COMPARING RESIDENT AND VISITOR TRAIL USE IN JASPER NATIONAL PARK: IMPLICATIONS FOR FUTURE MANAGEMENT OF THE DAY-USE NETWORK

by

Colleen E. Anderson

B.R.M. (Honours), Acadia University, 1997

B.Sc. (Biology), Dalhousie University, 2000

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Name: Colleen E. Anderson

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Examining Committee:

Chair: **Krista Englund**

Dr. Wolfgang Haider
Senior Supervisor
Associate Professor
School of Resource and Environmental Management
Simon Fraser University

Wayne Tucker
Committee Member
Parks Canada Agency
Backcountry Recreation Specialist for the Mountain Parks

Dr. Murray Rutherford
Committee Member
Assistant Professor
School of Resource and Environmental Management
Simon Fraser University

Date Approved: April 14, 2005

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ABSTRACT

High quality outdoor recreation opportunities attract both residents and visitors to Alberta's Jasper National Park. An extensive day-use trail network surrounds the Town of Jasper and is widely used by hikers, mountain bikers, and horseback riders. But because this landscape is also of high value to wildlife, Parks Canada must manage the network for both ecological and social values. This study is intended to complement recent ecological work and augment current understanding of human use in this area.

Study results suggest residents and visitors use the network differently. Residents use the trails primarily for fitness, whereas visitors are mainly interested in experiencing the outdoors. While both groups value the current network, residents appear more protective of their recreational opportunities and are less supportive of management actions infringing upon their own use. These differences accentuate the importance of ensuring future management of the trail network reflects the needs of diverse users.

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To the Fox Force, truly a highlight of my time in Vancouver—may a reunion be lurking on some horizon.

To my family, thank you for instilling in me the value of hard work and the importance of high expectations.

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CHAPTER ONE: INTRODUCTION

1.1 Background and project rationale

Since the 1950s, outdoor recreation has grown dramatically in popularity (Cordell & Super, 2000). Improvements in transportation, increases in affluence and leisure time, and a host of other social changes have combined to alter its role and significance in North American life. In natural settings, outdoor recreation primarily involves the use of public lands. Canada's national parks are included among these areas, receiving approximately sixteen million person visits each year (Parks Canada Agency, 2004).[1] While not all of these individuals participate in outdoor recreation activities, estimates from a recent survey of visitors to the four Rocky Mountain Parks (Banff, Jasper, Yoho, and Kootenay) suggest approximately half of the 3.4 million visitors in 2003 engaged in some form of outdoor recreation (Parks Canada Agency, Canadian Tourism Commission, Alberta Economic Development, and the Mountain Park Visitor Survey Partnership, 2004).[2]

[1] "Person visit: Each time a person enters the land or marine part of a reporting unit for recreational, educational, or cultural purposes during business hours; through, local and commercial traffic are excluded; same day re-entries and re-entries by visitors staying overnight in the reporting unit do not constitute new person-visits" (Parks Canada Agency, 2004).

[2] Calculations using the Mountain Park Visitor Survey database indicated 50.3% of respondents had participated in at least one of the following activities: birdwatching, cycling/mountain biking, fishing, canoeing/kayaking, rafting, taking a boat cruise, walking, hiking, backpacking, horseback riding, mountaineering, golfing, cross-country skiing, skiing/snowboarding, snowshoeing, and ice climbing.

Despite the popularity of national parks as destinations for outdoor recreation enthusiasts, Canada's National Parks Act currently legislates public use and enjoyment as secondary to the protection of natural resources and processes (Wright & Rollins, 2002). Historically, however, this dichotomy has been somewhat ambiguous. Initially, national park establishment was influenced more by the nation's focus on economic development and the prevailing social values rather than by the need to preserve wilderness (McNamee, 2002). The potential for these natural areas to contribute to the national economy, both through resource extraction and their tourism value, drove the establishment of new national parks through the first half of the twentieth century.

Growing concern for the environment throughout the 1960s marked the beginning of a shift in the public's perception of national parks (McNamee, 2002). Policy amendments reflected this change, stating "ecological and historical integrity are Parks Canada's first considerations and must be regarded as prerequisites to use" (Parks Canada, 1979, s. 1.1). The concept of maintaining "ecological integrity" continued to feature prominently in later changes to parks policy and legislation as progressively stronger emphasis was placed on the preservation of ecological values over human enjoyment (Dearden & Dempsey, 2004; McNamee, 2002).

However, despite the evolution of national park policy, most people continue to view parks and protected areas as "essentially scenic, natural and historic heritage areas, whose principal use is recreation" (Nelson, 1998, p. 279). Consequently, one of the greatest challenges faced by managers of national parks and protected areas today is how to cope with the staggering numbers of visitors seeking recreation in natural

environments (Sowman & Pearce, 2000). Although once considered benign, recreational use has since been identified as the "most obvious, well-known, and most intensively managed threat to wilderness and parks" (Cole & Landres, 1996, p. 170). Should visitors lack the appropriate knowledge and ethics to guide their use of the park's resources, they may conflict with wildlife or cause damage to the physical environment (Cole, 1993; Hammitt & Schneider, 2000; Hood & Parker, 2001; Manning, Ballinger, Marion, & Roggenbuck, 1996). While enjoyment and resource protection are by no means mutually exclusive, creative management strategies are required to ensure visitor activities do not cause irreparable ecological damage.

This challenge becomes more complex when park managers must also consider the needs of residents living either within or directly adjacent to national parks. Seven of Canada's national parks have townsites within their boundaries (Government of Canada, 2000, s. 2[1]) while others have been established on lands bordering local communities. Given the beautiful scenery and the access to recreational opportunities typically associated with national parks, some may perceive these areas as offering the ideal backyard. Although research focusing on park residents is limited, the results of several studies suggest that these individuals greatly value the recreational opportunities afforded by the national park landscape (Lathrop, 2003a; Manning & Valliere, 2001; Mauro, Stark, & McVetty, 2001; Mauro, 2002; Nickerson, 2003; Stedman, Beckley, Wallace, & Ambard, 2004).

However, the benefits of living in a national park come at a cost; Parks Canada's obligation to protect ecological integrity imposes limits on the activities permitted in the

park landscape. In the context of outdoor recreation, restrictions on use may be deemed necessary in areas of high ecological concern. However, the success of these measures – or any other management actions – will be influenced by their acceptability to the public. As expressed by Bixler, Noe, and Hammitt, "Without visitor support for management policies, managers can expect an erosion of public and political support, further threatening a park's integrity" (1992, p. 336). Their findings that frequent visitors tend to be less supportive of restrictive park policies than non-frequent visitors indicate park visitors cannot be treated as a homogeneous group. This appears to be particularly true when local users are involved.

Although research comparing the management preferences of local residents and park visitors is scarce, some work was conducted in Alberta's Jasper National Park (hereafter referred to as Jasper NP)—home to one of Canada's seven national park communities. A 1994 trail survey highlighted several differences in the respective patterns of use, needs, motivations, and attitudes of local and visiting trail users.[3] Among these differences was the finding that Jasper residents are less supportive than visitors of hypothetical trail closures for wildlife protection purposes (Canadian Heritage, 1995a). Of particular interest is that these results appear analogous to those of Bixler et al. (1992).

Similar to the frequent and non-frequent users in Bixler et al.'s (1992) study, residents and visitors likely have a disproportionate reliance on the Jasper landscape. Whereas visitors are present for only a finite period of time, many residents live in the Town of Jasper year-round and hence, may recreate primarily in this area. In fact, Jasper

[3] Although the study results compared the responses of local and non-local visitors, it is important to note that permanent Jasper residents accounted for only 10% of the 486 survey participants (Canadian Heritage, 1995a).

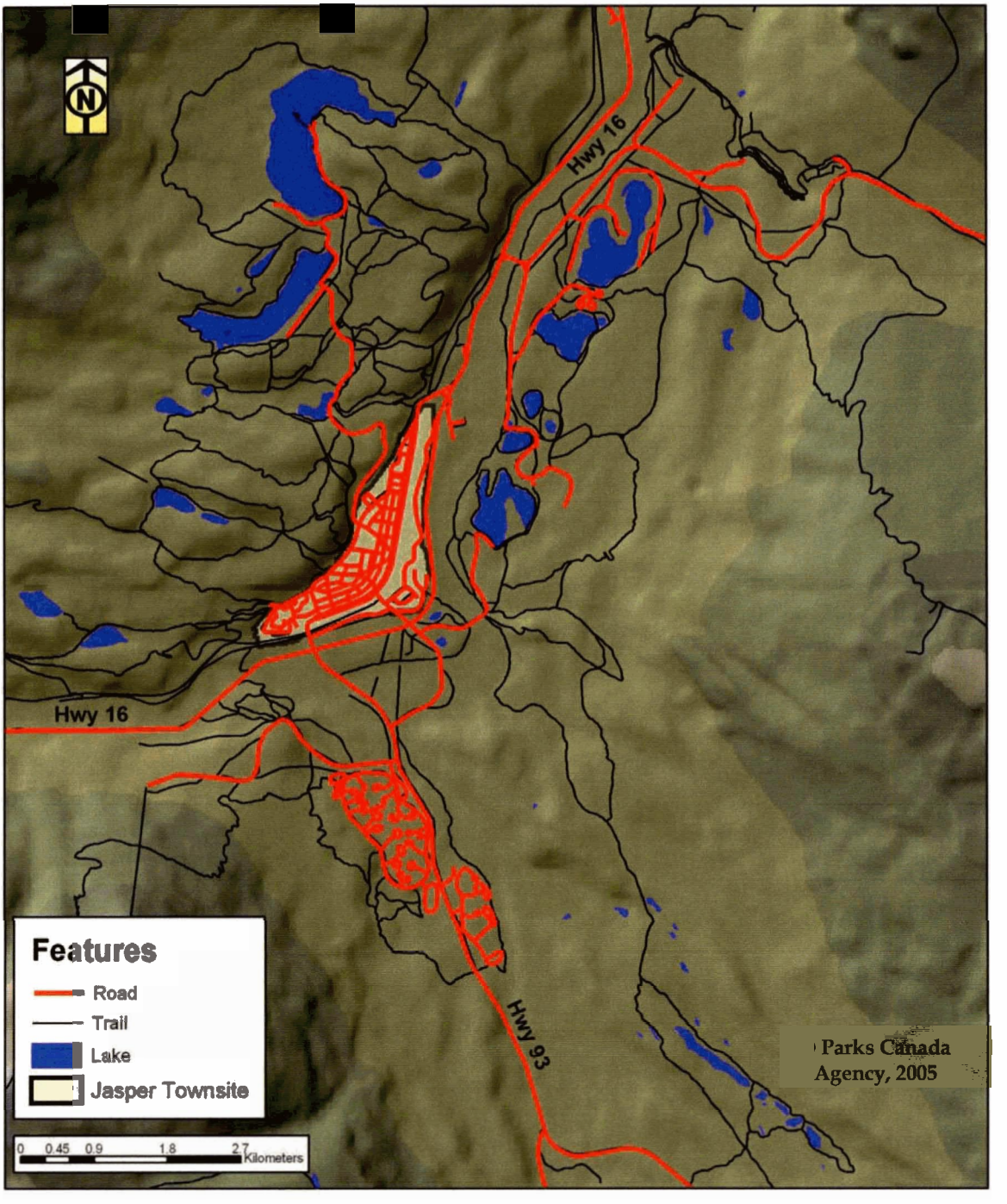
residents interviewed as part of a study on community attachment rarely mentioned recreating outside of the park (Stedman et al., 2004). Consequently, park residents may be more protective of their access to recreational opportunities and more resistant to restrictive management policies intended to protect the integrity of these natural areas. The current study explores this idea, building upon the previous Jasper trail study to include a more detailed investigation of the patterns of use, level of satisfaction, and preferences for trail management of Jasper residents and visitors.

1.1.1 Study context

Development and human use in Jasper NP are concentrated at the confluence of the Athabasca, Maligne, and Miette Rivers (Parks Canada Agency, 2001a). Known as the Three Valley Confluence (3VC), this area is home to the Town of Jasper and its 4,800 permanent residents. Overnight summer population estimates for the town approach 20,000 (Parks Canada Agency, 2001a) since most of the 1.9 million people visiting Jasper NP each year spend time in this area (Parks Canada Agency, 2004).

The bulk of recreational opportunities in the 3VC exist by virtue of an extensive day-use trail network surrounding the Town of Jasper *(Figure 1)*. The 154 kilometre network is heavily used by both residents and visitors, offering recreational opportunities for hikers, horseback riders, and mountain bikers in the summer months, and cross-country skiers and snowshoers in the winter months. However, this landscape is not only of high value to humans; because it is situated in the heart of the park, the 3VC is a also significant axis for wildlife movement and dispersal (Parks Canada Agency, 2001a).

Figure 1: The Jasper day-use trail network



Map used with permission from Parks Canada Agency

In fact, both the trail network and the Town of Jasper are situated in the most biologically diverse area of the park. Known as the montane ecoregion, this area provides habitat for more species of plants and animals than are found at higher elevations (Cardiff, 2000; Parks Canada Agency, 2001a). The implications of high levels of human use for ecological functioning in the 3VC are well recognized. In 2000, these concerns stimulated a consultative process that reviewed key ecological issues and recommended tools to contribute to recovery in this area (AXYS Environmental Consulting, 2001). In response to these recommendations, Parks Canada worked with community stakeholders and expert consultants to devise an overall strategy for improving ecological integrity in the 3VC (Parks Canada Agency, 2001a).

Both the *Jasper National Park of Canada Management Plan* (Parks Canada Agency, 2000c) and the *Three Valley Confluence Restoration Framework* (Parks Canada Agency, 2001a) emphasize the importance of actively managing human use to ensure both residents and visitors experience the park without adversely affecting ecological integrity. In the context of outdoor recreation, restoring habitat connectivity in the 3VC requires park managers to devise more effective strategies for managing trail use (AXYS Environmental Consulting, 2001; Parks Canada Agency, 2001a). Although ecological research has granted an understanding of wildlife movement through this landscape, little is known about the recreational use of the trail network. However, this human use data is required if Parks Canada is to successfully manage the 3VC for both social and ecological values.

1.2 Purpose and objectives of the study

The purpose of the Summer Trail Use Study 2003 was to collect, analyze, and interpret human use data that will be used to guide future trail management decisions in the 3VC. Data collected by this study was intended to both complement recent ecological research in the 3VC and augment the current level of understanding of human use of the day-use trail network. Study findings were also anticipated to contribute to the development of a social vision for this landscape, hence corresponding with the ecological vision shaped by recent ecological initiatives (e.g. AXYS Environmental Consulting, 2001; Dobson, Whittington, St. Clair, & Wesbrook, 2004; Mercer, Carrow, & Deagle, 2000; Mercer, Deagle, & Carrow, 2002; Parks Canada Agency, 2001a; Whittington, 2002).

The current document explores only selected results from the Summer Trail Use Study 2003, focusing specifically on differences between residents' and visitors' use of this network and the resultant implications for trail management.

1.3 Research questions

This document addresses the following research questions:

1. Do the patterns of trail use of residents and visitors differ?
2. Do the motivations of residents and visitors differ?
3. Do their respective levels of satisfaction with the existing trail network differ?
4. Do the ways in which residents and visitors seek information about the trail network differ?
5. Do the factors affecting their quality of experience differ?

6. Do their preferences for trail management differ?
7. What are the management implications of the study findings?

1.4 Overview of research methods

This project draws information from three of the four data collection methods employed by the Summer Trail Use Study 2003: intercept surveys, mail surveys, and discussion groups. Although trail counter data was also collected for the study, it has been omitted for the current purpose.

During the summer of 2003, intercept surveys were conducted at fourteen sites within the study area.[4] Willing trail users were stopped and asked about that particular trail experience. They were also asked if they would participate in a more detailed mail survey, to be distributed in September 2003. Mail survey questions investigated residents' and visitors' patterns of trail use, motivations, satisfaction with the current network, and preferences for trail management. To provide greater insight into resident attitudes, discussion groups for hikers, dogwalkers, mountain bikers, and horseback riders were also held in March 2004. In addition to identifying the trail characteristics preferred by participants and ways in which the existing network could be improved, these sessions also enabled further exploration of user conflict and unofficial trail use.

[4] The study area was bounded by the Pyramid Bench to the west, the Overlander trail to the north, Trail 7 to the east, and the Valley of the Five Lakes to the south.

1.5 Organization of this document

This document is organized in five chapters. Chapter One presented the background and rationale for the study, the purpose of the study, research questions, and a brief overview of research methods. Chapter Two reviews literature pertaining to the presence of residents in national parks, the evolution of national parks management in Canada, potential social and ecological impacts of recreation, and the various strategies used to manage recreationists. Chapter Three describes methods used to both collect and analyze the data. The fourth chapter presents selected results of the Summer Trail Use Study 2003, comparing the responses of residents and visitors. Finally, Chapter Five discusses the implications of these results for future management of trail use in the 3VC.

CHAPTER TWO: LITERATURE REVIEW

2.1 Communities in national parks

The presence of resident communities within national park boundaries is not unusual in an international context, and is even considered commonplace in densely populated countries where park establishment has been relatively recent. In England and Wales, for example, the 250,000 people living in national parks own most of the land and control the majority of economic activity (Dower, 1995). This reality provides a stark contrast to the Canadian experience, where national parks are now primarily intended to protect ecological values and processes rather than exist as working landscapes. Consequently, the occurrence of communities within seven of Canada's national parks presents an interesting challenge for management.

The Canada National Parks Act requires each of the seven national park communities to produce a community plan to guide future growth and land use (Government of Canada, 2000, s. 33[1]). The Minister of Canadian Heritage must approve each plan, ensuring it is consistent with both the Canada National Parks Act and Parks Canada's Guiding Principles and Operational Policies. Shortly after the approval of the *Jasper Community Land Use Plan* in June 2001, the Town of Jasper achieved local government and joined Banff to become the second self-governed townsite within a Canadian national park (Parks Canada Agency, 2002). Aside from the authority retained by Parks

Canada over land use planning and development, the Town of Jasper now has the full responsibilities of an Alberta municipality.

Jasper's location within a national park means residents have access to numerous opportunities not available in most towns of a similar size (Parks Canada Agency, 2001b). The many activities attracting park visitors also contribute to the high quality of life enjoyed by Jasper residents. Trail use, in particular, is considered integral to the local lifestyle (Cardiff, 2004). Residents of nearby Banff NP share this sentiment, as some consider access to trails and high quality trail experiences a key element of their quality of life (Mauro et al., 2001).

Although the limited number of sizeable communities within Canadian national park boundaries prevents further comparisons, research on residents living in adjacent communities provides similar accounts of the recreational benefits offered by nearby national parks. Manning and Valliere's (2001) study of resident use of the carriage roads in Maine's Acadia NP found almost all respondents had used these roads, and many had used them for nearly 20 years. Similarly, both residents (Nickerson, 2003) and business leaders (Lathrop, 2003a) living adjacent to Montana's Glacier National Park cited outdoor recreation opportunities as one of the main benefits of living in this region.

However, locals are not alone in their enjoyment of these areas; in general, as tourism grows in a community, visitors may begin to seek the same cultural, biophysical, and recreational opportunities. The resultant competition for scarce resources can displace residents from their favourite sites (Eagles & McCool, 2002). When Washington's North Cascades NP was established, for example, the influx of tourists crowded local residents

out of some leisure and recreational activities (O'Leary, 1974). Although not in the context of national parks, similar dynamics are also reported in the broader tourism literature (Ap & Crompton, 1993; Lankford, Pfister, Knowles, & Williams, 2003; Liu & Var, 1986; McCool & Martin, 1994; Perez-Verdin, Lee, & Chavez, 2004).

In some situations, separate management policies may be considered appropriate in order to protect recreational opportunities for residents. For example, increased competition for fishing on Montana's Big Hole River has led to the prohibition of non-resident fishing on certain days of the week (Eagles & McCool, 2002). Similarly, Parks Canada is currently working with members of the community, snowmobile clubs, and environmental organizations to devise separate guidelines for resident and non-resident snowmobiling in Newfoundland's Gros Morne NP (J. Anderson, personal communication, March 4, 2005).

While differential management approaches may be neither practical nor desirable in most situations, understanding how both residents and visitors utilize the recreation resource may help to explain differences in each group's attitudes towards management policies. During a management planning process for British Columbia's Garibaldi Provincial Park, differences in the views voiced by local and non-local visitors tended to reflect what this area represented for each group (Saremba & Gill, 1991). Since visitors from Vancouver mainly use the park for activities considered compatible with wilderness management practices, this group advocated preservation values. In contrast, because nearby Whistler residents use the area to engage in "near-urban" activities such as snowmobiling, mountain biking, horseback riding, fishing, and

hunting, they believed this area should be managed for a wider spectrum of recreational needs. Consequently, differences in the respective needs of residents and visitors may have significant implications for management.

In a recent study of resident trail use in Banff NP, some participants suggested that because residents' perceptions and expectations of a quality recreation experience differs from that of visitors, the trail network should provide suitable opportunities for both groups (Mauro et al., 2001). A similar gap appears to exist between the motivations, needs, and patterns of use of local and visiting trail users in Jasper NP (Cardiff, 2004). Whereas residents' choice of trails reflects their personal experience, visitors tend to select trails promoted by Parks Canada information sources. Additionally, Cardiff suggests these two groups have different perceptions of the national park landscape and their relationship with it.

In general, understanding the needs, motivations, and expectations of park users is key to developing effective policies (Eagles & McCool, 2002). Recognizing that fundamental differences may exist between park residents and visitors (e.g. Mauro et al., 2001, Canadian Heritage, 1995a; Saremba & Gill, 1991), it appears important to consider how management actions will affect each group rather than treating park users as homogeneous. Although the presence of resident users adds a further dimension to national park management, the broader challenge is ensuring human use does not occur at the expense of ecological integrity. The following section clarifies this responsibility, outlining how Parks Canada's approach has evolved to reach its present mandate.

2.2 The evolution of national park management in Canada

Although national parks policy identified ecological integrity as a prerequisite to use more than twenty-five years ago (Parks Canada, 1979), translating this direction into practice has proven a gradual and challenging process. Parks Canada's commitment to maintain ecological integrity was formalized as law in 1988, when amendments to the Canada National Parks Act identified it as "the first priority when considering Park zoning and visitor use in a management plan" (Government of Canada, s. 5[1.2]). However, in the decade to follow, two studies called this commitment into question.

In 1994, growing concern over the state of Banff National Park's Bow Valley led the Minister of Canadian Heritage to form a task force to assess the cumulative environmental impact of development and use in the Bow Valley watershed (Banff-Bow Valley Study, 1996a). The Banff-Bow Valley Task Force reported serious environmental pressure in Banff National Park, raising concerns about the state of ecological integrity in Canada's other national parks (Parks Canada Agency, 2000a).

In response to these findings and the Liberal Party's 1997 Red Book commitment to address ecological integrity in national parks, in 1998 the Minister of Canadian Heritage commissioned a wider study of the state of Canada's national parks (Parks Canada Agency, 2000b). The Panel on Ecological Integrity was tasked with assessing Parks Canada's approach to the maintenance of ecological integrity and making system-wide recommendations based on their findings. Following this two-year process, the Panel identified a number of threats to the ecological integrity of Canada's national parks. While policies to enact management for ecological integrity were clearly already in

place, the Panel observed Parks Canada had yet to adopt these policies as practice (Parks Canada Agency, 2000a).

As promised in an action plan released in response to the Panel's report (Parks Canada Agency, 2000b), Parks Canada solidified its commitment to ecological integrity with the development of new national parks legislation in 2000. The new Canada National Parks Act strengthened the former ecological integrity clause by stating, "Maintenance or restoration of ecological integrity, through the protection of natural resources and natural processes, shall be the first priority of the Minister when considering all aspects of the management of parks" (Government of Canada, 2000, s. 8[2]). In addition, consistent with Panel recommendations, the new Act defines ecological integrity for the first time in legislation. Parks Canada expanded on the definition that had appeared in its 1994 Guiding Principles and Operating Policies, stating:

> "Ecological integrity" means, with respect to a park, a condition that is determined to be characteristic of its natural region and likely to persist, including abiotic components and the composition and abundance of native species and biological communities, rates of change and supporting processes. (Government of Canada, 2000, s. 2[1])

Although the prioritization of ecological integrity is now unequivocally clear in legislation, enjoyment remains a secondary purpose of national parks. However, as expressed by the Panel on Ecological Integrity, "the term 'enjoyment' in the Act does not mean that people have the right to use the Parks in ways or levels of use that have negative impacts on ecological integrity and hence on the experience of future generations" (Parks Canada Agency, 2000a, p. 11-2). Included in the Panel's

recommendations was the need to base human use in national parks on the principle of responsible experience, ensuring this use does not lead to abuse.

2.2.1 *Managing human use in national parks*

The concept of managing human use in national parks is by no means new; over the past two decades, Parks Canada has used various approaches and terms to describe its understanding and management of human/environment relations (Kachi, 2004). The Visitor Activity Management Process (VAMP) represents one such attempt (Graham, Nilsen, & Payne, 1988). By integrating social science information with data about the natural and cultural environment of the park, this process attempts to "match visitor interests with the specific educational and outdoor recreation opportunities determined for each national park through the management plan" (Canadian Heritage, 1994, s. 4.1.1). Despite its potential, this framework has had few applications (Newsome, Moore, & Dowling, 2002; Payne & Nilsen, 2002); severe budget cuts in the early 1990s dramatically reduced Parks Canada's activity in this area, not to mention its overall social science capacity (Kachi, 2004).

However, Parks Canada's adoption of an ecosystem approach to management has since highlighted the need to rebuild its social science capacity and reinvest in "human use management" – an approach focusing on "understanding, influencing and managing human/environment relationships in the greater park ecosystem" (Kachi, 2004, p. 2). While human use management may require some restrictions, it should not been seen as limiting peoples' freedom; instead, it should be viewed "as a means to protect the park

for future generations, while allowing as many people as possible to enjoy the experiences and activities it has to offer" (Banff-Bow Valley Task Force, 1996b, p. 50).

2.2.2 *Managing human use in Jasper National Park*

The need to carefully manage human use is particularly apparent in areas with a high degree of overlap of human and ecological values. In response to recommendations by a panel reviewing commercial accommodation development in the 3VC (AXYS Environmental Consulting, 2001), Parks Canada recently completed a cumulative effects analysis to determine the state of ecological integrity in this area and guide its decisions on further commercial growth (Parks Canada Agency, 2001a).

In the context of trail use, this analysis suggested current management of the day-use trail network compromises ecological values of the 3VC (Parks Canada Agency, 2001a). Findings of a wildlife movement study support this concern, suggesting human use of trails in this area is displacing carnivores both temporally and spatially (Mercer et al., 2000; Mercer et al., 2002). Large carnivores appear to avoid areas of high human use either by moving away from these trails or using them at times of the day when human use is at its lowest. These findings are consistent with other studies that document the potential for human presence to displace large carnivores (Hood & Parker, 2001; Jope, 1985; Mace & Waller, 1996; McLellan & Shackleton, 1989). Park ecologists are also concerned that increased unofficial trail use in recent years has intensified human pressure on wildlife (Mercer et al., 2000; Mercer et al., 2002).

Using the results of the cumulative effects analysis, park managers, community stakeholders, and expert consultants cooperatively developed a framework for improving ecological integrity in the 3VC. Given that both residents and visitors rely on this landscape, the framework aims to "restore ecological integrity through people, not in spite of them" (Parks Canada, 2001a, p. 2). Furthermore, acknowledging the recreational value of the 3VC, Parks Canada set the objective "to improve ecological integrity in this area in ways that also ensure residents and visitors can enjoy quality outdoor recreation opportunities in healthy landscapes" (Parks Canada Agency, 2001a, p. 1).

Additionally, Parks Canada committed to several human use management initiatives in the current management plan for Jasper NP (Parks Canada Agency, 2000c). Recent trail-related initiatives have included the formation of a Trail Stewards group to undertake projects that improve trail-use conditions for both wildlife and people; the development of signage to reduce trail user conflicts and discourage the use of unofficial trails; the modification of Parks Canada publications to communicate wildlife messages and reduce human use on selected trail segments perceived to be of high value to wildlife; and the diversion of cross-country ski trail use to improve wildlife movement through the Signal Mountain Wildlife Corridor (Parks Canada Agency, 2002). However, while these initiatives represent an important first step, ensuring the social functionality of the trail network ultimately requires a better understanding of how humans use this landscape *(Appendix A).*

Prior to the Summer Trail Use Study 2003, a three-year study beginning in 1994 had provided the only comprehensive examination of frontcountry trails. During the first summer, trail users were intercepted and asked about their encounters with other parties, their level of satisfaction with the existing network, and their reaction to potential management scenarios (Canadian Heritage, 1995a). To supplement this information, use level data was collected for various trail segments during the following two summers (Canadian Heritage, 1995b).

Study findings indicate respondents were generally very satisfied with the existing network (Canadian Heritage, 1995a). While they tended to be supportive of temporary trail closures to protect wildlife and vegetation, users were evenly divided on permanent closures. Respondents were also split on the issue of limiting the use of a trail to one specific activity group in order to minimize potential user conflicts. Less than one-third of trail users experienced crowding, and conflicts between activity groups also did not appear a problem. While some individuals reported unpleasant encounters with other users on the trail, when measured in aggregate, findings suggest meeting other trail users had either no effect or actually enhanced respondents' overall experience. However, one fundamental limitation of these results is their applicability to local residents; since less than 10% of the 486 users surveyed were permanent Jasper residents, findings of the survey overwhelmingly represent the views of park visitors. Consequently, while differences in the responses of these two groups are of interest, any such comparisons should be interpreted with caution.

Parks Canada's recent commitment to improve human use management in the 3VC highlighted the need to re-examine trail use in this area. An overview of the development of the trail network and its management is presented in the following section to characterize the current status of trail use in the 3VC.

2.3 Current trail management in Jasper NP

In an area widely travelled for thousands of years, first by animals and Aboriginal people; then by non-native explorers, fur company employees, railway workers, and settlers; and now by park users (Parks Canada Agency, 2003), it is not surprising many trails have been established in the lands adjacent to the Town of Jasper. Patterns of historic use, as opposed to ecological considerations, have determined the current location of trails in this landscape (Cardiff, 2004). Although trails were mapped in the early 1980s, the concept of an "official trail network" did not take shape until 1996. At this time, Parks Canada worked with the local cooperative association Friends of Jasper National Park to identify which trails would be officially recognized and maintained (Gadd, 1997). Due to the continued efforts of this group, a more coherent scheme of identifying and marking the trails was implemented over the next few years.

During this same period, the condition of day-use trails began to decline as limited resources were redirected to backcountry trail maintenance (Cardiff, 2004). Consequently, the high-use frontcountry trails suffered increases in vegetation loss and erosion, deteriorated trail surfaces, and occurrences of both trail braiding and short-cuts. Additionally, in the absence of any coherent management presence, individuals continued to appropriate old trails and wildlife trails rather than limiting their use to

official trails. Although most of these informal (or "unofficial") routes were not created by current users and instead evolved over time from game trails and old packhorse trails (Mosedale, 1999), the expansion of human use beyond the townsite network is of concern, given that some of these trails pass through sensitive wildlife habitat (Mercer et al., 2002).

As part of a *Wild Trails* communication program, Parks Canada discourages the use of three segments of the official network as well as several unofficial trails thought to serve as important areas for wildlife movement (G. Skinner, personal communication, March 11, 2005). Signs at each of these trailheads explain to users that the area is important to wildlife and request they choose another trail. Motion activated cameras have also been placed along these trails as part of an ongoing wildlife monitoring project (Mercer et al., 2000; Mercer et al., 2002). While the *Wild Trails* efforts have raised the public's level of awareness about wildlife movement concerns, images captured by these cameras indicate at least some individuals continue to use these areas.

Other efforts to restore wildlife movement have focused on the Fairmont Jasper Park Lodge golf course (Dobson et al., 2004). In addition to modifying the fence that had encircled the golf course and served as a barrier to wildlife movement for seventy years, human use of the area has also been diverted during the winter season. Communication efforts associated with this initiative encourage hikers and skiers to avoid the golf course and certain neighbouring trails. These initiatives led to an 80% decline in winter recreational use of the golf course between 2001 and 2003.

Parks Canada also institutes formal trail closures to protect certain species during young-rearing seasons. For example, a section of one popular trail is closed each year during elk calving season and similar measures are also used to protect wolf denning areas as necessary (G. Skinner, personal communication, March 11, 2005). In contrast to the voluntary approach characterizing the aforementioned efforts, these closures are legally binding and enforced by park wardens.

But such use limitations are unusual in Jasper; generally, the freedom enjoyed by trail users in the 3VC is unparalleled in any other national park in North America (Cardiff, 2004). Jasper's trail network is one of few trail systems within Canadian national parks to be managed almost entirely for multiple user groups. Only a fraction of the 154-kilometre trail network is designated for the sole use of hikers; the remainder of the trails are open to all three of the principal user groups: hikers, mountain bikers, and horse users (Parks Canada Agency, 2003). Despite the recent adoption of restrictions on mountain biking in neighbouring Banff NP, this activity has not yet been regulated to the same degree in Jasper NP (Cardiff, 2004). However, given Parks Canada's commitment in the current management plan to permit mountain biking only on designated trails (Parks Canada Agency, 2000c), this may soon change.

The formation of the "Jasper Trail Stewards" (JTS), a public advisory group to address trail management issues, has also influenced recent management of the trail network. This broadly based interest group consisting of local trail users, business owners, biologists, and Parks Canada staff aims to promote awareness and understanding of trail use in Jasper and to propose solutions for trail management issues (Trail Stewards

Working Group, 2001). Since 2001, the group has undertaken various projects focused on improving trails for both wildlife and humans. Their work also played an important role in Parks Canada's recent success securing new Ecological Integrity funding to reconfigure and expand the trail network (S. Cardiff, personal communication, March 23, 2005).

However, in addition to its accomplishments, the group has also faced several internal challenges due to the need to reconcile diverse interests and values. Rather than being insurmountable, problems faced by the JTS simply attest to the difficulty of managing natural areas for a range of recreational and ecological values. Although aspects of this situation are unique to Jasper NP, resource managers worldwide share the greater challenge of managing human use in ecologically sensitive areas. The following section outlines several issues associated with the recreational use of national parks.

2.4 Recreation management in national parks

The use of national parks for outdoor recreation presents managers with two distinct sets of challenges; not only must they manage recreational use so as to minimize its adverse ecological impacts, but they also need to provide high quality recreational experiences for users with diverse needs and expectations. The following subsections provide greater detail on each of these challenges.

2.4.1 Ecological impacts of outdoor recreation

In general, the increasing popularity of outdoor recreation activities has led to greater and more widespread impacts on natural ecosystems (Lynn & Brown, 2003). This

presents an obvious concern in Canadian national parks where maintaining ecological integrity is the first priority. Recreational activities can affect four major landscape components: water, soil, vegetation, and wildlife (Cole, 1993; Hammitt & Cole, 1998). Since Jasper NP managers are primarily concerned with the impacts of recreation on wildlife, the three other components have been grouped together as biophysical impacts and are treated only briefly for the current purpose. A more detailed discussion of the impacts of recreation on wildlife follows.

2.4.1.1 Biophysical impacts of outdoor recreation

Trail construction and use can have significant impacts on soil and vegetation, including soil compaction, erosion, muddiness, loss of vegetative ground cover, and changes in species composition (Leung & Marion, 1999). Recreationists who leave designated trails cause even greater damage by trampling vegetation (Cole, 1993). Areas receiving heavy human use may become criss-crossed by informal trail networks and in extreme cases, may even become completely devoid of undergrowth. Damage to ground cover can initiate a chain of events resulting in decreased stability of soils, increased erosion, and ultimately, increased sedimentation in adjacent waterways.

The degree of biophysical impact is influenced by the location, diversity, intensity, and duration of the trail activities (Newsome et al., 2002). Researchers tend to agree that horseback riding causes the most damage to existing trails due to the high level of stress imposed on the soil surface (Dale & Weaver, 1974; Deluca, Patterson, Freimund, & Cole, 1998). In comparison to hikers, horse traffic has been shown to make more sediment available (Deluca et al., 1998; Wilson & Seney, 1994), and to create deeper (Dale &

Weaver, 1974) and wider (Weaver & Dale, 1978) trails. While researchers generally agree that horseback riding causes more damage than hiking, the relative impacts of other trail activities are less clear.

Wilson and Seney (1994) conducted a comparative study of the soil erosion caused by hiking, horseback riding, mountain biking, and motorcycle use. Although their findings indicate horseback riding and hiking have a greater impact on sediment availability than either mountain biking or motorcycle use, criticisms of the validity of measurement techniques call these results into question (Hammitt & Cole, 1998; Vandeman, 2004). Vandeman also challenges Thurston and Reader's (2001) claim that the impacts of hiking and biking have similar effects on the vegetation and soil of a previously undisturbed deciduous forest. Even though their results indicate mountain biking causes significantly greater impacts on soil exposure at higher pass intensities, Thurston and Reader conclude that the two activities trample vegetation at equal rates.[5] Lathrop (2003b) is also critical of the "real world applicability" of these findings given that the study failed to address the effects of speed, turning, and braking. Instead, he suggests study treatments only loosely approximate the actual forces exerted by mountain biking.

In addition to investigating the ecological damage caused by various activities, researchers are also curious as to how these biophysical impacts influence the visitor experience. Although in some studies, visitors have reported biophysical impacts as having little effect on their experience (e.g. Knudson & Curry, 1981; Martin, McCool, & Lucas, 1989), other researchers have found visitors both observe and are influenced by

[5] "Pass intensity" refers to the number of times the hiker or biker travelled along the treatment lane. Five different intensities were compared: 0, 25, 75, 200, and 500 (Thurston & Reader, 2001).

environmental impacts (e.g. Floyd, Jang, & Noe, 1997; Hammitt, Bixler, & Noe, 1996; Lynn & Brown, 2003; Noe, Hammitt, & Bixler, 1997; Roggenbuck, Williams, & Watson, 1993). Should individuals attribute this damage to specific activity groups, trail impacts can also contribute to conflict between users (Hendee, Stankey, & Lucas, 1990; Manning, 1999).

Although results of studies investigating the cause and effect of various trail impacts are not without debate, research in this area is generally more straightforward than that exploring the influence of recreation on wildlife. Compared to the impacts on vegetation, the effects of recreation on animals are not always immediately obvious, direct, or easily measured (Hammitt & Cole, 1998). The following section describes how recreation can adversely affect wildlife and explores various factors influencing this disturbance.

2.4.1.2 Impacts of outdoor recreation on wildlife

It is well established that human presence can significantly impact the behaviour and, in turn, the survival of many wildlife species (McCoy, 2003). Recreation can affect animals either directly, through disturbance, or indirectly, through habitat modification or pollution (Knight & Cole, 1995a). Disturbance can be either intentional (i.e. harassment) or unintentional (i.e. photographing wildlife or hiking through an animal's territory). Knight and Cole speculate that unintentional disturbance "is probably the primary means by which non-consumptive recreational activities impact wildlife" (1991, p. 239).[6]

[6] The term "non-consumptive" is used to distinguish activities such as hiking or nature photography from activities such as hunting or fishing that actively "consume" the resource.

Though seemingly benign, even casual intrusions of recreationists on foot may significantly affect vulnerable wildlife populations (Boyle & Samson, 1985).

However, while well appreciated that recreational activities disturb wildlife, the specifics of these interactions are poorly understood (Knight & Cole, 1995a) and study results fail to provide firm support for management (Cole & Hammitt, 2000; Hammitt & Cole, 1998; Knight & Gutzwiller, 1995; Liddle, 1997). Rather than documenting the long-term effects of wildlife disturbance, studies tend to focus on immediate responses, such as death or behavioural changes (Cole & Landres, 1996; Knight & Cole, 1995a). Furthermore, these responses generally apply to individuals as opposed to populations or communities.

Despite the difficulties associated with studying the effects of recreation on wildlife, numerous impacts have been documented. Results of these studies indicate human disturbances can alter wildlife physiology, behaviour, reproduction levels, and species composition and diversity (Hammitt & Cole, 1998). Pomerantz, Decker, Goff, and Purdy (1998) classified these impacts as ranging from aberrant behaviour or stress to indirect and direct mortality, hence recognizing that even the least severe impacts may affect reproductive or survival rates. Since animals are mobile, recreational use has the potential to disrupt entire populations or habitats (Cole & Knight, 1991); animals disturbed in one area can remember the experience and respond differently as they move to new areas (Cole, 1993). Furthermore, the recreational disturbance of wildlife can have far reaching effects as adults can pass their reactions to disturbance on to their offspring.

Although it is difficult to predict how recreational activity will affect a given animal, Knight and Cole (1995b) propose two groups of factors believed to shape wildlife response: (1) characteristics of the wildlife being affected, and (2) characteristics of the recreational disturbance.

Characteristics of the wildlife being affected

Animals vary in their sensitivity to recreational disturbance; while coyotes, raccoons, and skunks have generally adapted to the presence of human activity, evidence suggests other species are less tolerant of human disturbance (Joslin & Youmans, 1999). Wary species such as grizzly bears, wolves, and cougars are considered particularly vulnerable because of their requirement for a large territory. Variation between the survival needs and behaviour of different species helps to explain why some animals are more sensitive to disturbance than others. A species' vulnerability to human disturbance appears to be affected by whether it has specialized food and shelter requirements; whether it lives in a stable environment and hence has not evolved mechanisms to respond to rapid changes; and the size, age, and sex composition of animal groups (Knight & Cole, 1995b). Even within a species, tolerance for interactions will vary among individuals based upon the time of year, breeding season, animal age, habitat type, and previous experience with recreationists (Hammitt & Cole, 1998).

Characteristics of the recreational disturbance

As to be expected, the nature of the disturbance also shapes wildlife response. Knight and Cole (1995b) identify six distinct factors that help to explain the variability in wildlife reaction to recreational disturbance: type of activity, recreationist's behaviour,

predictability, frequency and magnitude, timing, and location. Research in these areas highlights several findings of particular relevance for managing trail use.

Animals generally show little overt response to disturbances they perceive as frequent enough to be expected and non-threatening. Consequently, wildlife outside of designated human use areas tend to be less habituated to people and thus may experience greater disturbance due to intrusions occurring off-trail (Jope, 1985; Mainini, Neuhaus, & Ingold, 1993; Miller, Knight, & Miller, 2001; Taylor & Knight, 2003a). The presence of a dog also appears to heighten wildlife response (MacArthur, Geist, & Johnston, 1982; Mainini et al., 1993; Miller et al., 2001).

The timing of the recreational disturbance appears to be an important factor; disturbance during the breeding season may influence an individual's productivity, whereas disturbance at other times of the year may affect its ability to forage, and hence, its survival (Knight & Cole, 1991). While birds appear to be most sensitive during the breeding season, mammals are considered most vulnerable during the immediate post-natal period (Gabrielsen & Smith, 1995). Wildlife response has also been observed to vary with the time of day possibly indicating an increased tolerance during important foraging times (Gander & Ingold, 1997; Taylor & Knight, 2003a).

Only a limited number of studies have compared the relative responses of wildlife to various trail activities. Wisdom, Ager, Preisler, Cimon, and Johnson (2004) found elk to be more tolerant of hiking and horseback riding and less tolerant of mountain biking and ATV use, whereas they observed little difference in the reaction of mule deer to each of the four activities. Although work by Taylor and Knight (2003a) also indicates mule

deer respond similarly to hiking and mountain biking, their results have been criticized for failing to include experimental controls (Wisdom et al., 2004) and neglecting to account for differences in the distances travelled by hikers and bikers (Vandeman, 2004). The latter oversight also appears to apply to Gander and Ingold's (1997) conclusion that hiking, jogging, and mountain biking have a similar influence on habitat use by male chamois. Papouchis, Singer, and Sloan's (2001) findings that desert bighorn sheep are more sensitive to hikers than to either vehicles or mountain bikers are also questionable due to flaws in the experimental design.[7] Given these shortcomings, it is of particular interest that these studies have been used to defend mountain biking (e.g. Sprung, 2004).

Despite the observation that recreationist behaviour can have a profound impact on wildlife response, this area remains virtually unstudied (Knight & Cole, 1995b). This is particularly concerning given the general public impression that recreation is benign and does not negatively impact wildlife (Flather & Cordell, 1995; Wilkinson, 2002). Consistent with this misconception, half of the 640 backcountry users surveyed by Taylor and Knight (2003b) did not believe that recreation adversely affects wildlife. Consequently, they perceived it acceptable to approach wildlife more closely than empirical data from Taylor and Knight's study indicated wildlife would allow. These and other findings (e.g. Klein, 1993) highlight the importance of educational initiatives as a means of influencing responsible visitor behaviour.

[7] Whereas the vehicles and mountain bikers in this study were restricted to the roads as per park regulations, nearly all hiker disturbances occurred off-trail and in variable locations.

Management implications

Although researchers have identified numerous knowledge gaps in this area (Cole & Landres, 1996; Knight & Cole, 1995a), the potential for recreation to adversely affect wildlife is well established even by the current body of literature. Consequently, natural resource managers have a responsibility to respond to conflicts between outdoor recreationists and wildlife (Knight & Gutzwiller, 1995). Bound by Parks Canada's commitment to ecological integrity, managers in Jasper NP acknowledge their obligation to address concerns about wildlife movement in the 3VC (Parks Canada Agency, 2001a). However, as outlined in the *Three Valley Confluence Restoration Framework*, initiatives to restore ecological value must also consider the needs of the residents and visitors who rely on this landscape. Managing for this recreational use involves a separate set of challenges, which are the focus of the following subsection.

2.4.2 *Providing quality recreational experiences in national parks*

By dedicating national parks "to the people of Canada for their benefit, education and enjoyment", the Canada National Parks Act formally acknowledges these areas as intended for human use (Government of Canada, 2000, s. 4[1]). Although not all visitors to national parks participate in outdoor recreation activities, studies indicate many do (Parks Canada Agency et al., 2004; Parks Canada Agency, Alberta Economic Development, & the Banff-Lake Louise Hotel-Motel Association, 2000). One of the most important goals of outdoor recreation management is to provide opportunities for quality recreation experiences (Manfredo, Driver, & Brown, 1983). According to the management plan for Jasper NP, Parks Canada shares this goal (Parks Canada Agency, 2000c).

In general, outdoor recreationists seek a wide variety of experiences, ranging from solitude to skill development to socialization (Driver & Knopf, 1977). While many of these experiences are widely shared among recreationists (Manning, 1998), research has also shown the type of benefits sought by individuals are likely to be strongly related to the activities in which they participate (Lee, Scott, & Moore, 2002). For example, work by Lee et al. on suburban trail use found walkers were most likely to use the trail for purposes of bonding with family and friends, whereas both runners and bicyclists were more interested in developing their skills.

Preferences for trail attributes may also differ both among and within user groups (Flink, Olka, & Searns, 2001). As part of the Lands Adjacent to Banff trail survey, Mauro (2002) explored the influence of various attributes on respondents' choice of a trail. Although hikers reported being less likely to choose trails having a number of steep hills, this feature had little influence on the trail choices of runners, dogwalkers, and horseback riders. With the exception of dogwalkers, each of these user groups disliked narrow trails. In contrast, mountain bikers showed a preference for trails with both of these physical attributes.

Compared to hikers and horseback riders, the preferences of mountain bikers tend to receive more attention in the literature. An international survey of mountain bikers found these users generally favour a mix of gentle and steep slopes, and that the presence of turns, bumps or jumps, and obstacles enhances their experience (Symmonds, Hammitt, & Quisenberry, 2000). Research has also documented preferences for single track over wider trails, and for short, steep trails or longer, flatter trails over those in

between (Morey, Buchanan, & Waldman, 2002). Work by Cessford (1995) indicates a relationship between biker preferences and level of experience; while novice bikers favour smooth, wide trails with few obstacles, expert riders prefer rougher, narrower trails. In general, this user group tends to prefer a variety of settings to allow for various degrees of riding difficulty, terrain, and scenery (Goeft & Alder, 2001).

While Mowen, Graefe, and Williams (1998) maintain activity type as a useful starting point from which to understand and manage for recreational trail diversity, they also acknowledge the value of incorporating other variables. In fact, some researchers warn that simply assuming users vary dramatically by activity may superficially segment users and neglect those who engage in multiple pursuits (Watson, Asp, Walsh, & Kulla, 1997). Alternatively, the Recreation Opportunity Spectrum (ROS) planning framework created by the USDA Forest Service promotes a focus on trail experiences as opposed to trail activities. Providing a diverse array of recreational opportunities not only enables users to choose the conditions most suited to their needs (Moore & Barthlow, 1996), but is also the best way to meet the wide range of public tastes and assure quality experiences from a societal perspective (Manning, 1998).

Although desirable, it is rarely possible to satisfy the needs of all trail users (Moore, 1994). Limited resources place obvious constraints on the extent to which recreation resource managers are able to provide diverse, high quality experiences. In national parks, for example, land managers also have to consider the appropriateness of various activities given the overarching goals of the landscape (Canadian Heritage, 1994; Wilkinson, 2002). Several factors have the potential to interfere with the quality of

experiences on multi-use trails (Moore, 1994). The following sections provide greater detail on two of the more serious threats to quality experiences—crowding and conflict—and outline mechanisms adopted by some recreationists in order to cope with these situations.

2.4.2.1 Contending with crowding in outdoor recreation

The substantial body of crowding-related research reflects a long history of concern about the effects of increasing use on the quality of the recreation experience (Manning, 1999). Crowding has been described as a negative evaluation of the number of people an individual remembers seeing (Shelby, Vaske, & Heberlein, 1989), highlighting the idea that it involves more than purely the number of visitors in an area. In fact, research indicates perceptions of crowding are affected by multiple factors, including the personal characteristics of visitors (motivations, preferences, expectations, level of experience, attitudes, and demographics); the characteristics of those encountered (type and size of group, behaviour, and perception of alikeness); and situational variables (type of area, location within an area, and environmental factors) (Manning, 1999).

Although early studies assumed an inverse relationship between perceptions of crowding and visitor satisfaction, research has since shown only a weak association between the two (Dawson & Watson, 2000; Manning, 1999; Stewart & Cole, 2001). Nevertheless, crowding remains a widespread concern for both recreation area managers and visitors, and in some areas has led to the adoption of restrictions on use (Manning, 1999). Although crowding is a common source of user conflict, Owens (1985) proposed a time dimension as a means of distinguishing between the two; crowding is

generally considered an immediate and transient social interaction, whereas conflict is viewed as "a cumulative process of social interaction which, once established, becomes an enduring state" (cited in Williams, 1993, p. 30).

2.4.2.2 Managing user conflicts in outdoor recreation

The traditional view of recreational conflict originates in the work of Jacob and Schreyer who explained it as "goal interference attributed to another's behaviour" (1980, p. 369). This definition suggests the behaviours of some individuals can interfere with the ability of others to attain the outcomes and benefits that motivated them to engage in a particular activity in the first place (Schreyer, 1990). The subsequent inability to attain goals pursued through recreational activities leads to a negative emotional response and dissatisfaction with the recreational experience. Owens (1985) further developed this idea, suggesting conflict arises not as a result of goal interference, but because of the inability to adapt to this interference.

An alternative perspective suggests recreational conflict occurs as a result of differing social values (Vaske, Donnelly, & Heberlein, 1980; Carothers, Vaske, & Donnelly, 2001; Watson, 2001). For example, social value differences may exist between hikers and mountain bikers as the former is a traditional activity and the latter relatively new (Carothers et al., 2001). Previous research indicates traditional users frequently question the social acceptability of any non-traditional activities in natural settings (Blahna, Smith, & Anderson, 1995; Chavez, Winter, & Baas, 1993; Moore, 1994; Watson, Williams, & Daigle, 1991).

Multiple use areas tend to pose special management challenges due to the diverse and potentially conflicting interests involved (Schneider & Winter, 1998). While feelings of conflict tend to be directed towards individuals participating in different activities, conflict between members of the same user group may also occur (Moore & Barthlow, 1996). Furthermore, research suggests inter-group conflict is often one-sided; one group resents the other, whereas the opposite is not true (Chavez, 1997; Manning, 1999; Moore & Barthlow, 1996; Moore, Scott, & Graefe, 1998; Watson et al., 1991; Watson, Niccolucci, & Williams, 1994). This highlights the importance of promoting appropriate trail etiquette and informing users of the potential for undesirable behaviours to diminish the recreational experiences of other individuals (Watson et al., 1991).

2.4.2.3 Mechanisms for coping with crowding and conflict in outdoor recreation

Research indicates at least some individuals adopt various coping behaviours in response to perceptions of crowding, conflict, or other stressful situations in outdoor recreation (Johnson & Dawson, 2004; Kuentzel & Heberlein, 1992; Manning & Valliere, 2001; Schuster, Hammitt, & Moore, 2003). Coping mechanisms include both deliberate and non-deliberate behaviours that reduce stress, hence enabling a person to deal with a particular situation (Manning & Valliere, 2001). Outdoor recreationists appear to use three primary forms of coping behaviour: displacement, rationalization, and product shift. However, only the first of these behaviours will be addressed for the current purpose as exploring the use of the latter mechanisms was considered beyond the scope of the current study. Because both rationalization and product shift are cognitive coping

responses, their detection would have required questions specifically targeted for this purpose.

Displacement is a behavioural coping mechanism that occurs when recreational users alter their use patterns either spatially or temporally to avoid conflict or crowding (Manning and Valliere, 2001). Various studies have documented evidence of displacement among recreational users (Anderson & Brown, 1984; Becker, 1981; Hall & Shelby, 2000; Hammitt & Patterson, 1991; Miller & McCool, 2003; Robertson & Regula, 1994; Shelby, Bregenzer, & Johnson, 1988; Vaske et al., 1980). Manning and Valliere's study of carriage road use in Maine's Acadia NP is of particular relevance to the Jasper situation as it represents "the first coping-related study focusing on people who live in and around a park or outdoor recreation area" (2001, p. 423). Results indicate almost all of the study participants use coping mechanisms, and half have adopted temporal and/or spatial displacement behaviours. Perceived increases in problem behaviours, such as bicycles traveling at excessive speeds or people blocking the carriage roads, were stronger predictors of the adoption of displacement behaviours than were increasing use levels.

In general, methods for investigating displacement suggest inherent difficulties in understanding the behaviours and attitudes of individuals who are no longer there (Robertson & Regula, 1994). For this reason, displacement offers one explanation for the lack of relationship between use levels and satisfaction since those most sensitive to crowding may have already shifted their use to another site (Manning & Valliere, 2001). Although traditionally explained as a response to crowding or other stressful situations,

Hall and Cole (2000) propose that displacement may also occur as a result of increased regulation. That is, individuals who care more about freedom and lack of regulation than crowding may be displaced in the event of increased restrictions on use.

2.4.2.4 Management implications

Recreational use has the potential to cause a variety of ecological and social impacts. In addition to devising strategies to minimize the environmental damage caused by recreationists, managers of multi-use areas must also contend with social issues threatening the quality of recreational experience (Moore, 1994). The final section of this chapter describes several of the strategies available for managing recreational use.

2.5 Strategies for managing recreational use

Management responses are often classified according to the directness with which they act on visitor behaviour (Chavez, 1996; Leung & Marion, 1999; Manning et al., 1996; Payne & Nilsen, 2002; Shindler & Shelby, 1993). Direct management tactics aim to regulate visitor behaviour whereas indirect tactics attempt to influence the decisions leading to behaviour. Orams (1996) offers a different means of grouping management responses, classifying them as physical, regulatory, economic, or educational management strategies. While the literature primarily discusses these strategies as they pertain to wilderness use, the following sections present each of these strategies in the context of trail use. A fifth section describes how to enhance visitor compliance with management actions.

2.5.1 *Physical management strategies*

Unlike the other three approaches, physical management strategies focus on site management rather than visitor management. Determining *where* use will occur falls within the domain of visitor management; site management, on the other hand, refers to *how* this area is managed as well as the physical manipulation of this resource (Hammitt & Cole, 1998). Site management enables managers to direct and channel use, and to maintain desired environmental conditions (Anderson, Lime, & Wang, 1998). Several physical controls can be used to manage the interactions of humans with sensitive resources.

2.5.1.1 Building formal trails

Hammitt and Cole (1998) claim that because people seldom travel off-trail, managers can control where most people go simply through careful consideration of where trails are built. However, in areas where a network of trails already exists, relocating trails of concern may be more applicable than building new trails (Newsome et al, 2002). By rerouting trails though less sensitive areas, park managers can reduce the pressure on wildlife corridors, hence helping to restore ecological integrity. However, unless people can actually be discouraged from using the old section of trail, relocating a trail will make little sense (Hendee et al., 1990).

2.5.1.2 Trail hardening and maintenance

Regular maintenance or trail hardening can also be used to address off-trail travel or the use of informal trails. If trails are well maintained and clearly defined, trail users may be less likely to deviate from established paths (Newsome et al, 2002). Conversely, since

some users perceive non-maintenance of trails as a psychological barrier to use, managers also may be able to discourage the use of particular trails by ceasing maintenance activities (Hammitt & Cole, 1998). However, recognizing that some individuals prefer the challenge of non-maintained trails, this strategy will likely not prove effective for all trail users.

2.5.1.3 Physical barriers

Physical barriers can also obstruct visitor movement. Although generally considered undesirable and obtrusive in natural areas, barriers may be considered necessary to allow the recovery of sensitive areas (Hammitt & Cole, 1998). Typically, barriers used in natural settings are not insurmountable and instead exert their presence either by disguising a trailhead or by activating visitor norms about the desirability of complying with management intentions (Anderson et al., 1998).

Site rehabilitation offers another means of disguising areas not intended for visitor use (Anderson et al., 1998). Should trampled vegetation provide evidence that earlier visitors have travelled off-trail, later users may follow suit. Research suggests removing the evidence of off-trail travel can help to reduce this behaviour among subsequent users (Vande Kamp, Johnson, & Swearingen, 1994; Anderson et al., 1998). Consequently, simply removing potential behavioural triggers can help to alter visitor behaviour.

2.5.2 *Regulatory management strategies*

In the past, minimal regulation was regarded as essential to satisfactory experiences in natural areas (Hendee et al., 1990). Should recreation be understood as an opportunity

to 'recreate' oneself by escaping the constraints and structure imposed by work and regular routines, heavily regulated areas will hold little appeal for most visitors (Bixler et al., 1992). Eagles and McCool echo this sentiment, relating it directly to national parks:

> Fundamental to visitor motivations in visiting national parks is a sense of freedom, where the locus of control appears to be within the individual. When visitors perceive regulations as unnecessarily intrusive or interfering with their motivations they are likely to oppose them, and compliance will not be complete. (2002, p. 99)

However, in recognizing that freedom should remain an important element of recreational experiences, Eagles and McCool do not suggest that there should not be regulations, only that park managers may first want to try less intrusive techniques. This is particularly important given the potential for restrictive policies to anger visitors and trigger backlash behaviours (Bixler et al., 1992). Should they not share park managers' perceptions that impacts are serious enough to warrant restrictions, visitors may resent aggressive regulations or law enforcement (Roggenbuck, 1992).

In general, support for management action tends to be strongest when visitors perceive policies as improving their own personal use (Shindler & Shelby, 1993). As issues become more personally relevant, however, even pro-environmental individuals may be less supportive of changes to current conditions (Bixler et al., 1992; Noe & Hammitt, 1992). Instead, these individuals may offer stronger support for proposed changes that are primarily informational and have less of an impact on personal action (Noe & Hammitt, 1992).

Although researchers and managers agree that non-restrictive measures are preferable, not all resource problems can be solved in this manner; some visitor impacts must instead be managed through restrictive policies (Bixler et al., 1992). In some cases, increases in ecological damage and visitor crowding have enhanced support for more direct approaches to managing visitor behaviour (Shindler & Shelby, 1993; Watson & Niccolucci, 1995). As a result, guidelines, rules, and regulations tend to be widely used to manage visitors in resource-sensitive destinations (Newsome et al., 2002). The following sections discuss three regulatory tactics to minimize visitor impacts in sensitive areas: closures, use limitations, and zoning.[8]

2.5.2.1 Closures

Closures can be used to protect sensitive resource areas while redistributing use to alternative areas (Anderson et al., 1998). Park managers can impose either temporary closures—based on seasonal conditions or visitor use patterns—or permanent closures. When possible, Anderson et al. recommend the use of temporary closures over permanent closures because of the lower cost to the visitor. However, they claim permanent closures may be merited in situations where human use poses a serious threat to wildlife or other sensitive resources.

Temporarily closing areas identified as particularly important for breeding animals can help to reduce human-wildlife interaction and its associated impacts (Anderson, 1995). While relatively simple to administer, seasonal closures require specific knowledge of

[8] Although sometimes classified as a physical management strategy, closures are addressed in the context of regulation because trail users would likely perceive such actions as restricting or regulating their current patterns of use.

human impacts on the species of concern before they can be implemented (Haysmith & Hunt, 1995). Given that the time frame during which a disturbance occurs influences wildlife responses, time of day restrictions may also be appropriate for time periods when wildlife use critical resources (Knight & Temple, 1995). However, as with any restrictive policies, unless visitors can be convinced of the need for this action, public support will likely be low for closures. To offset the loss of opportunity, Hammitt and Cole (1998) stress the importance of providing attractive alternatives should the use of some trails or areas be discouraged.

While the literature yields few examples of research investigating the effectiveness of trail closures, several studies have investigated the public reaction to closures as a hypothetical management action. As part of the 1994 Jasper Day Use Trails Survey, researchers gauged the respondents' level of support for both temporary and permanent closures if deemed necessary for the protection of wildlife and/or vegetation (Canadian Heritage, 1995a). Analogous to Bixler et al.'s (1992) findings for frequent and non-frequent visitors, results show that Jasper visitors are more supportive of both temporary and permanent trail closures than are residents.[9] In fact, responses suggest resident trail users would likely demonstrate strong opposition to permanent closures.

Although the Lands Adjacent to Banff trail survey investigated only the views of residents—and hence does not allow for comparisons between resident/visitor attitudes—unlike the 1994 Jasper survey, it explored the level of support for various management actions under differing rationales (Mauro, 2002). These results indicate

[9] Again, note only 10% of the 486 respondents were permanent Jasper residents.

Banff residents are slightly more accepting of both temporary and permanent trail closures from a public safety point of view (minimizing the potential for dangerous encounters) rather than in the interest of helping wildlife movement (Mauro, 2002).

2.5.2.2 Use limitations

Use limitations offer another means of responding to concerns about visitor impacts. Hammitt and Cole describe this tactic as "a convenient way to limit impact without either having to understand the real cause of problems or getting involved in more active or direct management of problems" (1998, p. 256). While not a preferred tool, they consider use limitations justified in places where the level of demand is sufficiently high to leave little alternative or where the only other option is severe restrictions precluding many of the preferred uses. In general, Hammitt and Cole recommend adopting this approach only after thorough analyses indicate use limitations as the best means of avoiding both unacceptable levels of impact and excessive regulation.

While limiting use has traditionally been of greater concern in backcountry or river management situations, it is becoming of increasing importance in frontcountry or day-use areas (Anderson et al., 1998). However, this tactic is really only practical for areas where access points are controlled, making it easier to institute a permitting system. Furthermore, because the relationship between use levels and impacts is not linear, reducing use may not substantially reduce impacts (Hammitt & Cole, 1998; Anderson et al., 1998). In fact, selected characteristics of recreational use (such as visitor behaviour, frequency of use, and type of use) appear to have more influence on resultant environmental and social impacts than on volume of use (Pigram & Jenkins, 1999).

2.5.2.3 Zoning

Zoning either assigns certain recreational activities to select areas or restricts the activities permitted in a particular area (Manning, 1999). Regulations based on identified management zones enable managers to protect desired resource conditions, segregate different users, and maintain diverse and high quality recreation experiences (Anderson et al., 1998). Nationwide, Parks Canada uses this strategy as a means of classifying areas according to ecosystem and cultural resource protection requirements (Parks Canada Agency, 2000c). Similarly, the Recreation Opportunity Spectrum promotes zoning as a means of planning visitor use in natural areas (Daniels & Kranich, 1990). In general, zoning tends to be presented in the recreation management literature in the context of enhancing visitor enjoyment and minimizing conflicts between user groups rather than as a means of protecting ecologically sensitive areas (Hammitt & Cole, 1998; Leung & Marion, 1999; Newsome et al, 2002).

2.5.3 Economic management strategies

Economic management strategies attempt to modify visitor behaviour through either price incentives or disincentives (Kuo, 2002). Price incentive strategies have little applicability for day-use activities in national parks given that the nominal park fees apply upon entry, rather than being associated with individual visitor activities. However, price disincentives in the form of fines could be used to discourage inappropriate behaviour and encourage compliance with chosen management strategies.

Work by Hendricks, Ramthun, and Chavez (2001), Gramann, Bonifield, and Kim (1995), Martin (1992), and Swearingen and Johnson (1988) identifies fines as a potentially

effective means of discouraging rule-violating behaviours. In fact, research at Washington's Mount Rainier National Park found that a sign stating "Off-trail hikers will be fined" was more effective than other trailside signs used in the same day-use hiking area (Swearingen & Johnson, 1988). However, in order for fines to enhance visitor compliance, the threat of the sanction must be perceived as real (Anderson et al., 1998). Consequently, the use of sanctions poses a high cost to the park due to the enforcement effort required. These issues are addressed in greater detail in a later section on visitor compliance.

2.5.4 Educational management strategies

Although visitor management in natural areas is currently dominated by regulatory strategies, considerable potential exists for education to increase user knowledge in the short run and prompt attitude change in the long run (Papageorgiou, 2001). Educational management strategies attempt to eliminate undesirable behaviours through enhancing understanding and appreciation of the resource (Kuo, 2002; Watson et al., 1997). This management approach tends to be widely accepted because it is highly unobtrusive (Manfredo & Bright, 1991) and does not overtly regulate or seek to directly control visitors (Newsome et al., 2002).

Hammitt and Cole (1998) claim education to be of utmost importance in addressing illegal, careless, unskilled, and uninformed actions. Communications involving messages designed to influence attitudes and behaviour ("persuasive communications") are considered particularly effective as a means of reducing these types of problem behaviours:

> Simply informing the recreationist about the rules is likely to induce compliance, unless the individual disagrees with the need for the regulation or the approach taken for its enforcement. Even if recreationists initially oppose the rules, persuasive messages explaining the reason for specific rules and communicating the environmental and social impacts of problem behaviours may alter opinions and gain the necessary compliance. (Roggenbuck, 1992, p. 165)

In contrast, persuasive intervention will likely be ineffective for addressing wilful violations. In these cases, park managers may have greater success should they fully explain the reasons for park regulations, and especially those reasons benefiting the recreationist.

The effectiveness of education as a management tool ultimately lies in its ability to engage the intended audience (Stewart, Hayward, Devlin, & Kirby, 1998). In general, messages should be interesting, understandable, relevant, and defensible. Although a seemingly obvious consideration, Roggenbuck (1992) suggests managers too often ignore the strength of message content. Given that individuals learn partly by evaluating message arguments, he warns that should arguments be weak, the message will be rejected and pre-existing attitudes and behaviours will be reinforced.

Roggenbuck (1992) also believes managers often give inadequate consideration to the previous knowledge and experience of recipients when devising message content. However, research on the effects of communication on recreationists shows previous experience at a park affects the degree to which individuals are attentive to new information (Bixler et al., 1992; Manfredo and Bright, 1991; McCool & Cole, 2000). In particular, Manfredo and Bright (1991) found recreationists with a high level of experience in the study area were less responsive to information, whereas those with

less experience were more easily influenced by communication strategies. Consequently, individuals with more prior knowledge may perceive new information as having low utility, and therefore devote little time and attention to it. These results highlight the importance of considering the knowledge and experience of the target audience and suggest the need to develop communication products specifically for both repeat visitors and resident users.

The strategy used to encourage compliance with persuasive messages will also influence the success of communications. Moral appeals focus on the moral reasoning of the recipient by explaining the social or environmental consequences of disobeying rules and asking visitors to adopt more responsible behaviours (Hendricks et al., 2001). In contrast, fear appeals are designed to target a fear of consequences, typically reminding individuals that certain regulations exist and outlining the personal consequences for violating these rules (Swearingen & Johnson, 1988; Martin, 1992).

Gramann et al. (1995) found communicating sanctions was more effective in increasing intentions to obey rules than communicating the social or environmental consequences of rule violation. The observation that sanctions were successful even among people with high levels of social responsibility suggests this approach has more general utility in curbing rule violations than moral appeals. However, due to the difficulties associated with imposing and enforcing sanctions, the researchers acknowledge moral appeals still have great value, particularly in areas where visitors tend to be more educated as a whole. Moreover, because the strongest intentions to obey rules were achieved when both sanctions and social/environmental consequences were

communicated, they suggest the two strategies should be viewed as complementary, rather than competing, approaches.

In comparison, when investigating mountain biker adherence to trail etiquette guidelines, Hendricks et al. (2001) found the effectiveness of these two approaches varied depending upon the behaviour targeted. Whereas fear appeals were the most successful means of encouraging mountain bikers to yield to other trail users and discouraging them from riding through watercourses, moral appeals proved more effective in reducing rider speed and persuading them to dismount for sections of trail where riding was not permitted.

Message source is another factor thought to influence the likelihood of visitor compliance. Using individuals similar to the recipient or perceived as credible sources to communicate the information can help to increase message effectiveness (Hendricks et al., 2001; Petty, McMichael, & Brannon, 1992). Although Klein (1993) and Swearingen and Johnson (1988; 1995) report the use of uniformed employees as a successful means of gaining visitor compliance, Hendricks et al. (2001) found this source to be less effective than a volunteer patrol hiker or mountain biker.

In general, interpersonal contact appears to be more effective than relying on non-personal media such as signs, brochures, or audio-visual mechanisms (Hendricks et al., 2001). However, while it is acknowledged that non-personal media may be inadequate if used in isolation, these and other passive methods are more frequently used to communicate park messages (McCool & Cole, 2000). Particularly in times of reduced budgets and staff presence, bulletin boards have become one of the most widely used

communication tools. Cole, Hammond, & McCool (1997) highlight the importance of avoiding information overload on bulletin boards by selecting only a few critical messages and designing them so they can be adequately processed in a short period of time.

Overall, while researchers tend to agree that educational strategies are necessary when managing recreational use in ecologically sensitive areas, some caution that these strategies are not likely to solve specific problems in a short period of time (Cole, 1995; Cole et al., 1997). Cole et al. (1997) advise regarding education as preventative medicine rather than a cure, suggesting that while education is always beneficial when done properly, responding to well-defined or severe problems will require more than education alone.

Few studies have compared the effectiveness of providing education and information with other management tactics (Newsome et. al., 2002). Despite this lack of comparative efficacy, Cole (1995) claims these indirect actions have been preferentially favoured because of their palatability to visitors. However, in the context of addressing deteriorating conditions at campsites, education has been found to be ineffective in many places (Newsome et. al., 2002). Management tactics that directly regulate use should change the behaviours of most visitors, whereas information only increases the likelihood of people behaving as desired. Consequently, Newsome et al. suggest education is most effective when used in conjunction with other management approaches.

2.5.5 *Achieving visitor compliance*

No one tactic is likely to deter all forms of non-compliance or to counteract all of the various motives for a single non-compliant act (Johnson & Vande Kamp, 1996). Consequently, researchers and managers recommend using an integrated approach consisting of multiple deterrence tactics to enhance visitor compliance with management goals. Furthermore, Watson et al. (1997) suggest new policies will be only of limited value unless they are accompanied by enforcement. Swearingen and Johnson (1994; 1995) emphasize that even a strong education program does not preclude the need for deterrence and enforcement efforts because not all visitors will be exposed to or heed such messages.

Anderson et al. (1998) discuss "deterrence and enforcement" as a distinct category of management tactics to control and eliminate non-compliant visitor behaviour. While these tactics encourage visitors to act in responsible ways, they also make clear the prohibitions against, and the consequences of, non-compliant behaviour. Three commonly used techniques include signs, sanctions, and the use of agency or law enforcement personnel. Although both signs and sanctions have already been addressed in the context of educational and economic management strategies, respectively, a few additional comments are required on their use as deterrence and enforcement tactics prior to addressing the third technique – the use of agency personnel.

In order to effectively deter non-compliant behaviour, signs must clearly outline what is or is not allowed, the rationale for the rule, and the sanctions—if any—for violating

regulations. Stating that most visitors follow the rules can also help reduce non-compliance (Johnson and VandeKamp, 1996). Should visitors perceive non-compliant behaviour as the norm, they may rationalize their own rule-violating behaviour on the basis that "everybody else is doing it" (Cialdini and Trost, 1998). Similar to findings of Gramann et al. (1995), work by Swearingen and Johnson (1988) showed signs threatening sanctions to be more effective than those appealing to preservation values. Sanctions are intended to activate visitor beliefs about either the non-compliant act or the undesirability of getting caught. However, visitors must recognize sanctions as a real threat in order for this tool to effectively deter non-compliant behaviours (Anderson et al., 1998).

While the use of agency or law enforcement personnel is often closely linked with the enforcement of sanctions, research indicates that in some cases, the mere presence of park staff may also influence visitor behaviour. Based on a study of non-compliant visitor behaviour in the American national parks, Johnson and Vande Kamp (1996) suggest stationing uniformed employees near areas most damaged by visitor behaviour can help to deter non-compliance. Similarly, research conducted in a frontcountry area of Washington's Mount Rainier National Park showed the presence of a uniformed employee to significantly reduce the occurrence of off-trail hiking (Swearingen & Johnson, 1988). Although the uniformed employee was not engaging in enforcement activity, the researchers speculated the presence of the employee likely strengthened visitor beliefs that non-compliance would lead to negative social or legal consequences. More recent survey research at the same site indicates the vast majority of visitors

consider encounters with uniformed staff as either a neutral or positive part of the park experience (Swearingen and Johnson, 1995).

Despite these findings, Johnson and Vande Kamp (1996) warn the use of uniformed employees as a non-compliant behaviour deterrent has both practical and philosophical implications. First, financial and human resources pose obvious constraints to this approach. Second, the overuse of uniformed employees could detract from the "perceived freedom" element considered fundamental to some recreational activities. This latter consideration highlights the importance of considering the impact of management actions on the visitor experience.

In general, public support is critical to the success of management goals (Bixler et al., 1992). Helping trail users understand the rationale for a particular management strategy can build support for a specific action, thus helping to facilitate its implementation (Anderson et al., 1998; Newsome et al, 2002; Watson et al., 1997). In particular, Bixler et al. (1992) highlight the importance of gaining the support of long-term and frequent visitors, as these users are more likely responsible for resource damage. Recognizing that this audience may be harder to reach than the first time or appreciative oriented visitors, they recommend developing communications specific to each group.

CHAPTER THREE: METHODS

This document is based on empirical research conducted as part of the Summer Trail Use Study 2003. Parks Canada collaborated with the Jasper Trail Stewards to develop the Terms of Reference for that study (*Appendix A*). The Terms of Reference specified four main components:

1. An intercept survey of trail users;
2. A mail survey of both residents and visitors;
3. A monitoring component to quantify levels of use;
4. Discussion groups with local trail users.

With the exception of the monitoring component, the present document draws upon results from each of the other three study components. The current chapter provides a basic overview of these three data collection methods. Further detail is available in the *Summer Trail Use Study 2003 Final Report* (Anderson, 2004).

3.1 Intercept survey

The purpose of conducting intercept surveys was twofold. First, this method enabled the researcher to gather details about specific trail experiences that would have been difficult for respondents to recall in a later mail survey. Second, it provided the opportunity to solicit participation for the mail survey.

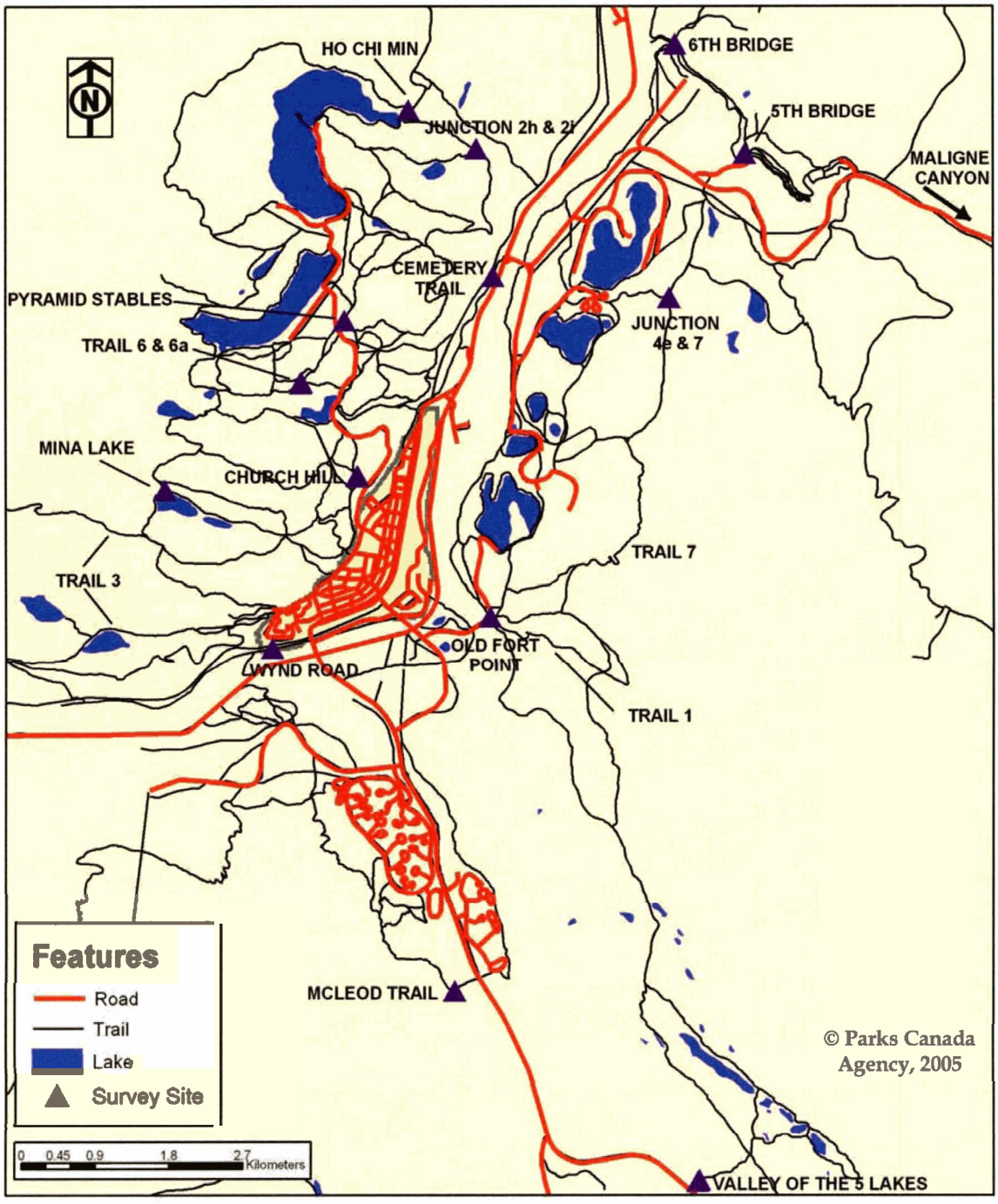
Between May 18 and August 31, 2003, intercept surveys were conducted at fourteen sites within the study area *(Figure 2; Appendix B)*. These locations were chosen with input from Parks Canada staff and were either at the beginning of a trail or at a trail junction. By varying the timing and location of intercept surveys, the study design ensured all trail users had an equal chance of being interviewed. As a result, the responses of the 514 individuals who participated in the intercept survey are representative of the greater population of trail users. Intercept survey data was analyzed using the Statistical Package for Social Science (SPSS).

3.2 Mail survey

3.2.1 Mail survey design

The content of the mail survey directly reflected the research questions outlined in the study's Terms of Reference. Survey questions were crafted with input from both Shawn Cardiff (Integrated Land-use Specialist for Jasper National Park) and Wayne Tucker (Backcountry Recreation Specialist for the Mountain Parks). Separate versions were designed for residents and visitors to ensure questions were worded appropriately for each group *(Appendices C & D)*. With these exceptions, the two versions were essentially identical to allow for comparisons between residents and visitors. In mid-August, the mail survey was tested with the help of several Jasper Trail Stewards and other interested individuals.

Figure 2: Map of the study area with intercept survey sites



Map used with permission from Parks Canada Agency

3.2.2 *Mail survey distribution*

Early in September 2003, 700 mail surveys were distributed to Jasper residents. Volunteers delivered surveys to the homes of the 150 residents contacted through the intercept survey. The remainder of the resident surveys were either distributed randomly through the post office or were given to specific target groups and individuals.[10] All of the 274 visitor surveys were mailed to visitors encountered through intercept surveys. During the last week of September, reminder cards followed using the same methods of distribution. Survey response rates and the demographics of respondents are discussed in the following chapter.

3.2.3 *Analysis of mail survey results*

Data from the mail surveys was analyzed using the Statistical Package for Social Science (SPSS). Comparisons were made between residents and visitors using independent samples t-tests.[11] Tests were also performed to ensure the use of a convenience sample (target groups and individuals) did not compromise the integrity of the resident sample. The responses of the 28 targeted respondents were compared to those of the remaining 146 residents who had been contacted randomly, either through the intercept survey or the random mailing. Comparisons between these two groups highlighted differences on only three of 75 items, indicating the target groups/individuals do not differ

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[10] Target surveys were used to encourage the participation of mountain bikers and horseback riders—two groups that appeared to be under-represented in the intercept surveys. A total of 110 target surveys were distributed among local bike and outdoor shops, individuals owning horses at Cottonwood Stables, staff at the Pyramid Riding Stables, the Jasper Trail Stewards, the Friends of Jasper Association, Information Centre staff, and individuals who directly contacted Parks Canada to request a survey.

[11] Because less than 10% identified themselves as seasonal residents, all residents have been grouped together for the purpose of making comparisons to the visitor sample.

significantly from the remainder of the resident sample.[12] As a result, it is reasonable to assume that the data collected by the study can be used to estimate the characteristics of both resident and visiting trail users.

3.3 Discussion groups with local trail users

In March 2004, discussion groups were held with each of four user groups: hikers, dogwalkers, mountain bikers, and horseback riders. Participation was solicited through an advertisement in the Jasper Booster (a local newspaper) and posters placed around town. A third party was contracted to moderate the discussion groups. Discussions in these one to two hour sessions focused on trail characteristics preferred by participants, whether the current trail network satisfied their needs, and how it could be improved. Specifically, these discussions enabled further exploration of trail use conflict and unofficial trail use. Although only selected results will be presented from the discussion groups, complete results are available in Thomlinson, 2004.

[12] The three items for which differences were found include: attitudes towards trails designated exclusively for either dogwalkers or horses *(Question 19 in resident mail survey)* and the effect of "encountering potentially dangerous wildlife" on trail experience *(Question 20 in resident mail survey)*.

CHAPTER FOUR: RESULTS

This chapter presents selected results of the Summer Trail Use Study 2003, focusing on comparisons between residents and visitors.[13] To provide necessary context, the first section summarizes study participation and the demographics of participants. Next, each group's use of the trail network is outlined in terms of patterns of trail use, motivations, and preferences for specific areas of the network. The next two sections compare how residents and visitors obtain information about the trails and their level of satisfaction with the existing network and its management. The final section explores each group's preferences for trail management. Although this chapter focuses primarily on intercept and mail survey data, selected discussion group results are presented where useful.

4.1 Summary of study participation and demographics

4.1.1 Intercept survey

A total of 514 intercept surveys were completed during the study period. A further 39 parties declined participation in the study, but were recorded as observations along with

[13] Although Jasper residents were asked to identify whether they were a seasonal or permanent resident, less than 10% identified themselves as seasonal residents. As a result, *all* residents have been grouped together for the purpose of making comparisons to the visitor sample.

an additional 1043 non-interviewed parties.[14] Three-quarters of the 514 individuals interviewed were visitors rather than residents of Jasper National Park (n=385, 75%). Permanent and seasonal residents accounted for 19.3% (n=99) and 5.8% (n=30) of intercept survey participation, respectively. Of the 343 visitors for whom the place of origin is known, half were from Canada (n=181, 52.8%) and the remainder were from overseas (n=95, 27.7%) or the United States (n=67; 19.5%). The majority of Canadian visitors were from Alberta (n=129, 71.3%).

4.1.2 Mail survey

The mail survey response rates for residents and visitors were 24.9% (n=174) and 52.9% (n=145), respectively. Although the low response rate of residents is of particular concern, a discrepancy is to be expected given that all visitors receiving a survey had met the researcher on the trail and thus had additional context and familiarity with the study. Furthermore, by providing their addresses, these individuals had also indicated their willingness to participate in the mail survey. Among residents, response rates appear to be influenced by how respondent participation was solicited. Those who had participated in the intercept survey had the highest response rate (n=70, 46.7%), followed by targeted groups/individuals (n=28, 25.5%), and then by individuals contacted through the random mailing (n=76, 17.3%). Although disappointing, this range of response rates is consistent with findings of Crompton and Tian-Cole (1999) that suggest differences between recreation interest samples and random samples can be attributed to the importance of the issue to respondents. The lower response rates in the

[14] Trail users were observed but not interviewed when another interview was already in progress or when their party was just starting on the trail. These observations were recorded to construct a more complete picture of trail use.

current study likely also resulted from the fact that only one wave of surveys was distributed rather than the more costly three waves used by some researchers.

The majority of resident respondents live in Jasper permanently (n=154, 88.5%) rather than seasonally (n=16; 9.2%).[15] When asked how long they have lived in Jasper, responses of permanent residents ranged from one to 68 years, giving a mean response of 18.8 years. The seasonal residents indicated they have lived in Jasper seasonally for between one and 35 years, and on average for 5.7 years.

Respondents to the visitor mail survey are primarily from Canada (n=105, 72.4%), with one-quarter of respondents (n=39, 26.9%) originating from the United States.[16] The majority of Canadians are from Alberta (n=72, 68.6%). British Columbia (n=13, 12.4%) and Ontario (n=9, 8.6%) are the only other provinces with sizeable representation. More than two-thirds of the respondents (n=96, 71.1%) are repeat visitors, having visited the park on more than one previous occasion. Furthermore, 42.2% (n=57) have been to the park ten or more times.

Respondents to both the resident and visitor mail surveys follow a fairly similar age distribution, and are not significantly different from one another. For both surveys, the 45 to 54 years age category has the greatest representation.[17] Compared to permanent

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[15] The remaining four respondents did not specify whether they lived in Jasper permanently or seasonally.

[16] For logistical reasons, surveys were sent only to visitors from Canada or the United States.

[17] Comparing the age distribution of resident respondents to Statistics Canada data suggests the views of the 45-54 year old age group were over-represented in this study. Census data indicates that this age group comprises 17.7% of the resident population over 19 years of age, whereas they accounted for 25.4% of mail survey participation (n=44) (Statistics Canada, 2001).

residents, those living in Jasper on a seasonal basis tend to be younger on average, with more than half being between 19 and 24 years of age (n=9, 56.3%).

4.1.3 Discussion groups

Although participation in each of the four resident discussion groups was limited to ten individuals, none of these groups was filled to capacity. A total of four hikers, five dogwalkers, eight mountain bikers, and six horseback riders participated in these discussions. Demographic information was not collected for these individuals.

4.2 How each group uses the trail network

Residents' and visitors' use of the network is characterized by their preferred activities and frequency of participation (i.e. patterns of trail use); their motivations for using the network; and the factors influencing their choice of a specific trail—each of which are addressed in the following sections.

4.2.1 Patterns of trail use

Among residents and visitors, hiking is by far the most popular trail activity both in terms of respondents' preferences and their frequency of participation *(Figures 3 & 4)*.[18] Cross-country biking[19] ranks second for both groups, although only one-fifth of visitors

[18] Resident trail activities in order of preference are: hiking, cross-country biking, dogwalking, jogging, downhill biking, and horseback riding. Visitors' trail activities in order of preference are: hiking, cross-country biking, jogging, horseback riding, downhill biking, and dogwalking.

[19] In response to feedback during the testing of the surveys, mountain biking was split into "cross-country biking" and "downhill biking" to enable respondents to identify their preferred genre of biking. However, because results indicated all but one downhill biker also participated in cross-country biking, in the current chapter, the two activities have been re-grouped as "mountain biking" where possible.

participated in this activity during their most recent visit to Jasper. In comparison, more than half of residents cross-country bike at least one time each month and almost one-third participate in this activity at least once each week. These results are consistent with observations recorded during the intercept survey. Although residents

Figure 3: Residents' frequency of participation in trail activities on Jasper's day-use trails

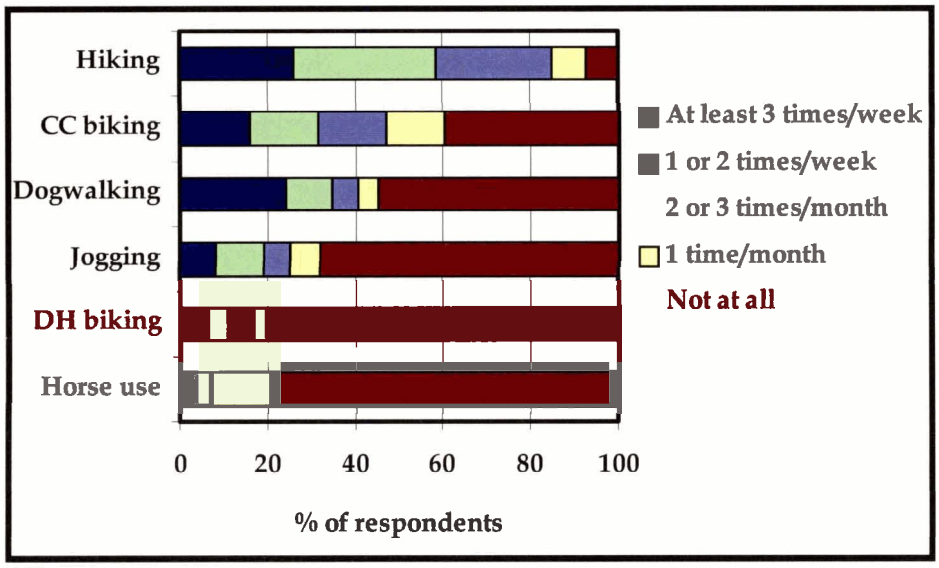
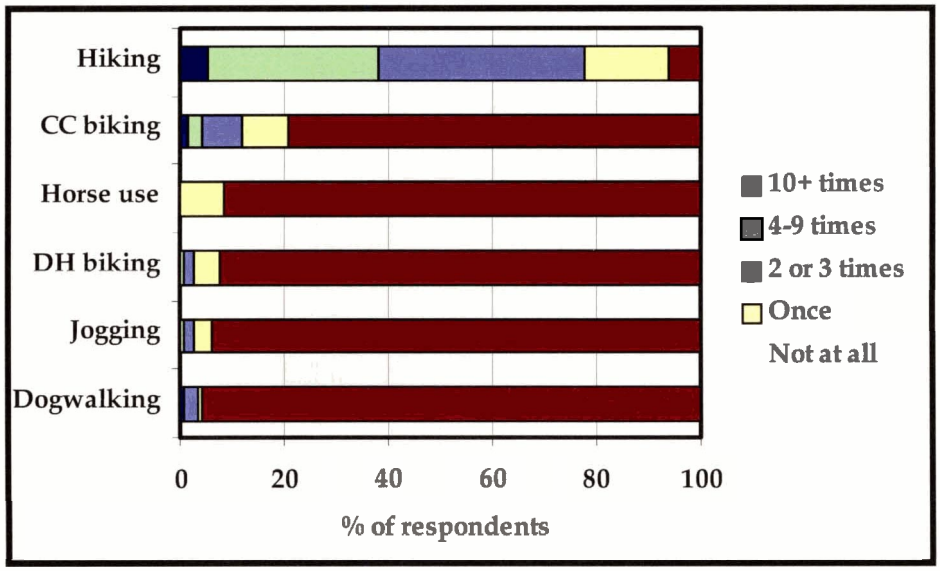


Figure 4: Visitors' frequency of participation in trail activities on Jasper's day-use trails



interviewed on the trail were fairly evenly split between these two activities, four times as many visitors were hiking rather than biking. In general, residents participate in a wider range of trail activities than do visitors. This difference is to be expected, given that visitors spend only a relatively short and finite period of time in Jasper.

Differences in rates of participation in dogwalking are particularly striking. Three-quarters of the intercept survey participants accompanied by dogs were residents rather than visitors (n=35; 76.1%). This is to be expected, given that visitors may not necessarily travel with their dogs. In contrast, dogwalking is the third-most preferred activity of residents. Likely reflective of the need to regularly exercise their pets, study results also show resident dogwalkers are on the trails more than nine times each month as compared to the four to seven times each month that residents participate in other activities.

4.2.2 *Motivations of trail users*

Study participants use the trail network primarily to enjoy the natural environment, to be in a peaceful setting, and for exercise *(Table 1; Figure 5)*.[20] Differences in the motivations of residents and visitors simply reflect the inherent discrepancies between the two groups and are to be expected. Given that residents are more familiar with the trail network, it makes sense they should consider their familiarity with a particular trail more important than would visitors. Similarly, it follows that visitors would be more interested in exploring new trails—and mail survey results suggest they are. A third difference lies in their respective interests in seeing wildlife. While residents are less

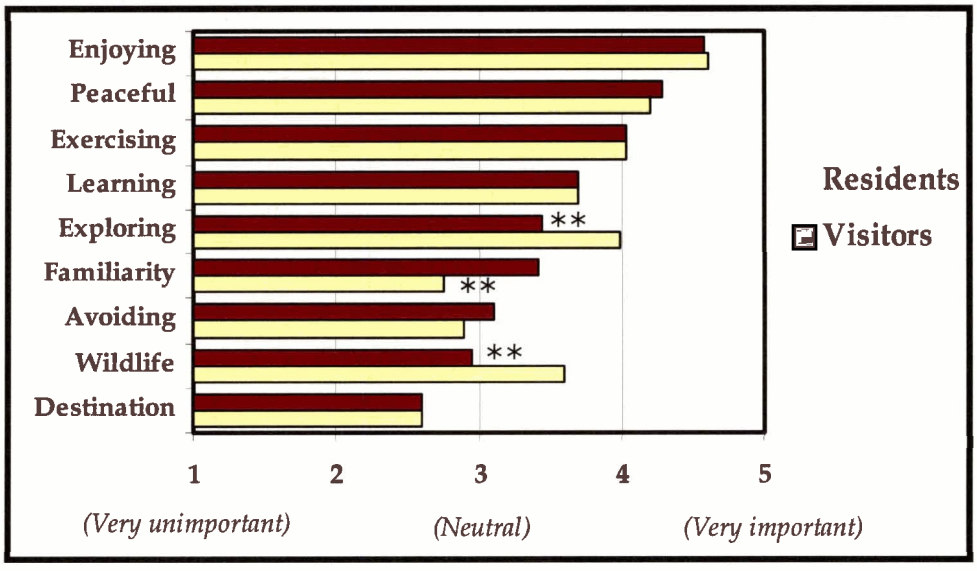
[20] Because abbreviated labels were necessary for the purpose of displaying the results, tables listing the items presented to survey respondents precede several figures in this chapter.

motivated by this desire, results presented later in this chapter show that encountering wildlife strongly enhances the trail experience of both groups *(Figure 11)*.

Table 1: Motivation items presented to mail survey respondents

Motivation item	Label
Enjoying the natural environment	Enjoying
Being in a peaceful, quiet setting	Peaceful
Exercising and challenging myself	Exercising
Learning about the natural environment	Learning
Exploring a new trail	Exploring
Using a familiar trail	Familiarity
Avoiding encounters with other trail users	Avoiding
Seeing wildlife	Wildlife
Getting to a destination	Destination

Figure 5: Importance of various motivations when using the trail network



*** indicates significance at p<0.01*

Additional results indicate that while both groups agree on the two most important reasons for using the trails, their priorities differ. Residents mainly use the network to stay fit whereas visitors use it as a means of experiencing the outdoors. Overall, results of the current study are consistent with those of the 1994 study that identified "enjoy

nature" and "exercise" as the two most important motivations for using the trail network (Canadian Heritage, 1995a).

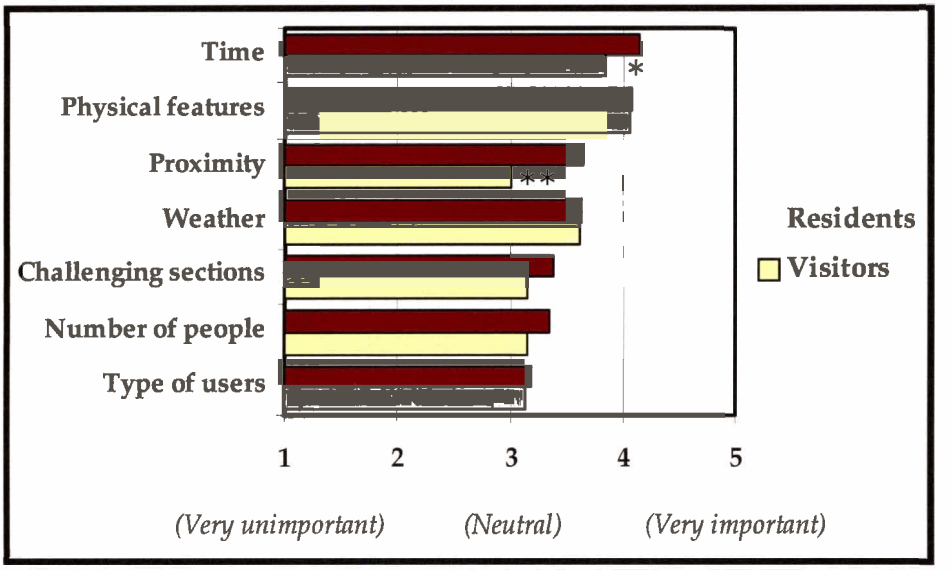
4.2.3 *Factors influencing trail choice*

Residents and visitors agree the amount of time they have available and the physical features of the trail itself are the two most important characteristics influencing their choice of a trail *(Table 2; Figure 6)*. As to be expected, residents are more concerned than

Table 2: Trail characteristics presented in mail survey

Trail characteristic	Label
The amount of time I have available	Time
The physical features of the trail itself	Physical features
The proximity of the trail to where I live or stay	Proximity
The suitability of the trail given the weather conditions	Weather
The presence of challenging or technical sections on the trail	Challenging sections
The number of people I expect to encounter	Number of people
The type of users I expect to encounter	Type of users

Figure 6: Importance of various factors when selecting a day-use trail



** indicates significance at p<0.05; ** indicates significance at p<0.01*

visitors about the proximity of the trail to their home and the amount of time they have available. Neither group appears concerned about either the number or type of other users encountered or the presence of challenging or technical sections on the trail.

4.2.3.1 Preferences for specific trails

The distribution of residents and visitors among the various intercept sites indicates the specific trail preferences of the two groups differ *(Tables 3 & 4)*. In fact, other study results show a fair amount of overlap between the trails residents consider overused and the trails visitors list as being among their favourites.

Table 3: Summary of intercept survey participation at each site

Survey site	# of surveys conducted at each site	Residents surveyed at each site		Visitors surveyed at each site	
		#	%	#	%
1. Valley of Five Lakes	99	7	7.1	92	92.9
2. Old Fort Point	90	19	21.1	71	78.9
3. Fifth Bridge	76	4	5.3	72	94.7
4. Junction 4e & 7	50	19	38.0	31	62.0
5. Church Hill	43	23	53.5	20	46.5
6. Pyramid Stables	36	4	11.1	32	88.9
7. Junction 8 & 8b	33	17	51.5	16	48.5
8. Junction 6 & 6a	28	3	10.7	25	89.3
9. Wynd Road	17	16	94.1	1	5.9
10. Sixth Bridge	17	0	0	17	100
11. Cemetery Trail	16	13	81.3	3	18.8
12. Junction 2h & 2i	7	2	28.6	5	71.4
13. McLeod Trail	1	1	100	0	0
14. Ho Chi Mihn	1	1	100	0	0
Total	514	129	-	385	-

Table 4: Top five intercept sites for residents and visitors

Residents	Visitors
1. Church Hill (Trail 2)	1. Valley of Five Lakes (Trails 9/9a)
2. Old Fort Point (Trails 1/1a)	2. Fifth Bridge (Maligne Canyon)
3. Junction 4e & 7	3. Old Fort Point (Trail 1)
4. Junction 8 & 8b	4. Pyramid Stables (Pyramid Bench)
5. Wynd Road	5. Junction 4e & 7

In general, visitors tend to frequent widely promoted and easily accessible trails such as the Valley of Five Lakes, Maligne Canyon, and Old Fort Point. Obviously, this group's trail use patterns will vary depending on the amount of time spent in Jasper. In contrast, because they live in the park, residents have greater freedom and opportunity to explore multiple areas. Consequently, it is not surprising that few residents limit their activities to only one favourite trail. While more than half (n=71; 51.8%) explore other routes in addition to using their preferred trail, an additional 40% of residents are content to divide their trail use among two to four trails.

The low proportion of residents encountered during the intercept survey suggests not all use the main trails during the summer season. Some individuals seem to either use trails outside of the study area or select routes other than the chosen intercept sites. While some trail use shifts to areas outside of the 3VC that remain inaccessible throughout the rest of the year, other residents appear to seek the solitude offered by the less popular day-use trails.

Comments from both survey respondents and discussion group participants support this notion. As expressed by one resident, "Many local trail users need to find a trail to 'get away from it all'. This is especially important when the valley trails are overrun in the summer". Furthermore, comments from discussion group participants suggest the high volume of visitor use during the summer months is one factor contributing to the attractiveness of unofficial trails. Some participants reported returning to popular sites, like the Valley of Five Lakes, only when trails are quieter in the autumn.

In addition to differences between residents and visitors, certain areas of the trail network also emerged as being popular among particular user groups *(Table 5)*. Although hikers frequented almost all trails included as intercept sites, mountain bikers appeared to prefer the Cemetery Trail and Trail 7. In fact, with the exception of Sixth Bridge (Maligne Canyon) and the Junction of 2h & 2i, the sites with the greatest concentration of mountain bikers were also the same sites with higher resident representation. This is consistent with results indicating the majority of mountain bikers interviewed were residents. Most joggers were encountered at sites easily accessed from town such as Church Hill (Trail 2) and Junction 8 & 8b. It is to be expected that horse use would be concentrated on the trails in proximity to the Pyramid Stables.

Table 5: Activities of trail users interviewed or observed at each site

Survey site	Total number of parties	% hiking at each site	% jogging at each site	% biking at each site	% on horseback at each site
1. Valley of Five Lakes	374	86.9	0.5	12.6	0
2. Old Fort Point	347	57.6	3.7	38.0	0.6
3. Fifth Bridge	284	94.4	0.4	5.3	0
4. Church Hill	189	47.1	19.6	31.7	1.6
5. Junction 4e & 7	91	11.0	2.2	84.6	2.2
6. Pyramid Stables	75	42.7	1.3	13.3	42.7
7. Junction 6 & 6a	52	67.3	0	11.5	21.2
8. Sixth Bridge	50	56.0	4.0	40.0	0
9. Wynd Road	49	51.0	8.2	40.8	0
10. Junction 8 & 8b	48	43.8	18.8	37.5	0
11. Cemetery Trail	27	0	3.7	96.3	0
12. Junction 2h & 2i	7	57.1	14.3	28.6	0
13. McLeod Trail	2	0	0	100	0
14. Ho Chi Mihn	1	0	0	100	0

4.2.3.2 Perceptions of individual trails within the trail network

Both residents and visitors were asked to identify a trail that would fit each of a number of criteria. Presented in Table 6 are the two most popular responses provided for each category. Although comparing resident and visitor responses suggests their perceptions of individual trails differ, the visitors' limited familiarity with the trail network should be considered a potentially intervening factor.

Table 6: Trails nominated by residents and visitors to fit certain criteria

One trail I would....	Residents	Visitors
Recommend for solitude	**Trail 3 (31)* Trail 8 (12)**	**Valley of Five Lakes (9) Trail 1 (8)**
Recommend for a good view	Trail 2/2b (35) Trail 1 (14)	Trail 1 (21) Maligne Canyon (9)
Recommend for seeing wildlife	**Trail 6 (17) Trail 7**	**Trail 6 (8) Trail 1 (5)**
Consider overused	Valley of Five Lakes (19) Trail 2 (17)	Maligne Canyon (15) Trail 7 (6)
Consider underused	**None (28) Trail 3 (17)**	**None (9) Trail 6 (4)**
Consider well-maintained	All (23) Trail 2 (18)	All (17) Trail 7 (9)
Consider poorly-maintained	**None (26) Trail 8 (11)**	**None (9) Trail 6 (5)**
Consider poorly signed	None (43) Trail 3 (5)	None (9) Valley of Five Lakes (8)
Consider my favourite	**Trail 7 (12) Trail 8 (12)**	**Maligne Canyon (12) Trail 1 (8)**

** The number in parentheses following each response represents the number of respondents who gave that particular answer.*

4.2.3.3 Preference for specific trail attributes

Comparing residents' and visitors' descriptions of their "ideal trail" highlights several differences in their preferences for trail attributes and management options *(Table 7)*. While both groups agree hiking would be allowed on their ideal trail, visitors show considerably less support for permitting mountain biking. Less than one-quarter of each group is in favour of allowing horse-use. Both residents and visitors are fairly divided as to whether or not wardens should patrol the trails, but the majority agree trails should be signed.

Table 7: Respondents' descriptions of their ideal trail

Trail management: **My ideal trail would...**		**# of residents in favour (N=171)**	**% of valid resident responses**	**# of visitors in favour (N=141)**	**% of valid visitor responses**
Allow the following activities	Hiking/jogging	161	94.2	132	93.6
	Mountain biking	97	56.7	38	27.7
	Horse use	42	24.6	26	18.4
Be patrolled by wardens?	Yes	71	44.4	68	51.1
	No	89	55.6	65	48.9
Have signage at junctions?	Yes	154	91.7	140	97.9
	No	14	8.3	3	2.1
Trail characteristics **My ideal trail would be predominantly...**					
Trail surface	Soil	72	46.8	55	44.7
	Exposed roots	16	10.4	22	17.9
	Hardened*	73	47.4	49	39.8
Topography	Flat	5	3.8	6	5.4
	Many short hills	77	58.8	53	47.7
	Few long hills	49	37.4	54	48.6
	Straight	3	2.2	2	1.7
	Winding	134	97.8	115	98.3
Maintained?**	Yes	154	91.7	129	94.2
	No	14	8.3	8	5.8
Forest type	Mixed & non-forested	5	3.1	0	0
	Leaved forest	1	0.6	61	48.0
	Mixed forest***	155	96.3	60	47.2
	Evergreen forest	0	0	6	4.7

Table 7: Respondents' descriptions of their ideal trail *(cont.)*

Trip Highlights My ideal trail would offer the following:		# of residents in favour (N=171)	% of valid resident responses	# of visitors in favour (N=141)	% of valid visitor responses
Lake / River?	**Yes**	**153**	**93.3**	**134**	**96.4**
	No	**11**	**6.7**	**5**	**3.6**
Viewpoints	Yes	162	95.9	140	98.6
	No	7	4.1	2	1.4
Wildlife viewing	**Yes**	**121**	**73.8**	**116**	**87.9**
	No	**43**	**26.2**	**16**	**12.1**
Encounters **On my ideal trail, I would prefer to meet in one hour....**					
Hikers/joggers	**0 groups**	**36**	**21.4**	**15**	**11.1**
	2 groups	**94**	**56**	**60**	**44.4**
	4 groups	**27**	**16.1**	**37**	**27.4**
	6 groups	**7**	**4.2**	**15**	**11.1**
	8 groups	**0**	**0**	**4**	**3.0**
	10 groups	**4**	**2.4**	**4**	**3.0**
Mtn. Bikers	0 groups	69	41.1	60	45.8
	1 groups	37	22	26	19.8
	2 groups	45	26.8	26	19.8
	3 groups	9	5.4	11	8.4
	4 groups	6	3.6	6	4.6
	6 groups	2	1.2	2	1.5
Horse users	**0 groups**	**114**	**68.7**	**82**	**63.1**
	1 group	**48**	**28.9**	**41**	**31.5**
	3 groups	**4**	**2.4**	**7**	**5.4**
Large groups	**0 groups**	**100**	**62.9**	**54**	**42.5**
	1 group	**54**	**34**	**61**	**48.9**
	3 groups	**5**	**3.1**	**12**	**9.4**

* *Trail is sufficiently compacted to provide a hard surface, but is not paved.*
** *A trail is considered "maintained" if fallen trees and other debris are cleared from the trail and bridges are in good condition.*
*** *A mixed forest includes both leaved and evergreen trees.*

Their preferences for trail characteristics are fairly similar; both groups favour maintained trails and oppose having exposed roots. Residents show a clear preference for a mixed forest while visitors favour either a mixed or deciduous ("leaved") forest. The physical attractions of water and viewpoints are considered important by almost all respondents, while about three-quarters are interested in wildlife viewing. Consistent with earlier results, visitors are more strongly in favour of the latter feature than are

residents. Also consistent with other results *(Figure 11)*, both groups prefer having only a few encounters with other trail users. The desire for avoiding encounters with other users is strongest against mountain bikers, horseback riders, or large groups.

4.3 How each group obtains information about the trail network

Residents and visitors also differ in terms of how they obtain information about the trail network. Because almost all residents interviewed had used that particular trail in the past, this group appears less likely to actively seek out trail-related information. Mail survey results support this notion, indicating the majority of residents learn about the network through personal discovery/exploration and friends/word of mouth *(Table 8)*. In contrast, visitors are more likely to use Parks Canada information sources.

Table 8: How do you obtain information about Jasper's trail network?

Information sources presented to respondents	RESIDENTS (n=173)		VISITORS (n=145)	
	Yes	No	Yes	No
Parks Canada sources (brochures, trail office, trail kiosks, website)	**49.7**	**50.3**	**82.8**	**17.2**
Outdoor/bike shops in town	12.7	87.3	13.8	86.2
Local guidebooks	**31.8**	**68.2**	**38.6**	**61.4**
Websites (other than Parks Canada website)	1.2	98.8	12.4	87.6
Friends/word of mouth	**71.1**	**28.9**	**32.4**	**67.6**
Through personal discovery and exploration	72.8	27.2	42.1	57.9

Additional results indicate a sizeable proportion of trail users have never used some of the various information sources. While not surprising that approximately one-third of residents (n=55, 32.5%) have never used the Parks Canada information centre as a source of trail information, over one-fifth of visitors (n=32; 22.2%) have also never used this source. Also of interest is that almost one-third of both groups (29.7% of residents; 30.6% of visitors) have never read the Summer Trails brochure.

4.3.1 *Satisfaction with the current provision of trail-related information*

The top-box theory maintains that at least 40% of respondents will rate each category as "top-box" (or in this case, "Very useful") if Jasper NP is doing a good job satisfying its trail users. Based on this theory, residents are satisfied with the "Summer Trails" map, the provision of trail markers, and maps at trail junctions *(Table 9; Figure 7)*. In contrast, they feel the Parks Canada information centre, trail kiosks, and the Parks Canada website need further improvement. With the exception of the Parks Canada website, visitors assigned top-box ratings to all items *(Figure 8)*.

Table 9: Items used to survey whether the needs of respondents are being met with respect to the provision of trail-related information

Item	Label
"Summer trails" map/brochure	"Summer trails"
Parks Canada information centre	Info centre
Information kiosks at trailheads	Trail kiosks
Parks Canada website	PC website
Trail maps at trail junctions	Maps at junctions
Trail markers along the trail	Trail markers

Figure 7: Distribution of resident responses when asked to evaluate the information provided about the trail network

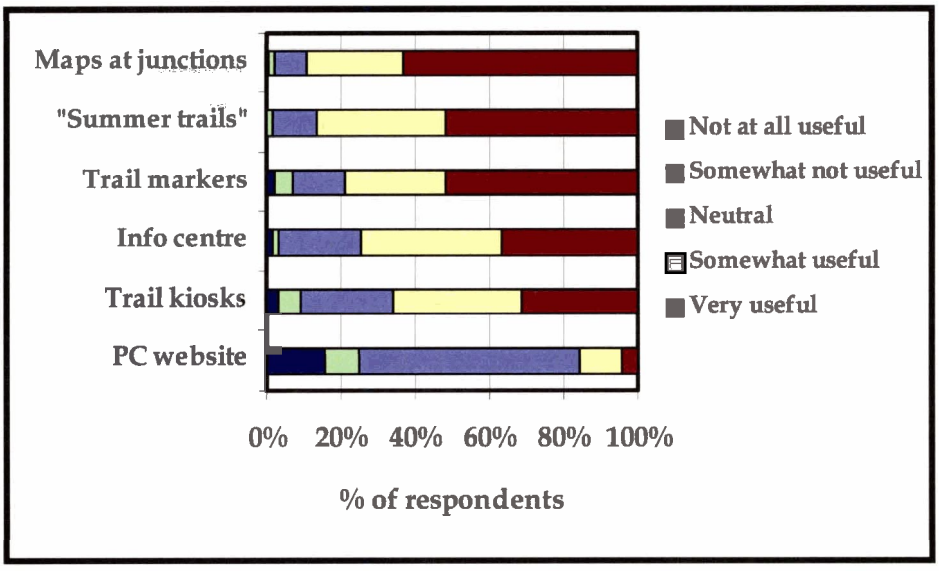
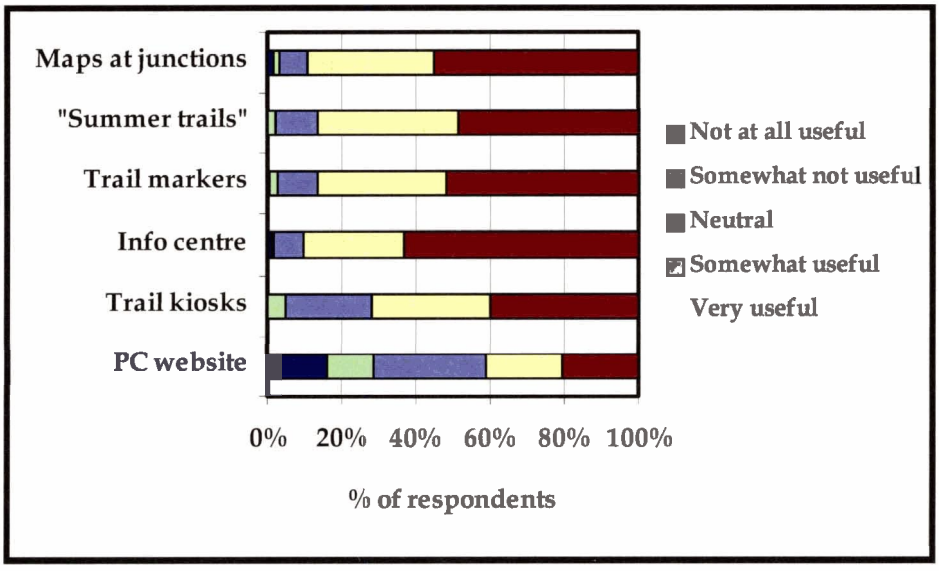


Figure 8: Distribution of visitor responses when asked to evaluate the information provided about the trail network



4.4 Overall satisfaction of trail users

Study results overwhelmingly indicate both residents and visitors greatly value the day-use trail network. It contributes to the lifestyle of many residents and is considered by

some as one of the main highlights of living in Jasper: "I have always felt that we are extremely fortunate to have the extensive awesome trails within the Jasper townsite. This is what makes living in the National Park so great. It is so easy for everyone (young and old, fit and unfit) to get out there". This sentiment appears to be shared by visitors as well: "I find the variety of day-use trails in and around Jasper the main reason why I visit every year".

Consistent with these comments, almost all intercept survey participants (n=495, 96.3%) reported their trail experience as either meeting or exceeding their expectations. Of the 19 parties who said their experience had failed their expectations, all but two were visitors. Several of these individuals questioned the accuracy of trail descriptions and suggested the level of difficulty should also be indicated. Others expressed concern about the inadequacy of markers in areas where trail braiding makes it difficult to follow the correct route. A number of parties were also dissatisfied with the condition of heavily used trails, and particularly those used by horses. Although some mail survey respondents shared these concerns about maintenance, overall results suggest most trail users are satisfied with current conditions. When asked to identify both a well maintained and a poorly maintained trail, the most popular responses were "all" and "none", respectively *(Table 6)*.

In general, the vast majority of mail survey respondents appear satisfied with Parks Canada's current provision of trail-related services *(Table 10; Figures 9 & 10)*. Of the items presented on the survey, respondents were least satisfied with interpretive signage, the clarity of trail markers, and trail maps and brochures. A number of

individuals even pointed out that Parks Canada does not currently provide trail maps—rather the Friends of Jasper NP do. In contrast to intercept survey results, findings from the mail survey indicate residents are significantly less satisfied with trail maintenance (*Pearson chi square=25.824, df=2, p<0.01*). Residents also have a lower level of satisfaction with the provision of trails of varying levels of difficulty (*Pearson chi square=6.182, df=2, p<0.05*) and interpretive/educational signage (*Pearson chi square=9.016, df=2, p<0.05*).

Comments written by mail survey respondents offer further insight into the overall satisfaction with the trail network. More than half of all residents (n=70, 55.1%) and one-fifth of the visitors (n=20, 20.0%) who provided comments were either critical or offered suggestions for managing the trails. In comparison, half of all visitor comments (n=54, 54.0%) and one-quarter of all resident comments (n=33, 26.0%) expressed satisfaction with the trail network. This range of opinions communicates an important message: trail users vary markedly in their expectations for the network. While some residents expressed the need for stricter regulations, others believe "less management is in order—not more". Similarly, while some claim the current network is more than sufficient, others think additional trails should be developed.

Table 10: Items used to survey whether the needs of respondents are being met with respect to trail-service provision

Item	Label
Trails in a variety of landscapes	**Landscape**
Trails of varying levels of difficulty	Difficulty
Trail maps and brochures	**Maps/brochures**
Clearly signed trails	Clearly signed
Well-maintained trails	**Well maintained**
Interpretive or educational signage	Interp. Signage

Figure 9: How well is Parks Canada meeting residents' needs in providing the following?

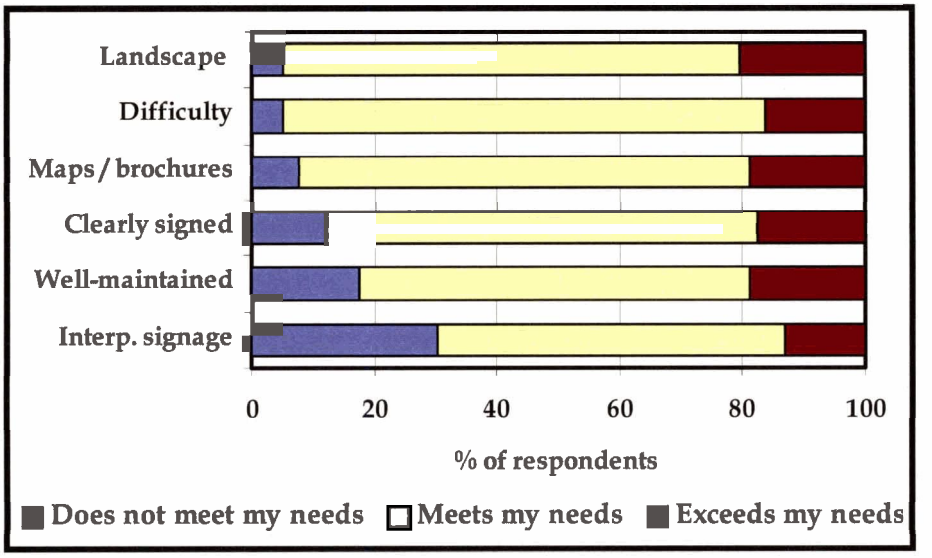
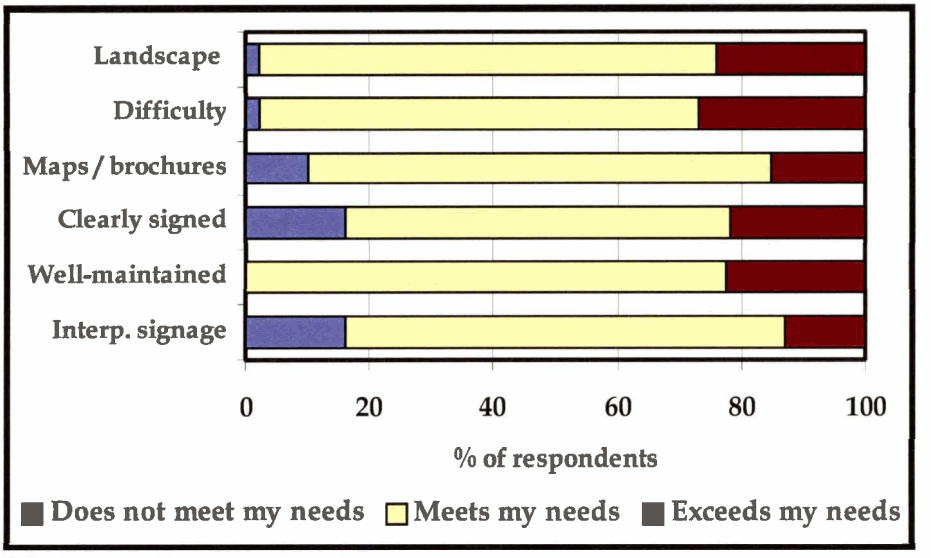


Figure 10: How well is Parks Canada meeting visitors' needs in providing the following?



In particular, some discussion group participants proposed the creation of certain links (or connector trails) as a means of redirecting some unofficial trail use. They also suggested that addressing the lack of trails designed specifically for mountain biking could have similar benefits. Cross-country biking accounts for a significant proportion

of Jasper's trail use, given that both residents and visitors consider it the second-most popular trail activity. Furthermore, 60% of residents cross-country bike, albeit with varying intensities. While casual bikers likely feel the current trail network meets (or even exceeds) their needs, some of the more skilled bikers suggest more technical trails are needed. Rather than necessarily calling for the construction of new trails, participants in the mountain biking discussion group suggested current trails could simply be modified to provide more challenging features.

While it is probable that most visitors consider only official trails in their evaluation of the trail network, comments by discussion group participants indicate at least some residents consider unofficial trails part of Jasper's overall trail offer (Thomlinson, 2004). In fact, unofficial trail use appears widespread among residents, or at least among those who participated in the discussion groups. Comments by some of these individuals suggest unofficial trails offer a different experience than that provided by the official network. In addition to diversifying Jasper's overall trail offer, participants reported these trails as being quieter, less "beaten up" than heavily used official trails, more challenging, having more desirable physical attributes, and as offering a short-cut home.

Although no one activity group emerged as the principle group using unofficial trails, several comments in the mail surveys and discussion groups attributed the bulk of this use to mountain bikers. However, study results failed to support this perception given that individuals in all groups mentioned using unofficial trails. Despite Parks Canada's efforts to communicate the importance of these areas for wildlife, none of the discussion group participants seemed to think their behaviour was adversely impacting animals.

That said, some mountain bikers claimed they would respect Parks Canada's efforts to discourage the use of sensitive areas providing the rationale was clearly communicated and legitimate.

4.5 Preferences for trail management

Several mail survey questions were used to understand respondents' preferences for trail management. The following sections explore how various situations affect residents' and visitors' quality of trail experience and compare the two groups' reactions to various hypothetical management actions.

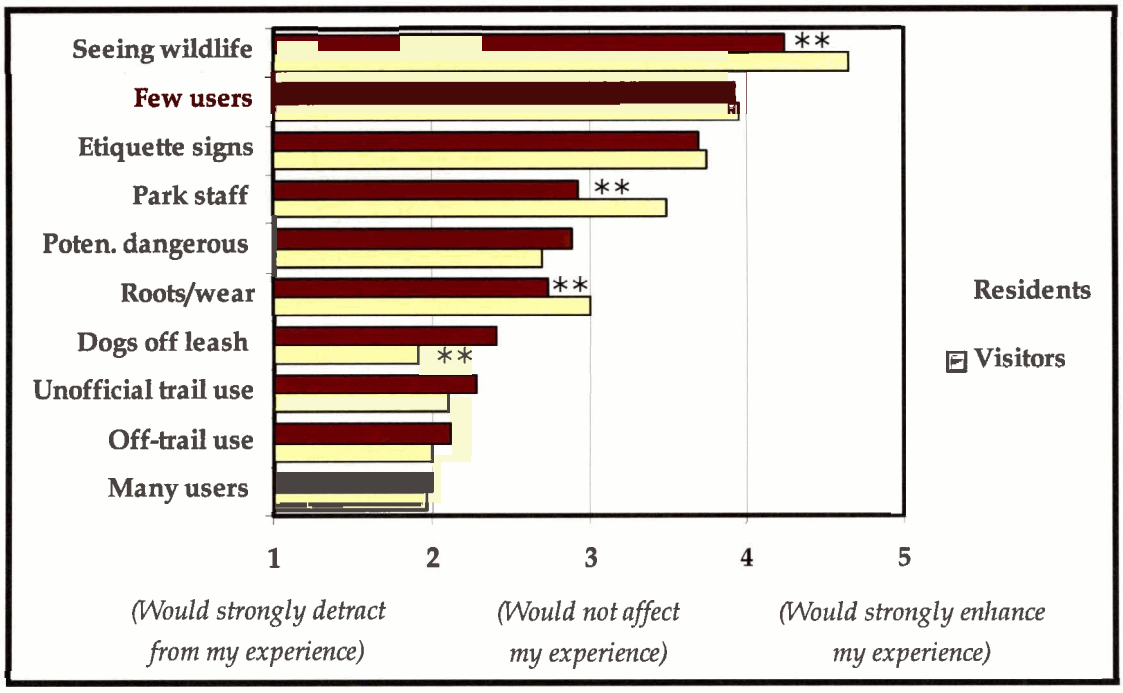
4.5.1 Effect of various situations on the quality of trail experience

A number of factors appear to influence the quality of trail experience. Residents and visitors agree seeing wildlife strongly enhances their experience, whereas encountering many other users on the trail, seeing other users either off-trail or using unofficial trails, and observing dogs off-leash detract from their experience *(Table 11; Figure 11)*. Encountering park staff and exposed roots/wear on the trail detracts more from the experience of residents than from the experience of visitors. In comparison, visitors are more negatively affected by encountering dogs off-leash and are more positively affected by seeing wildlife.

Table 11: Situations presented to mail survey respondents

Item	Label
Seeing wildlife	Seeing wildlife
Few other users on the trail	Few users
Signs posted on the trail communicating a trail sharing etiquette	Etiquette signs
Park staff on the trail	Park staff
Encountering potentially dangerous wildlife	Poten. dangerous
Exposed roots/wear on the trail	Roots/wear
Dogs off leash on the trail	Dogs off-leash
Seeing others using unofficial trails	Unofficial use
Seeing other users off-trail	Off-trail use
Many other users on the trail	Many users

Figure 11: How would the following situations affect your trail experience?



*** indicates significance at p< 0.01*

According to mail survey findings presented in Figure 11, the number of other users on the trail clearly has a strong influence on the quality of trail experience. However, other study results suggest this factor has only a negligible effect. More than 80% of intercept survey participants identified both the number and type of other trail users as unimportant considerations in their choice of a trail. Although results presented in Figure 6 appear consistent with these findings, the distribution of these responses

suggests otherwise; in fact, more than 40% of residents and over one-third of visitors rated these factors as either important or very important when choosing a trail.

Furthermore, almost three-quarters of residents (n=118, 73.8%) said they would change their patterns of use if current levels of trail use were to double. This preference for quieter trails appears to motivate some residents to alter their trail use patterns during the summer months to avoid the trails most popular among visitors. However, while both groups demonstrate a clear preference for less busy trails, it appears they also have a high tolerance when other trail users are encountered. Even though the number of encounters reported ranged widely, very few intercept survey participants (n=22, 4.3%) thought they met too many other parties on the trail. Interestingly, all but one of these dissatisfied trail users were visitors.

Concerns about other trail users also surfaced in comments written by mail survey respondents. One-fifth of the 127 resident comments (n=26, 20.5%) specifically referred to multiple user groups sharing the trails. About two-thirds of these respondents (n=17, 65.4%) addressed the need to designate trails for particular user groups. The remaining one-third (n=9, 34.6%) expressed satisfaction with the current multi-use network. In comparison, while only several of the 100 visitor comments specifically referred to multiple user groups sharing the trails (n=7, 7.0%), all of these comments addressed the need to designate trails for particular user groups. However, because more than 60% of visitor comments expressed satisfaction with the trail network in general, overall this group appears to favour rather than oppose the current multi-use approach.

Some individuals from each group also contributed critical comments targeted at specific user groups. While they were most concerned about horse use and mountain biking, several comments were also made in reference to dogwalking *(Table 12)*. Comments from other respondents acknowledged their problems with other user groups as limited to isolated occurrences or individuals rather than being representative of the community as a whole. As expressed by one resident, "Bike riders are becoming a problem—some bike riders". Such comments highlight the importance of proper trail etiquette—another common issue raised by mail survey respondents. According to one resident, "If everyone understood proper trail etiquette and it was well enforced, we could all get along much better".

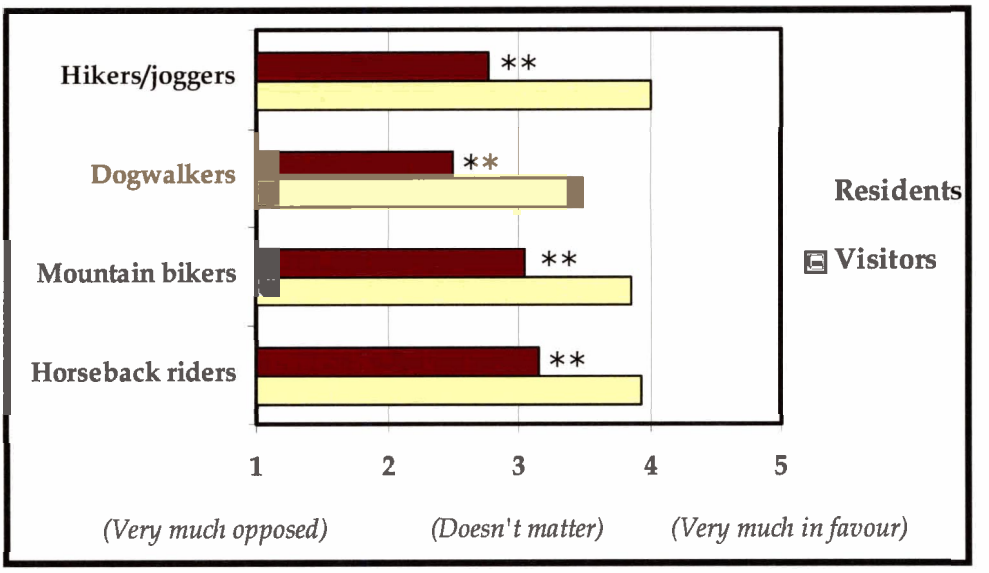
Table 12: Summary of mail survey comments pertaining to concerns about certain user groups

	RESIDENTS (N=127)		VISITORS (N=100)	
Concerns about:	# of resident comments	% of resident comments	# of visitor comments	% of visitor comments
Horseback riders	20	16.1	6	6.1
Mountain bikers	17	13.7	10	10.2
Dogwalkers	7	5.6	3	3.1
Hikers	0	0	0	0

4.5.2 *Attitudes towards designating trails*

One approach for addressing user conflicts is to designate trails for the use of specific activity groups. This tool can also be used to exclude specific users from an area in response to ecological concerns. When presented to mail survey respondents, designated trails were framed as a means of reserving individual trails for the exclusive use of a particular activity group *(Figure 12)*.

Figure 12: Attitudes towards designating trails for the exclusive use of each of the four user groups



*** indicates significance at p<0.01*

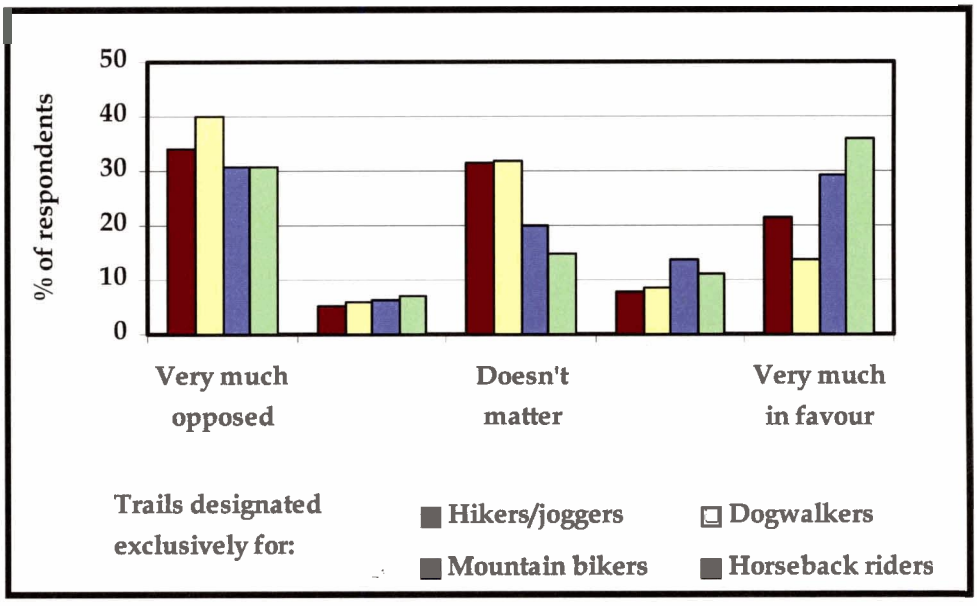
Results indicate the two groups differ in their attitudes towards this management action. Residents appear indifferent to designating trails for the exclusive use of each of the four user groups, though they are "on the cusp" to opposing trails designated for dogwalkers (mean response=2.5).[21] In contrast, visitors are in favour of all options for designated trails with the exception of dogwalking. However, rather than opposing trails being reserved for dogwalkers, the mean result for this item nears the divide between indifference and support.

Although they appear relatively neutral on this issue, the attitudes of individual residents are actually quite divided. The distribution of responses indicates residents are either strongly in opposition, neutral, or strongly in favour of designated trails—very few respondents selected the moderate statements of "Opposed" or "In favour"

[21] For the purpose of analysing these results, a set of rules was developed to lend structure to the determination of opposition, indifference, or support. Mean values less than 2.5 were assumed to signify overall opposition, means between the values of 2.5 and 3.5 to show indifference, and means greater or equal to 3.5 to indicate overall support by the entire sample.

(Figure 13). This implies that the majority of residents who have an opinion (i.e. those who are not neutral on the issue)—have a **strong** opinion.

Figure 13: Distribution of resident attitudes towards designating trails for the exclusive use of each of the four user groups

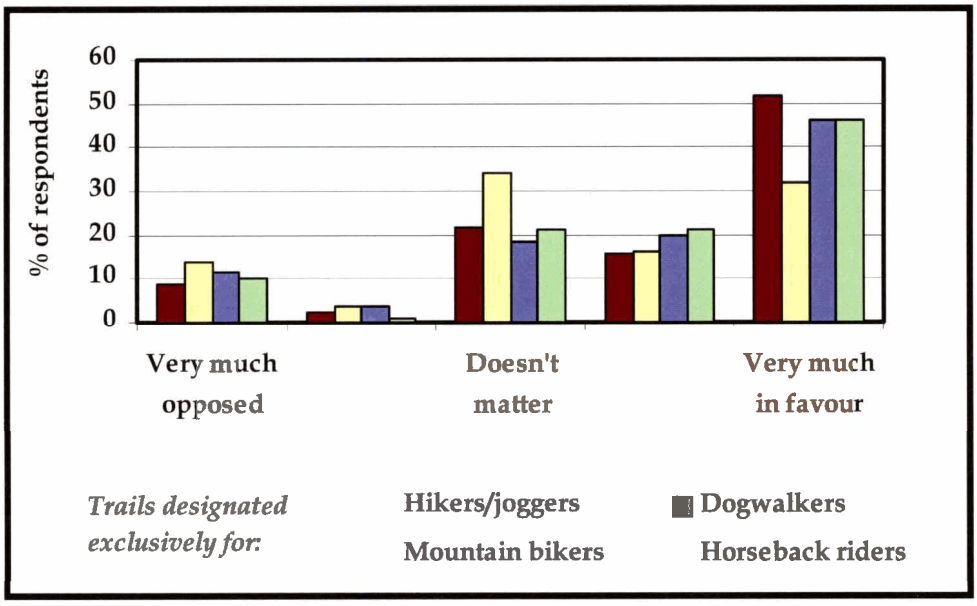


Furthermore, about one-fifth of residents (n=37, 22.0%) are altogether opposed to designating trails, as they are "Very much opposed" or "Opposed" to trails designated for each of the four user groups. In comparison, less than one-tenth (n=15, 8.9%) are universally in favour of this measure, as indicated by their "In favour" or "Very much in favour" responses for each of the four user groups.

In contrast, visitors are significantly more in favour of the concept of designating trails for specific user groups. Furthermore, as a group, visitors are less divided on this issue *(Figure 14)*. Only nine visitors (6.3%) indicated they were "Opposed" or "Very much opposed" to designating trails for each one of the four user groups, whereas over one-

third (n=48, 35.3%) indicated that they were either "In favour " or "Very much in favour".

Figure 14: Distribution of visitor attitudes towards designating trails for the exclusive use of each of the four user groups



4.5.3 *Support for various hypothetical management actions*

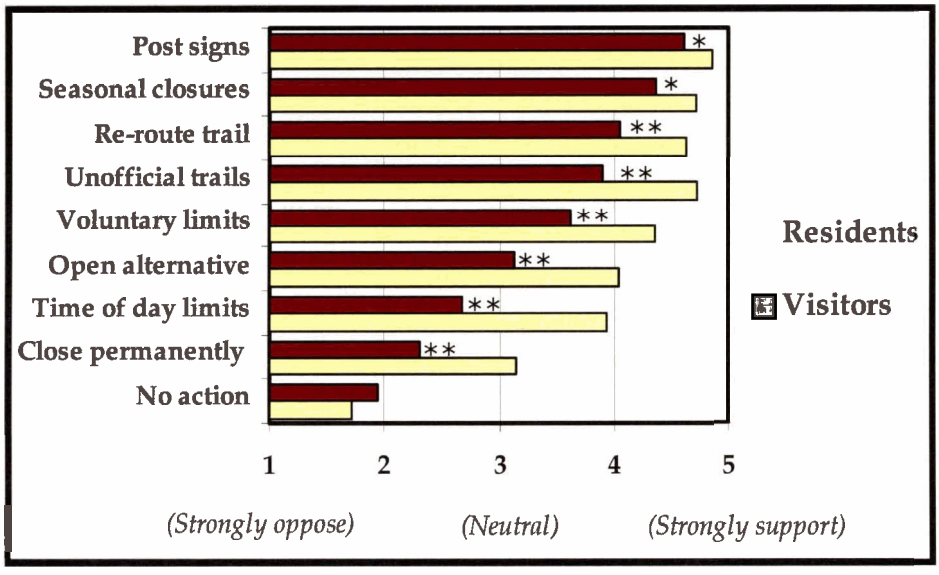
The level of support for several other management actions was gauged using a question that presented respondents with one of three scenarios and asked them to rate the acceptability of various actions given the situation. The three scenarios corresponded to possible rationales for taking management action on a specific trail: wildlife habitat restoration, public safety, and user enjoyment. The trail in question was presented to residents as "one of the trails you use most frequently" and to visitors as "one of your favourite trails in Jasper".

Respondents receiving the "wildlife habitat restoration" rationale were instructed to assume a given trail was crucial for wildlife movement and that some management action was required to restore or improve this habitat. With the exception of "no action", residents show significantly less support than visitors for all of the hypothetical actions presented *(Table 13; Figure 15)*.

Table 13: Possible management actions presented to respondents who received the "wildlife habitat restoration" or "public safety" version of this question

Item	Label
Post signs and communicate with trail users about how they can minimize disturbance	Post signs
Seasonal closures of important wildlife areas during periods of breeding and young-rearing	Seasonal closures
Re-route the trail to avoid areas that are especially important to wildlife	Re-route trail
Discourage use of unofficial trails in the area	Unofficial trails
Ask users to voluntarily limit their use of the trail	Voluntary limits
Close the trail permanently to all users and develop a trail in less sensitive area	Open alternative
Limit all use to certain times of the d	Time of day limits
Close the trail permanently to all users	Close permanently
No action	No acti

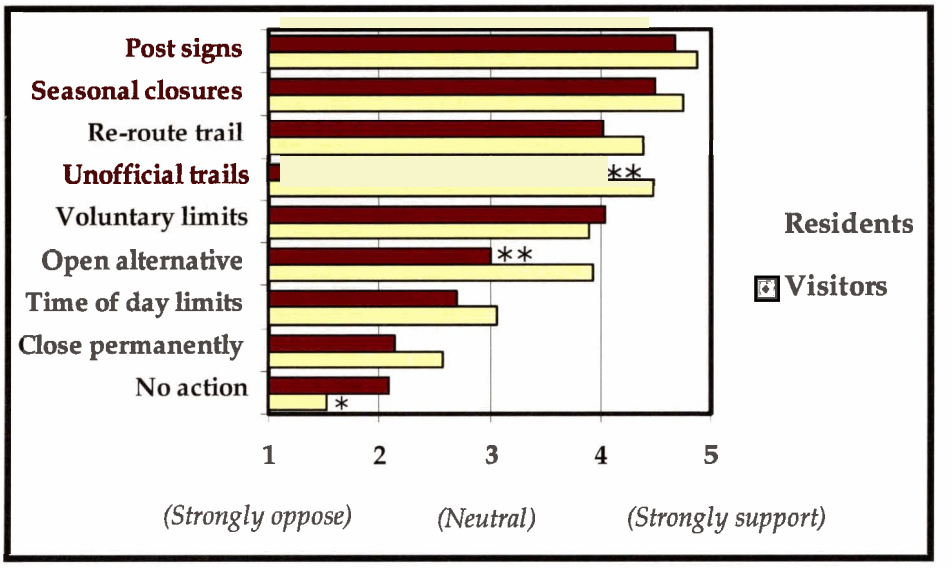
Figure 15: Acceptability of management actions taken to restore or improve wildlife habitat



** indicates significance at p<0.05; ** indicates significance at p<0.01*

Because respondents receiving either the "wildlife habitat restoration" or "public safety" versions were presented with the same items, these two sets of results are directly comparable. Under the "public safety" rationale, respondents were told a given trail required some type of management action to minimize the potential for a dangerous encounter with wildlife. Although the general level of support (or opposition) for each management action was fairly similar to that reported under the previous rationale, residents and visitors showed more agreement in their responses *(Figure 16)*.

Figure 16: Acceptability of possible management actions taken in response to concern for public safety



** indicates significance at p<0.05; ** indicates significance at p<0.01*

In each case, respondents appear most supportive of management actions that do not infringe considerably upon their own use of the trail network. Regardless of whether management actions were hypothetically motivated by concern for wildlife habitat or for public safety, respondents were most receptive to "soft" actions including: posting signs to communicate how trail users can minimize their disturbance, seasonal closures, re- routing trails, voluntary closures, and discouraging the use of unofficial trails in the

area. As a whole, respondents were relatively indifferent to actions that either limited when they could access the trail (time of day limits) or closed the trail to all users. It is interesting to note that in both cases, opposition is strongest for not taking any action whatsoever.

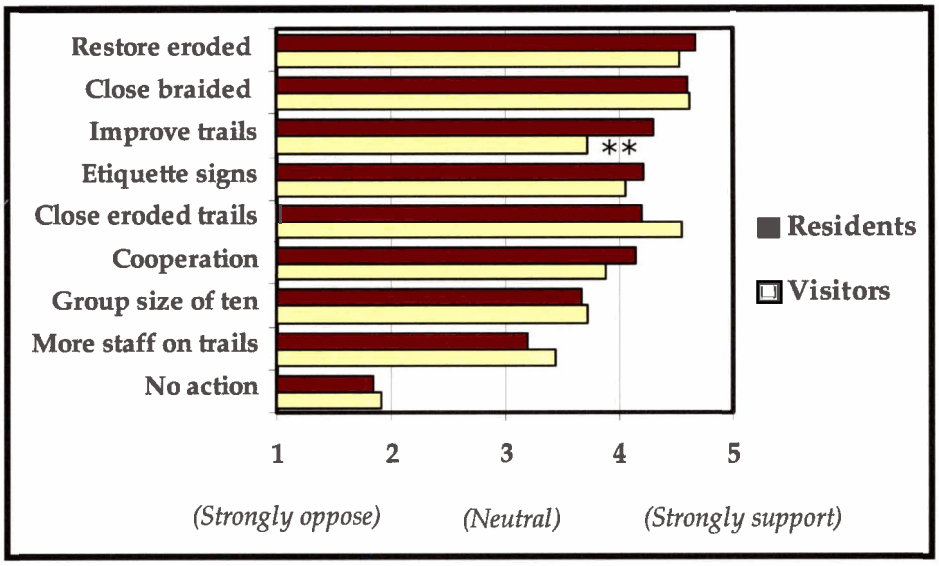
While these results imply respondents would willingly accept any and all management actions, separating the responses of residents and visitors suggests otherwise. First of all, visitors have a significantly stronger level of support for all management actions taken in response to concern for wildlife habitat. They are fairly indifferent to closing trails permanently, opposed to not taking any action whatsoever, and support all other possible management actions to some degree. While residents are similarly opposed to not taking any action, they also oppose closing trails permanently to all users—regardless of whether this action is motivated by concern for wildlife habitat or for public safety. Interestingly, although visitors show stronger support for a number of actions intended to restore or improve wildlife habitat, residents' level of support (and opposition) does not differ significantly under these two rationales.

Results of the third version of this question indicate a high level of support for most of the actions proposed as a means of enhancing user enjoyment *(Table 14; Figure 17)*. The only exceptions to this are indifference to increasing the staff presence on trails and opposition to not taking any action whatsoever. The attitudes of residents and visitors are similar for all but one of the hypothetical management actions. Residents more strongly support improving trails to encourage the use of existing trails than do visitors.

Table 14: Possible management actions presented to respondents who received the "user enjoyment" version of this question

Item	Label
Restore eroded sections of trails	Restore eroded
Close braided sections of trails to allow vegetation to recover	Close braided
Improve trails to encourage use of existing trails	Improve trails
Use signage to remind trail users of proper trail sharing etiquette	Etiquette signs
[redacted] trails showing severe erosio[redacted]ded tra[redacted]	
Have user groups work together to promote trail sharing etiquette	Cooperation
Limit group size on the trails to ten	Group size of ten
Have a stronger staff presence on trails	More staff on trails
No action	No action

Figure 17: Acceptability of possible management actions taken to enhance user enjoyment



*** indicates significance at p<0.01*

4.5.4 *Attitudes towards voluntary closures*

The attitudes of respondents towards voluntary closures were surveyed in greater detail in an effort to assess the effectiveness of the current *Wild Trail* signs in discouraging the use of these trails. Although both groups show some degree of support for voluntary closures *(Figures 15 & 16)*, results suggest the effectiveness of this management approach is questionable *(Table 15)*. While the majority of respondents said they would choose another trail if they were to encounter a sign stating the area was important for wildlife

and requesting they choose another trail, almost one-third indicated they would continue on the intended trail. Furthermore, one-third of those choosing to ignore the sign on that particular day also indicated they would continue using the area in the future, although less frequently.

Table 15: How would you react if you encountered a voluntary trail closure for wildlife protection?

Response	Residents (%) (N=163)	Visitors (%) (N=141)
I would choose another trail	**57.1**	**88.7**
I would continue on the intended trail, but plan to choose an alternative trail next time	22.7	5.7
I would continue to use the area, but less frequently	**18.4**	**3.5**
I would continue on the intended trail	1.8	2.1

Results indicate residents and visitors differ in their anticipated reactions to this situation *(Pearson's chi square = 39.860, df=3, p<0.01)*.[22] Whereas almost 90% of visitors said they would choose another trail, less than 60% of residents gave this same response. Observations made during data collection contribute a different perspective on non-compliance. Intercept surveys were conducted on three trails with *Wild Trail* signs: McLeod Trail, Ho Chi Mihn, and at the junction of Trails 2h and 2i. Although a similar number of survey hours were dedicated to each of these sites, the junction of Trails 2h and 2i was the busiest for intercept surveys *(Table 3)*. Interestingly, while both parties encountered on McLeod Trail and Ho Chi Mihn were Jasper residents, five of the seven parties encountered at the junction of Trails 2h and 2i were visitors.

Through the researcher's interactions with trail users and various observations made during data collection, a number of factors possibly contributing to non-compliance

[22] The "Unsure/I don't know" category was omitted for the chi square procedure because too few respondents chose this category.

became apparent. Comments from intercept survey participants suggested the clarity, quality, and placement of *Wild Trails* signs should be examined. Additionally, some of the information and maps disseminated by local accommodation providers fail to discourage the use of these trails.

The compliance of some trail users also appears to be influenced by their perception of the legitimacy of the concern for wildlife movement. Comments from both survey respondents and discussion group participants suggest trail users will be more willing to comply with these closures if the rationale for discouraging use of the area is clearly communicated and defensible. Furthermore, one resident highlighted the fact that "not all people respond/react to conservation-based messaging", thus suggesting messages of this nature target only one segment of the population. Additionally, some trail users simply enjoy using these areas and are only willing to make minor changes to their behaviour as evidenced by the almost one-fifth of residents (n=30; 18.4%) who indicated they "would continue to use the area, but less frequently".

CHAPTER FIVE: MANAGEMENT IMPLICATIONS

While important to manage Jasper's day-use trail network for both social and ecological values, Parks Canada's ultimate responsibility is to maintain the ecological integrity of this area. As a result, in providing for a wide range of outdoor recreation activities, management of the network must not infringe upon wildlife needs or ecological processes (Parks Canada Agency, 2001a). This chapter interprets study results in this context, relating them to the literature and discussing their implications for future trail management.

5.1 Patterns of trail use

Similar to findings of Saremba and Gill (1991) for local and non-local visitors to Garibaldi Provincial Park, the recreational experiences sought by residents and visitors in Jasper appear to differ. Residents primarily use the trail network for fitness whereas visitors are more interested in simply experiencing the outdoors. Although results indicate visitors are also interested in exercising and challenging themselves *(Figure 5)*, unlike residents, this is not their prime motivation when in Jasper. During their visit they tend to focus on unique experiences—such as hiking in the mountains—which they cannot do at home.[23] In contrast, because residents live in Jasper, they use the trails to participate in a wider range of activities *(Figure 3)*. Not surprisingly, this group also

[23] Another plausible explanation for why visitors primarily hike is because this activity requires little planning or specialized equipment.

reports a higher level of participation for "intermediate" (Clawson & Knetsch, 1966) or "near-urban" (Saremba & Gill, 1991) activities such as jogging and dogwalking.

The management expectations of local and non-local users tend to reflect the recreational experiences sought by each group (Saremba & Gill, 1991). Although Jasper residents were generally satisfied with the current network and its management, more than half were quick to identify areas needing improvement, compared with only one-fifth of visitors. While this discrepancy was likely influenced by their respective levels of familiarity with the trails, differences between their needs may have also been a factor. Although it is rarely possible to please all users (Moore, 1994), management of the trail network should provide a diverse array of recreational opportunities. Consistent with comments made by participants in the Lands Adjacent to Banff focus groups, differences between residents' and visitors' perceptions and expectations of a quality experience highlight the importance of providing suitable opportunities for both (Mauro et al., 2001).

5.1.1 The influence of crowding on patterns of use

As reported in the tourism literature, competition with visitors for scarce resources can crowd residents out of some recreational opportunities (Ap & Crompton, 1993; Eagles & McCool, 2002; Lankford et al., 2003; O'Leary, 1974). Results from the current study support this notion as it appears higher use levels during the summer season have a significant influence on residents' patterns of use and choice of trails *(Tables 3 & 4)*.

Although both groups prefer quieter trails, it is of interest that visitors account for all but one of the 22 intercept participants who reported encountering too many other users on the trails.[24] This discrepancy may reflect residents' higher level of familiarity with the network; more intimate knowledge of the trails may allow this group to avoid unsatisfactory conditions. In contrast, visitors who are less familiar with the network are likely less able to select alternate routes. Consequently, intercept survey results may misrepresent visitors' lower level of satisfaction with user encounters; should dissatisfied residents have purposely chosen other trails, only those residents less sensitive to adverse conditions would have participated in the intercept survey.

This shift in use patterns—whether to lesser-known official trails or to unofficial trails — indicates that at least some residents adopt temporal or spatial displacement behaviours to avoid undesirable conditions. Although the current study did not specifically investigate the use of this coping mechanism, resident comments on the mail survey and in discussion groups provide ample evidence of its use. Residents' reasons for avoiding certain areas of the trail network are consistent with those documented by other studies (e.g. Hall & Shelby, 2000; Manning & Valliere, 2001; Shelby et al., 1988)—higher levels of use, site conditions, and the behaviour of other users. However, because data from the current study provides only anecdotal evidence of displacement, results indicate only that some residents are being displaced rather than estimating the extent to which this occurs.

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[24] Although not presented in this document, results of a discrete choice experiment included in the mail survey also indicate a clear preference for quieter trails. When asked to choose between various sets of hypothetical trail profiles, both residents and visitors opted for trails with lower levels of use (Anderson, 2004).

Addressing the factors cited as leading to displacement may enhance the quality of resident experience and reduce their need to avoid less desirable conditions. Improving the physical state of trails and expanding current efforts to promote appropriate etiquette would also improve the visitor experience. However, responding to concerns about crowding would likely be more complex, given that use limitations are not suitable for Jasper's situation. Not only do current use levels fail to merit such restrictions, but this approach would be impractical given the multiple uncontrolled access points of the day-use network (Anderson et al., 1998). Furthermore, research shows only a weak association between perceived crowding and satisfaction (Dawson & Watson, 2000; Manning, 1999; Stewart & Cole, 2001), hence indicating that other factors also influence user satisfaction. As a result, management actions targeting the flow of visitors through an area may effectively reduce user density, but fail to address the other factors shaping perceptions of crowding (Manning, 1999).

Still, Parks Canada should not ignore study results indicating that at least some residents purposely avoid busy trails during the summer season. Because perceptions of crowding depend on each individual's evaluation of the number of other users he or she encounters, addressing this issue would require an understanding of the norms or standards shaping these perceptions (Vaske & Donnelly, 2002). With the exception of a few sites (e.g. Valley of Five Lakes, Maligne Canyon, and Old Fort Point), such an investigation may actually find perceptions of crowding on the trail network to be higher than in reality. Should this be the case, communicating estimates of anticipated encounters may help to encourage displaced residents to return to these trails. Furthermore, because perceptions of crowding are influenced by users' expectations

(Dawson & Watson, 2000), simply ensuring both residents and visitors have appropriate expectations for encounters may also help to reduce these perceptions.

Since the Summer Trail Use Study 2003 did not expressly investigate crowding, data is insufficient to assess the seriousness of this issue. Jasper residents may simply have unreasonable expectations for quieter trails, given that they live in an area dedicated to *all* Canadians for their benefit, education, and enjoyment (Government of Canada, 2000). Although this may be true, discussion group results that identify high use levels as contributing to unofficial trail use indicate the need for management attention. Recognizing that perception of crowding is not the only reason for the use of these trails, other factors influencing this aspect of resident behaviour are discussed in the following section.

5.1.2 Unofficial trail use

As reported in Mosedale's (2003) study of mountain biking in the Canadian Rockies, the emergence of informal trails around the Town of Jasper is of particular concern to park managers. Consistent with his findings, comments of discussion group participants in the current study identify residents—rather than visitors—as the primary users of unofficial trails (Thomlinson, 2004). The fact that several of these participants consider unofficial trails as part of the overall trail offer suggests the high value that some place on the network may actually reflect the experiences offered by trails other than those designated by Parks Canada. Although their more intimate knowledge of the trail network likely influences this aspect of resident behaviour, differences in the respective needs and level of satisfaction of the two groups also appear to play a role. According to

Schreyer, Knopf, and Williams, recreationists "search for settings which allow them to behave in the ways they desire" (1985, p. 16). Therefore, residents' use of unofficial trails implies some level of dissatisfaction with the experience provided by the official network.

Given that the review of the literature clearly indicates the potential for recreation to disturb wildlife, Parks Canada's commitment to ecological integrity imparts a responsibility to respond to Mercer et al.'s (2002) concerns about unofficial trail use. Although some trail users question the legitimacy of these concerns, study results show that both groups support discouraging the use of unofficial trails to either restore or improve wildlife habitat *(Figure 15)*. While support from visitors was significantly stronger, only about one-tenth of residents indicated they would oppose this action. Additionally, both groups reported that seeing others use unofficial trails would detract from their own experience *(Figure 11)*.

These results suggest the majority of trail users in both groups at least support the *concept* of reducing unofficial trail use. However, particularly among residents, the preference for non-restrictive actions (i.e. ones that do not infringe considerably upon their own behaviour) implies a reluctance to permanently give up access to trails in areas of high value to wildlife *(Figure 15)*.[25] Furthermore, the individuals who *are* more supportive of restrictive measures may not even use unofficial trails in the first place. Consequently, it is reasonable to expect vocal opposition to this action—particularly from those who currently use unofficial trails in areas of high value to wildlife.

[25] For the purpose of gauging respondents' attitudes towards trail closures, no distinction was made between official and unofficial trails. Consequently, these results are being interpreted somewhat cautiously given that respondents' interpretations of this item may have varied.

5.1.2.1 Strategies to address unofficial trail use

Park managers have several options for addressing unofficial trail use. In areas where human use is not considered to interfere with wildlife movement, unofficial trails could be legitimized or turned into official trails. The 1994 Jasper Day Use Trails Survey found that while attitudes on this issue are divided, local trail users tend to be less supportive of this action than non-local users (Canadian Heritage, 1995a).[26] Comments by discussion group participants suggest this discrepancy may reflect a desire to maintain these trails as "resident trails"—a distinction that would be lost were they to be featured on the Summer Trails map. Furthermore, unless this action is used to compensate for a reduction in access to other areas, legitimizing certain unofficial trails would expand the ecological footprint of the network. While it could be argued that these areas are already receiving use, undoubtedly the level of use—and hence the impact—will increase should these trails be advertised. Ignoring the continued use of areas with *Wild Trails!* signs could have a similar effect; although human use of these areas is fairly minimal at present, more users may return to these trails in the absence of stronger management action.

Site management strategies can also be used to address unofficial use. Should these trails diversify the overall trail offer as suggested by discussion group participants (Thomlinson, 2004), park managers could divert some of this use by providing a similar experience within the official network. For example, those who perceive these trails as more "interesting" and challenging may change their patterns of use if the official network was to include more difficult routes or ones designed specifically for mountain

[26] Again, note only 10% of the 486 respondents were permanent Jasper residents.

biking. Building features into existing trails could also enhance the attractiveness of official trails without expanding the network's ecological footprint. However, while physical management strategies may help to discourage *some* use of unofficial trails, a more direct approach will likely be required in areas of high value to wildlife.

Study results indicate current voluntary measures (i.e. voluntary closures) are only of limited effectiveness in discouraging the use of unofficial trails and select sections of the official network believed to overlap with valuable wildlife habitat *(Table 15)*. Although residents appear to be the primary users of unofficial trails, some visitors continue to use sections of the official network included in the *Wild Trails!* program. These findings highlight the need to re-examine the current approach to managing human use in areas of high value to wildlife. Because they lack "teeth", voluntary measures rely solely upon communication efforts to change what appears to be ingrained behaviour among some trail users. While widespread support for educational management strategies is encouraging *(Figure 15)*, this alone does not guarantee compliance; some trail users may favour this approach simply because it does not require them to alter their own behaviour (Noe & Hammitt, 1992). Furthermore, results suggesting voluntary measures are not entirely successful support the notion that in some situations, education is more successful when used in conjunction with other tools rather than on its own (Johnson & Vande Kamp, 1996; Newsome et al., 2002).

Despite the past preference for less intrusive management actions (Hendee et al., 1990), study results indicate not all trail users respect what voluntary measures intend to accomplish. Consequently, this approach may actually provide a perverse incentive to

continue using an area in that it creates an attractive trail experience for some individuals (i.e. trails are less "manicured", more challenging, and individuals can expect fewer encounters with other trail users). In effect, individuals who respect these efforts lose out by foregoing a desirable experience. While any reduction in unofficial trail use may accomplish management objectives to minimize wildlife disturbance (Mosedale, 2003), the social implications of continued use should also be considered; those who abide by voluntary measures may resent that others continue to use these areas. Furthermore, continued use of these areas by even a few individuals has the potential to undermine the overall success of management efforts (Hendee et al., 1990) should others rationalize their own rule-violating behaviour on the basis that "everybody else is doing it" (Cialdini & Trost, 1998).

The limited success of current efforts to manage unofficial use accentuates the need for more decisive action. Several residents who expressed frustration with what they described as Parks Canada's reluctance to confront this issue share this sentiment. According to one resident, "Parks should be more clear and concise when asking people to voluntarily avoid areas. 'Voluntary' is not the way to go, if a 'real' habitat concern is there, 'close' the area then no ambiguity for any user group". As suggested by this comment, areas of high ecological concern should be legally closed to trail users (Anderson et al., 1998). Consistent with results that indicate Banff residents question the differential application of closures to the various user groups (Mauro et al., 2001), this Jasper resident's comment highlights the importance of closing sensitive areas to *all* trail users unequivocally. The fact that discussion group participants also echo this

sentiment accentuates the need to ensure any differential management policies are firmly supported and legitimized by ecological data.

It is to be expected that residents are significantly more opposed to permanent closures than visitors *(Figure 15)* given the much larger personal relevance that management actions have for local users (Bixler et al., 1992; Noe & Hammitt, 1992). Any reduction in the overall trail offer due to closures would likely have a nominal effect on the experience of those who use the network infrequently. In contrast, because regular users appear protective of their recreational opportunities, they would likely resist any reduction in current access. However, their opposition to permanent trail closures should be weighed not only against visitors' indifference to this action, but also against both groups' insistence that some action be taken. Should ecological data deem trail closures necessary, Hammitt & Cole (1998) advise offering alternative trails to appease opposition. While the value of providing alternatives should not be underestimated, effective communications will likely prove the most important means of building understanding and support among resistant trail users.

5.1.2.2 Implications of study results for park communications

Given the importance of explaining the rationale for regulations to recreationists (Anderson et al., 1998; Hendee et al., 1990), educational management strategies will be critical should the use of unofficial trails be prohibited in ecologically sensitive areas. Careful consideration of the message content, source, and intended audience will help to ascertain the effectiveness of communications (Roggenbuck, 1992). Jasper residents are

not very receptive to current Parks Canada communications. Therefore, new and innovative methods of communicating with this group will likely be required.

For example, discussion group participants commended the use of an "information tent" during the Syncline Ridge fire in 2003. Using a similar approach to disseminate information about the trail network may help Parks Canada reach frequent trail users; while they may not perceive themselves as needing trail information, these individuals may respond to the novelty of a new information source. Park staff or volunteers could also communicate directly with users either on the trails or at trailheads. Although an increased staff presence will likely prove necessary in the case of unofficial trails, volunteers have also been shown as an effective means of conveying information and messages to trail users (Hendricks et al., 2002). Improvements to the trailhead kiosks will likely also improve their effectiveness, particularly if residents and visitors are involved in designing and testing new communication products.

Several discussion group participants claimed they would respect Parks Canada's efforts to discourage human use of these areas providing the rationale is clearly communicated and defensible. The fact that these trail users continue to frequent sensitive areas insinuates either that current communications are insufficient to influence their behaviour or that these individuals are simply not interested in adhering to management intent. Since support for closures will be greatest should trail users be convinced of the legitimacy of the action, Roggenbuck's caution about providing strong and convincing arguments is of particular relevance. Given some residents' general distrust of Parks Canada, any opportunities for these individuals to reject messages and

reinforce pre-existing attitudes and behaviours must be minimized. Furthermore, as expressed by one resident, park managers must consider the fact that "not all people respond/react to conservation-based messaging". Consequently, communications should also address the fundamental skepticism of individuals who believe that restrictions for the sake of wildlife are unnecessary as "animals are adaptive and not unduly influenced by trail users"*(resident comment)*.

In general, research suggests a combination of moral and fear appeals will be most effective for gaining user compliance (Gramann et al., 1995; Hendricks et al., 2001; Swearingen & Johnson, 1988). This means park communications should outline not only the importance of closures for wildlife, but also the personal consequences for rule violators. In order for fear appeals to be perceived as posing a legitimate threat, economic sanctions (i.e. fines) should be instituted and enforced using warden patrols (Anderson et al., 1998).

Parks Canada will need to weigh the importance of compliance against the investment of financial and human resources required by enforcement. Although an increased staff presence will be important to ensure compliance, neither group strongly supports seeing park employees on the trails *(Table 7; Figure 17)*. However, providing trail closures are justified by ecological data, the philosophical implications of these restrictions should be of limited concern; Parks Canada's commitment to prioritise ecological integrity must take precedence over the "perceived freedom" element considered fundamental to some recreational activities (Johnson & Vande Kamp, 1996).

5.2 Perceptions of user conflict

According to the goal-interference view of user conflict (Jacob & Schreyer, 1980), differences between the recreational experiences sought by residents and visitors create the opportunity for one group's use of the trails to interfere with that of the other. The use of the trail network for dogwalking provides an excellent example, particularly due to the high proportion of resident dogs that are off-leash. While both groups agree that seeing dogs off-leash would detract somewhat from their trail experience, visitors are significantly more sensitive to this situation *(Figure 11)*. Consequently, residents' frequent use of the trail network for this purpose may interfere with the enjoyment of some visitors. Although dogwalking is considered a legitimate activity on Jasper's trails, it should be managed with the experience of all trail users in mind. While allowing dogs to run free may enhance the enjoyment of dogwalkers, Parks Canada should be aware that its failure to enforce the "on leash" rule of national parks not only poses a threat to wildlife (MacArthur et al., 1982; Mainini et al., 1993; Miller et al., 2001), but also has a detrimental effect on the experience of other individuals.

In general, although some perceive conflict as a widespread problem on the trails, study results suggest only a portion of trail users experience conflict with others. The majority of respondents fail to consider the number and type of other users they expect to encounter as important when choosing a trail. Similarly, only a limited number of comments on mail surveys and in discussion groups expressed concern about other users. These comments also suggest conflict occurs primarily between members of different activity groups. While additional tension may exist within user groups, the scope of the current study did not allow for its detection. Consequently, consistent with

the recreation management literature (e.g. Chavez, 1997; Manning, 1999; Moore & Barthlow, 1996; Moore et al., 1998; Watson et al., 1994), conflict between Jasper trail users appears largely asymmetrical; although one party may resent the behaviour of another party, this feeling is not reciprocated.

Although more focused research would also be required to identify the specific sources of conflict, participants in the current study most commonly cited trail etiquette and the perceived environmental impact of others as fuelling this tension. Addressing these and other root causes of conflict should alleviate at least some of the tension felt by affected users (Moore & Barthlow, 1996).

5.2.1 Addressing user conflict

As reported in other studies (Carothers et al., 2001; Watson et al., 1991), trail etiquette is a key factor in determining the effect that meeting other users has on an individual's experience, and also influences his or her tolerance for sharing the trail with other types of users. Widespread support for two initiatives currently underway in Jasper NP—posting etiquette signs on the trails and having user groups work together to promote a trail sharing etiquette—suggests these efforts should be continued, and even augmented. Communications outlining appropriate conduct should inform users of the potential for their own behaviour to diminish the recreational experiences of other individuals (Watson et al., 1991). These efforts may also help to reduce the alleged environmental damage caused by mountain bike and horse use (Hendee et al., 1990)—the two activities critiqued most often in resident and visitor comments. Trail

improvements and more regular maintenance could also be undertaken to address this potential source of user conflict (Hendee et al., 1990).

Study participants identified activity separation as a further means of addressing user conflict, either through parallel trails (i.e. separate trails running parallel to one another) or the use of designated trails. However, the success of this approach as a means of reducing conflict depends in part on the underlying source of the conflict. Should competing values, norms, or definitions of appropriate use of an area fuel tensions rather than the direct interactions between users, some researchers suggest user separation will likely prove ineffective for addressing this conflict (Carothers et al., 2001; Ivy, Stewart, & Lue, 1992; Owens, 1985). Alternatively, increased enforcement, expanded education programs, and the posting of signs may be more successful in these cases (Carothers et al., 2001).

Work by Moore et al. (1998) suggests that users tend to be most positive about sharing trails with others engaged in the same activity. While Jasper visitors' relatively high support for designated trails is consistent with these findings, residents are strongly divided on this issue. Although the attitudes of some individuals are more closely aligned with those of visitors, as a group, residents tend to be more tolerant of sharing the trails with other user groups *(Figures 12-14)*, possibly due to their own participation in multiple activities (Watson, Zaglauer, and Stewart, 1996). In fact, one resident warned that separating user groups would lead to "intolerance, single-mindedness, tension, and lack of support". Additionally, at least some residents' opposition to designating trails may result from their desire to accommodate all of their own needs.

In contrast, it may be easier for those who participate in only one or two activities to support designating trails, particularly when their own patterns of use would remain unaffected.

Understanding *why* trail users oppose designating trails can help park managers more effectively address their true concerns. In the Lands Adjacent to Banff trail survey, Mauro (2001) noted strong resident opposition to actions perceived as entailing a loss of opportunity. Although some individuals in the current study may simply say they do not support segregating user groups, their opposition may be rooted in a similar fear of losing opportunities. While a net reduction in access may be the unfortunate reality of designating trails, providing alternatives or tradeoffs could minimize losses and help to alleviate some of this opposition.

In general, positive interactions both on and off the trail are important to break down barriers and build understanding among different users (Chavez, 1996; Moore & Barthlow, 1996). This accentuates the value of initiatives that bring the various user groups together, such as the Jasper Trail Stewards (JTS). Seeking feedback from both current and former members of the JTS may help Parks Canada determine how a group of this nature could function more effectively and may also encourage frustrated individuals to re-join the group. Parks Canada should also consider how to more regularly involve visitors in discussions about trail management, particularly given differences between the two groups' preferences for management.

5.3 Obtaining information about the trail network

Results indicating most residents seek information through word of mouth or their own exploration rather than using Parks Canada sources are not surprising, considering their higher level of experience and familiarity with the trail network *(Table 8)*. Similarly, because visitors are less acquainted with the network, it is to be expected that they would rely more heavily on Parks Canada information sources. However, the fact that sizeable proportions of the two groups have never used the "Summer Trails" brochure or the Parks Canada Information Centre is particularly concerning, since both are important means of conveying trail-related messages. While study results suggest the promotion of these information sources could be enhanced, they also emphasize the value of using a variety of message sources to reach trail users (Hendricks et al., 2001; Roggenbuck, 1992).

Findings of studies investigating the effectiveness of trailside bulletin boards (Cole et al., 1997; McCool & Cole, 2000) highlight the need to improve existing trail kiosks to better serve both as a source of information for trail users and as a means for Parks Canada to share its messages. Posting more detailed descriptions of the level of difficulty, conditions, and the types of users individuals should expect to encounter on a specific trail could help to ensure trail users have accurate expectations for their experience. Based on results indicating visitors accounted for almost all of the intercept survey participants who reported their trail experience as failing their expectations, providing

this information may actually enhance users' quality of experience.[27] Although visitors' lower level of familiarity with the network suggests this group would particularly benefit from this information, comments from both groups addressed this need.

The review of the literature identified several findings relevant to the provision of trail-related information in Jasper NP. Studies by Manfredo and Bright (1991) and McCool and Cole (2000) showed previous experience at a park to affect the degree to which individuals are attentive to new information. Those with a high level of experience in the area were found to be less responsive to information, whereas individuals with less experience were more easily influenced by park communications (Manfredo & Bright, 1991). Given the implications for a site with a high number of frequent trail users (many of whom are residents), these results highlight the need for Jasper-specific communications research to evaluate current efforts and identify strategies most effective for conveying park messages to the various audiences.

5.4 Conclusion

Comparing the patterns of use, satisfaction, and attitudes of residents and visitors indicates trail users are by no means a homogeneous group and attests to the diversity of public tastes in outdoor recreation (Manning, 1998). Even among Jasper residents, the

[27] By using the trails more regularly than visitors, residents have also had greater opportunity to align their expectations with the true conditions. Although not investigated by the current study, some residents' perceptions of the trail network may have undergone a "product shift" in which the recreation experience has been redefined to reflect the conditions actually encountered (Johnson & Dawson, 2004; Manning & Valliere, 2001; Shelby et al., 1988).

opinions expressed range widely.[28] While some are fiercely protective of their recreational opportunities, voicing strong opposition to any attempts to "control" their use of the landscape, others urge Parks Canada to take a tougher stance on trail management. Although residents are generally appreciative of the recreational opportunities associated with living in Jasper, at least in this study, very few overtly acknowledged the implications of living in a national park. Considering Jasper trail users "enjoy a degree of freedom unparalleled in any national park in North America" (Cardiff, 2004, p. 3), criticism of any attempts to regulate this use suggest some individuals take current recreational opportunities for granted.

In contrast, visitors are markedly less critical of the trail network and its management. Partly, this reflects a lower level of familiarity and less frequent use of the network. However, more of these individuals also noted Jasper's location within a national park. In fact, one visitor stressed the need to impress this on *all* trail users, "It is important that park managers find a way to let residents/visitors know that they are in a national park and what this means". These and other study results support the notion that residents and visitors have different perceptions of the landscape and their place within it (Cardiff, 2004).

In general, the differences between residents and visitors highlight the importance of ensuring chosen management actions reflect the needs of both groups. Considering that visitors are also legitimate users of Canada's national parks, granting residents a stronger voice simply because of their ability to have their opinions heard on a more

[28] Although beyond the scope of the current document, comparisons within the resident sample indicate further differences on the basis of residents' preferred activities, whether or not they participate in certain activities, and their age (Anderson, 2004).

regular basis would imbalance the public process. At the same time, failure to garner the involvement and support of Jasper residents will likely present a significant management challenge due to this group's extensive use of the trail network. Bixler et al. (1992) advise park managers to gain the support of long-term and frequent users since these individuals are most likely responsible for resource damage. Similarly, Mauro et al.'s recommendation for Banff NP managers "to consider residents as resources for trail management, rather than simply part of the problem" (2001, p. ii) is equally applicable to the Jasper situation, providing it does not diminish the strength of the visitor voice.

The divergence of opinions on the various trail management issues indicates not only that it will be impossible to please all users, but also that Parks Canada should expect to encounter opposition regardless of its chosen management direction. Since public support is critical to achieving management goals (Bixler et al., 1992), Parks Canada will need to actively build support among resistant trail users. Given that some individuals question the agency's credibility, external message sources could also be explored as they may be more readily received. Communication efforts should focus on enhancing users' understanding of the rationale for contentious actions and address the fundamental skepticism that human use has the potential to adversely affect wildlife. This is particularly important given the general public impression that recreation is benign and does not negatively impact wildlife (Flather & Cordell, 1995; Wilkinson, 2002).

While not investigated by the current study, it is likely that expectations for management are also influenced by the values that individuals perceive the overall park landscape to represent (Borrie, Freimund, & Davenport, 2002). The attitudes held by some study participants allude to the difficulty of managing these areas for users whose personal values conflict with the mandate of national parks. A failure to subscribe to Parks Canada's broader management direction may also contribute to distrust for the agency. While resistance to trail use restrictions is merely symptomatic of a larger problem, building support among trail users may also help to alter negative public perceptions in other aspects of national park management.

Although meeting the needs of a wide variety of park users poses a significant challenge for management, this task cannot overshadow Parks Canada's primary responsibility—maintaining ecological integrity. Like other forms of human use, recreation has tremendous potential to adversely affect the ecology of natural areas (Hammitt & Cole, 1998; Knight & Gutzwiller, 1995). However, rather than posing an uncontrollable threat, the effectiveness of strategies to manage recreational use will ultimately determine its impact. Given the current popularity of national parks among outdoor recreation enthusiasts, Parks Canada's ability to successfully manage for both ecological and social values will likely prove fundamental to sustaining the integrity of these landscapes.

Information collected by the Summer Trail Use Study 2003 was intended to complement recent ecological research and enhance the understanding of the social value of the 3VC. By detailing what residents and visitors value about the trail network, information gathered by this study also contributes to the development of a broader social vision for

this landscape. Results overwhelmingly indicate the experiences provided by the trail network are fundamental to both the local lifestyle and the visitor experience. However, managing the area for both social and ecological values ultimately requires strategies for providing high quality recreational activities without infringing upon wildlife needs or ecological processes. The human use data collected by this study represents only one step in this process. Ideally, Parks Canada should now involve trail users in determining how this information will be used. Working with trail users to articulate a vision for the future management of the network will help to prioritise user concerns and also provide an appropriate and consistent context for future management decisions.

By systematically comparing how residents and visitors use Jasper's day use trail network, the current study represents one of only a few investigations of the differences between these two groups of park users. Although the size of Jasper's resident population limits the applicability of results to other national park communities, study findings are also relevant for parks with gateway communities adjacent to their boundaries. Understanding whether local users differ from the larger visitor population can help to ensure park management reflects the needs of both groups. However, the resident/visitor comparison explored by this study represents only one means of segmenting trail users; ultimately, national park management must incorporate the views of a broad cross-section of individuals in order to truly assure the provision of high quality recreation experiences.

APPENDICES

Appendix A: Study terms of reference

Introduction

The trails within the three-valley confluence (3VC) are situated within some of the best potential habitat of Jasper National Park (JNP management plan, 2001). These trails are important wildlife movement areas, as well as important to the 'way of life' for local residents and Park visitors. Much work has been completed to describe the value of this area for wildlife (Mercer et al.), however, the same level of emphasis has not been completed for the social values of this network of trails. If Parks Canada is to successfully manage this area in a manner that ensures ecological and social functionality, emphasis must be placed on the human use of this trail network.

Simon Fraser University (SFU) and Parks Canada (Parks) are embarking on an ambitious research initiative to: understand the human use patterns (type of activity and user origins) on the trail network, the motivations for use of, and satisfaction with, the network of trails in the area; identify any trail conflict perceptions that may exist; and identify the social value of the trail network to experiencing Jasper National Park. The information gained through the study will be used to guide future trail management and human use management decisions. Parks, SFU, Jasper Trail Stewards, the Friends of Jasper are all contributing significant resources to the project.

Study area

The sample area for the study is bounded by the Pyramid Bench to the west, the Palisades and Overlander trail to the north, Signal fire road and Trail 7 to the east, and Whistler's shoulder and Valley of the Five Lakes to the south.

Research Objectives

To gather and present defensible data that reveals the dynamics (spatial, temporal, and social) of trail users in the 3VC and a social vision for the landscape.

- Determine trail use intensity by user type (walk/hike/jog, bike, horse or ski), place of origin and age
- Understand similarities and differences in motivations and expectations (spatial and temporal) by locals and visitors, and degree of satisfaction with the trail network
- Determine the occurrence and nature of trail use conflicts in terms of type, frequency and severity.
- Depict valued attributes of the 3VC trail network.
- Understand trail users' reaction to hypothetical trail management actions for ecological or social reasons.

Predicted Results

This research project should result in a clear understanding of the use of the 3VC trail network, the value of the network to residents and visitors of Jasper, and indications of a future vision for the trail network that respects the social and ecological values of this important area of Jasper, all gained through the independence of academically credible research.

Primary Research Questions

1. How do recreationalists use the 3VC landscape?
   - Who (proportionately locals and Park visitors)
   - When (seasonal, time of day, frequency, duration, and distance preferences)
   - Where (spatial selection by various user types)
   - Why (motivations – spatial and temporal relevance).
   - Why not (motivations – spatial and temporal relevance).
   - How (recreational activity)
2. How do users feel about the quality and quantity of trail experience offerings within the 3VC trail network?
   - What can be done to improve the trail network? (options)
   - Are there identifiable areas that require maintenance attention? (spatially important)
3. Do recreational use patterns result in encounters with other users with different use values? (spatial and temporal)
4. Do users make a distinction between "official trails" (numbered, signed, and indicated on maps) and other trails they use?
5. How do trail users (differentiate by user types and place of origin) respond to hypothetical trail management actions for ecological or social reasons?

Other Questions

- What are primary sources of information for trail users (media, location, message retention; differentiate by user types and place of origin)

- What do users know about wildlife research being conducted in the 3VC?

Methodologies

To answer the questions posed with adequate detail, four separate mechanisms are proposed.

1. *Intercept Survey:* A short intercept will be administered to trail users within the 3VC. It will focus primarily on who the trail users are (basic demographics), their primary activities during that trip, why they are on that trail versus other trails in the 3VC, and determine if they are willing to participate in a larger study.
2. *Residential Questionnaire:* A second, more complete questionnaire will be developed to better understand locals' use of the 3VC. Some locals may be intercepted while using the trails within the 3VC, however, this component of the research will allow for a much more detailed bank of questions, delving into many issues that can not be covered during the short intercept survey. This longer survey will be administered to residents of the Town of Jasper. This survey will obtain both quantitative and qualitative data. The questionnaire will assist in developing a vision for the 3VC that respects all trail users' opinions, the established importance for wildlife, and their own values for the landscape.
    - Administration of the residential questionnaire will be assisted by the Jasper Trail Stewards. Three approaches may be required.
        i. Local residents who are intercepted through the initial will be asked if they would be willing to participate in further research related to their recreational use of the 3VC.
        ii. Random households may be canvassed by dropping off questionnaires, and determining an appropriate time to return to pick-up the completed forms.
        iii. Advertisements may be placed in the Jasper Booster to solicit support to participate in the study.

SFU and Parks Canada will develop survey questions with review by the Jasper Trail Stewards. Analysis will be completed by SFU during the fall and winter of 2003-2004.

3. *Focus Groups:* A number of focus groups will be hosted by Parks Canada and SFU to gather information on trail use patterns, motivations and preferred options for the 3VC trail network. These focus groups may also be used as consultation tools for various management options to establish a network that is consistent with user values and those values that have been identified for wildlife in the area.
4. *Trail Counters:* To assist in determining the total and proportional use of the trails by local residents and Park visitors, trail counter sites will be situated near the intercept survey points.

Timing: Data collection in the field should be initiated prior to the May long Weekend, (suggest May 14), and conclude no earlier than September 3.

Communication Strategy

Newspaper article(s) and local radio will be used to build public awareness and understanding of the survey. Parks Canada will solicit the endorsement of the Jasper Trail Stewards in communicating positive messages and encouraging participation in the survey. Selected community groups and schools will be visited in person to explain the purpose of the survey and encourage support. Small posters could be placed in the trail office and bike shops. A public presentation (following the "Research Nights" format) will be held once analysis is complete. An open house is contemplated, but is more likely an action related to land use planning rather than research.

Contributions and Roles

Institution	Individuals	Contribution
SFU	Wolfgang Haider (academic supervisor) Colleen Anderson (graduate student)	Collect intercept survey data Analyze intercept survey data, residential questionnaire data, and focus group data Report on primary research questions Provide complete survey datasets
Jasper Trail Stewards		Volunteer hours for door-to-door canvassing of residents for participation in the study Promotion and support within the community
Friends of Jasper		Potential financial contributor
Parks Canada	Shawn Cardiff Wayne Tucker Geoff Skinner Debbie Mucha Carolyn Duchoslav	Provide necessary trail counting and field survey equipment Provide workspace in Jasper Provide SFU with complete trail counter data required to answer primary research questions Provide SFU with necessary mapping support to report on research questions Provide communications support $15,000 contribution to research

Appendix B: Intercept survey questions

1. Have you already participated in this survey? ☐*Yes* ☐*No*

2. Are you a visitor, seasonal resident, or a year-round resident of Jasper?
☐*visitor* ☐*seasonal resident* ☐*year-round resident*

3. How long have you lived in Jasper? ____ yrs

4. If you are a seasonal resident, how many years have you been coming here on a seasonal basis? _____ yrs

5. What trails did you use today? _____

6. How much time did you spend on the trails today? (record in minutes): _____

7. How many other parties did you meet on the trail? _____

8. Would you consider this too many, too few, or an acceptable number of groups to meet on the trail?
☐ *too many* ☐ *too few* ☐ *acceptable*

9. Which colour of motivation cards?
☐ *Likert scale* ☐ *red* ☐ *white* ☐ *green* ☐ *yellow*

10. *(Likert scale version of the intercept survey)* People have many reasons for choosing particular trails. I will now read you a number of factors that may have influenced your trail choices today. Using a scale ranging from *1=Not at all important, 3=Neutral, and 5=Very* important, please rate how important these factors were in influencing your decision to use this trail:

- Your familiarity with the trail
- The desire to explore a new trail
- The amount of time you have available
- The chance of seeing wildlife
- The desire to exercise and challenge yourself
- The physical features of the trail itself
- The desire to avoid encounters with other types of trail users
- The number of people you expect to encounter
- The desire to get to a destination
- The suitability of the trail given the weather conditions
- The trail is close to where you live or stay
- The desire to be in a peaceful, quiet setting
- The desire to learn about the natural environment

11. How did you hear about this trail?

☐ *recommended in a guide book* ☐ *recommended in the Visitor Centre*
☐ *recommended in one of the local shops* ☐ *recommended by a friend or relative*
☐ *I have used this trail in the past* ☐ *other* _____

12. Overall, how did your experience on the trail today compare to your expectations?

● *exceeded* ☐ *met* ☐ *failed*

13. If your experience failed to meet your expectations, please explain why.

_____

_____

14. Did you see any wildlife? ☐*Yes* ☐*No*

15. What type of wildlife did you see?

☐ *grizzly bear* ☐ *black bear* ☐ *coyote* ☐ *elk*
☐ *mule deer* ☐ *white-tailed deer* ☐*cougar* ☐ *other*_____

16. Where did your sighting occur? _____

17. How did the animal(s) respond to your presence?

☐ *seemingly unaware of my presence* ☐ *ran away*
☐ *indifferent* ☐ *showed aggression*

18. Where did you start your trip from today?

☐ *Jasper National Park* ☐ *Hinton* ☐ *Lake Louise*
☐ *Banff* ☐ *Edmonton* ☐ *Calgary*
☐ *other* _____

19. If you stayed in Jasper National Park last night, where did you stay?

☐ *hotel/motel in Jasper* ☐ *Jasper Park Lodge* ☐ *campground* ☐ *OCA*
☐ *hostel* ☐ *local residence* ☐ *with a friend* ☐ *other* _____

20. Which OCA?

☐ *Alpine Village* ☐ *Becker's Chalets* ☐ *Patricia Lake Bungalows*
☐ *Pine Bungalows* ☐ *Pyramid Lake Resort* ☐ *Pocohontas Bungalows*
☐ *Sunwapta Falls Resort* ☐ *Tekarra Lodge* ☐ *Jasper House Bungalows*

21. Which hostel?

☐ *Jasper Hostel* ☐ *Maligne Hostel*
☐ *Athabasca Falls Hostel* ☐ *Beauty Creek Hostel*

22. Which campground?

☐ *Whistlers*	☐ *Wilcox Creek*	☐ *Pocohontas*
☐ *Wabasso*	☐ *Snaring River*	☐ *Mt. Kerkeslin*
☐ *Honeymoon Lake*	☐ *Jonas Creek*	☐ *Columbia Icefield*
☐ *Wapiti*		

23. If you stayed in an accommodation other than those listed above, please specify:

_____

24. We are planning to mail out a more detailed survey about the recreational use of JNP's trails by the end of the summer. Would you be willing to participate in the survey?
☐ *Yes* ☐ *No*

25. Name and address:

_____

_____

SURVEYOR:

26. Mode of travel

☐ *on foot: walking/hiking*	☐ *on foot: jogging*	☐ *bicycle*
☐ *horse*	☐ *other* _____	

27. Party size: _____

28. Accompanied by a dog? ☐*Yes* ☐ *No*

29. Is the dog on a leash? ☐*Yes* ☐ *No*

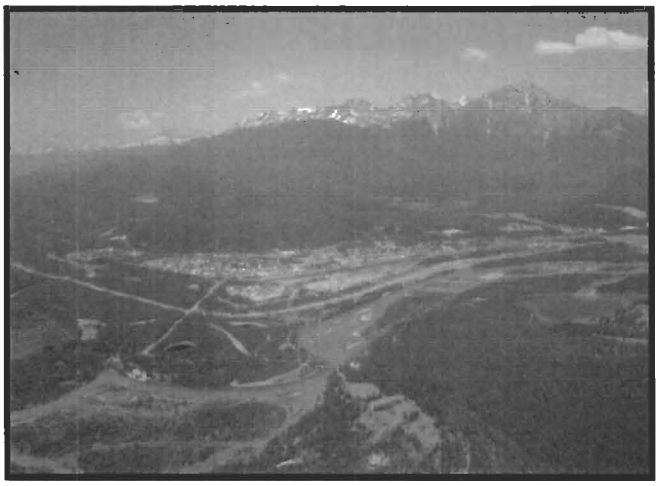
30. ☐ Observed in ☐ Observed out ☐ Declined participation

Appendix C: Resident survey

JASPER NATIONAL PARK

SUMMER TRAIL USE STUDY 2003

Resident Survey



School of Resource and Environmental Management
Simon Fraser University

JASPER TRAIL STEWARDS

Parks Canada Parcs Canada

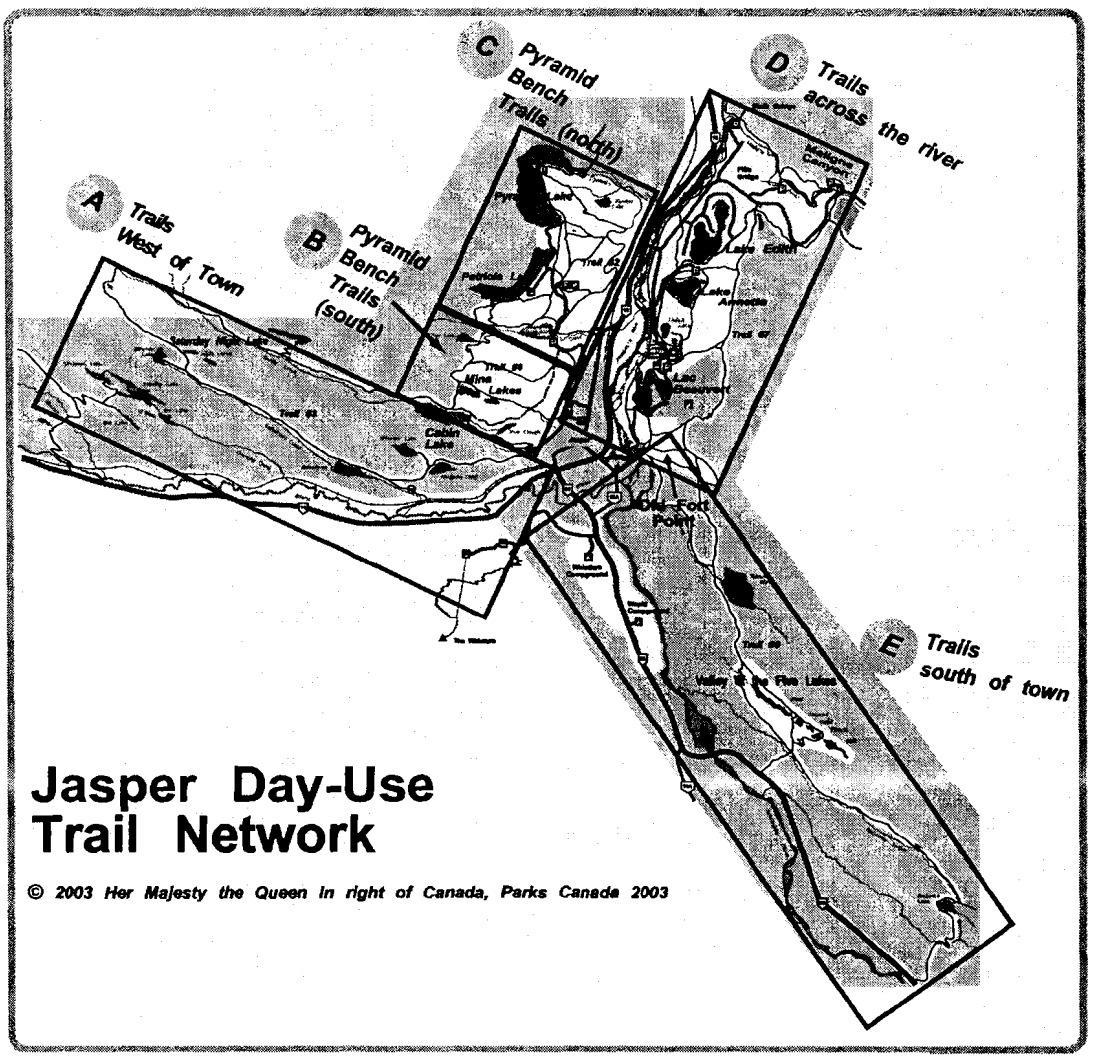
Image and logos used with permission from Parks Canada Agency

To win one of an assortment of great prizes, be sure to fill out the entry card and mail it with your completed survey.

Prizes available to be won:

$50.00 gift certificates
Freewheel Cycle
Source for Sports
Edge Control
Vicious Cycle
Totems
On-Line Sports and Tackle
Wild Mountain Willy's
Friends of Jasper National Park

$100.00 gift certificate
Mountain Equipment Co-op



Map used with permission from Parks Canada Agency

We are interested in learning about your use of the day-use trail network around the Town of Jasper and your opinion about how these trails should be managed. *Please refer to the study area outlined on the map included to help you answer the following questions.*

1. Since May of 2003, how often have you participated in each of the following activities on the day-use trails around the Town of Jasper?

	At least 3 times/week	1 – 2 times/week	Less than 1 time/week but several times/month	1 time/ month or less	Not at all
Hiking/ Walking	❑	❑	❑	❑	❑
Jogging	❑	❑	❑	❑	❑
Dog walking	❑	❑	❑	❑	❑
Cross-country (CC) mountain biking	❑	❑	❑	❑	❑
Downhill (DH) mountain biking	❑	❑	❑	❑	❑
Horseback riding	❑	❑	❑	❑	❑
Other *(please list)*: _____	❑	❑	❑	❑	❑

2. Please indicate up to three of your <u>most preferred</u> trail activities by ranking them as #1, #2, and #3. *(Though choosing a #1 activity may be difficult, it is important for us to better understand your needs as a trail user).* Next, consult the attached map of the study area and indicate which area you used most often for each of these activities by copying the matching letter from the map.

	Rank	Preferred area for each activity
Hiking/Walking	_____	_____
Jogging	_____	_____
Dog walking	_____	_____
CC Mountain biking	_____	_____
DH Mountain biking	_____	_____
Horseback riding	_____	_____
Other: _____	_____	_____

3. If you have also enjoyed any of your top three activities in places other than on the trails around the Town of Jasper during 2003, then please indicate below where you participated in each activity. *If you have not used any other places, please proceed to question 5.*

	Activity #1	Activity #2	Activity #3
Other parts of Jasper NP	❑	❑	❑
Other Mountain Parks (Banff, Yoho, Kootenay)	❑	❑	❑
Other locality *(please list)* _____	❑	❑	❑
Other locality *(please list)* _____	❑	❑	❑
Other locality *(please list)* _____	❑	❑	❑

4. How would you describe your pattern of trail use since May of 2003? *Please select the statement that best describes your pattern of use:*

❑ I definitely have a favourite trail or route that I use most often.
❑ I have a favourite trail or route, but frequently also explore other trails/routes or sections of other trails/routes.
❑ I use 2 or 3 trails/routes about equally often.
❑ I divide my trail use among 4 or more trails/routes about equally.
❑ Other: _____

5. Thinking of your #1 <u>most preferred</u> activity (from question 2), please name one trail you would:

Recommend for solitude _____
Recommend for a good view _____
Recommend for seeing wildlife _____
Consider overused _____
Consider underused _____
Consider well-maintained _____
Consider poorly maintained _____
Consider poorly signed _____
Consider your favourite _____

6. There are many reasons for using the day-use trail network around the Town of Jasper. Generally, how important is each of the following motivations for you when using the trails?

	Very				Very
Exploring a new trail	❑	❑	❑	❑	❑ Important
Using a familiar trail	❑	❑	❑	❑	❑
Seeing wildlife	❑	❑	❑	❑	❑
Exercising and challenging myself	❑	❑	❑	❑	❑
Avoiding encounters with other trail users	❑	❑	❑	❑	❑
Getting to a destination	❑	❑	❑	❑	❑
Being in a peaceful, quiet setting	❑	❑	❑	❑	❑
Enjoying the natural environment	❑	❑	❑	❑	❑
Learning about the natural environment	❑	❑	❑	❑	❑
Other *(please list)*:_____	❑	❑	❑	❑	❑

7. There are many trail characteristics influencing the choice of a trail. Generally, how important is each of the following characteristics for you when selecting a day-use trail around Jasper?

	Very Unimportant		Neutral		Very Important
The physical features of the trail itself (ie. length, width, change in elevation, surface)	❑	❑	❑	❑	❑
The presence of challenging or technical sections on the trail	❑	❑	❑	❑	❑
The number of people I expect to encounter	❑	❑	❑	❑	❑
The type of users I expect to encounter	❑	❑	❑	❑	❑
The suitability of the trail given the weather conditions	❑	❑	❑	❑	❑
The proximity of the trail to where I live	❑	❑	❑	❑	❑
The amount of time I have available	❑	❑	❑	❑	❑
Other: _____	❑	❑	❑	❑	❑

8. Please choose the statement that best describes how you use the trail system around the town of Jasper:

- ❑ I use the trails around the Town of Jasper primarily to improve my technical skills and use my equipment.
- ❑ I use the trails around the Town of Jasper primarily to stay fit, burn calories, and enjoy the area.
- ❑ I use the trails around the Town of Jasper primarily to experience the outdoors, taking the time to look at the flowers and wildlife.
- ❑ I use the trails around the Town of Jasper primarily to wander and stretch my legs.
- ❑ None of the above

9. How do you obtain information about Jasper's trail network?
Please check all sources of information that you have used.

- ❑ Parks Canada sources (brochures, trail office, trail kiosks, website)
- ❑ Outdoor/bike shops in town
- ❑ Local guidebooks
- ❑ Websites (other than the Parks Canada website)
- ❑ Friends/word of mouth
- ❑ Through personal discovery and exploration
- ❑ Other: _____

10. Would you like to obtain information from any other sources?
If yes, please specify: _____
_____

11. Please help us evaluate the information provided about the trail system around the Town of Jasper. How useful do you find each of the following sources of information?

	I have not used this source	Not at all useful		Neutral		Very useful
"Summer trails" map/ brochure	❑	❑	❑	❑	❑	❑
Parks Canada information centre	❑	❑	❑	❑	❑	❑
Information kiosks at trailheads	❑	❑	❑	❑	❑	❑
Parks Canada website	❑	❑	❑	❑	❑	❑
Trail maps at trail junctions	❑	❑	❑	❑	❑	❑
Trail markers along the trail	❑	❑	❑	❑	❑	❑

12. How would your **ideal** trail look? Thinking of your most preferred activity, please select your preferred combination of management options, physical characteristics, trip highlights, and encounters for a particular trail.

Trail management: **My ideal trail would...**		***Trip Highlights*** **My ideal trail would offer the following:**	
Allow the following activities *(choose all activities that apply):*	❑ Hiking/jogging ❑ **Mtn. biking** ❑ Horse-use	Lake/ River	❑ Yes ❑ No
Be patrolled by wardens?	❑ Yes ❑ No	Viewpoints	❑ Yes ❑ No
Have signage at junctions?	❑ Yes ❑ No	Wildlife viewing	❑ Yes ❑ No
Trail Characteristics **My ideal trail would be predominantly....**		***Encounters*** **For each hour spent on my ideal trail, I would prefer to meet...**	
Trail surface	❑ Soil ❑ Exposed roots ❑ Hardened *	Hikers/joggers	❑ 0 groups ❑ 2 groups ❑ 4 groups ❑ 6 groups ❑ 8 groups ❑ 10 groups
Topography	❑ Flat ❑ Many short hills ❑ A few long hills	Mountain bikers	❑ 0 groups ❑ 1 group ❑ 2 groups ❑ 3 groups ❑ 4 groups ❑ 6 groups
	❑ Straight ❑ Winding	Horse Users	❑ 0 groups ❑ 1 groups ❑ 3 groups
Maintained?**	❑ Yes ❑ No	Total # of groups with more than 6 people	❑ 0 groups ❑ 1 groups ❑ 3 groups
Forest Type	❑ **Evergreen trees** ❑ **Leaved trees** ❑ **Mixed forest***** ❑ **Mixed forest & non-forested**		

* Trail is sufficiently compacted to provide a hard surface, but is not paved.

** A trail is considered "maintained" if fallen trees and other debris are cleared from the trail and bridges are in good condition.

*** A mixed forest includes both leaved and evergreen trees.

On the next few pages we present you with several sets of hypothetical trail descriptions. Each set contains 4 options, consisting of 3 trail profiles describing day use trails around the Town of Jasper and an option to pursue the same activity on other trails.

The profile of each hypothetical trail describes

- Trail management
- Physical characteristics
- The # of other users you can expect to meet in one hour

(These descriptions do not imply that the trail offers any one of the features exclusively, but instead refer to the **predominant** condition).

13. **Your task**: When looking at each set, imagine that Jasper has only these three types of trails available. Given a total of 10 day trips, how many of these trips would you allocate to each option in this set? Please evaluate each set independently of the others. *Focus on your #1 most preferred activity (see your response to question 2) when making your trail decisions.*

An **example** is provided below:

	Option A (Trail 1)	Option B (Trail 2)	Option C (Trail 3)	Option D
Trail Management:				
Activities allowed:	Hiking Mtn. Biking Horse Use	Mtn. Biking	Hiking Horse Use	
Patrolled by wardens?	No	Yes	No	
Signage at junctions	Yes	No	Yes	
Trail Characteristics:				
Trail surface	Smooth soil	Hardened	Exposed roots	
Topography	Flat Winding	Few long hills Straight	Flat Winding	I would pursue this activity on trails outside of the day-use network.
Maintained?	Yes	No	No	
Forest type	Evergreen	Evergreen & non-forested	Mixed	
Trip Highlights:				
Lake/River	✓	-	-	
Viewpoints	✓	✓	-	
Wildlife Viewing	-	✓	✓	
# of each user group you meet:				
Hikers/joggers	3	0	3	
Mountain bikers	0	6	0	
Horseback riders	1	3	1	
Total # groups with more than 6 people	1	1	1	
Given a total of 10 trips, how many trips would you allocate to each option?	4	+ 3	+ 0	+ 3 = 10

SET 1

	Option A (Trail 1)	Option B (Trail 2)	Option C (Trail 3)	Option D
Trail Management				
Activities allowed	Hiking Mtn. Biking Horse use	Hiking Mtn. Biking Horse Use	Hiking Mtn. Biking Horse Use	
Patrolled by wardens?	Yes	No	Yes	
Signage at junctions	Yes	No	Yes	
Trail Characteristics				
Trail surface	Soil	Exposed roots	Hardened	
Topography	Few long hills Straight	Many short hills Winding	Flat Winding	I would pursue this activity on trails outside of the day-use network.
Maintained?	Yes	No	Yes	
Forest type	Evergreen Trees	Mixed forest and Non-Forested	Leaved Trees	
Trip Highlights				
Lake/River	✔	✔	-	
Viewpoints	-	✔	✔	
Wildlife viewing	✔	-	✔	
# of each user group you meet				
Hikers/joggers	2	6	8	
Mountain bikers	6	3	1	
Horseback riders	1	1	1	
Total # groups with more than 6 people	0	1	0	
Given a total of 10 trips, how many would you allocate to each option?	___ +	___ +	___ +	___ = 10

00

SET 2

	Option A (Trail 1)	Option B (Trail 2)	Option C (Trail 3)	Option D
Trail Management				
Activities allowed	Hiking Mtn. Biking	Hiking Mtn. Biking Horse use	Hiking Mtn. Biking Horse use	
Patrolled by wardens?	Yes	Yes	Yes	
Signage at junctions	Yes	Yes	No	
Trail Characteristics				
Trail surface	Hardened	Exposed roots	Hardened	
Topography	Flat Winding	Few long hills Winding	Flat Winding	I would pursue this activity on trails outside of the day-use network.
Maintained?	Yes	Yes	No	
Forest type	Mixed forest and Non-Forested	Evergreen Trees	Leaved Trees	
Trip Highlights				
Lake/River	-	✔	✔	
Viewpoints	-	✔	✔	
Wildlife viewing	✔	✔	✔	
# of each user group you meet				
Hikers/joggers	4	0	10	
Mountain bikers	4	6	4	
Horseback riders	N/A	1	1	
Total # groups with more than 6 people	3	1	1	

Given a total of 10 trips, how many would you allocate to each option? ____ + ____ + ____ + ____ = 10

11

SET 3

	Option A (Trail 1)	Option B (Trail 2)	Option C (Trail 3)	Option D
Trail Management				
Activities allowed	Hiking Mtn. Biking Horse use	Hiking	Hiking Mtn. Biking Horse use	
Patrolled by wardens?	No	No	Yes	
Signage at junctions	No	No	Yes	
Trail Characteristics				
Trail surface	Hardened	Hardened	Exposed roots	
Topography	Many short hills Winding	Few long hills Winding	Many short hills Winding	I would pursue this activity on trails outside of the day-use network.
Maintained?	Yes	No	Yes	
Forest type	Evergreen Trees	Leaved Trees	Evergreen Trees	
Trip Highlights				
Lake/River	✔	✔	-	
Viewpoints	✔	✔	-	
Wildlife viewing	✔	-	✔	
# of each user group you meet				
Hikers/joggers	0	0	2	
Mountain bikers	0	N/A	6	
Horseback riders	1	N/A	0	
Total # groups with more than 6 people	0	3	3	
Given a total of 10 trips, how many would you allocate to each option?	⌊_⌋	+ ⌊_⌋	+ ⌊_⌋	+ ⌊_⌋ = 10

12

SET 4

	Option A (Trail 1)	Option B (Trail 2)	Option C (Trail 3)	Option D
Trail Management				
Activities allowed	Hiking Mtn. Biking	Hiking Mtn. Biking Horse use	Hiking	
Patrolled by wardens?	No	No	Yes	
Signage at junctions	No	No	Yes	
Trail Characteristics				
Trail surface	Exposed roots	Hardened	Exposed roots	
Topography	Many short hills Straight	Many short hills Straight	Few long hills Straight	I would pursue this activity on trails outside of the day-use network.
Maintained?	No	Yes	Yes	
Forest type	Mixed Forest	Mixed forest and Non-Forested	Leaved Trees	
Trip Highlights				
Lake/River	✔	-	✔	
Viewpoints	-	✔	-	
Wildlife viewing	-	-	✔	
# of each user group you meet				
Hikers/joggers	8	8	8	
Mountain bikers	6	6	N/A	
Horseback riders	N/A	0	N/A	
Total # groups with more than 6 people	1	0	0	
Given a total of 10 trips, how many would you allocate to each option?	___	+ ___	+ ___	+ ___ = 10

13

SET 5

	Option A (Trail 1)	Option B (Trail 2)	Option C (Trail 3)	Option D
Trail Management				
Activities allowed	Horse use	Mtn. Biking Horse use	Hiking	
Patrolled by wardens?	Yes	No	No	
Signage at junctions	No	No	Yes	
Trail Characteristics				
Trail surface	Exposed roots	Soil	Exposed roots	
Topography	Few long hills Straight	Many short hills Winding	Few long hills Winding	I would pursue this activity on trails outside of the day-use network.
Maintained?	No	Yes	Yes	
Forest type	Evergreen Trees	Evergreen Trees	Mixed forest and Non-Forested	
Trip Highlights				
Lake/River	-	✔	-	
Viewpoints	-	-	✔	
Wildlife viewing	✔	✔	-	
# of each user group you meet				
Hikers/joggers	N/A	N/A	4	
Mountain bikers	N/A	4	N/A	
Horseback riders	0	1	N/A	
Total # groups with more than 6 people	0	0	0	
Given a total of 10 trips, how many would you allocate to each option?	___	+ ___	+ ___	+ ___ = 10

14

SET 6

	Option A (Trail 1)	Option B (Trail 2)	Option C (Trail 3)	Option D
Trail Management				
Activities allowed	Mtn. Biking	Hiking Mtn. Biking Horse use	Mtn. Biking	
Patrolled by wardens?	Yes	Yes	No	
Signage at junctions	Yes	Yes	No	
Trail Characteristics				
Trail surface	Exposed roots	Exposed roots	Soil	
Topography	Flat Straight	Flat Straight	Flat Straight	I would pursue this activity on trails outside of the day-use network.
Maintained?	No	Yes	No	
Forest type	Leaved Trees	Mixed forest and Non-Forested	Mixed forest and Non-Forested	
Trip Highlights				
Lake/River	-	-	-	
Viewpoints	✔	-	-	
Wildlife viewing	-	-	-	
# of each user group you meet				
Hikers/joggers	N/A	2	N/A	
Mountain bikers	1	3	1	
Horseback riders	N/A	3	N/A	
Total # groups with more than 6 people	0	1	3	
Given a total of 10 trips, how many would you allocate to each option?	⌊⌋	+ ⌊⌋ +	⌊⌋ +	⌊⌋ = 10

15

SET 7

	Option A (Trail 1)	Option B (Trail 2)	Option C (Trail 3)	Option D
Trail Management				
Activities allowed	Hiking Horse use	Hiking Mtn. Biking	Mtn. Biking Horse use	
Patrolled by wardens?	Yes	Yes	No	
Signage at junctions	No	Yes	No	
Trail Characteristics				
Trail surface	Soil	Exposed roots	Soil	
Topography	Few long hills Winding	Many short hills Winding	Many short hills Winding	I would pursue this activity on trails outside of the day-use network.
Maintained?	Yes	No	No	
Forest type	Mixed Forest	Leaved Trees	Mixed Forest	
Trip Highlights				
Lake/River	-	✔	✔	
Viewpoints	✔	-	-	
Wildlife viewing	-	-	-	
# of each user group you meet				
Hikers/joggers	6	10	N/A	
Mountain bikers	N/A	1	3	
Horseback riders	3	N/A	3	
Total # groups with more than 6 people	3	0	0	
Given a total of 10 trips, how many would you allocate to each option?	____ +	____ +	____ +	____ = 10

16

SET 8

	Option A (Trail 1)	Option B (Trail 2)	Option C (Trail 3)	Option D
Trail Management				
Activities allowed	Hiking Mtn. Biking	Hiking Mtn. Biking Horse use	Hiking Mtn. Biking Horse use	
Patrolled by wardens?	No	No	Yes	
Signage at junctions	Yes	No	No	
Trail Characteristics				
Trail surface	Exposed roots	Soil	Hardened	
Topography	Many short hills Straight	Flat Straight	Many short hills Straight	I would pursue this activity on trails outside of the day-use network.
Maintained?	No	No	No	
Forest type	Mixed forest and Non-Forested	Mixed Forest	Evergreen Trees	
Trip Highlights				
Lake/River	✔	-	-	
Viewpoints	✔	-	✔	
Wildlife viewing	✔	✔	✔	
# of each user group you meet				
Hikers/joggers	2	4	0	
Mountain bikers	3	2	2	
Horseback riders	N/A	0	0	
Total # groups with more than 6 people	1	3	0	
Given a total of 10 trips, how many would you allocate to each option?	___ +	___ +	___ +	___ = 10

17

SET 9

	Option A (Trail 1)	Option B (Trail 2)	Option C (Trail 3)	Option D
Trail Management				
Activities allowed	Hiking Mtn. Biking Horse use	Hiking Mtn. Biking	Hiking Mtn. Biking	
Patrolled by wardens?	No	Yes	No	
Signage at junctions	Yes	Yes	Yes	
Trail Characteristics				
Trail surface	Soil	Exposed roots	Exposed roots	
Topography	Many short hills Winding	Many short hills Straight	Many short hills Straight	I would pursue this activity on trails outside of the day-use network.
Maintained?	Yes	No	Yes	
Forest type	Leaved Trees	Mixed Forest	Mixed Forest	
Trip Highlights				
Lake/River	✔	-	✔	
Viewpoints	-	✔	✔	
Wildlife viewing	-	✔	-	
# of each user group you meet				
Hikers/joggers	10	6	6	
Mountain bikers	2	0	0	
Horseback riders	0	N/A	N/A	
Total # groups with more than 6 people	0	0	1	
Given a total of 10 trips, how many would you allocate to each option?	⌊_⌋	+ ⌊_⌋	+ ⌊_⌋	+ ⌊_⌋ = 10

18

The "Jasper Trail Stewards" is a broadly based interest group that aims to promote awareness and understanding of trail use in Jasper National Park and proposes solutions for trail management issues. The group includes walkers/joggers, bikers, horse-users, and skiers.

14. Were you previously aware of the Jasper Trail Stewards?

- ❑ Yes
- ❑ No

15. In your opinion, on which of the following issues should the Trail Stewards focus their efforts? *Please select **up to three** of the following issues that you consider most important for the Trail Stewards.*

- ❑ Improving trail conditions
- ❑ Improving wildlife habitat
- ❑ Educating peers about wildlife needs
- ❑ Educating peers about proper trail etiquette and ways to reduce environmental impact
- ❑ Advising Parks Canada about user needs
- ❑ Other: _____
- ❑ Unsure/ I don't know

We have a few more questions about your preferences for trail management.

16. Please tell us whether Parks Canada meets your needs in providing each of the following:

	Does not meet my needs	Meets my needs	Exceeds my needs
Well-maintained trails	❑	❑	❑
Clearly signed trails	❑	❑	❑
Trails of varying levels of difficulty	❑	❑	❑
Trails in a variety of landscapes	❑	❑	❑
Interpretive or educational signage	❑	❑	❑
Trail maps and brochures	❑	❑	❑
Other: _____	❑	❑	❑

17. Imagine you are participating in your most preferred activity in an area of the park you use regularly. At the beginning of one of the trails, you encounter a sign informing you that the area is important to wildlife and requesting that you choose another trail. *Please choose the statement that best describes how you would react:*

- ❑ I would choose another trail.
- ❑ I would continue on the intended trail.
- ❑ I would continue on the intended trail, but plan to choose an alternative trail next time.
- ❑ I would continue to use the area, but less frequently.
- ❑ Unsure/ I don't know

18. Imagine that the trails you use were to receive twice the amount of their current use. *Please choose the statement that best describes how you would react:*

- ❑ I would continue to use the same trails anyway.
- ❑ I would use the same trails during quieter periods of the day.
- ❑ I would seek alternative quiet trails.
- ❑ I would not go out as often.
- ❑ Other: _____
- ❑ Unsure/ I don't know

19. How would you feel about designating *some trails* for the exclusive use of each of the following user groups:

	Very much opposed		Doesn't matter		Very much in favour	Unsure / No Opinion
Hikers/joggers	❑	❑	❑	❑	❑	❑
Dog walkers	❑	❑	❑	❑	❑	❑
Mountain bikers	❑	❑	❑	❑	❑	❑
Horseback riders	❑	❑	❑	❑	❑	❑

20. Thinking about your most preferred activity, how would each of the following situations affect your experience:

	Would strongly detract from my experience		Would not affect my experience		Would strongly enhance my experience	Unsure / No Opinion
Many other users on the trail	❑	❑	❑	❑	❑	❑
Few other users on the trail	❑	❑	❑	❑	❑	❑
Dogs off leash on the trail	❑	❑	❑	❑	❑	❑
Park staff on the trail	❑	❑	❑	❑	❑	❑
Exposed roots/ wear on the trail	❑	❑	❑	❑	❑	❑
Signs posted on the trail communicating a trail sharing etiquette	❑	❑	❑	❑	❑	❑
Seeing others using unofficial trails (unmarked trails not included on the Parks Canada trail map)	❑	❑	❑	❑	❑	❑
Seeing other users off trail	❑	❑	❑	❑	❑	❑
Seeing wildlife	❑	❑	❑	❑	❑	❑
Encountering potentially dangerous wildlife	❑	❑	❑	❑	❑	❑

21. Suppose that one of the trails you use most frequently is also crucial for wildlife movement, and that some management action is required to restore or improve this habitat.* *Please rate the acceptability of each of the following actions that could be taken for this purpose.*

	Strongly Oppose		Neutral		Strongly Support	No Opinion / Unsure
Post signs and communicate with trail users about how they can minimize disturbance	❑	❑	❑	❑	❑	❑
Seasonal closures of important wildlife areas during periods of breeding and young-rearing	❑	❑	❑	❑	❑	❑
Re-route the trail to avoid areas that are especially important to wildlife	❑	❑	❑	❑	❑	❑
Ask users to voluntarily limit their use of the trail	❑	❑	❑	❑	❑	❑
Discourage use of unofficial trails in the area	❑	❑	❑	❑	❑	❑
Limit all use to certain times of the day	❑	❑	❑	❑	❑	❑
Close the trail permanently to all users	❑	❑	❑	❑	❑	❑
Close the trail permanently to all users and develop a trail with similar characteristics in a less sensitive area	❑	❑	❑	❑	❑	❑
No action	❑	❑	❑	❑	❑	❑
Other: _____	❑	❑	❑	❑	❑	❑

* Any implemented action would be evaluated on an ongoing basis and discontinued when no longer deemed necessary.

This last section relates to basic demographic information.

22. Do you:
    - ❑ live in Jasper year round (please go to question 23)
    - ❑ live in Jasper on a seasonal basis (please go to question 24)
    - ❑ other:_____

23. Including this year, how many years have you lived in Jasper? ___
    (please go to question 25)

24. a) Including this year, how many years have you been coming to Jasper on a seasonal basis? ____

    b) During what season(s) do you normally live in Jasper?
    - ❑ summer (July/Aug)
    - ❑ fall (Sept-Nov)
    - ❑ winter (Dec-April)
    - ❑ spring (May/June)

25. Which age category do you fit into?
    - ❑ 19-24 years ❑ 25-34 years ❑ 35-44 years
    - ❑ 45-54 years ❑ 55-64 years ❑ over 65 years

26. We would like you to share any other comments or concerns you may have regarding the trail network around the Town of Jasper. For example, perhaps there are particular trails that you feel require better maintenance, areas where you believe a trail is needed, or ideas that you would like to share regarding management strategies. Or, if you are content with the current trail system, then let us know that as well. *Please use the map to highlight particular areas of concern so we may better understand your comments.*

Thank you for assisting us with this study.
Your input is greatly appreciated.

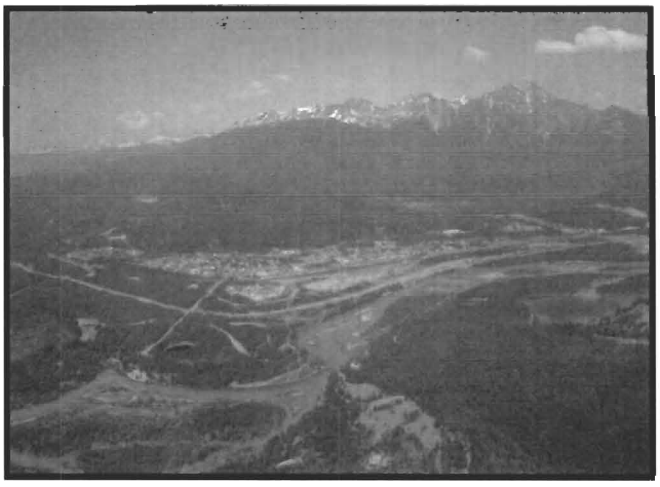
For your convenience, a postage-paid envelope
has been included with this survey.

Appendix D: Visitor mail survey

JASPER NATIONAL PARK

SUMMER TRAIL USE STUDY 2003

Visitor Survey



School of Resource and Environmental Management
Simon Fraser University

JASPER TRAIL STEWARDS

Parks Canada Parcs Canada

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We hope you enjoyed your visit to Jasper National Park earlier this summer. We are interested in learning about your use of the day-use trail network around the Town of Jasper and your opinion about how these trails should be managed. *Please refer to the enclosed map on the back of the cover letter to help you answer the following questions.*

1. a) Including your most recent visit, how many times have you visited Jasper National Park? _____

   b) During which month(s) did you most recently visit Jasper NP?

   _____

   c) On this visit, how many nights did you spend in Jasper NP? _____

2. During your most recent visit, how often did you participate in the each of the following activities on the day-use trails around the Town of Jasper?

	Not at all	Once	2 or 3 times	4-9 times	More than 10 times
Hiking/ Walking	❑	❑	❑	❑	❑
Jogging	❑	❑	❑	❑	❑
Dog walking	❑	❑	❑	❑	❑
Cross-country (CC) mountain biking	❑	❑	❑	❑	❑
Downhill (DH) mountain biking	❑	❑	❑	❑	❑
Horseback riding	❑	❑	❑	❑	❑
Other *(please list)*: _____	❑	❑	❑	❑	❑

3. Please indicate up to three of your ~~most preferred~~ trail activities by ranking them as #1, #2, and #3. *(Though choosing a #1 activity may be difficult, it is important for us to better understand your needs as a trail user).*

	Rank
Hiking/Walking	_____
Jogging	_____
Dog walking	_____
CC Mountain biking	_____
DH Mountain biking	_____
Horseback riding	_____
Other: _____	_____

4. Which trails did you use during your visit to Jasper NP? *(Please refer to the enclosed map when responding to this question).*

_____
_____
_____
_____

5. Thinking of your #1 ~~most preferred~~ activity (from question 3), please name one trail fitting each of the following criteria. *(If you are not adequately familiar with the trail network, please proceed to question 6).*

One trail I would...

Recommend for solitude _____
Recommend for a good view _____
Recommend for seeing wildlife _____
Consider overused _____
Consider underused _____
Consider well-maintained _____
Consider poorly maintained _____
Consider poorly signed _____
Consider your favourite _____

6. There are many reasons for using the day-use trail network around the Town of Jasper. Generally, how important was each of the following motivations for you when using the trails?

	Very Unimportant		Neutral		Very Important
Exploring a new trail	❑	❑	❑	❑	❑
Using a familiar trail	❑	❑	❑	❑	❑
Seeing wildlife	❑	❑	❑	❑	❑
Exercising and challenging myself	❑	❑	❑	❑	❑
Avoiding encounters with other trail users	❑	❑	❑	❑	❑
Getting to a destination	❑	❑	❑	❑	❑
Being in a peaceful, quiet setting	❑	❑	❑	❑	❑
Enjoying the natural environment	❑	❑	❑	❑	❑
Learning about the natural environment	❑	❑	❑	❑	❑
Other *(please list)*:_____	❑	❑	❑	❑	❑

7. There are many trail characteristics influencing the choice of a trail. Generally, how important was each of the following characteristics for you when selecting a day-use trail around Jasper?

	Very Unimportant		Neutral		Very Important
The physical features of the trail itself (i.e. length, width, change in elevation, surface)	❑	❑	❑	❑	❑
The presence of challenging or technical sections on the trail	❑	❑	❑	❑	❑
The number of people I expect to encounter	❑	❑	❑	❑	❑
The type of users I expect to encounter	❑	❑	❑	❑	❑
The suitability of the trail given the weather conditions	❑	❑	❑	❑	❑
The proximity of the trail to where I am staying	❑	❑	❑	❑	❑
The amount of time I have available	❑	❑	❑	❑	❑
Other: _____	❑	❑	❑	❑	❑

8. Please choose the statement that best describes your use of the trail system around the Town of Jasper during your last visit:

❑ I used the trails around the Town of Jasper primarily to improve my technical skills and use my equipment.

❑ I used the trails around the Town of Jasper primarily to stay fit, burn calories, and enjoy the area.

❑ I used the trails around the Town of Jasper primarily to experience the outdoors, taking the time to look at the flowers and wildlife.

❑ I used the trails around the Town of Jasper primarily to wander and stretch my legs.

❑ None of the above

9. How did you obtain information about Jasper's trail network? *Please check all sources of information that you used.*

❑ Parks Canada sources (brochures, trail office, trail kiosks, website)
❑ Outdoor/bike shops in town
❑ Local guidebooks
❑ Websites (other than the Parks Canada website)
❑ Friends/word of mouth
❑ Through personal discovery and exploration
❑ Other: _____

10. Would you like to obtain information from any other sources? *If yes, please specify:* _____
_____

11. Please help us evaluate the information provided about the trail system around the Town of Jasper. How useful did you find each of the following sources of information?

	I have not used this source	Not at all useful		Neutral		Very useful
"Summer trails" map/ brochure	❑	❑	❑	❑	❑	❑
Parks Canada information centre	❑	❑	❑	❑	❑	❑
Information kiosks at trailheads	❑	❑	❑	❑	❑	❑
Parks Canada website	❑	❑	❑	❑	❑	❑
Trail maps at trail junctions	❑	❑	❑	❑	❑	❑
Trail markers along the trail	❑	❑	❑	❑	❑	❑

12. How would your **ideal** trail look? Thinking of your most preferred activity, please select your preferred combination of management options, physical characteristics, trip highlights, and encounters for a particular trail.

Trail management: **My ideal trail would…**		***Trip Highlights*** **My ideal trail would offer the following:**	
Allow the following activities *(choose all activities that apply):*	❑ Hiking/jogging ❑ Mtn. biking ❑ Horse-use	Lake/ River	❑ Yes ❑ No
Be patrolled by wardens?	❑ Yes ❑ No	Viewpoints	❑ Yes ❑ No
Have signage at junctions?	❑ Yes ❑ No	Wildlife viewing	❑ Yes ❑ No
Trail Characteristics **My ideal trail would be predominantly….**		***Encounters*** **For each hour spent on my ideal trail, I would prefer to meet…**	
Trail surface	❑ Soil ❑ Exposed roots ❑ Hardened *	Hikers/joggers	❑ 0 groups ❑ 2 groups ❑ 4 groups ❑ 6 groups ❑ 8 groups ❑ 10 groups
Topography	❑ Flat ❑ Many short hills ❑ A few long hills	Mountain bikers	❑ 0 groups ❑ 1 group ❑ 2 groups ❑ 3 groups ❑ 4 groups ❑ 6 groups
	❑ Straight ❑ Winding	Horse Users	❑ 0 groups ❑ 1 groups ❑ 3 groups
Maintained?**	❑ Yes ❑ No	Total # of groups with more than 6 people	❑ 0 groups ❑ 1 groups ❑ 3 groups
Forest Type	❑ Evergreen trees ❑ Leaved trees ❑ Mixed forest*** ❑ Mixed forest & non-forested		

* Trail is sufficiently compacted to provide a hard surface, but is not paved.

** A trail is considered "maintained" if fallen trees and other debris are cleared from the trail and bridges are in good condition.

*** A mixed forest includes both leaved and evergreen trees.

On the next few pages we present you with several sets of hypothetical trail descriptions. Each set contains 4 options, consisting of 3 trail profiles describing day use trails around the Town of Jasper and an option not to select any of the trails offered.

The profile of each hypothetical trail describes

- Trail management
- Physical characteristics
- The # of other users you can expect to meet in one hour

(These descriptions do not imply that the trail offers any one of the features exclusively, but instead refer to the **predominant** condition).

13. **Your task:** When looking at each set, imagine that Jasper has only these three types of trails available. If you only had enough time to explore one of these trails, which one would you choose? Please evaluate each set independently of the others. *Focus on your #1 most preferred activity (see your response to question 3) when making your trail decisions.*

An **example** is provided below:

	Option A (Trail 1)	Option B (Trail 2)	Option C (Trail 3)	Option D
Trail Management:				
Activities allowed:	Hiking Mtn. Biking Horse Use	Mtn. Biking	Hiking Horse Use	
Patrolled by wardens?	No	Yes	No	
Signage at junctions	Yes	No	Yes	
Trail Characteristics:				
Trail surface	Smooth soil	Hardened	Exposed roots	
Topography	Flat Winding	Few long hills Straight	Flat Winding	I would pursue this activity on trails outside of the day-use network.
Maintained?	Yes	No	No	
Forest type	Evergreen trees	Mixed & non-forested	Mixed forest	
Trip Highlights:				
Lake/River	✓	-	-	
Viewpoints	✓	✓	-	
Wildlife Viewing	-	✓	✓	
# of each group you meet / hr:				
Hikers/joggers	3	0	3	
Mountain bikers	0	6	0	
Horseback riders	1	3	1	
Total # groups with. more than 6 people	1	1	1	
Please choose one option:	☑	☐	☐	☐

SET 1

	Option A (Trail 1)	Option B (Trail 2)	Option C (Trail 3)	Option D
Trail Management				
Activities allowed	Hiking Mtn. Biking Horse use	Hiking Mtn. Biking Horse Use	Hiking Mtn. Biking Horse Use	
Patrolled by wardens?	Yes	No	Yes	
Signage at junctions	Yes	No	Yes	
Trail Characteristics				
Trail surface	Soil	Exposed roots	Hardened	
Topography	Few long hills Straight	Many short hills Winding	Flat Winding	I would pursue this activity on trails outside of the day-use network.
Maintained?	Yes	No	Yes	
Forest type	Evergreen Trees	Mixed forest and Non-Forested	Leaved Trees	
Trip Highlights				
Lake/River	✔	✔	-	
Viewpoints	-	✔	✔	
Wildlife viewing	✔	-	✔	
# of each user group you meet / hr				
Hikers/joggers	2	6	8	
Mountain bikers	6	3	1	
Horseback riders	1	1	1	
Total # groups with more than 6 people	0	1	0	
Please choose one option: →	❑	❑	❑	❑

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SET 2

	Option A (Trail 1)	Option B (Trail 2)	Option C (Trail 3)	Option D
Trail Management				
Activities allowed	Horse use	Hiking Mtn. Biking Horse use	Hiking Mtn. Biking Horse use	
Patrolled by wardens?	No	Yes	No	
Signage at junctions	Yes	No	Yes	
Trail Characteristics				
Trail surface	Hardened	Hardened	Soil	
Topography	Few long hills Winding	Many short hills Winding	Many short hills Straight	I would pursue this activity on trails outside of the day-use network.
Maintained?	No	Yes	Yes	
Forest type	Evergreen Trees	Mixed forest and Non-Forested	Mixed forest and Non-Forested	
Trip Highlights				
Lake/River	✔	✔	✔	
Viewpoints	~	~	✔	
Wildlife viewing	~	✔	✔	
# of each user group you meet / hr				
Hikers/joggers	N/A	6	8	
Mountain bikers	N/A	2	2	
Horseback riders	1	1	1	
Total # groups with more than 6 people	1	1	3	
Please choose one option: →	❑	❑	❑	❑

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SET 3

	Option A (Trail 1)	Option B (Trail 2)	Option C (Trail 3)	Option D
Trail Management				
Activities allowed	Hiking Mtn. Biking	Hiking Mtn. Biking	Hiking Mtn. Biking	
Patrolled by wardens?	No	Yes	No	
Signage at junctions	No	No	Yes	
Trail Characteristics				
Trail surface	Exposed roots	Exposed roots	Exposed roots	
Topography	Flat Winding	Flat Winding	Flat Straight	I would pursue this activity on trails outside of the day-use network.
Maintained?	Yes	Yes	Yes	
Forest type	Evergreen Trees	Evergreen Trees	Mixed Forest	
Trip Highlights				
Lake/River	~	✔	✔	
Viewpoints	~	✔	✔	
Wildlife viewing	✔	~	~	
# of each user group you meet / hr				
Hikers/joggers	6	8	0	
Mountain bikers	6	4	6	
Horseback riders	N/A	N/A	N/A	
Total # groups with more than 6 people	0	3	0	
Please choose one option: →	❑	❑	❑	❑

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SET 4

	Option A (Trail 1)	Option B (Trail 2)	Option C (Trail 3)	Option D
Trail Management				
Activities allowed	Hiking Mtn. Biking Horse use	Mtn. Biking	Hiking Horse use	
Patrolled by wardens?	Yes	No	No	
Signage at junctions	Yes	Yes	Yes	
Trail Characteristics				
Trail surface	Exposed roots	Hardened	Exposed roots	
Topography	Many short hills Winding	Many short hills Straight	Many short hills Winding	I would pursue this activity on trails outside of the day-use network.
Maintained?	Yes	Yes	Yes	
Forest type	Mixed forest and Non-Forested	Mixed forest and Non-Forested	Mixed forest and Non-Forested	
Trip Highlights				
Lake/River	✔	~	~	
Viewpoints	✔	✔	✔	
Wildlife viewing	✔	✔	~	
# of each user group you meet / hr				
Hikers/joggers	10	N/A	10	
Mountain bikers	1	3	N/A	
Horseback riders	0	N/A	3	
Total # groups with more than 6 people	1	0	1	
Please choose one option: →	❑	❑	❑	❑

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SET 5

	Option A (Trail 1)	Option B (Trail 2)	Option C (Trail 3)	Option D
Trail Management				
Activities allowed	Hiking Mtn. Biking	Hiking Mtn. Biking	Hiking Mtn. Biking Horse use	
Patrolled by wardens?	No	Yes	Yes	
Signage at junctions	Yes	No	No	
Trail Characteristics				
Trail surface	Exposed roots	Exposed roots	Soil	
Topography	Few long hills Winding	Many short hills Straight	Many short hills Winding	I would pursue this activity on trails outside of the day-use network.
Maintained?	Yes	No	No	
Forest type	Leaved Trees	Mixed Forest	Leaved Trees	
Trip Highlights				
Lake/River	~	~	✔	
Viewpoints	✔	✔	✔	
Wildlife viewing	~	~	✔	
# of each user group you meet / hr				
Hikers/joggers	4	0	4	
Mountain bikers	3	2	1	
Horseback riders	N/A	N/A	0	
Total # groups with more than 6 people	0	0	0	
Please choose one option: →	❑	❑	❑	❑

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SET 6

	Option A (Trail 1)	Option B (Trail 2)	Option C (Trail 3)	Option D
Trail Management				
Activities allowed	Hiking	Hiking Horse use	Mtn. Biking Horse use	
Patrolled by wardens?	Yes	Yes	Yes	
Signage at junctions	No	No	Yes	
Trail Characteristics				
Trail surface	Soil	Exposed roots	Exposed roots	
Topography	Many short hills Straight	Many short hills Winding	Flat Winding	I would pursue this activity on trails outside of the day-use network.
Maintained?	No	No	Yes	
Forest type	Evergreen Trees	Leaved Trees	Evergreen Trees	
Trip Highlights				
Lake/River	✔	✔	~	
Viewpoints	✔	~	~	
Wildlife viewing	✔	✔	✔	
# of each user group you meet / hr				
Hikers/joggers	8	4	N/A	
Mountain bikers	N/A	N/A	0	
Horseback riders	N/A	3	1	
Total # groups with more than 6 people	0	0	0	
Please choose one option: →	☐	☐	☐	☐

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SET 7

	Option A (Trail 1)	Option B (Trail 2)	Option C (Trail 3)	Option D
Trail Management				
Activities allowed	Hiking Mtn. Biking Horse use	Hiking Mtn. Biking	Hiking Mtn. Biking	
Patrolled by wardens?	No	Yes	No	
Signage at junctions	No	Yes	Yes	
Trail Characteristics				
Trail surface	Hardened	Hardened	Soil	
Topography	Few long hills Winding	Many short hills Winding	Many short hills Straight	I would pursue this activity on trails outside of the day-use network.
Maintained?	Yes	No	No	
Forest type	Leaved Trees	Evergreen Trees	Evergreen Trees	
Trip Highlights				
Lake/River	✔	~	~	
Viewpoints	✔	~	✔	
Wildlife viewing	~	~	✔	
# of each user group you meet / hr				
Hikers/joggers	2	4	4	
Mountain bikers	6	6	6	
Horseback riders	0	N/A	N/A	
Total # groups with more than 6 people	3	1	0	
Please choose one option: →	❑	❑	❑	❑

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SET 8

	Option A (Trail 1)	Option B (Trail 2)	Option C (Trail 3)	Option D
Trail Management				
Activities allowed	Hiking Mtn. Biking	Hiking Mtn. Biking Horse use	Hiking	
Patrolled by wardens?	No	No	Yes	
Signage at junctions	Yes	No	Yes	
Trail Characteristics				
Trail surface	Exposed roots	Exposed roots	Hardened	
Topography	Flat Straight	Few long hills Winding	Flat Straight	I would pursue this activity on trails outside of the day-use network.
Maintained?	No	No	No	
Forest type	Mixed Forest	Evergreen Trees	Mixed forest and Non-Forested	
Trip Highlights				
Lake/River	✔	~	~	
Viewpoints	✔	✔	~	
Wildlife viewing	~	~	~	
# of each user group you meet / hr				
Hikers/joggers	0	6	2	
Mountain bikers	2	3	N/A	
Horseback riders	N/A	0	N/A	
Total # groups with more than 6 people	0	0	1	
Please choose one option: →	❑	❑	❑	❑

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SET 9

	Option A (Trail 1)	Option B (Trail 2)	Option C (Trail 3)	Option D
Trail Management				
Activities allowed	Hiking Mtn. Biking Horse use	Hiking	Hiking Mtn. Biking Horse use	
Patrolled by wardens?	Yes	No	Yes	
Signage at junctions	Yes	No	No	
Trail Characteristics				
Trail surface	Exposed roots	Exposed roots	Exposed roots	
Topography	Many short hills Straight	Flat Straight	Few long hills Winding	I would pursue this activity on trails outside of the day-use network.
Maintained?	No	No	Yes	
Forest type	Evergreen Trees	Mixed forest and Non-Forested	Mixed forest and Non-Forested	
Trip Highlights				
Lake/River	~	✔	~	
Viewpoints	✔	~	✔	
Wildlife viewing	✔	✔	~	
# of each user group you meet / hr				
Hikers/joggers	6	10	0	
Mountain bikers	4	N/A	1	
Horseback riders	0	N/A	1	
Total # groups with more than 6 people	1	0	0	
Please choose one option: →	❑	❑	❑	❑

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The "Jasper Trail Stewards" is a broadly based interest group that aims to promote awareness and understanding of trail use in Jasper National Park and proposes solutions for trail management issues. The group includes walkers/joggers, bikers, horse-users, and skiers.

14. Were you previously aware of the Jasper Trail Stewards?
    - ❑ Yes
    - ❑ No

15. In your opinion, on which of the following issues should the Trail Stewards focus their efforts? *Please select **up to three** of the following issues that you consider most important for the Trail Stewards.*

    - ❑ Improving trail conditions
    - ❑ Improving wildlife habitat
    - ❑ Educating peers about wildlife needs
    - ❑ Educating peers about proper trail etiquette and ways to reduce environmental impact
    - ❑ Advising Parks Canada about user needs
    - ❑ Other: _____
    - ❑ Unsure/ I don't know

We have a few more questions about your preferences for trail management.

16. Please tell us whether Parks Canada meets your needs in providing each of the following:

	Does not meet my needs	Meets my needs	Exceeds my needs
Well-maintained trails	❑	❑	❑
Clearly signed trails	❑	❑	❑
Trails of varying levels of difficulty	❑	❑	❑
Trails in a variety of landscapes	❑	❑	❑
Interpretive or educational signage	❑	❑	❑
Trail maps and brochures	❑	❑	❑
Other: _____	❑	❑	❑

17. Imagine you are participating in your most preferred activity. At the beginning of one of the trails, you encounter a sign informing you that the area is important to wildlife and requesting that you choose another trail. *Please choose the statement that best describes how you would react:*

- ❑ I would choose another trail.
- ❑ I would continue on the intended trail.
- ❑ I would continue on the intended trail, but plan to choose an alternative trail next time.
- ❑ Unsure/ I don't know

18. Thinking about your most preferred activity, how would each of the following situations affect your experience:

	Would strongly detract from my experience		Would not affect my experience		Would strongly enhance my experience	Unsure / No Opinion
Many other users on the trail	❑	❑	❑	❑	❑	❑
Few other users on the trail	❑	❑	❑	❑	❑	❑
Dogs off leash on the trail	❑	❑	❑	❑	❑	❑
Park staff on the trail	❑	❑	❑	❑	❑	❑
Exposed roots/ wear on the trail	❑	❑	❑	❑	❑	❑
Signs posted on the trail communicating a trail sharing etiquette	❑	❑	❑	❑	❑	❑
Seeing others using unofficial trails (unmarked trails not included on the Parks Canada trail map)	❑	❑	❑	❑	❑	❑
Seeing other users off trail	❑	❑	❑	❑	❑	❑
Seeing wildlife	❑	❑	❑	❑	❑	❑
Encountering potentially dangerous wildlife	❑	❑	❑	❑	❑	❑

19. Suppose that one of your favorite trails in Jasper required some type of management action in order to minimize the potential for a dangerous encounter with wildlife.* *Please rate the acceptability of the following actions that could be taken for this purpose.*

	Strongly Oppose		Neutral		Strongly Support	Unsure / No Opinion
Post signs and communicate with trail users about how they can minimize disturbance	❑	❑	❑	❑	❑	❑
Seasonal closures of important wildlife areas during periods of breeding and young-rearing	❑	❑	❑	❑	❑	❑
Re-route the trail to avoid areas that are especially important to wildlife	❑	❑	❑	❑	❑	❑
Ask users to voluntarily limit their use of the trail	❑	❑	❑	❑	❑	❑
Discourage use of unofficial trails in the area	❑	❑	❑	❑	❑	❑
Limit all use to certain times of the day	❑	❑	❑	❑	❑	❑
Close the trail permanently to all users	❑	❑	❑	❑	❑	❑
Close the trail permanently to all users and develop a trail with similar characteristics in a less sensitive area	❑	❑	❑	❑	❑	❑
No action	❑	❑	❑	❑	❑	❑
Other: _____ _____	❑	❑	❑	❑	❑	❑

*Any implemented action would be evaluated on an ongoing basis and discontinued when no longer deemed necessary.

20. How would you feel about designating *some trails* around the Town of Jasper for the exclusive use of each of the following user groups:

	Very much opposed		Doesn't matter		Very much in favour	Unsure / No Opinion
Hikers/joggers	❑	❑	❑	❑	❑	❑
Dog walkers	❑	❑	❑	❑	❑	❑
Mountain bikers	❑	❑	❑	❑	❑	❑
Horseback riders	❑	❑	❑	❑	❑	❑

This last section relates to basic demographic information.

21. Where do you live?

❑ In Canada (please name province):_____
❑ In US (please name state):_____
❑ Other (please specify):_____

22. Which age category do you fit into?

❑ 19-24 years ❑ 25-34 years ❑ 35-44 years
❑ 45-54 years ❑ 55-64 years ❑ over 65 years

Any other comments?

23. We would like you to share any other comments or concerns you may have regarding the trail network around the Town of Jasper. For example, perhaps there are particular trails that you feel require better maintenance, areas where you believe a trail is needed, or ideas that you would like to share regarding management strategies. Or, if you are content with the current trail system, then let us know that as well. Please use the map to highlight particular areas of concern so we may better understand your comments.

_____

_____

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_____

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Thank you for assisting us with this study.
Your input is greatly appreciated!

REFERENCE LIST

Anderson, C. (2004). *Jasper National Park summer trail use study 2003: Final report.* Submitted to Jasper National Park of Canada.

Anderson, D.H. & Brown, P.J. (1984). The displacement process in recreation. *Journal of Leisure Research, 16,* 61-73.

Anderson, D.H., Lime, D.W., & Wang, T.L. (1998). *Maintaining the quality of park resources and visitor experiences* (Report No. TC-777). St. Paul, MN: University of Minnesota, Department of Forest Resources, Cooperative Park Studies Unit.

Anderson, S. H. (1995). Recreational disturbance and wildlife populations. In R. L. Knight and K. J. Gutzwiller (eds.), *Wildlife and Recreationists: Coexistence Through Management and Research* (pp. 169-182). Washington: Island Press.

Ap, J. & Crompton, J.L. (1993). Residents' strategies for responding to tourism impacts. *Journal of Travel Research, 32,* 47-50.

AXYS Environmental Consulting Ltd. (2001). *Evaluation of ecological recovery options for the Three Valley Confluence landscape management unit in Jasper National Park.* Calgary: Author.

Banff-Bow Valley Study. (1996a). *Banff-Bow Valley: At the crossroads. Technical report of the Banff-Bow Valley task force* (Robert Page, Suzanne Bayley, J. Douglas Cook, Jeffrey E. Green, and J.R. Brent Ritchie). Prep. for the Honourable Sheila Copps, Minister of Canadian Heritage, Ottawa, ON.

Banff-Bow Valley Study. (1996b). *Banff-Bow Valley: At the crossroads. Summary report of the Banff-Bow Valley task force* (Robert Page, Suzanne Bayley, J. Douglas Cook, Jeffrey E. Green, and J.R. Brent Ritchie). Prep. for the Honourable Sheila Copps, Minister of Canadian Heritage, Ottawa, ON.

Becker, R.H. (1981). Displacement of recreational users between the Lower St. Croix and Upper Mississippi Rivers. *Journal of Environmental Management, 13,* 259-267.

Bixler, R.D., Noe, F.P., & Hammitt, W.E. (1992). Restrictive and non-restrictive management of park visitors. *Journal of Environmental Systems, 21,* 335-348.

Blahna, D.J., Smith, K.S., & Anderson, J.A. (1995). Backcountry llama packing: Visitor perceptions of acceptability and conflict. *Leisure Sciences, 17,* 185-204.

Borrie, W.T., Freimund, W.A., & Davenport, M.A. (2002). Winter visitors to Yellowstone National Park: Their value orientations and support for management actions. *Human Ecology Review, 9*(2), 41-48.

Boyle, S.A. & Samson, F.B. (1985). Effects of non-consumptive recreation on wildlife: A review. *Wildlife Society Bulletin, 13,* 110-116.

Canadian Heritage, Parks Canada. (1994). *Guiding principles and operational policies.* Ottawa: Minister of Supply and Services Canada. Cat. No. R62-275/1994E.

Canadian Heritage, Parks Canada. (1995a). *Jasper day use trails survey: Draft interim report.* Strategic Research & Analysis, Alberta Region. Alberta: Author.

Canadian Heritage, Parks Canada. (1995b). *Jasper day use level study.* Business Service Group. Alberta: Author.

Cardiff, S. (2000). Confronting cumulative effects. *Research Links, 8*(3), 7-17.

Cardiff, S. (2004). Trail stewards: Involving users in human use management in Jasper National Park of Canada. In N.W.P. Munro, P. Dearden, T.B. Herman, K. Beazley, & S. Bondrup-Nielson (eds.), *Making Ecosystem Based Management Work: Connecting Managers and Researchers, Proceedings of the Fifth International Conference on Science and Management of Protected Areas*; 11-16 May 2003; Victoria, British Columbia. Wolfville, NS: SAMPAA.

Carothers, P., Vaske, J.J., & Donnelly, M.P. (2001). Social values versus interpersonal conflict among hikers and mountain bikers. *Leisure Sciences, 23*, 47-61.

Cessford, G. (1995). *Off-road mountain biking: A profile of participants and their recreation setting and experience preferences.* Retrieved September 20, 2004, from http://www.mountainbike.co.nz/politics/doc/profile

Chavez, D.J. (1996). Mountain biking: Direct, indirect, and bridge building management styles. *Journal of Park and Recreation Administration, 14*(4), 21-35.

Chavez, D.J. (1997). Mountain bike management: Resource protection and social conflicts. *Trends, 34*(3), 36-40.

Chavez, D.J., Winter, P.L., & Baas, J.M. (1993). Recreational mountain biking: A management perspective. *Journal of Park and Recreation Administration, 11*(3), 29-36.

Cialdini, R.B. & Trost, M.R. (1998). Social influence: Social norms, conformity, and compliance. In D.T. Gilbert, S.T. Fiske, & G. Lindzey (eds.), *The Handbook of Social Psychology: Volume Two* (4th ed.) (pp. 151-192). New York: Oxford University Press.

Clawson, M. & Knetsch, J.L. (1966). *The economics of outdoor recreation.* Baltimore: Johns Hopkins Press.

Cole, D.N. (1993). Minimizing conflict between recreation and nature conservation. Reprinted from D.S. Smith and P.C. Hellund (eds.), *Ecology of Greenways: Design and Function of Linear Conservation Areas* (pp. 105-122). Minneapolis: University of Minnesota Press.

Cole, D.N. (1995). Wilderness management principles: Science, logical thinking or personal opinion? *Trends, 32*(1), 6-9.

Cole, D.N. & Hammitt, W.E. (2000). Wilderness management dilemmas: Fertile ground for wilderness management research. In D.N. Cole, S.F. McCool, W.T. Borrie, & J. O'Loughlin (Comps.), *Wilderness Science in a Time of Change Conference – Volume 4: Wilderness Visitors, Experiences, and Visitor Management;* 23-27 May 1999; Missoula, MT (pp. 58-63). Proceedings RMRS-P-15-VOL-4. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Cole, D.N., Hammond, T.P., & McCool, S.F. (1997). Information quantity and communication effectiveness: Low impact messages on wilderness trailside bulletin boards. *Leisure Sciences, 19,* 59-72.

Cole, D.N. & Knight, R.L. (1991). Wildlife preservation and recreational use: Conflicting goals of wildland management. *Transactions of the North American Wildlife and Natural Resource Conference, 56,* 233-237.

Cole, D.N. & Landres, P.B. (1996). Threats to wilderness ecosystems: Impacts and research needs. *Ecological Applications, 6,* 168-184.

Cordell, H.K. & Super, G.R. (2000). Trends in Americans' outdoor recreation. In W.C. Gartner & D.W. Lime (eds.), *Trends in Outdoor Recreation, Leisure and Tourism* (pp. 133-144). New York: CABI.

Crompton, J.L. & Tian-Cole, S. (1999). What response rate can be expected from questionnaire surveys that address park and recreation issues? *Journal of Park and Recreation Administration, 17*(1), 60-72.

Dale, D. & Weaver, T. (1974). Trampling effects on vegetation of the trail corridors of north Rocky Mountain forests. *Journal of Applied Ecology, 11,* 767-772.

Daniels, S.E. & Krannich, R.S. (1990). The recreational opportunity spectrum as a conflict management tool. In J. Vining (ed.), *Social Science and Natural Resource Recreation Management* (pp. 165-179). Boulder: Westview.

Dawson, C.P. & Watson, A.E. (2000). Measures of wilderness trip satisfaction and user perceptions of crowding. In D.N. Cole, S.F. McCool, W.T. Borrie, & J. O'Loughlin (comps.), *Wilderness Science in a Time of Change Conference – Volume 4: Wilderness Visitors, Experiences, and Visitor Management;* 23-27 May 1999; Missoula, MT; (pp. 93-98). Proceedings RMRS-P-15-VOL-4. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Dearden, P. & Dempsey, J. (2004). Protected areas in Canada: Decade of change. *The Canadian Geographer, 48,* 225-239.

Deluca, T.H., Patterson, W.A, Freimund, W.A., & Cole, D.N. (1998). Influence of llamas, horses, and hikers on soil erosion from established recreation trails in western Montana, USA. *Environmental Management, 22,* 255-262.

Dobson, B., Whittington, J., St. Clair, R., & Wesbrook, M. (2004). *The effectiveness of wildlife corridor restoration: Fairmont Jasper Park Lodge golf course, final report 2000-2003.* Jasper National Park of Canada: Author.

Dower, M. (1995). Working with people who live in protected areas. In J.A. McNeely (ed.), *Expanding Partnerships in Conservation* (pp. 215-222). Washington: Island Press.

Driver, B.L. & Knopf, R.C. (1977). Personality, outdoor recreation and expected consequences. *Environment and Behavior, 9*, 169-193.

Eagles, P.F.J. & McCool, S. F. (2002). *Tourism in national parks and protected areas: Planning and management*. Wallingford: CABI.

Flather, C.H. & Cordell, H.K. (1995). Outdoor recreation: Historical and anticipated trends. In R.L. Knight & K.J. Gutzwiller (eds.), *Wildlife and Recreationists: Coexistence Through Management and Research* (pp. 3-16). Washington: Island Press.

Flink, C.A., Olka, K., & Searns, R.M. (2001). *Trails for the twenty-first century: Planning, design, and management manual for multi-use trails* (2nd ed.). Washington: Island Press.

Floyd, M.F., Jang, H., & Noe, F.P. (1997). The relationship between environmental concern and acceptability of environmental impacts among visitors to two U.S. national park settings. *Journal of Environmental Management, 51*, 391-412.

Gabrielsen, G.W. & Smith, E.N. (1995). Physiological responses of wildlife to disturbance. In R.L. Knight & K.J. Gutzwiller (eds.), *Wildlife and Recreationists: Coexistence Through Management and Research* (pp. 95-107). Washington: Island Press.

Gadd, B. (1997). *Report on the Jasper trails project*. Jasper, AB: Author.

Gander, H. & Ingold, P. (1997). Reactions of male alpine chamois *Rupicapra r. rupicapra* to hikers, joggers and mountain bikers. *Biological Conservation, 79*, 107-109.

Goeft, U. & Alder, J. (2001). Sustainable mountain biking: A case study from the southwest of western Australia. *Journal of Sustainable Tourism, 9*, 193-211.

Government of Canada. (1988). c. 48. *An Act to amend the National Parks Act and to amend an Act to amend the National Parks Act.*

Government of Canada. (2000). c. 32. *Canada National Parks Act.* An Act Respecting the National Parks of Canada.

Graham, R., Nilsen, P., & Payne, R.J. (1988). Visitor management in Canadian national parks. *Tourism Management, 9*, 44-62.

Gramann, J.H., Bonifield, R.L., & Kim, Y-G. (1995). Effect of personality and situational factors on intentions to obey rules in outdoor recreation areas. *Journal of Leisure Research, 27*, 326-343.

Hall, T. & Cole, D.N. (2000). An expanded perspective on displacement: A longitudinal study of visitors to two wildernesses in the Cascade Mountains of Oregon. In D.N. Cole, S.F. McCool, W.T. Borrie, J. O'Loughlin (comps.), *Wilderness Science in a Time of Change Conference – Volume 4: Wilderness Visitors, Experiences, and Visitor Management*; 23-27 May 1999; Missoula, MT (pp. 113-121). Proceedings RMRS-P-15-VOL-4. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Hall, T. & Shelby, B. (2000). Temporal and spatial displacement: Evidence from a high-use reservoir and alternate sites. *Journal of Leisure Research, 32*, 435-456.

Hammitt, W.E., Bixler, R.B., & Noe, F.P. (1996). Going beyond importance-performance analysis to analyze the observance-influence of park impacts. *Journal of Park and Recreation Administration, 14*(1), 45-62.

Hammitt, W.E. & Cole, D.N. (1998). *Wildland Recreation: Ecology and Management* (2nd ed.). New York: John Wiley & Sons.

Hammitt, W.E. & Patterson, M.E. (1991). Coping behavior to avoid visitor encounters: Its relationship to wildland privacy. *Journal of Leisure Research, 23*, 225-237.

Hammitt, W.E. & Schneider, I.E. (2000). Recreation conflict management. In W.C. Gartner & D.W. Lime (eds.), *Trends in Outdoor Recreation, Leisure and Tourism* (pp. 347-356). New York: CABI.

HaySmith, L. & Hunt, J.D. (1995). Nature tourism: Impacts and management. In R.L. Knight & K.J. Gutzwiller (eds.), *Wildlife and Recreationists: Coexistence Through Management and Research* (pp. 203-219). Washington: Island Press.

Hendee, J.C., Stankey, G.H., & Lucas, R.C. (1990). *Wilderness management* (2nd ed.). Golden, CO: Fulcrum Publishing.

Hendricks, W.W., Ramthun, R.H., & Chavez, D.J. (2001). The effects of persuasive message source and content on mountain bicyclists' adherence to trail etiquette guidelines. *Journal of Park & Recreation Administration, 19*(3), 38-61.

Hood, G.A. & Parker, K.L. (2001). Impact of human activities on grizzly bear habitat in Jasper National Park. *Wildlife Society Bulletin, 29*, 624-638.

Ivy, M.E., Stewart, W.P., & Lue, C-C. (1992). The role of tolerance in recreational conflict. *Journal of Leisure Research, 24*, 348-360.

Jacob, G.R. & Schreyer, R. (1980). Conflict in outdoor recreation: A theoretical perspective. *Journal of Leisure Research, 12*, 368-380.

Johnson, A.K. & Dawson, C.P. (2004). An exploratory study of the complexities of coping behavior in Adirondack wilderness. *Leisure Sciences, 26*, 281-293.

Johnson, D.R. & Vande Kamp, M.E. (1996). Extent and control of resource damage due to non-compliant visitor behaviour: A case study from the U.S. national parks. *Natural Areas Journal, 16*, 134-141.

Jope, K.L. (1985). Implications of grizzly bear habituation to hikers. *Wildlife Society Bulletin, 13*, 32-37.

Joslin, G. & Youmans, H., coordinators. (1999). *Effects of recreation on Rocky Mountain wildlife: A review for Montana*. Committee on Effects of Recreation on Wildlife, Montana Chapter of The Wildlife Society.

Kachi, N. (2004). Human use management: A strategic direction for the future. In N.W.P. Munro, P. Dearden, T.B. Herman, K. Beazley, & S. Bondrup-Nielson (eds.), *Making Ecosystem Based Management Work: Connecting Managers and Researchers, Proceedings of the Fifth International Conference on Science and Management of Protected Areas*; 11-16 May 2003; Victoria, British Columbia. Wolfville, NS: SAMPAA.

Klein, M.L. (1993). Waterbird behavioral responses to human disturbances. *Wildlife Society Bulletin, 21,* 31-39.

Knight, R.L. & Cole, D.N. (1991). Effects of recreational activity on wildlife in wildlands. *Transactions of the North American Wildlife and Natural Resource Conference, 56,* 238-247.

Knight, R.L. & Cole, D.N. (1995a). Wildlife responses to recreationists. In R.L. Knight & K.J. Gutzwiller (eds.), *Wildlife and Recreationists: Coexistence Through Management and Research* (pp. 51-69). Washington: Island Press.

Knight, R.L. & Cole, D.N. (1995b). Factors that influence wildlife responses to recreationists. In R.L. Knight & K.J. Gutzwiller (eds.), *Wildlife and Recreationists: Coexistence Through Management and Research* (pp. 71-79). Washington: Island Press.

Knight, R.L. & Gutzwiller, K.J. (Eds.). (1995). *Wildlife and recreationists: Coexistence through management and research.* Washington: Island Press.

Knight, R.L. & Temple, S.A. 1995. Wildlife and recreationists: Coexistence through management. In R.L. Knight & K.J. Gutzwiller (eds.), *Wildlife and Recreationists: Coexistence Through Management and Research* (pp. 327-333). Washington: Island Press.

Knudson, D.M. & Curry, E.B. (1981). Campers' perceptions of site deterioration and crowding. *Journal of Forestry, 79*(1), 92-94.

Kuentzel, W.F. & Heberlein, T.A. (1992). Cognitive and behavioral adaptations to perceived crowding: A panel study of coping and displacement. *Journal of Leisure Research, 24,* 377-393.

Kuo, I-L. (2002). The effectiveness of environmental interpretation at resource sensitive tourism destinations. *International Journal of Tourism Research, 4,* 87-101.

Lankford, S.V., Pfister, R.E., Knowles, J., & Williams, A. (2003). An exploratory study of the impacts of tourism on resident outdoor recreation experiences. *Journal of Park and Recreation Administration, 21*(4), 30-49.

Lathrop, J. (2003a). *Business perspectives on the Flathead economy, conservation, and Glacier National Park: Analysis of Flathead County business community opinion.* Prepared for the National Parks Conservation Association. Retrieved February 4, 2005, from http://www.npca.org/across_the_nation/npca_in_the_field/northern_rockies/gateway/lathrop.pdf

Lathrop, J. (2003b). *Ecological impacts of mountain biking: a critical literature review.* Prepared for Wildlands CPR through the University of Montana's Environmental Studies Scientific Approaches to Environmental Problems. Retrieved March 3, 2005, from http://www.wildlandscpr.org/resourcelibrary/reports/mountainbikingreport.htm

Lee, J-H., Scott, D., & Moore, R.L. (2002). Predicting motivations and attitudes of users of a multi-use suburban trail. *Journal of Park and Recreation Administration, 20*(3), 18-37.

Leung, Y-F. & Marion, J.L. (1999). Spatial strategies for managing visitor impacts in national parks. *Journal of Park and Recreation Administration, 17*(4), 20-38.

Liddle, M. (1997). *Recreation ecology*. London: Chapman & Hall.

Liu, J. & Var, T. (1986). Resident attitudes toward tourism impacts in Hawaii. *Annals of Tourism Research, 13*, 193-214.

Lynn, N.A. & Brown, R.D. (2003). Effects of recreational use impacts on hiking experiences in natural areas. *Landscape and Urban Planning, 64*, 77-87.

MacArthur R. A., Geist, V., & Johnston, R.H. (1982). Cardiac and behavioral responses of mountain sheep to human disturbance. *Journal of Wildlife Management, 46*, 351-358

Mace, R.D. & Waller, J.S. (1996). Grizzly bear distribution and human conflicts in Jewel Basin Hiking Area, Swan Mountains, Montana. *Wildlife Society Bulletin, 24*, 461-467.

Mainini, B., Neuhaus, P., & Ingold, P. (1993). Behaviour of marmots *Marmota marmota* under the influence of different hiking activities. *Biological Conservation, 64*, 161-164.

Manfredo, M.J. & Bright, A.D. (1991). A model for assessing the effectiveness of communication on recreationists. *Journal of Leisure Research, 23*, 1-20.

Manfredo, M.J., Driver, B.L., & Brown, P.J. (1983). A test of concepts inherent in experience based setting management of outdoor recreation areas. *Journal of Leisure Research, 15*, 263-283.

Manning, R.E., Ballinger, N.L., Marion, J., & Roggenbuck, J. (1996). Recreation management in natural areas: Problems and practices, status and trends. *Natural Areas Journal, 16*, 142-146.

Manning, R.E. (1998). "To provide for the enjoyment": Recreation management in the national parks. *The George Wright Forum, 15*(1), 6-20.

Manning, R.E. (1999). *Studies in outdoor recreation: Search and research for satisfaction* (2nd ed.). Corvallis: Oregon State University Press.

Manning, R.E. & Valliere, W.A. (2001). Coping in outdoor recreation: Causes and consequences of crowding and conflict among community residents. *Journal of Leisure Research, 33*, 410-426.

Martin, D.C. (1992). The effect of three signs and a brochure on visitors' removal of pumice at Mount St. Helens. In H.H. Christensen, D.R. Johnson, & M.H. Brookes (eds.), *Vandalism: Research, Prevention and Social Policy* (pp. 121-131). United States Department of Agriculture, Forest Service, General Technical Report, PNW-GTR-293.

Martin, D.C., McCool, S.F., & Lucas, R.C. (1989). Wilderness campsite impacts: Do managers and visitors see them the same? *Environmental Management, 13*, 623-629.

Mauro, M. (2002). *Banff resident trail recreation survey*. Retrieved November 2, 2004, from http://www.biosphereinstitute.org/On_Line_ Documents.htm

Mauro, M., Stark, C., & McVetty, D. (2001). *Focus group report: Residents/local user groups.* Retrieved February 4, 2004 from http://www.biosphereinstitute.org/On_Line_ Documents.htm

McCool, S.F. & Cole, D.N. (2000). Communicating minimum impact behavior with trailside bulletin boards: Visitor characteristics associated with effectiveness. In D.N. Cole, S.F. McCool, W.T. Borrie, J. O'Loughlin (comps.), *Wilderness Science in a Time of Change Conference – Volume 4: Wilderness Visitors, Experiences, and Visitor Management*; 23-27 May 1999; Missoula, MT (pp. 208-216). Proceedings RMRS-P-15-VOL-4. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

McCool, S.F. & Martin, S.R. (1994). Community attachment and attitudes toward tourism development. *Journal of Travel Research, 32*, 29-34.

McCoy, N.H. (2003). Behavioral externalities in natural resource production possibility frontiers: Integrating biology and economics to model human-wildlife interactions. *Journal of Environmental Management, 69*, 105-113.

McLellan, B.N. & Shackleton, D.M. (1989). Immediate reactions of grizzly bears to human activities. *Wildlife Society Bulletin, 17*, 269-274.

McNamee, K. (2002). From wild places to endangered spaces. In P. Dearden & R. Rollins (eds.), *Parks and Protected Areas in Canada: Planning and Management* (2nd ed.) (pp. 21-50). Toronto: Oxford.

Mercer, G., Carrow, G., & Deagle, J. (2000). *Assessing wildlife movement and human use in the Three Valley Confluence: 1999 progress report*. Jasper National Park of Canada: Author.

Mercer, G., Deagle, J., & Carrow, G. (2002). Assessing wildlife movement in relation to human use. In S. Bondrup-Nielsen, N.W.P. Munro, G. Nelson, J.H.M. Willison, T.B. Herman, & P. Eagles (eds.), *Managing Protected Areas in a Changing World, Proceedings of the Fourth International Conference on Science and the Management of Protected Areas;* 14-19 May 2000; Waterloo, ON; (pp. 744-754). Wolfville, NS: SAMPAA.

Miller, S.G., Knight, R.L., & Miller, C.K. (2001). Wildlife responses to pedestrians and dogs. *Wildlife Society Bulletin, 29*, 124-132.

Miller, T. & McCool, S.F. (2003). Coping with stress in outdoor recreational settings: An application of transactional stress theory. *Leisure Sciences, 25*, 257-275.

Moore, R.L. (1994). *Conflicts on multiple-use trails: Synthesis of the literature and state of the practice*. Federal Highway Administration. Report No. FHWA-PD-94-031.

Moore, R.L. & Barthlow, K. (1996). Principles for minimizing trail conflicts: Applications to mountain biking. *Trends, 34*(3), 11-14.

Moore, R.L., Scott, D., & Graefe, A. (1998). The effects of activity differences on recreation experiences along a suburban greenway trail. *Journal of Park and Recreation Administration, 16*(2), 35-53.

Morey, E.R., Buchanan, T., & Waldman, D.M. (2002). Estimating the benefits and costs to mountain bikers of changes in trail characteristics, access fees, and site closures: Choice experiments and benefit transfer. *Journal of Environmental Management, 64*, 411-422.

Mosedale, J. (2003). Planning for appropriate recreation activities in mountain environments: Mountain biking in the Canadian Rocky Mountains. *FES Outstanding Graduate Student Paper Series 7*(5).

Mowen, A.J., Graefe, A.R., & Williams, D.R. (1998). An assessment of activity and trail type as indicators of trail user diversity. *Journal of Park and Recreation Administration, 16*(1), 80-96.

Nelson, J.G. (1998). Parks and protected areas and sustainable development. In J.S. Marsh & B.W. Hodgins (eds.), *Changing Parks: The History, Future and Cultural Context of Parks and Heritage Landscapes* (pp. 279-294). Toronto: Natural Heritage.

Newsome, D., Moore, S.A., & Dowling, R.K. (2002). *Natural area tourism: Ecology, impacts and management*. Clevedon: Channel View.

Nickerson, N. (2003). *What the people think: Glacier National Park and vicinity*. Institute for tourism and recreation research, University of Montana. Retrieved February 4, 2005, from http://www.itrr.umt.edu/research/NPCAglacier.pdf

Noe, F.P. & Hammitt, W.E. (1992). Environmental attitudes and the personal relevance of management actions in a park setting. *Journal of Environmental Management, 35*, 205-216.

Noe, F.P., Hammitt, W.E., and Bixler, R.D. (1997). Park user perceptions of resource and use impacts under varied situations in three national parks. *Journal of Environmental Management, 49*, 323-336.

O'Leary, J.T. (1974). Land use redefinition and the rural community: Disruption of community leisure space. *Journal of Leisure Research, 8*, 263-274.

Orams, M.B. (1996). A conceptual model of tourist-wildlife interaction: The case study for education as a management strategy. *Australian Geographer, 27*, 39-51.

Owens, P.L. (1985). Conflict as a social interaction process in environment and behavior research: The example of leisure and recreation research. *Journal of Environmental Psychology, 5*, 241-259.

Papageorgiou, K. (2001). A combined park management framework based on regulatory and behavioural strategies: Use of visitors' knowledge to assess effectiveness. *Environmental Management, 28*, 61-73.

Papouchis, C.M., Singer, F.J., & Sloan, W.B. (2001). Responses of desert bighorn sheep to increased recreation. *Journal of Wildlife Management, 65*, 573-582.

Parks Canada. (1979). *Parks Canada Policy*. Ottawa: Department of Indian and Northern Affairs.

Parks Canada Agency. (2000a). *Unimpaired for future generations? Protecting ecological integrity with Canada's national parks*, vol. 2: *Setting a new direction for Canada's National Parks*. Report of the Panel on the Ecological Integrity of Canada's National Parks, Ottawa, Cat. No. R62-323/2000-2E.

Parks Canada Agency. (2000b). *Action plan in response to the report of the panel on the ecological integrity of Canada's national parks*. Retrieved October 21, 2004 from http://www. pc.gc.ca/docs/pc/rpts/ie-ei/report-rapport_2_e.asp

Parks Canada Agency. (2000c). *Jasper National Park of Canada management plan*. Minister of Public Works and Government Services Canada. Cat. No. R64-105/28-2000E.

Parks Canada Agency. (2001a). *The Three Valley Confluence restoration framework: Jasper National Park*. Jasper National Park of Canada: Author.

Parks Canada Agency. (2001b). *Jasper community land use plan*. Jasper National Park of Canada. Catalogue: R64-105/30-2000E.

Parks Canada Agency. (2002). *Implementation report: Jasper National Park of Canada management plan*. Jasper National Park of Canada: Author.

Parks Canada Agency. (2003). *Summer trails*. Jasper National Park of Canada: Author.

Parks Canada Agency. (2004). *Parks Canada attendance 1999-00 to 2003-04*. Retrieved February 1, 2005 from http://www.pc.gc.ca/docs/pc/attend/attend_E.pdf

Parks Canada Agency, Alberta Economic Development, & the Banff-Lake Louise Hotel-Motel Association. (2000). *Patterns of Visitor Use Survey*. Alberta: Author.

Parks Canada Agency, Canadian Tourism Commission, Alberta Economic Development, & the Mountain Park Visitor Survey Partnership. (2004). *2003 survey of visitors to Banff, Jasper, Kootenay, and Yoho National Parks of Canada*. Alberta: Author.

Payne, R.J. & Nilsen, P.W. (2002). Visitor planning and management. In P. Dearden & R. Rollins (eds.), *Parks and Protected Areas in Canada: Planning and Management* (2nd ed.) (pp. 148-178). Toronto: Oxford.

Perez-Verdin, G., Lee, M.E., & Chavez, D.J. (2004). Outdoor recreation in a protected area in southern Durango, Mexico: Analysis of local residents' perceptions. *Society and Natural Resources, 17*, 897-910.

Petty, R.E., McMichael, S., & Brannon, L.A. (1992). The elaboration likelihood model of persuasion: Applications in recreation and tourism. In M.J. Manfredo (ed.), *Influencing Human Behavior: Theory and Applications in Recreation, Tourism, and Natural Resources Management* (pp. 77-101). Champaign, IL: Sagamore.

Pigram, J.J. & Jenkins, J.M. (1999). *Outdoor recreation management*. London: Routledge.

Pomerantz, G.A., Decker, D.J., Goff, G.R., & Purdy, K.G. (1988). Assessing impact of recreation on wildlife: A classification scheme. *Wildlife Society Bulletin, 16*, 58-62.

Robertson, R.A. & Regula, J.A. (1994). Recreational displacement and overall satisfaction: A study of Central Iowa's licensed boaters. *Journal of Leisure Research, 26*, 174-181.

Roggenbuck, J.W. (1992). Use of persuasion to reduce resource impacts and visitor conflicts. In M.J. Manfredo (ed.), *Influencing Human Behavior: Theory and Applications in Recreation, Tourism, and Natural Resources Management* (pp. 149-208). Champaign, IL: Sagamore.

Roggenbuck, J.W., Williams, D.R., & Watson, A.E. (1993). Defining acceptable conditions in wilderness. *Environmental Management, 17*, 187-197.

Saremba, J. & Gill, A. (1991). Value conflicts in mountain park settings. *Annals of Tourism Research, 18*, 455-472.

Schneider, I.E. & Winter, P.B. (1998). Multiple use management preferences by visitors with differing leisure identity salience. *Journal of Park and Recreation Administration, 16*(4), 22-38.

Schreyer, R. (1990). Conflict in outdoor recreation: The scope of the challenge to resource planning and management. In J. Vining (ed.), *Social Science and Natural Resource Recreation Management* (pp. 13-31). Boulder: Westview.

Schreyer, R., Knopf, R.C., & Williams, D.R. (1985). Reconceptualizing the motive/environment link in recreation choice behavior. In G.H. Stankey & Stephen F. McCool (comps.), *Proceedings—symposium on recreation choice behavior;* 22-23 March 1984; Missoula, MT (pp. 9-18). Gen. Tech. Rep. INT-184. Ogden, UT: USDA Forest Service, Intermountain Research Station.

Schuster, R.M., Hammitt, W.E., & Moore, D. (2003). A theoretical model to measure the appraisal and coping response to hassles in outdoor recreation settings. *Leisure Sciences, 25*, 277-299.

Shelby, B., Bregenzer, N.S., & Johnson, R. (1988). Displacement and product shift: Empirical evidence from Oregon rivers. *Journal of Leisure Research, 20*, 274-288.

Shelby, B., Vaske, J.J., and Heberlein, T.A. (1989). Comparative analysis of crowding in multiple locations: Results from fifteen years of research. *Leisure Sciences, 11*, 269-291.

Shindler, B. & Shelby, B. (1993). Regulating wilderness use: An investigation of user group support. *Journal of Forestry, 91*(2), 41-44.

Sowman, P. & Pearce, D. (2000). Tourism, national parks and visitor management. In R.W. Butler & S.W. Boyd (eds.), *Tourism and National Parks: Issues and Implications* (pp. 223-243). West Sussex: Wiley & Sons.

Sprung, Gary. (2004). *Natural resource impacts of mountain biking: A summary of scientific studies that compare mountain biking to other forms of trail travel.* Prepared for International Mountain Bicycling Association. Retrieved March 3, 2005, from http://www.imba.com/resources/science/impact_summary.html

Statistics Canada. (2001). *Community highlights for Jasper.* Retrieved November 7, 2004, from http://www12.statcan.ca/english/profil01/PlaceSearchForm1.cfm

Stedman, R., Beckley, T., Wallace, S., & Ambard, M. (2004). A picture *and* 1000 words: Using resident-employed photography to understand attachment to high amenity places. *Journal of Leisure Research, 36*, 580-606.

Stewart, E.J., Hayward, B.M., Devlin, P.J., & Kirby, V.G. (1998). The "place" of interpretation: A new approach to the evaluation of interpretation. *Tourism Management, 19,* 257-266.

Stewart, W.P. & Cole, D.N. (2001). Number of encounters and experience quality in Grand Canyon backcountry: Consistently negative and weak relationships. *Journal of Leisure Research, 33,* 106-120.

Swearingen, T.C. & Johnson, D.R. 1988. *An analysis of off-trail hiking in response to special social control techniques at Paradise Meadows, Mount Rainier National Park.* Subagreement no. 10, Co-op agreement no. CA-9000-3-004. Seattle, WA: USDI National Park Service, Cooperative Park Studies Unit, College of Forest Resources, University of Washington.

Swearingen, T.C. & Johnson, D.R. (1994). Keeping visitors on the right track: Sign and barrier research at Mount Rainier. *Park Science, 14*(4), 17-19.

Swearingen, T.C. & Johnson, D.R. (1995). Visitors' responses to uniformed park employees. *Journal of Park and Recreation Administration, 13*(1), 73-85.

Symmonds, M.C., Hammitt, W.E., & Quisenberry, V.L. (2000). Managing recreational trail environments for mountain bike user preferences. *Environmental Management, 25,* 549-564.

Taylor, A.R. & Knight, R.L. (2003a). Behavioral responses of wildlife to human activity: Terminology and methods. *Wildlife Society Bulletin, 31,* 1263-1271.

Taylor, A.R. & Knight, R.L. (2003b). Wildlife responses to recreation and associated visitor impacts. *Ecological Applications, 13,* 951-963.

Thomlinson, E. (2004). *2004 User discussion groups for the Jasper trail system.* Western Canada Service Centre, Social Science Research, Parks Canada Agency.

Thurston, E. & Reader, R.J. (2001). Impacts of experimentally applied mountain biking and hiking on vegetation and soil of a deciduous forest. *Environmental Management, 27,* 397-409.

Trail Stewards Working Group. (2001). *Terms of reference (amended September, 2001).* Jasper National Park of Canada.

Vande Kamp, M.E., Johnson, D.R., & Swearingen, S.C. (1994). Preventing visitor-caused damage to national park resources: What do we know? What should be done? *Park Science, 14*(3), 8-10.

Vandeman, M.J. (2004). *The impacts of mountain biking on wildlife and people –A review of the literature.* Paper presented at the 31st annual Natural Areas Association Conference, Emerging issues: Perils and possibilities; 13-16 October 2004; Chicago, IL. Retrieved March 3, 2005, from http://home.pacbell.net/mjvande/scb7.htm

Vaske, J.J. & Donnelly, M.P. (2002). Generalizing the encounter—norm—crowding relationship. *Leisure Sciences, 24,* 255-269.

Vaske, J.J., Donnelly, M.P., & Heberlein, T.A. (1980). Perception of crowding and resource quality by early and more recent visitors. *Leisure Sciences, 3,* 367-381.

Watson, A.E. (2001). Goal interference and social value differences: Understanding wilderness conflicts and implications for managing social density. In W.A. Freimund & D.N. Cole (comps.), *Visitor Use Density and Wilderness Experience*: proceedings; 1-3 June 2000; Missoula, MT; (pp. 62-67). Proc. RMRS-P-20. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Watson, A.E. , Asp, C., Walsh, J., & Kulla, A. (1997). The contribution of research to managing conflict among national forest users. *Trends, 34*(3), 29-35.

Watson, A.E. & Niccolucci, M.J. (1995). Conflicting goals of wilderness management: Natural conditions vs. natural experiences. In D.J. Chavez (technical coordinator), *Proceedings of the Second Symposium on Social Aspects and Recreation Research*; 23-25 February 1994; San Diego, CA; (pp. 11-15). Gen. Tech. Report PSW-156. Albany, CA: USDA Forest Service, Pacific Southwest Research Station.

Watson, A.E., Niccolucci, M.J., & Williams, D.R. (1994). The nature of conflict between hikers and recreational stock users in the John Muir Wilderness. *Journal of Leisure Research, 26*, 372-385.

Watson, A.E., Williams, D.R., & Daigle, J.J. (1991). Sources of conflict between hikers and mountain bike riders in the Rattlesnake NRA. *Journal of Park and Recreation Administration, 9*(3), 59-71.

Watson, A.E., Zaglauer H., & Stewart, S. (1996). Activity orientation as a discriminant variable in recreation conflict research. *Proceedings of the 1995 Northeastern Recreation Research Symposium* (pp. 103-108). USDA Forest Service Technical Report NE-218.

Weaver, T. & Dale, D. (1978). Trampling effects of hikers, motorcycles, and horses in meadows and forests. *Journal of Applied Ecology, 15*, 451-457.

Whittington, J. (2002). *Movement of wolves (Canis lupus) in response to human development in Jasper National Park, Alberta*. A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfilment of the degree for the Master of Science. University of Alberta.

Wilkinson, P.F. (2002). Protecting ecological integrity in Canada's national parks: Allowable and appropriate visitor use. In S. Bondrup-Nielsen, N.W.P. Munro, G. Nelson, J.H.M. Willison, T.B. Herman, & P. Eagles (eds.), *Managing Protected Areas in a Changing World, Proceedings of the Fourth International Conference on Science and the Management of Protected Areas;* 14-19 May 2000; Waterloo, ON; (pp. 184-195). Wolfville, NS: SAMPAA.

Williams, D.R. (1993). Conflict in the great outdoors. *Parks and Recreation, 28*(9), 28-35, 122.

Wilson, J.P. & Seney, J.P. (1994). Erosional impact of hikers, motorcycles, and off-road bicycles on mountain trails in Montana. *Mountain Research and Development, 14*, 77-88.

Wisdom, M.J., Ager, A.A., Preisler, H.K., Cimon, N.J., & Johnson, B.K. (2004). Effects of off-road recreation on elk and mule deer. *Transactions of the North American Wildlife and Natural Resource Conference, 69*, in press.

Wright, P. & Rollins, R. (2002). Managing the national parks. In P. Dearden & R. Rollins (eds.), *Parks and Protected Areas in Canada: Planning and Management* (2nd ed.) (pp. 207-239). Toronto: Oxford.