wildlife is considered a public resource and as such is owned by the citizens; controversial issues that involve difficult choices generally benefit from decision-making processes that result in more reasonable and acceptable decisions than those generated from special interest groups alone; decisions regarding public resources are subject to public scrutiny and apt to fail without public support; and public involvement processes generally bring a broader range of knowledge and expertise to bear on a management issue and thus can provide information that might otherwise be overlooked. Additionally, effective public involvement promotes fairness, encourages competent decisions, holds governments accountable, and promotes citizen acceptance of government decisions (Lauber and Knuth 1998).

Defining the public (who to involve) and how to involve them are basic questions in developing public involvement processes. Often public involvement in natural resource management has suffered from an apathetic public or dominance by interest groups that are not representative of the public (Parkins et al. 2001). Engaging a more representative public may require using processes in which citizens' views are taken seriously and influence management decisions.

Surveys of the public are one means to collect input. Although surveys can reach a large number and diverse range of people and indicate knowledge of the issue, attitudes, and acceptance of management options, surveys do not foster discussion and deliberation, which are a key component of effective public involvement (Lauber and Knuth 1998; Parkins 2002). Public involvement that provides the opportunity for citizens to discuss the issue and that takes into account their values and preferences is generally considered to be more effective. Lauber and Knuth (1998), for example, found that a telephone survey, designed to elicit preferences on the reintroduction of moose, lacked many of the attributes (e.g., interchange of ideas, attempts to

resolve areas of disagreement, and decisions that are mutually acceptable to interested and affected citizens) considered necessary for an effective deliberative decision-making process. Similarly, Lauber et al. (2002) concluded that, in the absence of deliberation, citizens often lack knowledge and rely on their own limited experience in making judgments.

Rural and Urban Preferences

Differences in values, attitudes, and management preferences between urban and rural populations have been cited as one of the primary factors underlying conflicts in natural resource management (e.g., Green et al. 1996; Smith and Krannich 2000; Ericsson and Heberlein 2003; Patterson et al. 2003; Clendenning et al. 2005). Urban residents tend to express greater concern for the environment and are more supportive of policies and management directed at protecting natural resources. The differences between rural and urban residents have been attributed to environmental value orientation and economic dependence on natural resources. Rural residents tend to have a stronger utilitarian orientation toward the environment, valuing resources for the products and services they provide, whereas urban residents tend to be more ecocentric, valuing natural resources for their inherent worth (Green et al. 1996; Jones et al. 1999; Patterson et al. 2003). The dependence of rural residents on natural resources for their economic livelihood and use of the landscape for other activities, such as recreation, makes them less supportive of policies and management that decrease or restrict access to resources. Some studies, however, suggest that rural–urban differences related to the environment are diminishing as more urban residents move into rural areas, technology (such as the Internet) provides rural residents with many urban-centered perspectives, and environmental awareness increases in society in general (Fortmann and Kusel 1990).

Rural–urban differences tend to be more pronounced in specific natural-resource issues that require local rural citizens to bear most of the costs associated with management decisions.

These decisions often result in more resource-use regulations, reduced economic activity and job losses, impacts on the rural way of life, and reduced autonomy in management decisions (Bath 1989; Jones et al. 1999; Ericsson and Herberlein 2003; Patterson et al. 2003).

Differences in attitudes between rural and urban populations on several wildlife management issues have followed a similar pattern. That is, urban residents tend to exhibit more protectionist attitudes and support protection-oriented management strategies for wildlife (e.g., Manfredo and Zinn 1996); differences seem to be diminishing as urban residents migrate to rural areas (Clendenning et al. 2005); and differences may be more pronounced on specific management issues that affect local rural populations. For example, one of the most controversial issues is the management of large carnivores such as wolves. Urban residents tend to have more positive attitudes toward large carnivores and are more supportive of their protection. In contrast, local rural residents, who must coexist with carnivores, express more negative attitudes and are less supportive of their protection because of concerns over livestock predation, human safety, and impacts on game species such as deer and elk (Pate et al. 1996; Ericsson and Herberlein 2003; Casey et al. 2005).

Although much of the human dimensions literature on large carnivore management has focused on rural–urban differences, Kellert et al. (1996) suggested that variation in attitudes and preferences among rural communities should be a primary consideration in the development of grizzly bear management plans in the Rocky Mountains of North America. These authors suggested that attitudes tend to be polarized between communities that are primarily dependent on tourism and recreation and other rural communities that are dependent on resource extractive industries. Taylor and Clark (2005) show a similar rural dichotomy over grizzly bear conservation in Wyoming between long-term residents with agricultural livelihoods and more recently arrived residents with professional careers. Thus, effective grizzly bear management will require an understanding of the differences in attitudes and management preferences between rural and urban communities and among rural communities in or near grizzly habitat. In this study, we compare residents in rural communities that are dependent on natural resource extractive industries with residents in a national park community dependent on tourism and with urban residents.

METHODS

Study Area

The Foothills Model Forest (FtMF) is a nonprofit corporation representing a partnership of industry, federal and provincial governments, landowners, and others dedicated to improving sustainable forest management (Foothills Model Forest 2006). The landbase for which the partners have authority covers about 2.75 million hectares of primarily public land in the Rocky Mountains and eastern slopes of west–central Alberta,

Canada (Fig. 1). The landbase is rich in natural amenities, including mountains, glaciers, lakes, rivers, and a variety of wildlife. FtMF encompasses Jasper National Park, Willmore Wilderness Park, and includes many forest uses such as timber harvesting, petroleum extraction, mining, tourism, and recreation. Several communities situated in or near the FtMF are dependent on resource extractive industries (Patriquin et al. 2002). The largest of these is Hinton, which in 2001 had a population of 9406 (Statistics Canada 2001). One community

(Jasper), situated within Jasper National Park, is dependent on nature-based tourism. In addition, the FtMF is a popular recreation destination for Albertans, including those from the nearby urban centre of Edmonton, who hunt, fish, camp, and ride off-road vehicles (McFarlane et al. 1999). The model forest has a population of grizzly bears that is coming under increasing pressure from human encroachment.

The original FtMF Grizzly Bear Program study area covered approximately 1 million hectares of the eastern slopes from Highway 16 south to the Brazeau River. In 2003, the area was

extended north of Highway 16 to the Berland River and south to the Clearwater River. The area was extended again in 2004 to include 7.72 million hectares of the eastern slopes, extending from south of Grande Cache to the United States border. In 2005, the study area was extended north to Grande Prairie and east to Swan Hills (Foothills Model Forest 2005). Our study focused on grizzly bear conservation within the model forest (which comprises only a portion of the Grizzly Bear Program study area) because this is the area over which FtMF partners have jurisdiction to make management decisions.

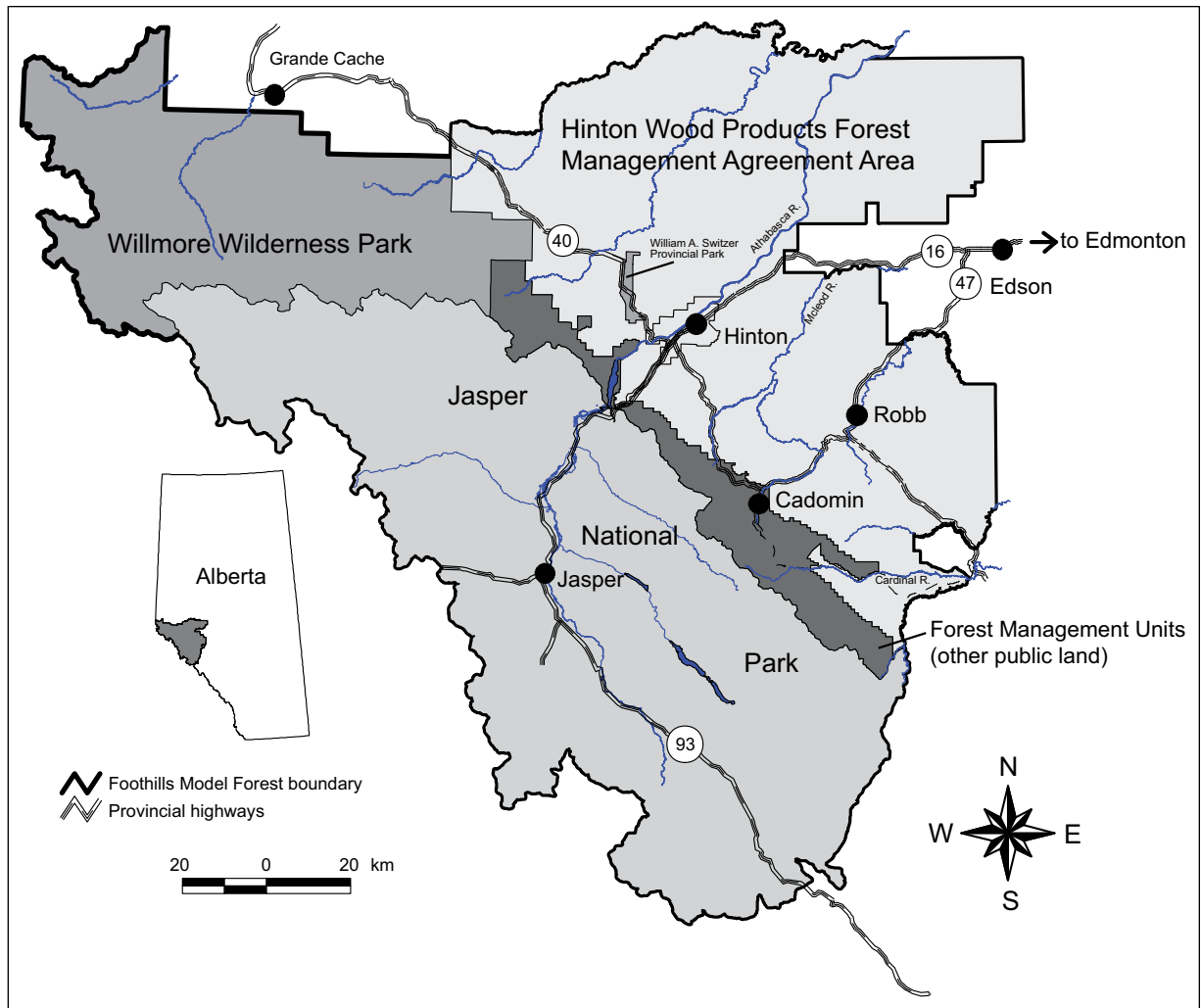


Figure 1. Map of the Foothills Model Forest, Alberta, Canada.

Samples

Samples representing three mutually exclusive populations were obtained by telephone solicitation. These were residents of Edmonton; residents of the FtMF and surrounding area (including Hinton, Edson, Grande Cache, Cadomin, Brûlé, and Robb) but living outside Jasper National Park; and residents of Jasper National Park. A 50:50 gender ratio was sought in all samples.

A random sample of 10 695 listed telephone numbers from the three populations were contacted in the telephone solicitation. Of these, at 3433 numbers a qualified respondent could not be reached (for sample selection, the respondent had to be a resident of the household and 18 years of age or older), and 2369 were ineligible phone numbers (e.g., fax machine or business number). There were 4893 numbers with a qualified person. Of these, 1700 agreed to participate in a mail survey on grizzly bear management in the FtMF (willingness rate of 34.7%): 388 Jasper, 660 FtMF, and 652 Edmonton residents.

Questionnaire

Data were collected using a mail survey. We developed a questionnaire in consultation with the Alberta Provincial Grizzly Bear Recovery Team. The questionnaire collected information on perceived sustainability of the grizzly bear population in the FtMF, awareness of the FtMF Grizzly Bear Program, knowledge of grizzly bear biology and ecology, perceived threats to grizzly bear populations, attitudes toward grizzly bears, preferences for grizzly bear management in the FtMF, the role of the public in grizzly bear management decisions, experience with grizzly bears, and demographics.

Knowledge was measured using 10 true-or-false statements. A “not sure” response was also available for each statement. Perceived sustainability of the grizzly bear population in the FtMF was measured on a scale of 1 to 4, with 1 = very unsustainable and 4 = very sustainable. A “not sure” option was also available. Perceived threats to grizzly bears in the FtMF were assessed using 19 potential threats. Each was rated from 1

to 5, with 1 = poses no risk and 5 = poses a great risk to the health and productivity of populations. A “no opinion” option was also available. Attitudes toward grizzly bears were assessed using eight positive (e.g., “Grizzly bears are important to the balance of nature”) and five negative (e.g., “Grizzly bears are a nuisance”) statements. For each, respondents indicated their level of agreement on a scale of 1 to 5, with 1 = strongly disagree and 5 = strongly agree. A summed attitudinal score was created by reverse coding the negative statements and summing the scores for each respondent. Attitudinal scores ranged from a possible minimum of 13 to a possible maximum of 65, with higher scores reflecting a more positive attitude toward grizzly bears. Level of support for 20 resource management options was assessed on a scale of 1 to 5, with 1 = strongly oppose and 5 = strongly favor, with a “no opinion” option. To assess what role the public should have in grizzly bear management in the FtMF, respondents were asked to choose one of five options. Respondents indicated how much influence 15 stakeholder groups should have in decision-making on a scale of 1 to 3, with 1 = no influence at all, 2 = some influence, and 3 = a great deal of influence. They then indicated which of the groups should have the most and which should have the least influence in decision-making. Experience with grizzly bears was based on whether respondents had seen a grizzly bear in the wild. Participation in recreational activities in Alberta was based on participation in hiking, camping, fishing, hunting, and off-road vehicle use during a typical year. The demographic information included age, sex, education, membership in environmental or recreational organizations, and whether anyone in the household received their economic livelihood from various natural resource industries.

In addition to quantitative data collected from the close-ended questions on the survey, qualitative data were collected in the form of the respondents’ written comments obtained by the open-ended question, “Is there anything else you would like to tell us?”. This question allowed respondents to express their thoughts and perceptions in their own words and provide insight to answers given in the close-ended questions. It also allowed respondents

an opportunity to raise issues not included in other survey questions. Four hundred and thirty respondents (38.2%) provided comments.

Survey Implementation

The questionnaire was tested on two groups: scientists and managers with knowledge of grizzly bears and grizzly bear management, and Hinton residents of varied backgrounds and differing levels of knowledge about grizzly bears. Adjustments were then made to the initial design to clarify wording and address other concerns.

The initial mailing, consisting of the questionnaire, cover letter, and postage-paid return envelope, occurred on May 12, 2004. This was followed on May 21, 2004, by a reminder post card. A second complete survey package was mailed to non-respondents on June 10, 2004.

Data Analysis

All statistical analyses were performed using the SAS® statistical package (version 9.1 for Windows). Differences among group means were examined using analysis of variance (ANOVA) and Tukey's studentized range test. Chi-square test of goodness of fit and chi-square test of independence were used to examine the associations between place of residence and frequency distributions. For statistical tests, we used $p \leq 0.05$ as the significance level.

Written comments were analyzed using QSR Nvivo 2.0®, a software package designed for analyzing text data. It was used to sort paragraphs, passages, and sentences into specific researcher-defined categories. To begin the analysis, comments were sorted into broad categories: five management areas (industry and development, access and recreation, hunting, communications and education, and poaching), stakeholders, the balance between meeting human and grizzly needs, and other comments. Comments regarding the five management areas, stakeholders, and the balance between humans and grizzlies were then analyzed to allow comparison between residents of Jasper, the FtMF, and Edmonton. Only a few comments, selected to be representative of each theme, are presented in this report. Although QSR Nvivo was useful in organizing the comments, the variable nature of the comments required the researcher to classify the comments. Many comments contained multiple subjects and each respondent's comments could be coded into one or several categories. This adds an element of subjectivity to the results. Nevertheless, the comments offer insight into the choices respondents made on the closed-ended questions.

RESULTS

Survey Response

Of the 1700 surveys mailed, 22 were returned to sender, reducing the effective sample to 1678. By the cut-off date of August 5, 2004, 1125 completed surveys had been received, for an overall response rate of 67.0%. Response rates for the samples were Jasper 69.0% ($n = 265$), FtMF 68.5% ($n = 447$), and Edmonton 64.0% ($n = 410$).

Demographics

Males were slightly in the majority in the Edmonton (50.9%) and FtMF (53.0%) samples, whereas females represented 57.1% of the Jasper sample. This was expected because the Jasper sample obtained from the telephone recruitment consisted of 57% females.

Mean ages of the three groups were similar, 44 to 46 years (Table 1), but age distributions of the three groups differed significantly. The Edmonton group had the widest age distribution: more respondents were in the 18–24 and 55 and over groups. In the Jasper group, most respondents were in the 25–44 age groups, the youngest sample overall.

The Jasper and Edmonton groups were similar in education level, whereas FtMF respondents had less education (Table 2). FtMF respondents were

almost twice as likely as the other groups to have no post-secondary education and only half as likely to have a university degree (bachelor's or higher). In contrast, more respondents from the Jasper and Edmonton groups had a university degree.

To evaluate whether the samples were representative of their populations, a comparison of gender, age, and educational level was made with comparable census sub-division information (see notes to Table 3) from the 2001 census (Statistics Canada 2001). For these comparisons, respondents under age 20 were excluded from the samples and the educational categories were merged to conform with 2001 census categories.

Females were over-represented among the Jasper respondents (Table 3). As well, people between the ages of 45 and 64 and people with at least some university were over-represented in all samples. To determine if these discrepancies affected the survey results, we regressed knowledge, attitude, and preference variables on age, sex, and education. These results suggested that of the variables that differed from the census, education had the greatest effect on the survey results. Therefore, we weighted the survey results proportional to the expected educational observations from the census.

Table 1. Age of survey respondents^a

Age group in years	Community group					
	Jasper		Foothills Model Forest		Edmonton	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
18–24	14	5.4	17	4.0	34	8.7
25–34	54	20.9	66	15.6	77	19.7
35–44	74	28.6	115	27.3	84	21.5
45–54	73	28.2	124	29.4	87	22.3
55–64	25	9.7	57	13.5	66	16.9
65 or older	19	7.3	43	10.2	42	10.8
Mean age (SD) ^b	259	43.5 (13.2)	422	46.0 (13.3)	390	44.9 (14.8)

^a $\chi^2 = 26.7$; $df = 10$; $p = 0.0029$.

^bMeans are not significantly different ($p < 0.05$) according to Tukey's studentized range test. SD = standard deviation.

Table 2. Education level of survey respondents^a

Highest level of education	Community group					
	Jasper		Foothills Model Forest		Edmonton	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Grade 9 or less	2	0.8	14	3.3	4	1
Some high school	4	1.5	49	11.4	22	5.6
High school graduate	46	17.6	107	24.8	60	15.2
Technical school or community college	68	26.0	142	33.0	103	26.0
Some university	47	17.9	38	8.8	52	13.1
University degree (Bachelor's)	66	25.2	59	13.7	89	22.5
Some graduate studies	12	4.6	5	1.2	17	4.3
Graduate university degree	17	6.5	17	3.9	49	12.4

^a $\chi^2 = 100.4$; $df = 14$; $p < 0.0001$.

Table 3. Comparison of survey respondents with the 2001 national census

Census variable	Region; % of people aged 20 and over					
	Jasper ^a		Foothills Model Forest ^b		Edmonton ^c	
	Census	Sample	Census	Sample	Census	Sample
Gender						
Male	52.0	43.0	51.4	54.4	48.6	51.4
Female	48.0	57.0	48.6	45.6	51.4	48.6
Age						
20–24	16.5	5.0	9.0	3.6	11.5	7.5
25–34	26.3	20.9	20.6	15.7	20.8	20.0
35–44	24.6	28.7	28.0	27.4	22.6	21.8
45–54	17.5	28.3	20.3	29.5	18.5	22.6
55–64	6.3	9.7	11.2	13.6	10.8	17.1
65 and older	8.8	7.4	11.1	10.2	15.7	10.9
Education						
Without high school diploma	18.8	2.3	32.4	15.0	25.2	6.8
High school graduate	16.0	17.1	14.9	24.0	10.7	13.7
Technical school or community college	42.0	25.7	38.8	33.2	36.9	26.3
Some university	12.4	17.9	4.9	8.7	8.0	13.1
Bachelor's degree or more	11.2	37.0	8.7	19.1	19.1	40.2

^aJasper is approximated by census subdivision Jasper (census subdivision code 15 033).

^bFtMF is approximated by census subdivisions Hinton (14 019), Edson (14 024), and Grande Cache (18 005).

^cEdmonton is approximated by census subdivision Edmonton (11 061).

Dependence on Natural Resources

The FtMF group was very dependent on income from natural resource sectors, particularly the forestry, petroleum, and mining sectors (Table 4). The Jasper group was much more likely to earn income from the tourism industry or a natural resource agency. Although Edmonton residents were less likely to rely on income from primary industries, tourism, or natural resource agencies, nearly one in four did; the oil and gas industry was the most common source of natural resource sector income for Edmonton respondents.

Recreational Activities and Organizations

The three groups indicated that in a typical year they were active walkers and campers, but less involved in other recreational activities such as hunting, fishing, and using off-road vehicles in Alberta (Table 5). Nearly all the Jasper group walked or hiked in parks and protected areas, whereas the FtMF group was most active in several other activities, particularly hunting and using off-road vehicles. For example, nearly half of the FtMF group used off-road vehicles, whereas only about 10% of the other groups did so. FtMF residents were also more than three times more likely to hunt. All groups were equally likely to camp in serviced campgrounds, whereas FtMF residents were more likely than the other groups to random camp. The Edmonton sample was less likely than the other groups to participate in most of the activities, but slightly more likely to participate in hunting and using off-road vehicles than Jasper respondents. Only 1% to 9% of each group did not participate in any of the activities.

The Jasper group was very active in recreational and environmental organizations. More than 30% of Jasper respondents belonged to at least one organization and were most likely to belong to a natural history, environmental, or other outdoor recreation club (Table 6). About 15% of Edmonton respondents and 23% of FtMF respondents were involved in at least one such organization.

FtMF respondents were more likely to belong to a hunting, fishing, or off-road vehicle organization, corresponding to their higher levels of involvement in these activities. No Edmonton or Jasper respondents indicated they belong to an off-road vehicle organization.

Familiarity with Grizzly Bear Research

None of the groups considered themselves to be well informed about grizzly bear research in the FtMF (Table 7). This was especially true of the Edmonton group; nearly two-thirds of that group indicated they were not at all informed. Although majorities of the other groups indicated they were somewhat informed, fewer than 10% considered themselves very well informed.

Experience with Grizzly Bears

Most of the respondents reported having seen a grizzly bear in the wild. More than half (54.9%) of Edmonton respondents had seen a grizzly in the wild and 88.5% of Jasper and 86.2% of FtMF respondents claimed to have seen a grizzly in the wild. The high frequency of sightings among model forest residents may be related to their proximity to grizzly habitat and greater involvement in many outdoor recreational activities.

Knowledge

Overall, the true-or-false statements indicated that respondents were not well informed about grizzly bears (Table 8). For example, a majority in all groups believed the Canadian Rockies is the best grizzly bear habitat in North America and subscribed to the commonly held myth that grizzlies have poor eyesight. A majority also did not know that the grizzly bear is not classified as endangered by the Alberta government. Other facts were more widely known. A majority in all groups knew that grizzlies eat mostly plants, do not prey heavily on livestock, once ranged across Alberta, are threatened by habitat loss, do not commonly die of old age, and are not best identified by color.

Table 4. Dependence on natural resource sectors for economic livelihood

Industry	Community group ^a						χ^2	<i>p</i> value
	Jasper		Foothills Model Forest		Edmonton			
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%		
Forest industry	3	1.2	131	31.0	14	3.6	171.7	<.0001
Mining industry	3	1.2	56	13.2	10	2.6	53.4	<.0001
Oil and gas industry	7	2.8	110	26.0	52	13.4	67.2	<.0001
Agriculture	2	0.8	17	4.0	14	3.6	6.1	0.048
Tourism industry	143	56.1	24	5.7	9	2.3	381.9	<.0001
Natural resource agency	51	20.0	22	5.2	12	3.1	67.2	<.0001
Nobody in the household depends on them	77	30.2	157	37.1	300	77.5	185.3	<.0001

^aColumns do not total 100% as respondents could answer in multiple categories.

Table 5. Recreational activities

Recreational activity	Community group ^a						χ^2	<i>p</i> value
	Jasper		Foothills Model Forest		Edmonton			
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%		
Walk or hike in parks and protected areas	257	98.1	340	77.3	297	74.6	64.9	<.0001
Walk or hike on public land outside of parks	200	76.3	357	81.1	246	61.8	41.5	<.0001
Camp in serviced campgrounds	177	67.6	286	65.0	243	61.1	3.1	0.2102
Camp in areas without serviced campgrounds	128	48.9	248	56.4	106	26.6	78.6	<.0001
Hunt	21	8.0	130	29.6	33	8.3	86.5	<.0001
Fish	113	43.1	226	51.4	128	32.2	31.6	<.0001
Use off-road vehicles for recreation	25	9.5	200	45.5	44	11.1	175.2	<.0001
Does not take part in these activities	3	1.2	16	3.6	35	8.8	22.3	<.0001

^aColumns do not total 100% as respondents could answer in multiple categories.

Table 6. Organizational memberships

Organization	Community group ^a						χ^2	<i>p</i> value
	Jasper		Foothills Model Forest		Edmonton			
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%		
Hunting or fishing organization	11	4.2	54	12.4	15	3.8	27.5	<.0001
Natural history or birdwatching club	22	8.5	9	2.1	7	1.8	25.2	<.0001
Off-road vehicle club	0	0.0	21	4.8	0	0.0	32.2	<.0001
Outdoor recreation club	35	13.5	31	7.1	18	4.6	17.8	<.0001
Environmental or conservation organization	51	19.6	24	5.5	33	8.4	37.9	<.0001
Does not belong to any of these	177	68.1	334	76.8	337	85.3	27.4	<.0001

^aColumns do not total 100% as respondents could answer in multiple categories.

Table 7. Familiarity with grizzly bear research in Foothills Model Forest^a

Level of familiarity	Community group					
	Jasper		Foothills Model Forest		Edmonton	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Not at all informed	70	26.4	140	32.1	260	63.2
Somewhat informed	178	66.6	259	59.3	146	35.4
Very well informed	19	7.0	37	8.6	6	1.4

^a $\chi^2 = 128.0$; *df* = 4; *p* < 0.0001.

Table 8. Knowledge of grizzly bears

True-false statement	Respondents with correct answer								χ^2	p value
	Jasper		Foothills Model Forest		Edmonton		n	%		
	n	%	n	%	n	%				
Grizzly bears have very poor eyesight	89	32.8	116	25.9	113	26.8	113	26.8	4.4	0.1135
The best way to identify a grizzly bear is by its color	225	83.2	337	75.2	241	57.1	241	57.1	62.0	<.0001
The Government of Alberta classifies the grizzly bear as an endangered species	118	43.6	162	36.2	128	30.4	128	30.4	12.5	0.002
Grizzly bears breed about once every 3 to 5 years	175	64.7	224	50.0	160	37.8	160	37.8	47.9	<.0001
The Canadian Rockies has the best grizzly bear habitat in North America	72	26.8	47	10.4	23	5.5	23	5.5	71.4	<.0001
Grizzly bears once ranged across most of Alberta, including where Edmonton and Calgary are now situated	194	71.9	286	63.7	253	59.9	253	59.9	10.5	0.005
Plants (including roots, shoots, and berries) are the main source of food for grizzly bears in Alberta	250	92.6	392	87.3	355	84.1	355	84.1	10.8	0.005
The greatest cause of grizzly bear deaths in the Canadian Rockies is old age	194	71.9	318	70.9	284	67.3	284	67.3	2.1	0.3434
The greatest threat to grizzly bear populations is loss of habitat	240	88.7	353	78.7	381	90.3	381	90.3	26.7	<.0001
In areas where grizzly bears exist near livestock, their primary food is cattle and sheep	237	87.9	366	81.6	315	74.6	315	74.6	19.0	<.0001

Attitudes

All samples had a positive attitude toward grizzly bears (Table 9). For example, respondents strongly agreed that grizzly bears are important to the balance of nature, that a healthy grizzly bear population is a sign of a healthy environment, that it is important Alberta always has a sustainable grizzly bear population, that it is important to know grizzlies exist in Alberta, and that grizzly bears are a symbol of the greatness of nature. They also strongly disagreed that it is a grizzly bear's nature to want to kill humans and that grizzly bears are a nuisance.

The most positive responses were for statements referring to the ecological or existence value of grizzly bears, such as "grizzly bears are important to the balance of nature" and "whether or not I get to see a grizzly bear, it is important to know they exist in Alberta." Only two statements revealed a slightly negative attitude toward grizzlies. FtMF residents disagreed slightly that "the needs of grizzly bears should come before the needs of people living in or near grizzly bear habitat." FtMF and Edmonton residents agreed weakly with "the quality of life in human communities near grizzly bear habitat should be a primary consideration in decisions on bear management." These two statements most clearly juxtapose the needs of humans and grizzly bears, which may help to explain the ambivalent responses.

The Jasper sample reflected the most positive attitude toward grizzly bears, with a mean attitudinal score of 53.4; this equates to an average of more than 4 out of 5 on each attitudinal statement. The FtMF and Edmonton samples were lower, and not significantly different from each other, at 50.0 and 51.1, respectively.

Perceived Threats

A majority of respondents indicated they felt the grizzly bear population in the FtMF is somewhat or very sustainable (Table 10). The FtMF group was most likely to indicate the population is sustainable. Nearly one-third of the FtMF group indicated it is very sustainable, in

contrast to only 18.2% and 11.3% of Jasper and Edmonton residents, respectively. The Edmonton respondents were much more likely to indicate they were unsure how sustainable the population is, suggesting less certainty about the grizzly's future.

For ease of presentation, possible threats to grizzly bear populations in the FtMF were grouped into the following categories: industry and development activities; human use of grizzly bear habitat; management; and environmental issues (Table 11). Respondents rated development in bear habitat as among the most highly rated threats, including agriculture, housing, timber harvesting, development of roads, tourist resorts, oil and gas, and mining. These high ratings coincide with the fact that 79% to 90% of each sample were aware that loss of habitat is the greatest threat to grizzly populations (Table 12). With the exception of tourist resorts, the risks from all development activities were rated lower by the FtMF group than by the Jasper or Edmonton respondents. Jasper respondents had perceived a lower risk from tourist resorts than from other developments. These results may reflect a tendency to perceive a reduced risk from industries or activities with which one is associated or which are important to one's community.

Some threats from human use, such as grizzly bears becoming accustomed to humans, unrestricted public access, motorized off-road recreational use, and licensed grizzly bear hunting, also received moderate to high risk ratings. Again, FtMF residents rated the threats related to human use lower than the other groups. For the most part, management and environmental issues were perceived as much lower risks. Illegal and unlicensed killing of grizzly bears was the most notable exception; all groups considered this to be one of the highest risks. A lack of resources to address wildlife management issues was also considered a relatively high risk. Two threats were rated as low risks by all samples: "non-motorized recreational use of lands in bear habitat" and "putting a lot of trust in science to help develop solutions to wildlife management issues."

Table 9. Attitudes toward grizzly bears

Attitudinal statement	Community group ^a					
	Jasper		Foothills		Edmonton	
	<i>n</i>	Mean (SD)	<i>n</i>	Mean (SD)	<i>n</i>	Mean (SD)
Positive statements						
Grizzly bears are important to the balance of nature	262	4.6 (0.7)a	441	4.5 (0.8)b	404	4.5 (0.9)ab
The needs of grizzly bears should come before the needs of people living in or near grizzly bear habitat	259	3.4 (1.3)a	443	2.9 (1.3)b	404	3.3 (1.2)a
A healthy grizzly bear population is a sign of healthy environment	262	4.4 (0.9)a	443	4.2 (1.0)b	401	4.3 (0.9)ab
Grizzly bears have the right to exist for their own sake regardless of human concerns	261	4.0 (1.1)a	442	3.6 (1.3)b	403	3.9 (1.1)a
It is important that Alberta always has a sustainable grizzly bear population	260	4.6 (0.8)a	443	4.5 (0.8)a	404	4.5 (0.8)a
It is morally wrong to kill a grizzly bear	260	3.4 (1.4)a	441	3.0 (1.4)b	404	3.3 (1.3)a
Whether or not I get to see a grizzly bear, it is important to know they exist in Alberta	262	4.7 (0.8)a	443	4.5 (0.8)b	404	4.6 (0.8)ab
The grizzly bear is a symbol of the greatness of nature	261	4.6 (0.7)a	441	4.3 (0.9)b	403	4.4 (0.9)b
Negative statements						
Grizzly bear populations should be controlled so they pose no danger to people	262	2.0 (1.2)a	443	2.7 (1.4)b	403	2.8 (1.2)b
It is a grizzly bear's nature to want to kill humans	262	1.3 (0.8)a	441	1.4 (0.9)ab	402	1.5 (0.9)b
All grizzly bears that attack people should be destroyed	262	2.8 (1.4)a	442	2.7 (1.4)a	405	2.7 (1.3)a
The quality of life in human communities near grizzly bear habitat should be a primary consideration in decisions on bear management	260	2.9 (1.2)a	441	3.1 (1.2)b	402	3.2 (1.2)b
Grizzly bears are a nuisance	262	1.3 (0.8)a	440	1.6 (0.9)b	402	1.5 (0.9)b
Summed attitudinal score	252	53.4 (7.4)a	419	50.0 (7.7)b	383	51.1 (7.3)b

^aRated on a scale of 1 to 5, where 1 = strongly disagree and 5 = strongly agree. Any two means in a row that do not share a letter are significantly different ($p < 0.05$) according to Tukey's studentized range test.
 Note: SD = standard deviation.

Table 10. Perceived sustainability of grizzly bear population in Foothills Model Forest^a

Rating of sustainability	Community group					
	Jasper		Foothills Model Forest		Edmonton	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Very unsustainable	25	9.3	27	6.2	14	3.6
Somewhat unsustainable	44	16.3	43	9.9	91	22.6
Somewhat sustainable	126	47.3	193	44.4	165	40.8
Very sustainable	49	18.2	134	30.7	46	11.3
Not sure	23	8.8	38	8.8	88	21.8

^a $\chi^2 = 102.5$; $df = 8$; $p < 0.0001$.

Management Preferences

For ease of presentation, management options were grouped into the following categories: industry and development activities; human access to grizzly habitat; legal hunting; and management and communications. Although there were differences of degree between the samples, there was general agreement in direction of support or opposition to the management options presented (Table 12). Of the 20 options, 15 were supported by all three samples. Two were opposed by all three samples. For only three of the options was there disagreement between the samples as to whether the option should be supported or opposed.

Among the options related to industry and development, requiring industries to coordinate road building to reduce the number of roads was most strongly supported. This was followed by changing existing timber harvesting, mining, and oil and gas facilities to better address the needs of bears. Expansion of industrial activities was generally opposed. Jasper residents were more supportive of coordinated road building and changing industry practices and were less supportive of industry expansion than the FtMF and Edmonton samples. The opposite was true of FtMF respondents. That is, of the three samples, FtMF was most supportive of industrial expansion and least supportive of changing existing industrial practices.

Although industry, development, and human use of grizzly habitat were perceived to be among the greatest threats to grizzly bear populations in the FtMF (Table 10), management options to address these threats were not the most strongly supported. Among the most strongly supported options by all groups were those related to management and communications, such as educating forest users about how to avoid and react to bear encounters, bear-proofing settlements and facilities, educating the public about grizzly bears, increased enforcement of anti-poaching laws, and moving bears that pose a risk to humans. Support for these options was high across all groups.

In terms of legal hunting, there was support for training hunters to distinguish between black and grizzly bears, a temporary ban on grizzly bear hunting, and reducing the number of grizzly bear licenses. However, a permanent ban on hunting of grizzlies received less support from Jasper and Edmonton residents and was opposed by FtMF residents. With the exception of hunter training, FtMF residents were less supportive of management options related to reducing hunting opportunities than were the other groups.

There was also support for limiting human access to grizzly habitat by establishing new protected areas with no industrial activity or motorized recreational access, by seasonally or temporarily closing roads and trails to off-road

Table 11. Perceived threats to grizzly bear populations in the Foothills Model Forest

Threat	Community group ^a					
	Jasper		Foothills Model Forest		Edmonton	
	<i>n</i>	Mean (SD)	<i>n</i>	Mean (SD)	<i>n</i>	Mean (SD)
Industry and development activities						
Conversion of forested land into agriculture	259	4.3 (0.9)a	434	4.0 (1.1)b	397	4.4 (0.9)a
Tourist resorts in bear habitat	261	3.8 (1.1)a	435	3.8 (1.1)a	393	4.2 (1.0)b
Development of roads and other access routes in the forest	263	4.2 (1.0)a	436	3.7 (1.2)b	399	4.1 (1.0)a
Oil and gas exploration, drilling and pipelines in bear habitat	261	4.2 (1.0)a	436	3.5 (1.2)b	391	4.1 (1.0)a
Timber harvesting operations in bear habitat	262	4.2 (0.9)a	437	3.6 (1.2)b	394	4.3 (1.0)a
Mining developments in bear habitat	262	4.1 (1.0)a	433	3.3 (1.3)b	394	4.2 (1.0)a
Loss of forested land for housing	259	4.2 (1.0)a	430	3.7 (1.2)b	389	4.3 (0.9)a
Human use of grizzly habitat						
Unrestricted public use of roads and other access routes in the forest	262	4.1 (1.0)a	432	3.5 (1.2)b	400	4.1 (1.0)a
Licensed grizzly bear hunting	258	4.1 (1.2)a	429	3.3 (1.4)c	389	3.6 (1.3)b
Motorized off-road recreational use of lands in bear habitat	262	4.1 (1.0)a	437	3.2 (1.4)c	394	3.9 (1.2)b
Non-motorized recreational use of lands in bear habitat	261	2.6 (1.1)a	433	2.3 (1.1)b	393	2.7 (1.1)a
Grizzly bears becoming accustomed to the presence of humans	260	4.0 (1.1)a	434	3.8 (1.2)b	390	4.1 (1.0)a
Management						
Illegal and unlicensed killing of grizzly bears	258	4.3 (0.9)a	435	4.3 (0.9)a	394	4.3 (0.9)a
Wildlife managers inadvertently making an incorrect decision	249	3.3 (1.2)a	400	3.1 (1.2)b	355	2.9 (1.1)b
Putting a lot of trust in science to help develop solutions to wildlife management issues	240	2.8 (1.1)a	394	2.8 (1.2)a	352	2.7 (1.2)a
Lack of resources to address wildlife management issues	253	4.0 (1.1)a	416	3.7 (1.2)b	379	4.0 (1.0)a
Environmental issues						
Global warming	249	3.2 (1.1)a	404	2.9 (1.2)b	374	3.2 (1.1)a
Forest fires	262	3.0 (1.2)a	432	3.3 (1.2)b	396	3.5 (1.2)c
Introduction of non-native plant and animal species	251	3.1 (1.1)a	404	2.7 (1.2)b	368	3.0 (1.2)a

^aRated on a scale of 1 to 5, where 1 = poses no risk and 5 = poses a great risk. Any two means in a row that do not share a letter are significantly different ($p < 0.05$) according to Tukey's studentized range test.

Note: SD = standard deviation.

Table 12. Management preferences

Management option	Community group ^a					
	Jasper		Foothills		Edmonton	
	<i>n</i>	Mean (SD)	<i>n</i>	Mean (SD)	<i>n</i>	Mean (SD)
Industry and development activities						
An increase in oil and gas development in grizzly bear habitat outside protected areas	260	2.0 (1.1)a	426	2.7 (1.2)c	381	2.3 (1.2)b
Changing existing oil and gas facilities and operations so the needs of grizzly bears are better addressed	258	4.1 (1.0)a	434	3.3 (1.3)c	394	3.9 (1.2)b
An increase in land where timber harvesting is allowed in grizzly bear habitat outside protected areas	254	2.1 (1.1)a	427	2.6 (1.1)b	372	2.3 (1.2)a
Changing existing timber harvesting facilities and operations so the needs of grizzly bears are better addressed	259	4.3 (1.0)a	435	3.6 (1.2)b	394	4.1 (1.0)a
New mines in grizzly bear habitat outside protected areas	258	2.1 (1.2)a	425	3.1 (1.2)c	382	2.3 (1.1)b
Changing existing mining facilities and operations so the needs of grizzly bears are better addressed	258	4.1 (1.0)a	428	3.4 (1.3)c	392	3.9 (1.1)b
Require industries to coordinate their road building activities to reduce the number of roads overall	262	4.6 (0.7)a	436	4.1 (1.1)b	388	4.2 (1.0)b
Human access to grizzly habitat						
Seasonal or temporary closure of roads and trails used for off-road motorized recreation	258	4.4 (1.0)a	437	3.5 (1.5)b	394	4.2 (1.1)a
Permanent closure of roads and trails used for off-road motorized recreation	258	3.6 (1.4)a	438	2.4 (1.5)b	392	3.3 (1.4)a
Establish more protected areas with no industrial activity or motorized recreational access	259	4.4 (1.0)a	436	3.5 (1.4)b	394	4.3 (1.0)a
Reduce speed limits on highways in areas with bears	259	4.1 (1.1)a	434	3.2 (1.3)c	394	3.7 (1.2)b

Table 12. Concluded

Management option	Community group ^a					
	Jasper		Foothills		Edmonton	
	<i>n</i>	Mean (SD)	<i>n</i>	Mean (SD)	<i>n</i>	Mean (SD)
Hunting						
Train hunters to be able to distinguish between black bears and grizzly bears	253	4.6 (0.8)a	434	4.7 (0.7)a	392	4.6 (0.8)a
Reduce the number of grizzly bear hunting licenses	246	4.5 (1.0)a	426	3.9 (1.3)c	380	4.2 (1.0)b
A ban on grizzly bear hunting until the provincial population reaches a self-sustaining level	257	4.6 (0.8)a	432	4.1 (1.3)b	395	4.5 (1.0)a
A ban on grizzly bear hunting forever	254	3.7 (1.4)a	427	2.6 (1.4)c	387	3.1 (1.4)b
Management and Communications						
Increase law enforcement patrols to prevent poaching, catch poachers, and increase prosecution of poachers	261	4.7 (0.6)a	442	4.6 (0.8)a	398	4.6 (0.8)a
Educate forest users on how to avoid, how to be prepared for, and how to react to bear encounters	260	4.9 (0.4)a	440	4.8 (0.6)b	400	4.8 (0.5)ab
Educate the public about grizzly bears in the Foothills Model Forest	262	4.7 (0.5)a	436	4.7 (0.6)a	401	4.7 (0.5)a
Move bears that pose a danger to humans to more remote areas with suitable habitat	261	4.3 (1.1)a	438	4.5 (1.0)a	396	4.5 (0.9)a
“Bear proof” settlements, residences and facilities to reduce the availability of garbage and other things that attract bears	262	4.9 (0.4)a	438	4.6 (0.7)c	397	4.8 (0.5)b

^aRated on a scale of 1 to 5, where 1 = strongly oppose and 5 = strongly favor. Any two means in a row that do not share a letter are significantly different ($p < 0.05$) according to Tukey's studentized range test.
 Note: SD = standard deviation.

motorized recreation, and by reducing speed limits on highways. FtMF residents tended to be less supportive of these options. Permanent closure of roads and trails received less support than the other access options from Jasper and Edmonton residents and was opposed by FtMF residents.

There was disagreement among the samples on three options. The FtMF sample opposed, and the Jasper and Edmonton samples supported, “permanent closure of roads and trails used for off-road motorized recreation” and “a ban on grizzly bear hunting forever.” On the other hand, the FtMF sample supported, and the Jasper and Edmonton samples opposed, “new mines in grizzly bear habitat outside protected areas.” These options were also those with the greatest variance among the means, suggesting they are the most controversial.

To explore if the disagreement on these three options was related to specific interests, we examined the relationship between level of support and respondents’ involvement in specific activities. First, we examined if support for permanent closure of roads to off-road vehicle use was related to use of off-road vehicles and participation in random camping. Second, we examined if support for a permanent ban on hunting grizzly bears was related to participation in hunting. Finally, we examined if support for new mining developments was related to economic dependence on the mining sector.

Support for each of the three management options had significant relationships with participation in the affected activity. Specifically, opposition to permanent closure of roads was significantly related to use of off-road vehicles (Table 13). People who do not use off-road vehicles supported permanent road or trail closure, whereas those who do participate did not support closure. Among random campers, only campers in the FtMF sample were opposed to permanent road closure (Table 14). There was no significant difference among random campers and non-campers in the Edmonton and Jasper samples. Opposition to a permanent hunting ban was related to participation in hunting, with hunters in all three groups opposing a permanent ban

(Table 15). Support for the development of new mines was related to dependence on income from the mining sector among the FtMF group only (Table 16). Among the Jasper and Edmonton groups, both those who were dependent and those who were not dependent opposed new mining developments. In the FtMF group, respondents who did not participate in off-road vehicle use, random camping, or hunting, or were not dependent on mining tended to neither support nor oppose (i.e., mean score near 3.0) the management options. Additionally, opposition to the management options among activity participants was strongest in the FtMF sample. In other words, specific interests in the FtMF are the source of the strongest opposition for the management options of permanent road closure, a permanent hunting ban, and no new mining developments.

Respondents’ Comments on Preferences

Ninety-one respondents wrote comments regarding industry and development. Of these, 28 were from Jasper, 45 from the FtMF, and 18 from Edmonton. Selected comments are presented in Table 17. Overall, there appears to be a feeling that the FtMF is nearing or has exceeded its capacity for industrial development and that any further growth must be carefully scrutinized. Comments related to forestry and the petroleum industries expressed concerns about clearcuts, roads and seismic lines, and lack of bear proofing at industrial sites. However, there were mixed feelings about two industries: mining and tourism. Jasper respondents in particular opposed mining expansion—and the previously proposed Cheviot mine in particular—because it was viewed as incompatible with the nearby national park. FtMF residents, on the other hand, cited successful reclamation as a reason for supporting mining developments. The tourism industry also had both positive and negative associations, but was mentioned by relatively few respondents. It was seen as a source of non-extractive sustainable revenue, but was also associated with access-related concerns, described more fully in the next section. Expansion of residential developments was also identified as a source of concern.

Table 13. Support for permanent closure of roads and trails used by off-road vehicles by participation in off-road vehicle use

Community group	Uses off-road vehicles		Does not use off-road vehicles		<i>t</i> -value	<i>p</i> -value
	<i>n</i>	Mean (SD)	<i>n</i>	Mean (SD)		
Jasper	28	2.2 (1.4)	230	3.8 (1.3)	6.3	<.0001
Foothills Model Forest	204	1.8 (1.3)	234	3.1 (1.3)	10.3	<.0001
Edmonton	52	2.6 (1.5)	340	3.4 (1.3)	4.4	<.0001

Note: SD = standard deviation.

Table 14. Support for permanent closure of roads and trails used by off-road vehicles by participation in random camping

Community group	Random camps		Does not random camp		<i>t</i> -value	<i>p</i> -value
	<i>n</i>	Mean (SD)	<i>n</i>	Mean (SD)		
Jasper	127	3.6 (1.5)	131	3.6 (1.3)	0.1	0.9528
Foothills Model Forest	250	2.1 (1.4)	188	2.9 (1.4)	5.3	<.0001
Edmonton	111	3.3 (1.5)	281	3.3 (1.3)	0.6	0.5551

Note: SD = standard deviation.

Table 15. Support for a permanent ban on hunting by participation in hunting

Community group	Hunts		Does not hunt		<i>t</i> -value	<i>p</i> -value
	<i>n</i>	Mean (SD)	<i>n</i>	Mean (SD)		
Jasper	24	2.8 (1.4)	230	3.8 (1.3)	3.6	0.0004
Foothills Model Forest	133	1.9 (1.3)	294	3.0 (1.3)	8.2	<.0001
Edmonton	39	2.1 (1.4)	348	3.2 (1.3)	5.6	<.0001

Note: SD = standard deviation.

Table 16. Support for new mines by dependence on mining income

Community group	Receives income from mining		Does not receive mining income		<i>t</i> -value	<i>p</i> -value
	<i>n</i>	Mean (SD)	<i>n</i>	Mean (SD)		
Jasper	13	2.0 (1.2)	245	2.1 (1.2)	0.3	0.8017
Foothills Model Forest	73	3.4 (1.3)	352	3.1 (1.2)	-2.1	0.0342
Edmonton	27	2.2 (1.2)	355	2.3 (1.1)	0.5	0.6428

Note: SD = standard deviation.

Table 17. Selected comments about industry and development

Sample	Comments
Jasper	<p>Things like mining, forestry and oil and gas exploration are not bad for bears per se but where these activities occur is very important. We should arrange our extraction and disturbance around the habitat requirements of the grizzly.</p> <p>I admit that when I hear of open pit mining on the border of Jasper National Park, poaching and indiscriminate killing of bears in and around the Hinton/Cadomin area I lose faith in humans and their ability to be responsible around wildlife.</p> <p>I sincerely hope that Alberta's reputation as an area with little respect for conservation diminishes and that our provincial government enforces more stringent rules for industry. Tourism of our diverse wild areas needs to be enhanced and promoted for a sustainable economic future.</p> <p>Industry should respond to the needs of the environment, even if it costs more for consumers in the long run.</p>
Foothills Model Forest	<p>I feel that something could be done to improve the management for grizzly bears in the Foothills Model Forest. But at the same time I am a strong supporter in the rapid growth in industry. I have worked in both the forest and mining industry and have been around some oil and gas activity and in my opinion feel these industries have been doing an excellent job in sustaining a healthy habitat for all wildlife.</p> <p>I am appalled at the number of oil, gas and timber access roads being built all up and down the Eastern Slopes in the past 2 years. One needs to take a drive in order to believe it. The public needs to be made aware of this devastation of our wilderness. Whatever happened to the government's plans for a "green zone" on the Eastern slopes? ... More wilderness areas need to be set aside where there is absolutely no motorized access or industrial activity. This needs to be acted upon immediately so that future generations can enjoy what we have enjoyed and taken for granted all these years.</p> <p>I think our mines in this area have done an amazing job of recovery and I believe they are very concerned about environmental issues. I would hope the forest industry acts responsible for environmental concerns also.</p> <p>Working in the oil and gas industry, I have seen and travelled in the Robb, Hinton and Fox Creek areas. I have been concerned about all the land that has been cleared from forestry and wonder if that is where the most damage lies for the bear habitat. More and more wellsites are only accessed in the winter or by quad and I have seen some improvements in environmental preservation as new wells are built. (Thanks to govt regulations). What I cannot see improving is the number of trees removed. It changes: 1) the water table as more evaporation is imminent, 2) homes for animals and other biological life, 3) the amount of food and shelter from predators available, 4) many other factors too numerous to mention.</p> <p>I'm greatly distressed by the number of linear features (roads, pipelines, etc.) that crisscross our 'wilderness' areas. I believe industry needs to cooperate to reduce this.</p>

Table 17. Concluded

Sample	Comments
Foothills Model Forest	<p>Industrial sites in wilderness areas (rig camps) draw bears to a potentially fatal situation. There seems to be no government requirement to bear proof these camps. Garbage and human waste are often left on site where bears can access them. These grizzlies become “problem” bears that aren’t tolerated.... More permanent human habitation, like camp grounds, golf courses and acreages will eventually forever drive grizzlies from that area. No one will tolerate a grizzly bear foraging for berries beside their new backyard. Never mind that this bear, and other bears before it, having been using these same bushes for decades. I would much rather see a cutblock in a wilderness area than a new ski hill, golf course, campground or acreage development.</p> <p>I have noticed more bears now than in my earlier years. I’ve also noticed in areas with heavy seismic activity, little if any bear sign. In my opinion it seems that the oil/gas exploration affects the bear population more so than logging.</p> <p>I am not against industrial activity as long as it is carried in a sustainable and controlled manner and mined areas are reclaimed. Areas that have been mined have proven by the great amount of wildlife both in active mining areas and reclaimed areas that a good job can be done.</p> <p>Forestry and gas exploration are much bigger threats as they cover bigger areas and must be done in a responsible way.</p> <p>Tourism is as big a threat to environment as any other industry.</p> <p>Uncontrolled expansion of urban centers gobbling up farmlands and wildlife areas is probably the biggest threat to wildlife and the environment.</p>
Edmonton	<p>I have seen much of the countryside in the Coal Branch. I believe it should not be open to forestry, mining or oil exploration or private interests of any kind. This area has its natural beauty and should be left natural and not for greed, money or profit of any kind.</p> <p>I find it very disdainful when I see all the clearcuts, like the Weldwood Mgmt area, all the cutlines and logging roads in the areas mapped here in. I have been to the Cadomin area once and seen the devastation of the mines and off shoot activities. We here in Alberta feel it is our God given right to exploit every inch of Alberta environment for our greed with little respect for the nature of our province.</p> <p>I think that it’s a fine balance between getting tourism dollars into a region and allowing that tourism to have an impact on natural habitats. While controls on motorized vehicles will have a negative impact on a few tourism agencies, I think those losses are necessary to promote a sustainable tourism industry.</p>

Note: All statements in this table appear as they appeared in the original survey.

Jasper respondents wrote that industry can do better at meeting the needs of grizzly bears and that more government oversight is needed to ensure that industry appropriately addresses these needs. Some Jasper respondents also addressed specific industries. For example, nine respondents commented on mining, mostly negative and mostly expressing concerns about the proposed Cheviot mine. Five respondents mentioned forestry and the need to reduce the number and size of clearcuts. Oil and gas and ranching were also mentioned negatively, while tourism was mentioned positively.

For the most part, Edmonton respondents who provided comments about industry mentioned specific industries, including forestry, oil and gas, mining, and tourism, in a negative context. Edmonton respondents also mentioned residential developments resulting in habitat loss and the need for more protected areas without industrial activity.

Most FtMF respondents who wrote comments about industry also addressed specific industries. For example, 16 wrote about forestry and 17 wrote about oil and gas. Most of these comments were negative, many focused on the impact of roads crisscrossing the landscape. Tourism and expansion of residential areas were also viewed negatively. Industry in general was also mentioned by several respondents who expressed concerns about the dangers of habituation and cumulative impacts on the landscape. Other respondents indicated that industry can do better, for instance by coordinating their road-building activities, or harvesting logs cut when roads are built by other industries. On the other hand, 21 FtMF residents wrote about mining and most of these comments were positive, many mentioning the attention the industry pays to reclamation and wildlife that is attracted to mining sites.

Fifty respondents wrote comments regarding access and recreation. Of these, 10 were from Jasper, 28 from the FtMF, and 12 from Edmonton. Selected comments on access and recreation are presented in Table 18. The comments expressed serious concerns about access to grizzly habitat

and support for limitations on access. Motorized recreation in particular was associated with negative environmental impacts, and restrictions on this activity were generally supported.

Most of the Jasper respondents mentioned open roads and easy access to grizzly habitat as an important problem that must be addressed by limiting access or reclaiming industrial roads. Two writers specifically mentioned off-road vehicles and one mentioned the danger of grizzlies being hit by cars.

The most common comment by FtMF and Edmonton respondents regarding access and recreation concerned the negative impact of off-road vehicles on grizzly bears and their environment. A smaller number of writers from the FtMF indicated that off-road vehicles do not disturb grizzlies or cause damage, while one writer called for new areas where off-road vehicles could be used where they would not disturb grizzly bears. Other FtMF and Edmonton comments called for restricted access in general or more protected areas.

Forty-six respondents wrote about hunting: 11 from Jasper, 25 from the FtMF, and 10 from Edmonton. Selected comments about hunting are presented in Table 19. Most comments from all groups indicated that the grizzly bear hunt should be stopped. Many expressed concerns about hunting in general, trophy hunting in particular, and whether the current grizzly population could sustain the hunt. Several writers mentioned frustration that the Alberta government has not followed recommendations to declare grizzlies endangered and end the grizzly bear hunt. However, other writers supported the hunt. Several FtMF residents and one Edmonton resident considered a limited hunt as a way to control the population or to increase the survival of young bears by killing adult males. As well, some Jasper respondents supported allowing the hunt by aboriginal peoples only for cultural reasons.

Forty respondents wrote comments about communications: 12 from Jasper, 13 from the FtMF, and 15 from Edmonton. Selected comments about

communications are presented in Table 20. Most respondents from all groups mentioned the importance of the general public being well informed in order to help make sound management decisions, to accept necessary management practices, and to avoid human–bear conflict. Some writers called for public education specifically from bear biologists, Parks Canada, or the FtMF, or on certain topics such as the positive and negative impacts of industry on grizzly bears. Some FtMF and Edmonton respondents called for educational programs directed at students, particularly at an early age, to increase their awareness of grizzly bears and related environmental issues.

Twenty-two comments were received about poaching: 6 from Jasper, 12 from the FtMF, and 4 from Edmonton. A selection of comments are presented in Table 21. Many respondents called for increased fines or jail terms for poachers; others called for more resources to catch poachers. Some writers also expressed dismay that people would poach grizzly bears.

Sixty-four respondents provided comments about the appropriate balance between meeting

the needs of humans and the needs of grizzly bears: 13 from Jasper, 35 from FtMF, and 16 from Edmonton. A sample of the comments are presented in Table 22. Most Jasper and FtMF comments indicated the need for balance between development and habitat conservation. Vigilance is necessary to regulate human use, but extreme positions should be avoided. FtMF respondents often indicated that this balance has been achieved. Several Jasper respondents and one FtMF writer indicated that the needs of bears should be the primary consideration in land management decisions. These writers indicated that humans are causing the problems and that humans must accept the consequences or limitations of living in grizzly habitat. On the other hand, several FtMF respondents wrote that human needs must be the priority. These writers indicated that industrial development must continue in order to maintain the economy and standard of living, that humans and bears were not created equal, and that grizzly bears will adapt to human activities. The 16 Edmonton respondents were evenly split between the grizzlies-first and the humans-first positions.

Table 18 . Selected comments about access and recreation

Sample	Comments
Jasper	<p>Unlawful grizzly mortalities are primarily associated with nearness to roads, therefore strict measures must be developed to control road densities in grizzly habitat, and restrict access where appropriate.</p> <p>Access is a major major problem. Too many roads, cut lines, gas lines, power lines, access is pressure, pressure is bad. You don't want people walking or driving through your house all day; its upsetting to the whole family. Maybe build roads to extract resources but make them impenetrable when you're done. Service gas wells via helicopter. Heli-log. If you eliminated the ability to access these areas by road you would decrease human visitation by at least 90%. Problem solved.</p>
Foothills Model Forest	<p>Motorized vehicles are another greed operated industry. The devastation of ATVs and 4x4s etc is disgusting and they should not be admitted into backcountry areas. Period!</p> <p>For the grizzly to even have a future, a secure habitat is not merely a dream, it is an absolute necessity!</p> <p>I am against closing off access to areas because of any needs. The land belongs to the public not a few grizzly bear researchers, or American owned forestry and oil and gas companies which already block off too much access.... Don't let the overblown need of grizzly bears add to this.</p> <p>ATVs and off-highway vehicles are destroying many pristine valleys, muskegs and marshy areas. Their use must be greatly reduced. It is impossible to police their use of ATV trails unless hikers and horseback riders are encouraged to report them (much like the "Report a Poacher" program).</p>
Edmonton	<p>If it has been found that there is a permanent residence of a grizzly, especially sow with cubs should consider closure. ATV users should require license and further public education which includes not only how to handle ATV but wildlife conflict considerations.</p> <p>I would like to see less land use by motorized vehicles including quads. More control of camping in forested area (i.e., control of campfires and drinking, garbage, and general misuse of our environment).</p>

Note: All statements in this table appear as they appeared in the original survey.

Table 19. Selected comments about hunting

Sample	Comments
Jasper	<p>Why would you kill a grizzly? Grizzly hunting should be illegal unless you're native and it's survival for you! Education is the key, there is too many red neck out there!</p> <p>Grizzlies don't stand a chance in Alberta as long as the Klein government refuses to listen to govt-appointed committee recommendations to classify grizzlies as threatened and stop all hunting of this species.</p>
Foothills Model Forest	<p>Everywhere that the bear hunt has been cancelled has had bear problems. The bears are there if you look for them.</p> <p>I am ashamed that our provincial Premier and our Minister of Sustainable Resource Development in Alberta have chosen to ignore their own science regarding the recommendations to add the grizzly bear to the Alberta Endangered Species List. Even their own government "Grizzly Bear Recovery Team" recommended the grizzly bear hunt be suspended, but the 2004 hunt continued irregardless! Why pay for studies to choose to ignore the results and recommendations???</p> <p>There has been a lot of controversy in Alberta to close the grizzly bear hunting season. Then I ask why should we loose for the grizzly hunt, when that's not the problem. The problem with these bears is not hunting them, it is industrial greed that is taking place on what little habitat they have left.</p> <p>Hunting helps sustain manageable population levels and is necessary has been since the beginning of time. Grizzly bear hunting is aimed at the male population, which by nature are cannibalistic. Hunting them helps the survival of younger bears.</p>
Edmonton	<p>Hunting should not be stopped due to the possibility of over population.</p> <p>If grizzly bears are a threatened species, they should not be hunted period!</p>

Note: All statements in this table appear as they appeared in the original survey.

Table 20. Selected comments about communications

Sample	Comments
Jasper	<p>People should be shown aerial views of the area to convince them of the incredible impact the last few years has had on all of the foothills region.</p> <p>I think Parks Canada is improving their methods of public awareness. Although this past year, the focus seems to have been on wolves, elk and caribou, they are succeeding in public involvement.</p>
Foothills Model Forest	<p>Public awareness is key to the success of any program of this nature. It would be nice to see the model forest network increase their profile, and better inform the general public (local and otherwise) of the programs they are involved with. Specifically, it would be nice to know how the professionals (biologists/ecologists) at the model forest feel about issues such as oil/gas, mining and forestry activities and their impact on the region, from a scientific/factual point of view. Perhaps a more active (rather than passive) public awareness campaign is needed.</p> <p>Education is very important and if the public sees through cameras or experience what a jewel we have then maybe more will be done by the govt to preserve habitats.</p>
Edmonton	<p>3 years ago my family and I, while visiting Jasper and Banff saw several grizzly bear info centers set up. My kids were able to touch a bear skull and fur pelt. The park was using animals killed by poachers as well as animals that had to be put down because of being dangerous to humans.</p> <p>This has touched my daughter deeply.</p> <p>The public should be informed on the dangers whether it be pamphlets handed out entering our parks or signs in these areas. Most tourists aren't taught enough, and feed the bears thinking they won't attack if you have food. The public needs to learn to respect the grizzly territory.</p>

Note: All statements in this table appear as they appeared in the original survey.

Table 21. Selected comments about poaching

Sample	Comments
Jasper	<p>I am glad that poaching comes with sever consequences, but I think there is always room for improvement. Steeper fines and longer jail time could be implemented to hopefully deter more poachers.... I strongly feel that if the presence of governing authorities in the backcountry were increased on a continual basis, that the number of poached animals would drop.</p>
Foothills Model Forest	<p>We all watched Mary and were proud of her and her new cubs and were totally disgusted when her life was taken by a gun.</p> <p>I believe the #1 reason for declining grizzly population are the idiots everyone knows as poachers.</p>
Edmonton	<p>More money is needed to ensure we have more park rangers with more power to access fines and help prevent damage to our ecosystem.</p>

Note: All statements in this table appear as they appeared in the original survey.

Table 22. Selected comments about balance

Sample	Comments
Jasper	<p>Finding the solution for all sectors of our community to enjoy this great resource is the challenge. It certainly won't be easy, but don't lock it away. That benefits no one, in the long run, and I believe the grizzly needs us as much as we need him there.</p> <p>Anyone who lives in bear country must give bears their place... move or accept your losses minimize your human affairs and respect bears required behavior. We more often than not are the problem. Not the bears!</p> <p>We need to promote a sustainable and healthy grizzly bear population even if it means regulating human use.</p>
Foothills Model Forest	<p>As a resident of a community that depends on resource industry, I know only too well that need to create balance between the environment and employment. I do not want to lose industry in our area but at the same time, I am often disgusted by the blatant disregards and lack of respect for the beauty that surrounds us.</p> <p>In my opinion Hinton and area is a great example of industry and government working together to ensure viable wildlife populations of all species. The fact we had enough extra wolves in our area to export some to the United States is proof that its not as bad as some special interest environmental groups would have us believe. A recent drive down to Cadomin from Hinton I saw approximately 25 bighorn sheep rams, 1 3 yr old grizzly, 2 spiker mule deer, and one cow moose all on mine property. Is there a problem for wildlife to co-exist with industry? I think not.</p> <p>I think that it is more important for humans and industry to survive than bears. Although I do not wish any animal extinction I do not think that we should shut down industry and our town for survival. They will survive and adjust as they have in the past.</p> <p>I have worked in the mining industry for over 32 years and dealt with grizzly bears for all these years. We have never had problems. We have learned to co-exist.</p> <p>I strongly believe that humans have souls and animals do not. I don't believe in cruelty to animals but I don't believe in worshipping them either. We are not and were not created equal.</p> <p>It is difficult to make decisions between jobs and nature. The economy of our province is very important and one can see this by the number of people that have moved here from other provinces. We need to strike a reasonable balance between the future of our children and the future of our wildlife. I believe industry needs to be monitored to ensure that all possible considerations are made to protect that wildlife of Alberta.</p>
Edmonton	<p>The grizzly bear (and maybe the wolf) are so dependent on a large unspoiled habitat that this should be the priority for their survival. These great creatures should come first in all decisions on land use. When they are gone from an area it is a great loss for all.</p> <p>We need industry, roads and recreation but not at the total expense of nature.</p> <p>When it comes to help in between humans and animals we should prefer humans.</p>

Note: All statements in this table appear as they appeared in the original survey.

The Role of the Public

All three groups indicated the public should have some role in grizzly bear management in the model forest, but few respondents indicated that the public should “set management goals and priorities and have professional managers carry them out” (Table 23). All groups selected the same top two choices: “act as a full and equal partner with professional managers in setting management goals and priorities” and “let professional managers set goals and priorities and then actively inform and educate the public about their decisions.” The former was preferred by the Jasper and FtMF groups and the latter by the Edmonton group. Although Edmontonians were interested in being involved and informed, they may not feel as competent to make decisions about grizzly bear management, or they may feel more comfortable leaving the decision with professional managers because they expect less impact on their lives.

Stakeholder Influence

The stakeholder group that received the greatest support for influencing decisions on grizzly bear management in the model forest was Parks Canada. It is the only stakeholder that a majority of respondents indicated should have a great deal of influence in decision-making (Table 24). A relatively large proportion also supported provincial government departments, Albertans who live in or near grizzly bear habitat, and environmental groups having a great deal of influence. Support for environmental groups was strongest among the Edmonton sample (42%), followed by Jasper (40%), and the FtMF (25%). The FtMF residents seemed divided in support for environmental groups; an almost equal proportion (22%) indicated they should have no influence. FtMF respondents were also divided in the amount of influence that municipal governments should have, with 20% indicating no influence and 21% indicating a great deal of influence. Although Edmonton and Jasper residents were quite supportive of aboriginal peoples having a great deal of influence, the FtMF group was not. Of the industries, the forest industry received the most support for a great deal of influence among

all three groups: Jasper (16%), FtMF (23%), and Edmonton (22%). There was little support for influence by other industries, tourism operators, hunters and outfitters, motorized and non-motorized recreationists, and Albertans who do not live in or near grizzly bear habitat. However, a majority of respondents from each group indicated most stakeholders should have at least some influence on decisions. The exception was motorized recreational users; majorities of the Jasper and Edmonton groups and 48.0% of the FtMF group indicated motorized recreational users should have no influence.

The Edmonton and FtMF groups showed the greatest discrepancies. For example, FtMF respondents were more likely than the Edmonton respondents to assign more influence to all industries, with the exception of ranchers. They also gave more influence to Albertans living in grizzly habitat and recreational groups. Edmonton respondents, on the other hand, were more likely to assign greater influence to Parks Canada, environmental groups, Albertans who do not live in grizzly habitat, and aboriginal peoples.

Respondents were also given the option to add other stakeholders they felt should have influence on grizzly bear management decisions and 178 respondents (15.8%) did so. The most common response (57 respondents) was to include grizzly bear biologists, ecologists, and other researchers. Other commonly suggested stakeholders included other federal government departments such as the Canadian Wildlife Service; the Canadian public; specific environmental, conservation, or animal rights groups; students or youth; and the international community.

Respondents were asked to indicate which of the stakeholder groups should have the most and least influence in decisions on grizzly bear management in the FtMF. For the most influence, Parks Canada was mentioned most frequently by all groups, followed by provincial government departments (Table 25). Environmental groups and Albertans who live in grizzly habitat were also mentioned frequently. Industry, recreational users, and Albertans living outside grizzly habitat were

the least preferred groups for having the most influence. Motorized off-road recreation users were most likely to be mentioned by the three groups as deserving the least influence (Table 26). Hunters and outfitters, Albertans living outside grizzly habitat, and the oil and gas industry, were also commonly chosen as deserving the least influence.

Although the questions asked respondents to indicate which one stakeholder group should have the most and least influence, many respondents indicated more than one group. Sixty-one people indicated multiple stakeholders who should have the most influence. They listed a total of 142 choices, an average of 2.3 per respondent. Among the multiple answers, the most common was Parks Canada, listed by 49 respondents. This was followed by Alberta government departments ($n = 27$), environmental groups ($n = 15$), and people who live in grizzly habitat ($n = 14$). Results therefore are very similar to the preferences of respondents who selected only one stakeholder. Eighty-five respondents indicated multiple stakeholders who should have the least influence. They listed 283 choices, an average of 3.3 per respondent. The most commonly mentioned group was the oil and gas industry, indicated by 52 respondents. This was followed by the mining industry ($n = 49$), motorized recreational users ($n = 39$), forestry industry ($n = 37$), hunters and outfitters ($n = 26$), ranchers ($n = 19$), and tourism operators ($n = 17$). This list differs somewhat from the single responses in that multiple responses seem to favor less influence for industry, particularly oil and gas, mining, and forestry. These respondents may have had difficulty choosing between industries when faced with the question as to which single group should have the least influence.

Respondents' Comments about Stakeholders

Eighty-five respondents commented about stakeholders: 29 from Jasper, 28 from the FtMF, and 28 from Edmonton (Table 27). Many respondents from Jasper and Edmonton expressed concerns over the provincial government's handling of grizzly bear management, such as the reluctance to declare the grizzly endangered and a perceived unwillingness to invest in conservation and protection programs. Another common sentiment from Jasper and Edmonton respondents was that industry has profit as its primary objective and therefore should not have too much influence over grizzly bear management. Both these sentiments were also present in the FtMF comments, but were less common. FtMF writers were more likely to express the feeling that outsiders and environmental groups should not have influence in decision-making. Ten writers indicated these groups should have no influence as they are seen as unaffected by grizzly bear management in the FtMF, or as not credible. The need for many stakeholders to collaborate to find a balanced and effective approach to grizzly management was also commonly expressed by all three groups. Other common comments included the importance of sound science and the input of biologists and ecologists to finding effective solutions (especially among Jasper respondents), frustration over the imposition of the will of outsiders on local residents (FtMF residents), and confidence in professional wildlife and park managers (especially among Edmonton residents).

Table 23. The public's role in grizzly bear management^a

Public role	Community group					
	Jasper		Foothills Model Forest		Edmonton	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Have no role; let professional managers set all management goals and priorities without actively informing the public	0	0.0	5	1.2	6	1.5
Let professional managers set goals and priorities and then actively inform and educate the public about their decisions	77	30.0	126	29.5	163	41.4
Consult with professional managers on goals and let them set the priorities	58	22.5	62	14.4	59	15.0
Act as a full and equal partner with professional managers in setting management goals and priorities	111	43.3	201	46.9	116	29.6
Set management goals and priorities and have professional managers carry them out	6	2.3	20	4.6	36	9.1
Other	5	1.8	14	3.4	14	3.5

^a $\chi^2 = 53.0$; $df = 10$; $p < 0.0001$.

Table 24. Who should have a say in decision-making?

Stakeholder group	Community group; % indicating amount of influence												A great deal <i>p</i> -value ^a
	Jasper				Foothills Model Forest				Edmonton				
	<i>n</i>	None	Some	A great deal	<i>n</i>	None	Some	A great deal	<i>n</i>	None	Some	A great deal	
Parks Canada	267	2.9	34.7	62.4	444	5.5	37.6	56.9	411	0.6	19.6	79.8	<.0001
Provincial government departments	263	3.7	57.9	38.4	440	6.4	52.9	40.7	412	7.3	49.7	43.0	0.1762
Environmental groups	265	6.3	53.9	39.8	441	21.9	53.4	24.7	411	8.6	49.3	42.1	<.0001
Albertans who live in or near grizzly bear habitat	263	1.6	67.7	30.7	441	5.0	61.1	34.0	413	6.9	66.3	26.9	0.01
Municipal governments	266	13.0	65.3	21.8	437	19.6	59.9	20.5	412	15.9	61.7	22.3	0.2249
Aboriginal peoples	267	14.4	59.1	26.5	439	29.4	55.1	15.5	411	21.0	57.7	21.3	<.0001
Forest industry	263	30.9	53.1	16.0	442	15.4	62.0	22.7	411	32.7	46.1	21.2	<.0001
Oil and gas industry	265	35.1	51.7	13.2	443	24.9	60.5	14.7	412	47.6	40.0	12.5	<.0001
Ranchers	267	20.7	64.9	14.3	440	16.7	71.1	12.2	411	22.5	65.8	11.7	0.196
Mining industry	262	34.3	53.8	11.9	443	23.3	62.6	14.1	411	49.0	39.8	11.2	<.0001
Tourism operators	266	26.1	62.0	12.0	440	27.4	60.4	12.2	411	39.4	48.1	12.5	<.0001
Hunters and outfitters	260	36.5	52.7	10.8	442	29.2	56.2	14.5	410	43.7	47.2	9.1	<.0001
Non-motorized recreation users	267	21.1	66.0	12.9	444	24.8	64.3	10.9	411	32.9	57.8	9.3	0.01
Albertans who do not live in or near grizzly bear habitat	264	35.1	54.9	10.0	442	47.0	46.7	6.4	410	35.9	58.0	6.2	<.0001
Motorized off-road recreation users	264	62.9	31.8	5.3	443	48.0	45.4	6.6	410	70.7	25.2	4.1	<.0001

^aBased on χ^2 test for goodness of fit.

Table 25. Who should have the most influence?^a

Stakeholder group	Community group					
	Jasper		Foothills Model Forest		Edmonton	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Parks Canada	97	45.8	121	31.6	203	53.8
Provincial government departments	35	16.5	115	30.3	67	17.7
Environmental groups	32	14.9	33	8.6	48	12.7
Albertans who live in or near grizzly bear habitat	29	13.4	59	15.4	21	5.6
Municipal governments	2	1.0	12	3.3	2	0.4
Aboriginal peoples	6	3.0	8	2.0	12	3.1
Forest industry	3	1.4	17	4.5	10	2.8
Oil and gas industry	3	1.6	1	0.3	1	0.1
Ranchers	0	0.2	0	0.0	4	1.0
Mining industry	3	1.2	4	0.9	5	1.4
Tourism operators	0	0.0	0	0.0	0	0.0
Hunters and outfitters	0	0.0	8	2.1	2	0.4
Non-motorized recreation users	2	0.8	2	0.6	4	1.0
Albertans who do not live in or near grizzly bear habitat	0	0.2	0	0.0	0	0.0
Motorized off-road recreation users	0	0.0	2	0.4	0	0.0

^a $\chi^2 = 101.5$; $df = 26$; $p < 0.0001$.

Table 26. Who should have the least influence?^a

Stakeholder group	Community group					
	Jasper		Foothills Model Forest		Edmonton	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Parks Canada	4	1.9	5	1.4	3	0.9
Provincial government departments	3	1.2	19	4.9	3	0.7
Environmental groups	3	1.6	35	9.0	9	2.6
Albertans who live in or near grizzly bear habitat	0	0.0	1	0.3	2	0.4
Municipal governments	14	6.4	16	4.2	14	4.1
Aboriginal peoples	7	3.3	39	10.0	23	6.4
Forest industry	4	1.9	6	1.7	20	5.5
Oil and gas industry	16	7.2	24	6.1	51	14.2
Ranchers	2	0.8	6	1.5	1	0.1
Mining industry	12	5.4	20	5.1	17	4.6
Tourism operators	8	3.5	15	3.9	16	4.4
Hunters and outfitters	35	16.1	45	11.7	49	13.6
Non-motorized recreation users	6	2.5	3	0.9	8	2.3
Albertans who do not live in or near grizzly bear habitat	19	8.6	74	19.1	32	9.0
Motorized off-road recreation users	87	39.6	78	20.2	112	31.3

^a $\chi^2 = 122.9$; $df = 28$; $p < 0.000$.

Table 27. Selected comments about stakeholders

Sample	Comments
Jasper	<p>I don't trust the Alberta provincial government as it has a "this province is for Albertans to use" mentality. Nor are loud mouthed single minded environmental groups very helpful. We need good biological studies and then need to act on them. "Stakeholders" need to stand down to the bears' needs not steer management so that their interests compromise the long term viability of the grizzly.</p> <p>A collaborative working group is generally the best approach for most organizations trying to change behavior of certain user groups. Involving representation from all user groups in the decision-making process results in decisions everyone can live with. Closures and banning certain groups generally results in little changed behavior. Although we may all not agree on certain uses in an area, we must allow all concerned to have input in any type of restrictive change.</p> <p>I perceive provincial (Alberta) government biologists to be knowledgeable and competent to develop programs to ensure grizzly bear conservation for a sustainable future, but I perceive political interference is a significant barrier to advancing grizzly bear population.</p> <p>I do not believe any groups should have any more influence than another groups in grizzly bear management. I think it is important however that those most involved should be very educated/informed on the issues facing grizzly bear management. For example there can be just as many uninformed persons in environmental groups as there are hunters or ranchers. I also think it is important that all of the groups listed have an equal say so that a variety of voices and viewpoints are heard. Basically, do not allow the uninformed to have any involvement in decision making as difficult as this may be.</p> <p>Who speaks for the grizzlies, some environment groups think they are speaking of behalf of myself or there members, some industry types say what there doing is ok. We all know they are more interested in bottom lines and corporate image.</p>
Foothills Model Forest	<p>What angers me most however is 'city people' who are not facing job losses expressing their opinion on my community. Without any respect or consideration for the devastating blow mine/forestry closure have on the families and communities that depend on the income/economy. To these people I say "OK, you quit your job and then come and tell me that its OK to devastate my neighbors' lives for the sake of the environment."</p> <p>All forms of industry whether it is forestry, oil and gas, mining and even tourism are greedy! Their greed and profit margins are always their priority when making decisions and none should have influence on decision making when the environment is concerned. When \$ are removed, only then is a person objective.</p> <p>I think it is easy for environmental groups to verbally attack industry when it comes to developing in bear habitat (i.e., mining). I would have more respect for the environmental groups if they did more pro-active things i.e., help to discourage the legal and illegal shooting of all bears.</p>

Table 27. Concluded

Sample	Comments
Foothills Model Forest	<p>I realize it would not be possible to implement a grizzly management program in the Model Forest without the input of mining, forestry and oil and gas concerns. I do not believe, however, that they should have any real power in the decision making. A public forum could be held to rate concerns or ideas, but the majority of the public does not know enough to make good decisions concerning grizzly bears or their habitat. Professional consultants should be used for information or implementation only. The final decisions can only be made by a public body of gov representatives. If in that case the decisions are wrong there are more checks and balances. The grizzly bears are a natural resource, we cannot let private interests of any concerned group determine their future.</p> <p>Provincial Governments have the best understanding of the needs of Alberta. I doubt that 5% of the people in Ottawa know the difference between a polar bear and a grizzly bear. This is a provincial matter. Ultimately the people must be heard. It is the professionals responsibility to educate the public and then listen to all the stakeholders for direction.</p>
Edmonton	<p>Increased public involvement may lead to more pressure being put on industry and government to think more about nature and the environment, than the dollar or mineral/timber lease value.</p> <p>I believe that industrial interests, forestry, mining and oil-natural gas, are already overwhelmingly represented through the influence they wield over our provincial government. Their environmental record is dismal and I do not trust them in these matters at all.</p> <p>I expect it is going to be a challenge to save the grizzlies even if the management of this task is handled by those who care to save them. Very little hope of success if managed by people with a conflict of interest, whether these be in the 'public sector' or in 'professional managements' areas. The key question is the goal of the 'management' whether it is to save the grizzlies from extinction or to 'manage' them so they don't interfere with people.</p> <p>I remember with love the many evenings spent with park naturalists at the campground amphitheatres, being educated about the parks and wildlife. These people helped forge a deep respect and protective urge for bears in me.... It is those people I want making decisions in grizzly bear management. Not people in offices removed from the land of the grizzly bear.</p> <p>ENGOs (Environmental Non-Government Organizations) should have a lot more influence in decisions regarding forestry management and grizzly bear habitat.</p>

Note: All statements in this table appear as they appeared in the original survey.

This study provides insight into some of the human dimensions of grizzly bear management and has several implications for grizzly bear management and communications for the FtMF. Respondents from Jasper, other FtMF communities, and Edmonton demonstrated experience with grizzly bears but had little knowledge of grizzly bear biology and ecology, they had positive attitudes toward them, and supported many management options aimed at achieving forest sustainability while balancing the needs of grizzly bears. They perceived grizzly bear populations in the FtMF as sustainable, but rated many potential threats as posing risks to the population. Management implications of these findings focus on educational opportunities, public support for management options, potential conflicts in grizzly bear management, and engaging the public in management decisions.

Educational Opportunities

The FtMF Grizzly Bear Program is not well known outside of the FtMF. Nearly two-thirds of Edmonton respondents indicated they were not at all informed about grizzly bear research in the FtMF. In addition, the knowledge measure suggests that Albertans lack information about grizzly bear populations, their habitat requirements, and the impact of human activities on grizzly populations. Even FtMF residents, although aware of the Model Forest Grizzly Bear Program, exhibited low knowledge of grizzly bears. This suggests that publicity about the research program is effective but results from the research may not be reaching the public. Transferring results from the research program to natural resource managers is a primary goal of Phase III of the FtMF. However, if management efforts are to be supported, then it will be necessary to ensure that the results are also conveyed to a broader public.

In contrast to the opinions of bear biologists (McLellan 1990; Gibeau et al. 2002; Kansas 2002; Nielsen, Herrero et al. 2004; Alberta Grizzly Bear Recovery Team 2005), the public does not seem to

consider the population in danger of decline. Most respondents viewed the grizzly bear population in the model forest as at least somewhat sustainable, and many FtMF respondents viewed it as very sustainable. In addition, most respondents either believed or were not sure that the grizzly bear has been declared an endangered species by the government of Alberta. Therefore, they may also think the grizzly bear is afforded more protection in the province than is currently the case. Additionally, the bears' basic habitat requirements were not well understood. For example, many respondents viewed the Canadian Rockies and hence much of the model forest as being the best grizzly bear habitat in North America, while many other respondents were unsure. The lack of basic understanding of the bears' status and habitat requirements are examples where the model forest could transfer bear research findings beyond the model forest boundary. Effective management of grizzly habitat will require constraints on human disturbance (Weaver et al. 1996; Gibeau et al. 2002), and education about threats to grizzly bears may increase acceptance of such limitations. The positive attitudes toward grizzlies exhibited in this study suggest that Albertans would be receptive to information on grizzly bears and their conservation.

Public Support for Management Options

Management options that do not require trade-offs, such as education and increased law enforcement, were most strongly supported. However, changing existing operations for oil and gas, forestry, and mining to better address the needs of grizzly bears was also supported and new industrial development was opposed. Clearly, there is support for making some sacrifices of industrial development and economic opportunities to enhance grizzly bear conservation. In addition, several management options that would restrict hunting (such as a temporary ban on hunting grizzly bears) and access (such as a temporary closure of roads) were supported.

Only three options elicited disagreement between the study groups: the expansion of mining, permanent closure of roads and trails to off-road vehicle users, and a permanent ban on grizzly hunting. It appears that support for new mining and opposition to permanent road closures and a permanent hunting ban occurs primarily among respondents with specific interests. Off-road vehicle users and random campers in the FtMF sample appear to be the main source of opposition to permanent road closure, people dependent on mining in the FtMF sample were the source of support for new mines, and hunters were the source of opposition to a permanent ban on grizzly bear hunting.

Awareness of differences among groups with specific interests will help FtMF managers develop potential mitigation to offset negative impacts if these management options are implemented. For example, managing access through restriction and enforcement may meet with a large degree of opposition from off-road vehicle users. Therefore, development of off-road vehicle opportunities in areas of low habitat suitability or areas not frequented by grizzly bears may help to mitigate lost opportunities and gain public support. If off-road vehicle or random camping opportunities will be impacted negatively by access restrictions, it may be necessary to take a proactive approach to managing these activities in the model forest. Opening new opportunities such as off-road vehicle trails with random camping opportunities away from grizzly bear areas that meet the specific needs of recreationists might help mitigate closed access. For example, a study in the Sunpine Forest Products forest management agreement area of Alberta indicated that off-road vehicle campgrounds with designated trail networks were desirable among random campers (McFarlane et al. 2003). Providing such opportunities in the model forest might help offset opposition from these groups. The extent to which such camping opportunities are acceptable to FtMF off-road users and random campers should be explored further.

Potential Conflicts

Although there was general agreement among the three groups on perceived threats to grizzly bears, attitudes toward grizzly bears, and management preferences, there were also some notable differences. The FtMF respondents were more optimistic about the sustainability of grizzly bear populations in the model forest, perceived less risk to grizzly bears from industrial activities, and were not as receptive to restrictions on public access and industrial expansion in grizzly bear habitat. Rural residents and people employed in primary industries often had more negative attitudes toward wildlife and pro-environmental policies (Lohr et al. 1996; Kaltenborn et al. 1998; Ericsson and Heberlein 2003). Interestingly, however, attitudes of the FtMF sample toward grizzly bears were similar to those of Edmonton residents, and quite positive. Of the three groups, Jasper residents generally held stronger attitudes (i.e., their ratings were generally more positive or more negative than the FtMF and Edmonton respondents). Understanding attitudinal differences is important to gaining acceptance of grizzly bear conservation initiatives because individuals with extreme attitudes may be less receptive to alternative views and less likely to change their views (Bright and Manfreda 1995). Although other studies have shown that urban residents tend to represent extreme attitudes and preferences and are a major source of conflict in natural resource management (Ericsson and Heberlein 2003; Patterson et al. 2003), this study suggests that the potential for conflicts over grizzly bear management may be greatest within the FtMF—between residents of Jasper and residents of other communities in the model forest. These findings are consistent with those of Kellert et al. (1996), who concluded that attitudinal differences tend to be polarized with increasing proximity to grizzly habitat. Because areas rich in natural resources tend to attract people who hold differing viewpoints, such as nature enthusiasts and people involved in extractive industries, conflicts over

management preferences can be anticipated and may be compounded by positive and negative personal experiences with bears.

Several demographic differences may help explain the differences in attitudes and preferences between the Jasper and the FtMF respondents. For example, the Jasper group had a higher proportion of females, younger people, people with more education, and people involved in environmental organizations and natural history and birdwatching clubs. All these characteristics have been related to attitudes and management preferences, such as support for reintroduction of wolves (e.g., Bath 1989; Kellert 1991; Lohr et al. 1996; Bjerke et al. 1998). Also, the Jasper sample had very high employment in tourism and natural resource agencies, whereas the FtMF sample was highly dependent on forestry, mining, and petroleum sectors. Perceptions of differing impacts on these industries may also affect attitudes and management preferences. As well, it may be that national parks tend to attract people with certain values or attitudes, or that living in parks results in exposure to certain attitudes. Future analysis of these data will include multivariate analysis to explore the influence of demographics, knowledge, and experience with grizzly bears on attitudes and management preferences.

Engaging the Public

Stakeholders that traditionally have had considerable influence in natural resource and wildlife management decisions in Alberta, such as extractive industries, hunters, and off-road vehicle users, were not supported in having a lot of influence by local model forest or Edmonton residents. Although there was support for a variety of stakeholders having some influence in decisions on grizzly bear management, respondents agreed that Parks Canada, provincial government departments, environmental groups, and local residents should have more influence. Surprisingly, all samples gave environmental

groups more support in influencing decisions than municipal governments, aboriginal peoples, industries, hunters, and off-road vehicle users. This occurred despite the fact that only the Jasper group had a relatively high proportion belonging to an environmental-related organization. In other words, this support for environmental groups seems to transcend membership in environmental groups to support from a broader public.

Other studies suggest rural residents resent a perceived urban dominance in resource management (Ericsson and Heberlein 2003; Patterson et al. 2003). Edmonton residents, however, agreed with the model forest groups that locals should have more influence than non-locals in grizzly bear management decisions. Additionally, many Edmonton residents seem content in having a less active role than residents of the model forest. The Edmonton group was more supportive of letting professional managers set goals and priorities and then being informed and educated of their decisions. In contrast, most local residents wanted an active role as equal partners in setting goals and priorities for grizzly bear management. However, involving only local residents will present a challenge if consensus is sought on management decisions because of the differences in attitudes and preferences between Jasper and FtMF residents. As well, although Edmonton residents appeared willing to accept locals having more input, they may not agree with the outcome if the decisions cater to specific interests in the model forest. For example, a decision to allow new industrial development in grizzly bear habitat may appeal to a limited local interest and not be supported by citizens who are not employed by a natural resource sector. Therefore, public involvement in grizzly bear management in the FtMF should include processes that foster an open discussion and deliberation of values and preferences and that result in the public having a meaningful impact on decision-making.

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