

**Planning for Appropriate Recreation Activities**  
**In Mountain Environments:**  
**Mountain Biking in the Canadian Rocky Mountains**

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Volume 7, Number 5  
FES Outstanding Graduate Student Paper Series  
January 2003  
ISSN 1702-3548 (online)  
ISSN 1702-3521 (print)

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## **Abstract**

The Canadian Rocky Mountains offer spectacular settings and the necessary topographic features to be conducive to mountain biking. Calgary, one of the major population centres of the region, which has a proportion of mountain bike riders, is situated close to a high concentration of National Parks and other protected areas. The protected areas are therefore an important component of the local and regional outdoor recreation system. However, recreation can impose considerable stress on the parks ecosystems and is often incompatible with their mandate. The study combined the Visitor Activity Management Process with the Appropriateness Model in order to focus on policies regarding recreation and mountain biking in the Canadian Rocky Mountains and to offer a situational analysis, an examination of management strategies and specific recommendations.

## Chapter 1: Introduction

One of the main trends endangering the fragile ecosystems of mountain regions<sup>1</sup> is the increase of recreational use and tourism to these areas (Miller, 1998). Outdoor recreational activities are, however, extremely dependent on the quality and quantity of the natural resource: “the natural environment plays a fundamental part in attaining the outcomes and satisfactions sought from participation in certain forms of recreation” (Pigram & Jenkins, 1999: 32). However, certain activities and extensive participation in these activities can harm the environment on which they are relying and thus have profound detrimental impacts on the ecosystem of the visited region. Schreyer *et al.* (1985: 16) maintain that recreationists’ choice of the natural setting is not attributed to certain elements of the environment “as much as they search for settings which will allow them to behave in the ways they desire...”.

The Canadian Rocky Mountains offer a spectacular setting and the necessary topographic features to be conducive to mountain biking<sup>2</sup>. “[M]ountain environments are ... part of a widespread outdoor recreation system” (Kariel & Draper, 1992: 97) and mountain protected areas are important components of this system. Protected areas are often regarded as playgrounds for outdoor recreation and thus experience high use. However, human use, including mountain biking, can impose considerable stress on these ecosystems, which is sometimes incompatible with the mandate of the managing agency.

Various agencies, private owners and businesses manage regions within the Canadian Rocky Mountains and their policies, mandates and management objectives are an important tool in controlling the activity. The mountain range also crosses the provincial border between Alberta and British Columbia, thus falling under two separate sets of legislation and park systems. Since differences in management strategies can influence neighbouring areas, it is necessary to examine the mountain biking activity in a regional perspective.

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<sup>1</sup> A number of factors contribute to the classification of mountain regions as fragile: climatic extremes, the brevity of the growing season and scarcity of essential nutrients in mountainous terrain lead to low biological activity. This low productivity, combined with the steep slopes, is the cause for a slow rate of restoration after disturbance (Price, 1981).

<sup>2</sup> The term “mountain biking” will be used for off-road cycling in the context of this paper.

The popularity of mountain biking is steadily growing and is a force not to be underestimated or ignored. The mountain biking community will likely increase its efforts of establishing new illegal trails, should legal opportunities decrease much further or even disappear. It is therefore essential to investigate current opportunities in various jurisdictions as a prerequisite for any successful local management strategies.

Humans are the dominant species in every National Park. As a result of our social evolution we have expanded into one niche after another. We have created new niches where none existed. Further, we are a highly generalized animal capable of an immense range of behavior [and recreational activities].... In short, to understand the natural systems of the park you must understand the park's most dominant species (Campbell, 1979: 53).

Rider satisfaction and needs should, therefore, also be taken into account.

When mountain bikes started to become popular in the 1980s, land managers had very little information on the impacts of mountain biking. As a result the activity was banned from many public lands in the United States, due to the belief that mountain biking had considerable environmental impacts and caused a great deal of conflict with other user groups. Mountain biking in the Canadian Rocky Mountains did not reach levels comparable to certain areas in the United States in the 1980s and land managers therefore did not have to resort to such drastic measures. However, recent developments have shown that mountain biking is increasingly perceived as being a problem in some areas of the Canadian Rocky Mountains. This research has been undertaken in order to enable land managers to make informed choices on their management strategies.

The overriding question in managing protected areas is whether specific recreational activities and conservation efforts are compatible and, therefore, whether National Parks and other protected areas should allow or prohibit the recreational activities that might be detrimental to the ecosystem (Battin & Nelson, 1982; Budowsky, 1976). As the then Director General of National Parks, Ian D. Rutherford, said, we have to "... reduce the conflict between the forces that support resource protection and those that support recreation and tourism" (Rutherford, 1990: 2). "Knowing the importance ... visitors attach to particular features of recreational settings (called 'site attributes'<sup>3</sup>) is the foundation of effective recreation management" (Clark & Stankey, 1990a: 81). The reasons for

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<sup>3</sup> Site attributes are features that are essential for the visitor's or resident's recreational experience.

recreationists to undertake their activity will, in addition to these site attributes, enable managers and decision makers to determine whether an activity is appropriate in the protected area and will also help to find a compromise between conservation and recreation. "Attributes provide a basis for identifying compatibilities and conflicts with other resource uses" (Clark & Stankey, 1990a: 84).

The research answers several questions:

- can the experiences that mountain bike riders seek be satisfied without critically interfering with the conservation mandate and the policies of Parks Canada and other land-use<sup>4</sup> agencies
- can the experiences sought by riders be satisfied on trails situated in the immediate surroundings of National Parks and other protected areas and
- are the management techniques sufficient to minimize the biophysical impacts of the activity.

The purpose of this research is not to find physical ways of managing the impacts, but rather to discover ways to help accommodate the activity with the least impact on conservation efforts and, additionally, to determine whether mountain biking can be accommodated within land-use areas in the Canadian Rockies without interfering with their primary mandates.

The objectives of this research project are to:

- depict the current situation of mountain biking opportunities and associated problems (both perceived by riders and agencies) in the region
- examine the policy of the various agencies towards recreational use and, more specifically, mountain bike riding
- suggest ways to minimise the impacts of mountain biking on the ecological integrity of the protected areas and concurrently ensure the highest possible satisfaction of the user group.

The author traveled to the various study regions in the Canadian Rocky Mountains in order to examine the local mountain biking opportunities, to develop an understanding of the issues associated with recreation and mountain biking in particular, and to make

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<sup>4</sup> Agencies with the primary mandate of resource extraction or habitat and species protection.

recommendations towards the management of the activity in the region of the Canadian Rocky Mountains. The resulting paper is meant to help land managers in successfully managing mountain biking.

The paper consists of nine chapters. The second chapter focuses on various management frameworks for outdoor recreation activities and outlines the limitations of these frameworks. The third chapter provides a detailed history of the bicycle and the subsequent development of the mountain bike and examines recent trends within mountain biking. It also demonstrates the evolution of mountain biking into a mainstream activity. A literature review of land access issues, such as the biophysical impacts of mountain biking and conflict with other user groups, is presented in chapter four. Chapters four to eight consist of the original study focusing on research methods, policies regarding recreation and mountain biking, a situational analysis and the examination of management strategies. In conclusion, the ninth chapter makes specific recommendations to land managers regarding the issues and problems identified in chapter seven and eight.

## Chapter 2: Planning Outdoor Recreation

Participation in outdoor recreation has steadily increased in developed countries since World War II and has experienced a prolonged spurt since the 1960s (Pigram & Jenkins, 1999). Ewert (1995: 61) maintains that the Western “population is composed of a variety of subgroups that will have a different age ranges and consequent expectations”. Agreeing with this statement, Miller (1995) predicts the emergence of a new important subgroup: the children of the baby boomers born between 1978 and 1995. This group will eventually represent a cohort of substantial numbers in the United States, if not equal to the baby boomer population. This cohort has been released and will continue to be released into the recreational “market”: “a new influx of potential participants in an age group from 18 to 22 will be emerging in the next five years” (Ewert, 1995: 61).

Population growth, higher disposable income, increased leisure time and improved technologies are among several factors that have been identified as being responsible for the increase and availability of outdoor recreation opportunities (Battin & Nelson, 1982; Pigram & Jenkins, 1999).

It has been alternatively argued that as a society passes a certain level of affluence, people begin to seek satisfactions of a nonmaterial kind and those whose material wants are most adequately fulfilled are the first to turn to these nonmaterial sources of satisfaction (Campbell, 1981: 70).

As an increasing number of people have gained economic security, the needs turn towards nonmaterial desires. A trend towards more extreme types of recreation (e.g., white water rafting, rock climbing, mountain biking) as “an attempt to compensate for voids and deficiencies of suburban middle-class life” (Hollenhorst, 1995: 65) has been noticeable over the last few years. This trend, in turn, has spurred a series of significant issues for public agencies.

The most obvious issue will be the continuous wave of non-traditional participants seeking use of public lands as a backdrop for these activities. The question policy makers will be repeatedly faced with is ‘Are these activities appropriate for these public lands?’ The reaction to these new activities seems to go through a process of disregard, ridicule, resistance, and finally acceptance. ... Slow response to the desires of these new users may tend to evoke anger and confrontation.... (Hollenhorst, 1995: 66).

Since the pursuit of recreational activities is not static, but rather dynamic in nature – some being short-lived fads or being pursued by isolated groups and/or communities, others making the transition to mass activities (e.g., mountain biking) – it is necessary to

study the emergence of new recreational activities and trends in order to implement early management strategies to alleviate environmental impacts.

Clearly, an understanding of outdoor recreation patterns and processes requires an appreciation of such factors as:

- people's motivations, choices, participation and recreational satisfaction;
- and
- planning and policy-making (Pigram & Jenkins, 1999: 15).

A recreational activity can foster a feeling of ownership for the recreational resource in local users and user groups, which then can be utilised to promote conservation efforts, even in cases where the conservation measures appear to be a disadvantage to the recreationists. Just as hikers and backpackers had a strong influence on the environmental movement in the 1960s and 1970s, Sprung (1998) thinks that since "mountain biking occurs not only on wild lands, but also on roaded lands, ... this gives cyclists more experience of logging, grazing, mining and other impacts to our public landscapes". Many recreationists will fight to conserve the opportunity to live their experiences in wildlands should these become endangered through many types of development projects (e.g., resorts, real estate, highways). An example is the involvement of mountain bikers in the fight against the Jumbo Glacier Alpine Resort planned near the town of Invermere, BC. Examples of mountain bike groups working with environmental groups to conserve wilderness areas given by Sprung (1998) include:

- the fight against a golf course development in a hardwood forest at Panther Creek State Park, Tennessee and Bethpage State Park, New York
- fencing off a demolition site in order to protect an endangered turtle species in Massachusetts and
- fund raising to help trail programs devised to protect the endangered red-legged frog from siltation.

Outdoor recreation, however, often imposes considerable stress on these ecosystems, since certain activities and extensive participation in these activities can harm the environment on which they rely and thus have profound detrimental impacts on the ecosystem of the visited region. The effect of an activity on the biophysical environment depends on a variety of factors associated with the recreational activity, the period of the



activity, the resistance and resiliency<sup>5</sup> of the ecosystem, the extent of use and the presence or efficiency of management strategies (Hammit & Cole, 1998; Liddle, 1997; Pigram & Jenkins, 1999). The difficulty in substantiating the cause of environmental degradation or the effect of an activity adds to the complexity of recreation management, especially in protected areas.

The stress on the visited ecosystem is intensified as the boundaries of human use are pushed aside by technological advances. Their impacts have long been of concern; Nelson (1974), for example, reviewed the impacts of technology, especially in relation to recreation, on Banff National Park and tried to forecast trends and resulting management implications. Three factors, which have been attributed to new technology, are responsible for an increase in outdoor recreation and extreme recreation in particular:

- recreational users are able to venture into pristine areas, previously untouched by human activities (e.g., mountain biking, heli-skiing)
- improved equipment has increased the safety in outdoor recreation (e.g., improved avalanche equipment, Geographical Positioning System for mountaineering) and
- information technology has enhanced the flow of information (e.g., Internet chat rooms) (Ewert, 1995).

Through the application of these new technologies, recreational users are able to obtain up-to-date information on areas and can venture safely into pristine wilderness areas.

Managers can also expect to see the average skill and experience levels of participants lower as technology enables novices to visit areas and take part in activities formerly only accessible to the highly skilled and committed. The presence of these lower skilled users, many of whom may not be cognizant of or interested in the low-impact philosophy of backcountry travel, will exacerbate resource impacts and perceptions of crowding (Hollenhorst, 1995: 66).

### ***Recreation Management Frameworks***

Meeting these challenges will require rigorous planning and the adoption of stringent management actions to control and reduce the potential negative impacts (Hunt, 1995: 21).

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<sup>5</sup> "Resistance is the ability to absorb use without being disturbed (impacted); resilience is the ability to return to an undisturbed state after being disturbed" (Hammit & Cole, 1998: 18)

Several frameworks have been designed to optimise visitor satisfaction and minimise detrimental impacts to the protected areas [Clark & Stankey, 1990b; Graefe, 1990; Graham *et al.*, 1988; Stankey *et al.*, 1984]. Nilsen (1994), on the other hand, created a model designed to assess the appropriateness of recreational activities in protected areas. The underlying concepts behind those efforts include:

- (1) the resolution of conflict between recreational users with distinct expectations and
- (2) the harmonisation of the recreational activity with the protection and conservation of the resource base.

The frameworks have evolved at different times, have been created by different agencies with distinct purposes and therefore do not fit all situations. They will be briefly explained in the following paragraphs.

### **The Recreation Opportunity Spectrum (ROS):**

ROS, a land classification/zoning system, is tailored to satisfying visitor needs by creating a wide range of recreation opportunities, but leaves the choice to the recreationists: "Recreation opportunity settings imply a choice for recreationists..." (Clark & Stankey, 1990b: 128).

The spectrum within this framework is seen as a range of opportunities for different expectations and users (e.g., from campgrounds serving backpackers only, to campgrounds that cater to recreational vehicles).

The basic intent of the ROS framework was to define different types of recreation settings, each capable of providing a different type of recreational experience. This was to be accomplished by describing broad classes of recreation opportunities, identifying indicators of those opportunities, and defining specific standards for each indicator that make it possible to distinguish between different opportunities (Hammit & Cole, 1998: 210).

It does, however, not take the objectives of the responsible agency into account, offering a range in the degree of use across the Park System (e.g., one campground per National Park, to ten campgrounds per Recreational Area). It seems logical to offer a larger number of trails as the relative importance of protecting the environment decreases (e.g., municipalities offering a larger trail system than National Parks). ROS aims for a maximum number of recreation opportunities by using designated zones regulating the allowable uses. ROS recognizes six classes of recreation settings ranging from primitive to urban and assigns activities to the groups if those are compatible with

other recreational uses and users. It focuses on the quality of opportunities and does not mention quantity, which in the case of mountain biking is at least as important as, if not more significant than the quality of the experience.

Driver (1990) describes ROS as a production process that satisfies the demand for recreation. It does not take those situations into account in which recreation is detrimental to the goal of the protected area and compromises have to be made between the distinct uses. "A diversity of recreational opportunities can be offered simply by providing various combinations of activity, experience, physical setting, social setting, and managerial setting opportunities" (Hammitt & Cole, 1998: 210).

**Limits of Acceptable Change (LAC):**

This framework considers the impact of recreational activities and leads to the formulation of indicators of acceptable change within the system. (See Figure 1.) "The key is to define an optimal balance between these two conflicting goals [recreational use and preservation of the natural environment], in which both recreational opportunities and natural ecosystems are compromised to some extent" (Hammitt & Cole, 1998: 214). LAC "provides a framework for determining acceptable and appropriate resource and social conditions in recreation and wilderness settings" (Knopf, 1990; 201). It is based on the concepts of ecological and social carrying capacity and is a logical procedure for the guidance of land managers to preserve conditions within predetermined standards.

Since the natural environment is a fundamentally dynamic system, the LAC framework allows for natural change to occur, management actions will only be implemented should recreational impact exceed acceptable levels. LAC stays close to the concept of carrying capacity, setting "quantifiable standards of impact level beyond which management actions will be implemented" (HaySmith & Hurst, 1995: 215). The choice of indicators that shall be used for identifying unacceptable change to the resource base will, however, be the responsibility of the recreation manager and thus necessarily judgmental.

Stankey *et al.* (1984) present five steps involved in the LAC framework:

- I. Site analysis to determine base line data and to find site specific issues and concerns relevant to the biophysical, social, economic and political environment of the recreational activity.
- II. Identification of indicators that will represent change and definition of the limit of acceptable change.
- III. Comparison of current and past conditions with respect to the chosen indicators in order to set standards and baseline data.
- IV. Management measures to be taken should the recreational impact exceed acceptable limits are specified and evaluated.
- V. Implementation of the necessary management measures and establishment of a monitoring program to attain acceptable levels of impact.

**Visitor Impact Management (VIM):**

The VIM framework is an eight-step model to minimise impacts arising from visitor activities (Graefe, 1990). It was developed specifically for the United States National Parks and Conservation Association for use by the United States National Parks Service and was created following a literature review on the subject of recreational carrying capacity and recreational impacts (Pigram & Jenkins, 1999).

This framework follows a very scientific rationale; there is, however, no direct consideration of social factors influencing the visitor's choice of activity or any public participation that would help to find a compromise. Figure 2 demonstrates the basic process behind VIM and other management frameworks.

- I. Preassessment database review: information gathering that might contribute to the clarification of issues and problems concerning the activity or environment.
- II. Review of management objectives: definition and prioritisation of management objectives.
- III. Selection of key indicators: indicators should have a correlation with the management objectives.
- IV. Selection of standards for key indicators: decision on the appropriate level of indicators and their measurement.
- V. Comparison of standards and existing conditions

- VI. Identification of probable causes and impacts
- VII. Identification of management strategies
- VIII. Implementation (Graefe, 1990).

**Visitor Activity Management Process (VAMP):**

The VAMP framework was devised for the Canadian Parks Service (now the Parks Canada Agency) and is oriented towards recreation management in protected and neighbouring areas. (See Figure 3.) This framework takes three issues into account:

- the mandate and policies of the conservation agency
- public needs and expectations
- the biophysical environment (Tayler, 1990).

As Tayler (1990: 236) puts it, “A major emphasis throughout each stage of the process is to start by gaining an understanding of who comes to the park, why they come, what they do when they are there, and what their needs are”. Not only does VAMP take the motivations for seeking recreation and other social considerations into account, but it also takes an active interest in the regional situation and “the relationship of the park to its surrounding regions”. The process uses information from natural and social sciences to offer recreational opportunities and help decision-making. It is not concerned with indicators for environmental impacts, as it supposes them to be the objective of natural resource management.

Stages of the VAMP framework include:

- I. Establishment of visitor activity objectives
- II. Generation of the terms of reference
- III. Identification of visitor management issues
- IV. Analysis of the issues identified in step III
- V. Development of options for visitor activities and services
- VI. Recommendation delivery and approval of plan
- VII. Implementation

### **A Proposed Framework for Assessing the Appropriateness of Recreation Activities in Protected Heritage Areas:**

Nilsen (1994) presents a model to determine the allowability and appropriateness of visitor activities in National Parks, which strictly follows Parks Canada's policies and focuses on visitor experiences during the activities. These experience opportunities are related to the mandate of Parks Canada – to “encourage public understanding, appreciation, understanding and enjoyment of this heritage...” (Parks Canada, 1999b: 11) – to determine the appropriateness of the activity.

The framework was developed to refine the previous process of assessment (e.g., workshops with Parks Canada staff and activity stakeholders to deal with hang-gliding and trail bicycling [Bronson, 1983 & 1985]) and is structured into the five following steps:

- I. Setting goals and objectives of the assessment
- II. Identification of issues and opportunities regarding the activity
- III. Synthesis of issues
- IV. Description of future service developments necessary for the activity
- V. Implementation and monitoring (Nilsen, 1994).

An appropriate activity assessment is performed to create management directives for the particular activity in order to facilitate decision-making for land managers. The assessment has three potential results:

1. Parks Canada will actively support the activity.
2. The activity will not be actively supported, yet permitted.
3. The prohibition of the activity in National Parks (Nilsen, 1994).

The Framework for Assessing the Appropriateness of Recreation Activities takes the social values of visitor experiences into account:

It is important not to just lump users into a generic group, but to identify the mandate of the heritage area, the experience opportunities that the heritage area can provide and to compare these to the motivations of potential users. Consultations with participants in the activity can provide valuable insights into their motivations, the types of opportunities being sought and the levels of services required (Nilsen, 1994: 19).

The framework also considers the external environment of the protected area and questions the necessity of creating recreational opportunities if these can be satisfied outside of these areas.

### ***Limitations of Recreation Management Frameworks***

The selection of indicators, both for ecological and social change, is a crucial, yet subjective, step in the process of the framework. Pigram and Jenkins (1999: 99), however, maintain that

There is little agreement as to what constitutes useful generic indicators of recreation impact, so that it is necessary to derive site-specific indicators for particular environmental attributes at specific locations. ... The challenge for managers is to differentiate between recreation impacts and natural variations, and to identify base levels or reference points for particular indicators...

The complexity of the interaction between the natural environment and the recreational activity makes it difficult to isolate one particular cause for the degradation. It is, furthermore, often difficult to set baseline levels for indicators due to typical variation of natural conditions (Wall & Wright, 1977).

Some impacts take the form of naturally occurring processes that have been accelerated by human interference. ... Even without human activity ... severe impacts can occur because of natural fluctuations and disturbances that render effects associated with recreational use insignificant (Vaske *et al.*, 1995: 34).

Knopf (1990), in a review of the potentials and limitations of LAC, has found only one negative aspect to consider: the disregard of human potential to gain extraordinary experiences of the surrounding environment in outdoor situations.

It is fairly easy to accurately determine the magnitude of an impact, but difficult to agree on its importance for the functioning of the ecosystem (Hammit & Cole, 1998).

Only where specific objectives have been established for specific places can one consistently determine whether or not an impact of a given magnitude constitutes a problem that demands management attention. ... Given both budgetary constraints and a concern for avoiding unnecessary restriction of recreation use and behavior, it is best to attack not impacts but impact *problems* – situations in which impacts exceed levels specified in objectives (Hammit & Cole, 1998: 215).

Often several frameworks are combined so as to ensure optimal protection of the environment while concurrently incorporating user satisfaction.

## Chapter 3: The Development of the Mountain Bike and the Mountain Biking Activity/Sport

### *The Evolution of the Bicycle*

In order to explain the current situation it is necessary to examine the evolution of the bicycle and the resulting development of the mountain bike, as it evolved very similarly to the modern safety bicycle. Figure 4 shows the evolution of the bicycle. No single person can be identified as the inventor of the bicycle; rather, a string of technical improvements and innovations led to the idea of the bicycle. Depictions of pre-industrial bicycles have been found in several ancient civilisations, including China (2300 BC), Egypt (1600 BC) and Pompeii (100 BC). Leonardo da Vinci's assistant most probably drew a sketch (in the *Codex Atlanticus*) resembling early safety bicycles (built approximately 400 years later). However, the origin of the sketch is contested, as some scholars believe it to be a fake (Perry, 1995).

Walking horses were the forerunners of the bicycle in both England and Paris; the former children's toy was a fashionable article used by the English aristocrats and by the young royalists in Paris. The German, Karl von Drais (1775-1851), then perfected the hobby horse into his *Laufmaschine*, also called Draisine or swift-walker. The swift-walker was first built in 1816 and consisted of a wooden frame and wooden tyres with leather rims, which was operated by walking/rolling while sitting on the seat. In 1818, von Drais patented his invention and allowed its manufacturing by third parties. Improvements to the construction plans by Denis Johnson in England allowed the "rider" to assume a more upright position and increased comfort through the addition of padded arm rests (Perry, 1995).

The swift-walker was popular for a few seasons, in which considerable innovations were made (e.g., arm rests, padded/suspended saddles, larger wheels, metal steering bar, front forks and rear stays). The first United States patent for a swift-walker was given to W.K. Clarkson in 1819; shortly after that date, New York City prohibited hobbyhorses from public places and sidewalks. By 1820 the users shifted to include doctors, clergymen, postmen and merchants since swift-walkers were more affordable and used models became available (Perry, 1995). The next step towards the modern bicycle was the use of a drive mechanism to convert human power into faster speed/movement.



Louis Gomperts constructed such a mechanism in 1821 in the town of Surrey, England. The rider had to pull a ratchet bar situated on the front fork to turn a cog and thus move the wheel. The popularity of the swift-walker dwindled by 1825 and there was no significant development for the next 40 years (Perry, 1995).

Gavin Dalzell, a Scot, is accredited for constructing the world's first mechanical bicycle with treadle cranks in 1847. Between 1855 and 1866, a number of people claimed to have invented the velocipede by inserting pedal cranks onto the front wheel. The production of velocipedes spread through Europe and England by 1869 and fierce competition started for a share of the market.

Velocipedomania was a magical phenomenon around 1869. It was the beginning of bicycle ingenuity, when the components of bike technology were developed and the family of cycling machines branched out, eventually evolving into three forms: high-wheel bicycles, multi-wheel cycles, and safety bicycles (Perry, 1995: 24).

The Rover Company incorporated the drive-chain mechanism into the safety bicycle between 1884 and 1894, but only the invention of the pneumatic tires by J.B. Dunlop around 1888 made safety bicycles more popular than high wheels due to comfort reasons (large wheels are more flexible than smaller ones). With the pneumatic tires came an increase in speed and necessarily further advances in the braking mechanism and the development of gears.

The grass-root movement of bicycle enthusiasts, inventors and mechanics changed over time to an industry that had to comply with the rules of economic and "... grew into automated assembly line factories managed by corporate capitalists" (Perry, 1995: 36).

### ***The Development of the Mountain Bike***

Although fat-tired bikes were built previously in other areas, nothing evolved from those fringe attempts, so Marin County, California was declared the birthplace of the mountain bike. It was in the early 1970s that a group of friends started riding old clunkers on dirt trails in Marin County. The group started racing for an envelope of marijuana from the top of Mount Tamalpais to Larkspur Canyon. They used old Schwinn Excelsior frames, mounted a front drum brake and bought frames worth about five dollars U.S. whenever the frames broke. Probably a member of the Velo Club Tamalpais, Tim DuPertuis, who subsequently sold it, built one of the first fat tire bikes with derailleurs in Marin County in

1972. However, nothing happened as a result of this first refurbished clunker. When Marc Vendetti re-introduced the idea of off-road cycling to the club the following year, he had converted 20 to 30 people by the end of the year, including Joe Breeze, Otis Guy and Charlie Kelly (Berto, 1999). The clunkers were refurbished with any kind of spare parts that could be found in order to adapt them to off-road riding. Added components included front drum brakes, coaster brakes, knobby tires and anything else that was suitable. (See Figure 5 for technical advances adding to the development of the mountain bike.) With a growing number of people riding clunkers off-road, the three bicycle stores around Mount Tamalpais started carrying appropriate parts for the conversion to off-road bicycles, which made the development of refurbished clunkers a simpler task. Gary Fisher was the first person in Marin County to fit a derailleur to a clunker with 26-inch wheels around 1973–1975 (Berto, 1999). Most riders in those days would convert old clunker frames for their personal use or for friends only. They would get the frames and components from Legendary Wocus, a bicycle shop in Oregon that sold cheap frames, or the Schwinn Bike Shop in San José and acquire the special components from Gary Fisher (Berto, 1999).

In 1976, the first custom-built frame was built for Charlie Kelly, who weighed 180 pounds and put the conventional clunker frames under a lot of pressure. Since Charlie Kelly was unhappy with the first frame, he asked Joe Breeze in 1977 to construct another custom-built frame. The Breezer frames that were consequently built were the first models of the modern mountain bike.

The Breezers were new bicycles with all the latest components. They were widely seen and admired, and they proved that there was a market for something better than grungy old Schwinns. The Breezers expanded the market beyond Marin County (Berto, 1999: 45).

Since Gary Fisher did not like the Breezer frames and needed a fast builder to keep up with the demands, he ordered three custom-built frames from Tom Ritchey, but showed him the Breezer frames. Gary Fisher would add the components and sell the bicycles; he would pay Tom Ritchey when he had sold a bike. In the summer of 1979, Gary Fisher and Charlie Kelly founded the “MountainBikes” business and sold fully-equipped Ritchey frames for approximately US\$1,300. This was the start of the organised selling of modern mountain bikes (Berto, 1999).

Whereas only four businesses presented mountain bikes at the Long Beach Show in 1980, this number exploded to fifteen in 1981. Mountain bike mechanics and businesses started providing work and making different frame models. Specialized Bicycle Imports (SBI) fabricated components for mountain bikes; its founder Mike Sinyard was therefore aware of the growing popularity of the mountain bike (Berto, 1999). SBI started importing mass-produced frames from Japan and selling them as Specialized Stumpjumper in 1980 (Hope, 1997). Two other companies, Univega and Schwinn, started building factory-made mountain bikes in 1982. Finally, in 1983 mountain bike sales made up five percent of the United States bicycle market, compared to 95 percent in 1993 (Berto, 1999).

This brief history has shown the change from a grass-root movement and backyard mechanic stores to a mountain bike industry. Bill Deurhing (Mountain Bike, 2001: 52) from GT Bicycles recently made this statement: "It used to be that all a bike company needed to be successful was to employ a bunch of bike people – not anymore. Now you need engineers, suspension people, materials experts – and more engineers".

However, approximately 70 percent of mountain bikes are never taken off-road (Brown, 1988); they are instead used as city bicycles or merely as status symbol. "Mountain bikes were originally designed for off-road use, but their wide knobby tires, upright handlebar controls, and relaxed frame angles became popular for on-road touring and urban commuting..." (Perry, 1995: 39). Mountain bikes are now readily available in bicycle shops, sports stores and big department stores. Although the percentage of mountain bikes sold in Canada has decreased from 1996 to 1999, the actual number of mountain bikes sold has increased until 1998. (See Figure 6.) The amount of mountain bikes purchased in bicycle shops has consistently revolved around the 15 percent mark in the last four years. This is a good indication for the number of serious mountain bike riders in Canada, since the dollar value of mountain bike sales in bike shops varies between 23 and 30 percent of the sales value of the total bicycle sales. (See Figure 7.)

As the numbers just mentioned show, the popularity of mountain biking is definitely not decreasing and is a force not to be underestimated or ignored. The total bicycle industry accounts for 14 percent of the \$4.5-billion sporting goods market in Canada (Maierhofer, 2000). Bicycling is the world's second favourite recreational activity and Figure 8 shows that the activity ranked fourth in Canada for the year 1998 (Canadian Fitness and

Lifestyle Research Institute, 1997); there is at least one mountain bike in 52 percent of all Canadian households, with the highest percentage in the Province of Alberta. Maierhofer (2000) estimates that 54 percent of all bicycle owners ride more than 50 times per year. Mountain bike riders in the Canadian Rocky Mountains will likely ride more often, especially where there are a great number of mountain biking opportunities.

With increased emphasis on personal fitness and recreational activities bicycling continues as a highly popular activity in both the United States and Canada. It fits very well into the aging demographics of North America as an activity that can be carried on regardless of age (Industrial and Consumer Products Branch, 2000).

### ***Different Types of Mountain Biking***

Similar to skiing, the activity of mountain biking has evolved into several sub-sports. The first mountain bikes in Marin County were simply used to ride down Mount Tamalpais; the pioneers of mountain biking then used trucks to shuttle the bicycles back to the summit. The addition of gear derailleurs to the modified clunkers made the uphill rides far easier, thus prompting the initially very popular cross-country movement. Downhill biking became popular in the beginning of the 1990s, which initiated associated changes to the frames (full-suspension, weight increase, etc.). (See Figure 5.)

The third change in mountain biking only evolved recently and includes the components of downhill as well as cross-country biking and mixes them with BMX<sup>6</sup> riding skills. Freeriding, as the new trend is called, uses all characteristics of the trail/environment to perform tricks and increase the difficulty of the ride.

The stunts of the North Shore scene in Vancouver are the extreme side of freeriding, which is becoming an increasingly popular activity.

Mountain biking has become a part of everyday life for many people all over the world and has mainly been stimulated by the enjoyment, the physical challenge and the opportunity to experience their environment. With an increase in media coverage and the need for stress relief for the urban population, biking is an important component, which continues to grow in the midst of rapid change in the environment, technology, society and public policy (Wall, 1989).

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<sup>6</sup> Bicycle motocross.

### ***Racing***

The first pure mountain bike race was the Repack Race held on October 21, 1976 over an argument of who was the fastest downhiller between seven riders. The race name stems from the need to “repack” the grease of the coaster brakes after the 2.1-mile descent of Mount Tamalpais (Berto, 1999). The mountain bikes were transported up the hill by pick-up trucks, as their heavy weight made the climb rather difficult (Perry, 1997).

Only a week later, the second race was organised to include two more riders. Since then a number of Repack Races have been held each year, with reunions in 1996 and 1997. These races were an important component in the development of the early mountain bikes, since new technologies were adopted and copied so as to avoid mechanical failures. “In a typical race, five or six racers would fail to finish because of mechanical failures. Winning depended largely on rider skill, but everyone sought to gain a technical edge” (Berto, 1999: 42).

In September 1978, news of a bicycle race from Crested Butte to Aspen, Colorado, reached the small mountain bike community in Marin County and a few riders decided to try the race that led over Pearl Pass (3870 m) to Aspen. “During the transit of Pearl Pass, it was obvious that geared bicycles with good brakes were much better than one-speeds. It was also obvious that the custom-made *Breezers* were more durable than the old Schwinn clunkers” (Berto, 1999: 46).

## Chapter 4: Land Access Issues

### *Introduction*

From the beginning of mountain biking in Marin County, California, the sport and riders have often been perceived as having a “counter-culture image” (Berto, 1999). Irresponsible individuals (present in virtually all recreational user groups) have helped to foster that feeling by not yielding to horses and hikers, riding recklessly, riding in environmentally-adverse conditions and riding on closed trails or on private property without permission. The activity was and still is, considered to be, the new kid on the block, thus often nurturing hostility from other user groups. Since the rapid and unexpected emergence of mountain biking as preferred activity of many recreationists in the 1980s, recreation and land managers needed to adjust to the different aspects of mountain biking, which can affect the social, biological and physical environment. Since there were no data on mountain biking or even previous experience with the activity, managers would often choose the easiest option: banning mountain bikes from certain areas and trails. Problems that can lead to trail closures are found in two categories: biophysical impacts and user conflicts (Keller, 1990).

### *Biophysical Impacts of Mountain Biking*

Any human activity will have an impact – positive or negative – on the surrounding natural environment. Obviously, resource managers will have an inherent interest in the impact of recreational activities in order to evaluate their appropriateness according to the main mandate of the land-use agencies and to arrive at management measures to mitigate their impacts should the activity be found appropriate. “Recreation resource managers are understandably concerned with ecological impacts because many of them have the responsibility of maintaining the quality of recreational resources” (Hammit & Cole, 1998: 5). Managers need to get an insight into the impacts of mountain biking in order to determine appropriate management measures to prevent unacceptable impacts for the specific wilderness area.

In a recreational context, impacts become good or bad, important or insignificant, only when humans make value judgements about them. Those judgements are determined primarily by the type(s) of recreation an area is managed to offer, the objectives of various user groups, and the objectives of resource management (Hammit & Cole, 1997: 10).

In most of the early cases where trails have been closed to mountain bikes, the reason given is either environmental impact or social incompatibility, or both. It is therefore essential to understand the potential effects of mountain biking on the biophysical environment. Figure 9 demonstrates these impacts and the relationship between them for general recreation activities. Furthermore, the figure demonstrates that an activity can cause a multitude of impacts and "... each impact tends to exacerbate or compensate for other changes" (Hammit & Cole, 1997: 6). It is important to comprehend the interactions between the distinct impacts in order to apply management measures without increasing secondary impacts.

The impacts of recreational activities can have four effects on the ecosystem, they can:

- decrease its functional ability (e.g., as a water retaining system),
- affect its form (grassland, meadow, etc.),
- change its composition and population structure,
- alter its basic successional patterns (Hammit & Cole, 1997).

Weir (2000) presented a table of possible indicators of the physical damage (damage to the soil and vegetation) caused by mountain biking. (See Figure 10.) Mountain biking is no different from other recreational activities in that its participants put pressure on the biophysical environment. The pressure, however, is somewhat different from hiking or horseback riding, which is explained below.

### **Impact on Soil**

The impacts of mountain biking on soil are a result of the pressure exerted by total mass (combined weight of the bicycle, accessories and rider) and acceleration, which translates into physical forces acting on the soil. Since there have been no efforts to study the effect of mountain biking on trails and soil, Weir (2000) has combined research on the impacts of tractors and motorcycles on soil in his literature review and applied it to the activity of mountain biking. "By using the known physical between a tractor and a motorcycle and then comparing them to a mountain bicycle some educated conclusions may be made" (Weir, 2000: 27). The main differences that have to be taken into account are the weight, the vibration resulting from the engine and the torque of the vehicle.

Figure 11a) illustrates the directionality of the compactive<sup>7</sup> force generated by the gravitational force. The total mass is directed via the front fork and the seat stay to the centre of the wheel and re-directed onto the tire surface in contact with the soil surface (Weir, 2000). This compaction force will only have a negative impact when mountain biking off established trails (Cessford, 1995).

Figure 11b), on the other hand, demonstrates the erosive force originating from the torque action and acting on the rear wheel-soil interaction (Weir, 2000) and is created mainly when breaking or accelerating.

Those forces, called shear stresses<sup>8</sup>, are the initial causes of soil damage by mountain bikes. They create mass transport<sup>9</sup> when they exceed the shear strength<sup>10</sup> of the soil. “When these forces overcome the shear strength of the soil spinning out occurs, during acceleration and skidding during braking resulting in the mobilization of soil material” (Weir, 2000: 30). Several factors of soil characteristics are affecting shear strength: grain shape, moisture content, the degree of pressure on the soil, compaction and compression<sup>11</sup> levels of the soil. “When determining and considering forces that will cause a soil or deposit to deform or erode composition and physical characteristics of the material is of paramount importance” (Weir, 2000: 15).

The altered soil characteristics are then subjected to various erosive processes mainly due to water acting as a transporting medium. There are three kinds of erosion induced by water with the latter two being important issues for the impacts of mountain biking: rainsplash erosion; sheet, overland flow or wash; and gully erosion. The unevenness and irregularity of trails can induce erosion. The compaction and compression forces caused by mountain bikes might actually be beneficial for trails in ideal conditions (Weir, 2000) as they level out the trail surface, thus reducing the risk of erosion. The compaction force will, in instances where the trail is soft or wet, cause smearing and trail

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<sup>7</sup> Compaction is defined as “A physical change in soil properties that result in an increase in soli [sic] bulk density and a decrease in porosity. The packing together of soil particles by forces exerted at the soil surface, resulting in increased soil density” (Weir, 2000: 108).

<sup>8</sup> “The forces that work against shear strength are collectively known as shear stress normally the stress on an object operating parallel to the slope on which it lies” (Weir, 2000: 139)

<sup>9</sup> “When soils move without a transporting medium the process is known as Mass Transport” (Weir, 2000: 19).

<sup>10</sup> “The properties that keep a material together (i.e. resist stress generated by gravity)” (Weir, 2000: 13).

<sup>11</sup> Compression is a decrease in volume caused by pressure on a material.

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deformation and increase trail ruggedness in the subsequent dry-out. Skidding (blocking the rear wheel when still moving) or spinning of the rear wheel can set soil particles free that are then transported downslope, but more importantly can cause the formation of ruts and thus induce increased water erosion (Cessford, 1995).

Spinning usually occurs on steep uphill sections, caused by a re-distribution of the body weight onto the front wheel to avoid doing a wheelie and usually precedes the imminent dismount and push. Downhill shearing stresses (i.e., skidding) typically involve loss of traction in curves and ensuing sliding; "... this is *more* likely in extremely wet conditions, on uncompacted surfaces, or due to poor braking practices" (Cessford, 1995).

### **Impact on Vegetation**

Trampling, or "wheeling" as Cessford (1995) refers to it, is the main effect of riding mountain bikes off established trails. Manning (1979) sees the effects of trampling as a cycle. (See Figure 12.) The sequence starts with the reduction or complete removal of leaf litter and the humus layers, the following stage in some cases involves a reduction of organic matter within the layer of mineral soil, stage three necessarily entails soil compaction which causes the subsequent phases until induced erosion sets in. These effects of trampling on the soil only indirectly impact vegetational growth by shifting the composition of soil organisms to anaerobic species and reducing beneficial organisms such as earth worms, some nematodes and nitrogen fixing bacteria (Paul & Clark, 1989). A lack of vegetation cover can reduce the diversity of soil organisms and wildlife dependent on vegetation as a food source (Zabinski & Gannon, 1997). Hammitt and Cole (1998) present three vegetational parameters that are of importance to the recreational manager when estimating damage: the amount of vegetation, its composition and tree conditions (e.g., density, root exposure).

The erosive forces, mentioned above, directly impact when mountain bikes are taken off established trails the vegetation layer.

Ground cover is directly affected where trampling breaks, bruises, and crushes plants. ... Although growth of a few species is stimulated by low levels of trampling, most species exhibit reduced abundance, height, vigor, and reproductive capacity on recreation sites (Hammitt & Cole, 1998: 51).

When plants are damaged their photosynthetic ability is reduced, causing stunted growth and/or reduced reproduction success. Soil compaction, on the other hand,

affects the root system of the plant because the root extension needed to collect essential nutrients and water is disturbed. Compaction forces induce oxygen shortage, decrease water infiltration rates and increase mechanical resistance of the soil thus negatively affecting the growth of roots, germination, emergence and establishment of vegetation.

Cole (1981) reports a rapid decrease of vegetation cover with the initial increase of recreational use. It can thus be deduced that the first uses have the greatest impacts on the vegetation, whereas consequent use will prevent re-growth rather than damage vegetation. (See Figure 13.)

### **Impact on Wildlife**

The author has not been able to find research that dealt specifically with the impact mountain biking has on wildlife. "Recreational activities are widespread, yet our understanding of their effects on wildlife is rudimentary" (Knight & Cole, 1995: 51). The impact of disturbance by recreational use can be categorised into direct and indirect impacts. Kuss, Graefe and Vaske (1984) state that small wildlife species are more likely to be affected by indirect impacts on their habitat, whereas larger species are susceptible to direct impacts. More detailed research has been done on direct impacts of recreation on large mammals and birds (Anderson, 1988; Anthony *et al.*, 1995; Batten, 1977; Dorrance *et al.*, 1975; Ferguson & Keith, 1982) than on small animals.

### **Direct Impacts**

The assumption that mountain bike riders are faster and quieter than, for example, hikers and equestrians and have thus the potential to surprise wildlife and cause considerable harm, is frequently made in regards to possible negative effect on wildlife caused by mountain biking. This assumption and other pertinent questions need to be studied in a detailed study to help decision-makers in assessing the appropriateness of mountain biking in the area.

Understanding the role recreationists play in affecting wildlife is particularly critical, because natural resource managers may be more capable of changing recreationist's behavior than the characteristics of wildlife that predispose them to impacts (Knight & Cole, 1995b: 76).

The subsequent section outlines the impacts of general recreation activities on wildlife.

Most of the reported responses to non-motorised human travel are behavioural and short-lived. Disturbance by human use can lead to three learned behaviours in wildlife: habituation<sup>12</sup>, attraction and avoidance (Knight & Temple, 1995). Instinctive responses to human disturbance can be categorised in two kinds of defence mechanisms: the active (e.g., flight) and the passive defence response (e.g., hiding) (Gabrielsen & Smith, 1995). Figure 15 demonstrates the physiological differences between the two defence responses, whereas Figure 14 is a schematic representation of the behavioural reactions of wildlife upon disturbance.

Flight, displacement from feeding ranges and size reduction of breeding populations are some of the consequences of the direct impacts on wildlife (Knight & Cole, 1995a). In a study by MacArthur *et al.* (1982) responses to disturbances were greater when hikers approached over a ridge, suggesting that surprise disturbances have a more negative effect on wildlife. However, hikers had a greater effect on wildlife response than road traffic, helicopters, or aircrafts. Gabrielsen and Smith (1995) state that mechanical vehicles heading towards wildlife cause an active defence response, but that a more vigorous response is triggered by human contact. "This is probably because mechanical disturbance [including mountain biking] is most often very brief, while humans walking take more time to cover the same distance, and thus have a much more profound effect" (Gabrielsen & Smith, 1995: 103). The question that remains to be asked in respect to the impacts of mountain biking on wildlife is whether the stress incurred by animals due to the surprise element is greater than the profit from a shorter disturbance. "It is difficult to evaluate completely the full impact of stress" (Anderson, 1995: 163). There is a need for a detailed investigation in the energetic cost of animal response to any kind of human disturbance.

More long-term effects of human disturbance such as the displacement from feeding ranges are often the cause of continued human use, making it impossible to single out one activity. "There may be synergisms<sup>13</sup> or interactions when more than one recreational activity is occurring simultaneously" (Knight & Cole, 1995a: 62).

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<sup>12</sup> "Upon repeated stimulation, most behavioural and physiological concomitants decrease in intensity and gradually disappear" (Gabrielsen & Smith, 1995: 104).

<sup>13</sup> Synergism: the effect of two factors to produce an effect greater than the sum of their individual effects.

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## **Indirect Impacts**

The physical impacts of mountain biking, mentioned at the beginning of this chapter, will also have indirect effects on wildlife.

By directly impacting these components [soil, vegetation, or aquatic systems], people affect an animal's food supply and availability as well as shelter, or living space. In turn, impacts on food and living space influence behavior, survival, reproduction and/or distribution (Cole & Landres, 1995: 183).

Changes in soil characteristics can alter the vegetation's succession, germination, establishment, growth and reproduction, which in turn could affect the feeding ranges of wildlife (Cole & Landres, 1995). The same indirect impact occurs whenever mountain bike riders damage the vegetation layer, e.g., through the formation of multiple parallel tracks and informal tracks and lateral spread of tracks.

Habitat changes induced by recreational activities can reduce food matter, alter the living place (e.g., ovipository sites for insects) and impact the "... behavior, survival, reproduction, and distribution of individual animals" (Cole & Landers, 1995: 191), which in turn affect the population. However, it needs to be emphasised that any kind of human use of wilderness areas will have these impacts and that no sole activity can be singled out.

## **Factors Affecting Impacts**

Research concentrating on the impacts of recreational activities on the biophysical environment has shown that there are great variations in the responses of wildlife and the effects on the physical characteristics of the environment. The various factors influencing the level of impact of recreation is discussed below.

### *State of the Ecosystem*

The condition of the ecosystem is one of the major factors influencing the effect of recreational activities; obviously a sensitive ecosystem will show a stronger reaction than a resilient ecosystem.

### *Type of Activity*

Recreational activities have distinct characteristics that result in varying impacts on the environment. Consumptive activities, such as hunting, will affect wildlife in different ways than non-consumptive activities, such as bird watching. The same can be said for motorised and non-motorised recreational uses. However, the level of use is also a

major factor influencing the impact of the activity. Several other characteristics of activities and their impacts are examined below.

#### *Recreationist's Behaviour*

"The behavior of recreationists when carrying out recreational activities and interacting with wildlife can have a profound influence on wildlife responses" (Hammitt & Cole, 1998: 69). The directionality and speed of movement upon disturbance of wildlife determines the stress level experienced by animals. The use of bear bells could potentially give wildlife an advanced warning of the approaching mountain bike rider(s), limit the surprise element and thus influence the response. However, Schmor (1999) determined that background noise produced by the mountain bike (mainly chain rattling) reaches the same level of noise as bear bells. Little is known about the necessary level of noise to deter bears.

#### *Predictability*

The responses to predictable disturbances are dependent on the evaluation of the immediate threat. Animals will react strongly to disturbing recreational use, even if the disturbances are predictable, whereas there will be little response to non-disturbing activities.

#### *Frequency and Magnitude*

"There appear to be thresholds of disturbance frequencies above which substantial impacts to wildlife can occur" (Knight & Cole, 1995: 72-73). However, little is known about these thresholds. "For example, ... hiker intensity on trails ... are known to influence animal movement, feeding habits, and habitat occupation, but few threshold levels have been identified for these factors." (Hammitt & Cole, 1998: 69) Although the impact of a lone birdwatcher will be fairly small, hundred birdwatchers in the same location will have a more severe impact even though the activity is non-consumptive.

#### *Timing*

The time of disturbance is another factor influencing the level of stress suffered by wildlife. Sensitive time periods include breeding/nesting season (Hammitt & Cole, 1998) and the winter time when reduced energy intake due to disturbance rather than increased energy expenditure can prove to be fatal (Knight & Cole, 1995). "Disturbance during the breeding season may affect an individual's productivity; disturbance outside of

the breeding season may affect the individual's energy balance and, therefore, its survival" (Knight & Cole, 1995: 73).

### *Location*

The position of the disturbing element towards wildlife also influences the strength of wildlife response. Disturbances from higher elevations, for instance, evoke a greater response from wildlife than disturbances located downslope (Knight & Cole, 1995).

### *Wildlife Characteristics*

Wildlife characteristics also play a role in the intensity of the response to disturbance, such as the type, age and sex of the animal and the group size. "Even within a species, tolerance levels for interactions will vary by time of year, breeding season, animal age, habitat type, and individual animal experience with recreationists" (Hammit & Cole, 1998: 70).

### *User conflicts*

Trail conflicts can occur among different user groups, among users within the same user group, and as a result of factors not related to trail user activities at all. Conflict has been found to related [*sic*] to activity style, focus of trip, expectations, attitudes toward and perceptions of the environment, level of tolerance for others, and different norms held by different users (Moore, 1994).

Mountain biking interferes with many other user perceptions of wilderness and the experiences that they seek in their own activity and has received its share of bad press. (See Figure 16.) The following quotations are taken from Backtalk, a discussion forum in *Backpacker Magazine* (Keller, 1990: 57):

- "All vehicular traffic should be prohibited on state and federal hiking trails."
- "Encountering mountain bikes or any other kind of vehicle on a hiking trail degrades the experience, for which I go backpacking."
- "... I adamantly oppose the use of mountain bikes on hiking trails. They do not belong there, period. Put them on their own trails with strict restrictions."
- "Mountain bikers and other mechanized backcountry users miss the point of the outdoors. You should take time to enjoy the wilderness, not whiz by it."

These conflicts have arisen because participants of traditional recreational activities (hiking and horseback riding), who have lobbied and battled for their right to use trails

and often maintain these trails, are not keen on sharing what they believe to be their trails. "Conflicts are likely to arise when people feel threatened, or when they believe something belonging to them is in danger" (Keller, 1990: 26).

Public safety concerns of users other than mountain bike riders are also often expressed when demanding closing trails to mountain bikes. Hikers and equestrians have voiced legitimate safety concerns about mountain bicycle use on unpaved trails, including:

- Cyclists may ride too fast for conditions (e.g., on crowded, multiple-use trails).
- Cyclists may not slow down and/or may not be prepared to stop when approaching blind corners.
- Cyclists may surprise hikers and equestrians on trails because they are quiet and move rapidly (Keller, 1990).

A survey undertaken in 1987 in the Santa Barbara Mountains, California, pointed out that the majority of users (84%) had encountered bicycles on trails, however, only 11 percent were dissatisfied with meeting cyclists. Safety hazards due to bicycles were not a concern for 67% of respondents (Keller, 1990). A follow-up survey was done in 1989 to test a hypothesis that increased use is resulting in increased user conflicts, did not back the above hypothesis. This suggests that as mountain biking has become more popular and its use of multiple-use trails has increased, user groups have become accustomed to encountering mountain bikes and have re-considered their opinion of mountain bike riders.

Conflict in the backcountry, which most users visit to escape everyday problems, has a variety of consequences for the user:

- they will re-consider their view on acceptable conditions
- they might change their behaviour so as to avoid conflict (e.g. less regular outings, off-peak use) or
- they are displaced from the "overused" area (Kuss *et al.*, 1990).

The following chapters examine policies and strategies used to manage the land access issues discussed above and give a situational analysis of mountain biking opportunities in the Canadian Rocky Mountains.

## Chapter 5: Policies of Land-use Agencies

### *Introduction*

The overriding question in managing land-use areas is whether specific recreational activities and conservation efforts/resource extraction are compatible and, therefore, whether land managers should allow or prohibit the recreational activities that might be detrimental to the ecosystem or the extracting activity (Battin & Nelson, 1982; Budowsky, 1976). As the then Director General of National Parks, Ian D. Rutherford, said, we have to "... reduce the conflict between the forces that support resource protection and those that support recreation and tourism" (Rutherford, 1990: 2).

Conservation and land-use agencies have different mandates and put different emphasis on the provision of recreational experiences. Their scope and the area covered by their legislations and regulations can vary and thus have an effect on the successful fulfillment of mountain bike riders' expectations. It is important to examine the policies of those agencies to determine whether the present situation can be improved.

### *British Columbia Forest Service*

The BC Forest Service is the main steward of the BC land base (of over 85% of the provincial land mass) and is responsible for a range of uses and activities, such as timber, range and recreation opportunities and, in collaboration with other land-use agencies, for water, fish, wildlife, tourism, heritage, energy and minerals (Osborn, 1990). About three-quarters of Crown Land<sup>14</sup> is "managed for non-commercial timber values, such as recreation and cultural" (BC Ministry of Forests, 2000). As the BC Forest Service states, the responsibilities of their recreation staff entails to...

establish, develop and maintain recreation sites and trails for public use...

provide information on local forest recreational opportunities through maps and personal discussions...

manage public recreation use to ensure compliance with provincial recreation regulations (BC Ministry of Forests, 2000).

Although creating recreational opportunities is not a primary mandate of the BC Forest Services, their policies entail "... to identify the recreation needs and interests of society through ongoing liaison with the public" and to provide "... in areas of concentrated use,

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<sup>14</sup> Crown Land stands for land owned by a government.



a network of ... socially acceptable, and environmentally sound ... trails that encompass the full spectrum of outdoor recreation opportunities..." (BC Ministry of Forests, 2000).

Although the BC Forest Service does not have specific policies for mountain biking, Tom Hall<sup>15</sup> gave an account of the Ministry of Forests' directives on mountain biking during a Mountain Biking Symposium in British Columbia (Osborn, 1990: 31-32):

The ministry's position on mountain biking is the same as its position on any other recreational use of provincial forests, namely, we recognize mountain biking as one of a diversity of recreational activities that must be provided for in keeping with the philosophy of integrated use. The ministry, therefore, recognizes mountain biking as a legitimate use of provincial forests with its own specific needs and demands, and as such which, in turn, places demands on the land base and has an impact on other users and uses of that land base.

In accord with this statement, the BC Forest Service is prepared to cater for the needs of mountain bike riders, as long as the activity will not impact other uses in the area. Under section 102 of the Forest Practices Code (BC Ministry of Forests, 1999), a person wishing to build a trail needs to file a proposal with the district manager and must await his consent before starting construction or maintenance of trails. Approval will be dependent on a variety of factors including:

- potential resource conflicts (e.g., existing harvesting plans)
- zoning
- the stability of proposed structures and trails
- the sensitivity of the proposed area to disruption (determined jointly with BC Environment)
- maintenance guarantee
- other factors (e.g., terrain).

The BC Forest Service is currently in the process of devising a strategic plan to divide the timber harvesting areas into zones in order to preserve and protect individual experiences. Every activity will then have to fit into the objectives of the proposed zone.

The question of how the BC Forest Service can accommodate the mountain biking activity in the Provincial Forests remains to be answered. Tom Hall of the Ministry of Forests explains the benefits of the BC Forest Service's actions for mountain bike riders:

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<sup>15</sup> Then Manager of the Recreation Section of the Ministry of Forests.

- "... access to and recreational use of provincial forests through Forest Service roads, through multiple-use trails, through Forest Service recreation sites..."
- "... information about recreation opportunities, forest etiquette and safety through our brochures, demonstration forests..."
- "... conflict resolution planning processes, which include those to address conflicts between recreation and other users, and among recreation users themselves."
- "... enforcement authority for prohibiting certain uses in certain areas."
- "... the endorsement of certain club-sponsored events."
- "... specialized facilities" (Osborn, 1990: 32).

The Recreation Program of the BC Forest Service receives less than 0.5 percent of the entire Ministry of Forests' budget, making it difficult (if not impossible) to fund the construction of any new "specialized facilities" for any recreational activity. New trail construction to accommodate a likely increase of mountain bike riders will have to be funded by mountain bike clubs or associations or other outside sources.

As a general rule, specialized single-use facilities will only materialize through a mixture of non-Ministry of Forests funding sources, ... There are a variety of management agreements or other arrangements which can be arrived at to address the needs of managing and maintaining these facilities once they are built (Tom Hall in Osborn, 1990: 33).

### ***British Columbia Parks***

The policies of the British Columbia Ministry of Environment, Lands and Parks (BC Parks) are comparable to Parks Canada policies and guidelines. The Ministry does not see the provision of recreational opportunities as its main mandate, as "The first priority in the use and management of protected areas is to protect their ecological viability and integrity" (Government of British Columbia, 1993). Recreational experiences, however, have to be "...compatible with each area's objectives and the long-term protection of ecological viability and integrity, while enhancing the public's experience of the natural and cultural heritage of the province" (Government of British Columbia, 1993). The "opportunity for public use and appreciation", on the other hand, is one of the criteria being used in identifying and evaluating areas for potential inclusion in the park system.

The Protected Area Strategy (Government of British Columbia, 1993) goes as far as saying that “Protected areas should have the ability to attract and sustain use, foster understanding and appreciation of protected areas, and facilitate close contact with resources”.

So far 12.37% – amounting to approximately 11.7 million hectares –in 768 protected areas have been conserved. These protected areas “are set aside as nature preserves, as scientific research areas, and as places for education, appreciation and recreational activities” (BC Ministry of Environment, Lands and Parks, 2001).

BC Parks – similar to Parks Canada – makes a distinction between allowable and appropriate activities: “An allowed activity may not be appropriate within all areas of a protected area” (BC Ministry of Environment, Lands and Parks, 1995). The government agency also links the appropriateness of recreational activities to the “... association with and direct relation to the natural and cultural resources of the protected area” (BC Ministry of Environment, Lands and Parks, 1995). The activity is allowable only when this principle is met and the ecological integrity of the individual park is not threatened by pursuing the activity. Again, BC Parks emphasises the provision of activities outside the park boundaries if feasible: “Wherever possible, intensive recreational and tourism developments should occur in adjacent areas outside of protected area boundaries” (Ministry of Environment, Lands and Parks, 1995).

British Columbia offers some of the most diverse outdoor recreational opportunities in the world - from backcountry wilderness to sheltered bays; from pristine rivers to alpine meadows. Water, beaches, anchorages and marine life support a wide range of activities. River and trail corridors between protected areas are widely used. Wilderness settings, especially those near cities, are in high demand (BC Ministry of Environment, Lands and Parks, 2001).

The Government of British Columbia has set aside a variety of parks with different mandates, goals and objectives:

Many protected areas will be set aside primarily to protect rare or vulnerable features. Others will combine protection with giving people the opportunity to appreciate and enjoy the intrinsic values of the areas. Others will be protected to attract people to experience and appreciate their natural or cultural heritage (Government of British Columbia, 1993).

According to this system of protected areas, certain activities might not be appropriate in all parks. The guidelines regarding mountain biking (“Off-road activities mechanical

activities”) state that the activity is allowable, although mountain bike riders are limited to designated zones and/or trails. Appropriateness, however, depends on the management plan of the specific park (BC Ministry of Environment, Lands and Parks, 1995).

### ***Alberta Environment***

The Ministry employees are “proud stewards of Alberta’s renewable natural resources...” (Alberta Environment, 2000b) and, as such, are also responsible for regulating recreational activities in protected areas. Alberta Environment manages a system of 532 recreation and protected areas, totalling more than 2.05 million hectares (almost 5.07 million acres) and provides outdoor experiences of all kinds for eight million visitors every year, ranging from picnicking in recreational areas to multi-day backcountry hiking in wilderness areas (Natural Resources Service, Alberta Environment, 1997).

The Alberta Government specifies four objectives they wish to achieve within provincial parks and other protected areas:

***Preservation*** - to preserve and protect into perpetuity a network of representative, special and outstanding natural landscapes and features as well as landscape-related prehistoric, historic and cultural resources in Alberta.

***Heritage Appreciation*** - to provide opportunities to explore, understand and appreciate the natural and historical heritage of Alberta, and enhance public awareness of our natural environment and our relationship to and dependence on it.

***Outdoor Recreation*** - to provide a variety of natural, landscape-dependent, outdoor recreation opportunities, and related facilities and services.

***Tourism*** - to encourage residents and visitors to discover and enjoy the natural, historical and cultural heritage of the province through a variety of outdoor recreation and interpretive opportunities, facilities and services (Alberta Environment, 1998b: 2).

Alberta’s provincial lands are managed according to three distinct pieces of legislation: the Provincial Parks Act; the Wilderness Areas, Ecological Reserves and Natural Areas Act; and the Willmore Wilderness Park Act. These acts can designate valuable areas to seven different legislative classes with a varying degree of protection and allowable use:

- Ecological Reserves<sup>16</sup>
- Wildland Parks<sup>17</sup>
- Provincial Parks<sup>18</sup>
- Wilderness Areas<sup>19</sup>
- Natural Areas<sup>20</sup>
- Recreation Areas<sup>21</sup>
- Willmore Wilderness Area

**Legislation regarding recreation:**

Section 3 of the Provincial Parks act states that:

Parks shall be developed and maintained

(a) for the conservation and management of flora and fauna,

(b) for the preservation of specified areas and objects therein that are of geological, cultural, ecological or other scientific interest,

and

(c) to facilitate their use and enjoyment for outdoor recreation” (Government of Alberta, 2000a).

The Wilderness Areas, Ecological Reserves and Natural Areas Act (Government of Alberta, 2000b) mentions recreation only in respect to natural areas (Section 12.1):

“(1) The Lieutenant Governor in Council may, in order to

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<sup>16</sup> “Ecological Reserves are samples of functioning ecosystems protected for scientific research, education and heritage appreciation. Road access and facilities are not developed in Ecological Reserves” (Alberta Environment, 1999).

<sup>17</sup> “Wildland Parks encompass large areas of natural landscape where human developments and interference with natural processes are minimized. Wildland Parks, similar to Willmore Wilderness Park, accommodate a wider range of outdoor recreation pursuits than Wilderness Areas, including hunting, fishing and the use of horses” (Alberta Environment, 1999).

<sup>18</sup> “Provincial Parks are provincially significant natural and historical landscapes and features. A range of facilities along with interpretive and educational programs enhance opportunities for visitors to explore, understand, appreciate and respect the natural environment” (Alberta Environment, 1999).

<sup>19</sup> “Wilderness Areas are large areas that retain their primeval character, unaffected by human influences. Visitors travel on foot to experience solitude and personal interaction with nature” (Alberta Environment, 1999).

<sup>20</sup> “Natural Areas protect special and sensitive natural landscapes of local and regional significance while providing opportunities for education, nature appreciation and low intensity recreation. Facilities are limited to staging areas, trails and signs” (Alberta Environment, 1999).

<sup>21</sup> “Recreation Areas cater to a wide range of intensive recreation pursuits in natural, modified or man-made settings. Most Recreation Areas have little or no preservation value due to the levels of facility development, intensity of visitor use and frequently small size” (Alberta Environment, 1999).

- (a) protect sensitive or scenic public land from disturbance, and
  - (b) ensure the availability of public land in a natural state for use by the public for recreation, education or any other purpose,
- by regulation designate any area of public land as a natural area.

The Willmore Wilderness Park Act (Government of Alberta, 2000c), on the other hand, has no mention of recreation. Figure 17 demonstrates the current management objectives for four categories of protected areas.

#### *The Proposed Natural Heritage Act*

The Alberta government is currently in the process of revising its legislation for parks and protected areas. The proposed Natural Heritage Act will unify the legislation and be more comprehensible as it will establish one coherent system of protected areas.

Outdoor recreation presents one of four program goals for the new Natural Heritage Act, in order "... to provide a variety of intensive and non-consumptive outdoor recreation opportunities and related facilities and services" (Alberta Environment, 1998b: 2). The new classification system will consist of five classes ranging from "... the highly protected Provincial Nature Reserve class through to the Recreation Areas class, which is devoted primarily to outdoor recreation" (Alberta Environment, 1998b: 4).

The following paragraphs will clarify the changes that are relevant to the pursuit of recreational activities in provincial protected areas. Since the exact wording is of greatest importance to the meaning of the subsequent policies, the relevant passages will be cited from the Summary Report.

- Provincial Nature Reserve  
"Provincial Nature Reserves may make significant contributions to heritage appreciation by: providing opportunities for outdoor education, especially as it relates to scientific research on the site" (Alberta Environment, 1998b: 5).
- Wildland Provincial Park  
"The Wildland Provincial Park class will: ensure lasting preservation of the ecological integrity of natural landscapes and ecological processes, along with associated biological diversity, while providing opportunities for backcountry recreation; ..." (Alberta Environment, 1998b: 5).
- Natural Environment Provincial Park  
"The Natural Environment Provincial Park class will: ... provide significant opportunities for heritage appreciation, outdoor recreation and tourism, while

maintaining 'preservation' as the primary goal; ..." (Alberta Environment, 1998b: 6).

- Heritage Rangeland

"Not a priority objective but may provide limited opportunities for non-facility-based outdoor recreation ... to the extent that it is compatible with the preservation of natural values and grazing management" (Alberta Environment, 1998a: 1).

- Recreation Area

"The Recreation Area class will: include both natural and modified landscapes; ... be managed with outdoor recreation and tourism as the priority objectives; ..." (Alberta Environment, 1998b: 8).

Alberta Environment realises the inadequate protection value of Recreation Areas, but "... they are essential for the delivery of outdoor recreation opportunities at the regional and local level" (Alberta Environment, 1989b: 8).

Figure 18 simplifies the aspects of the proposed Natural Heritage Act relevant to mountain biking, whereas Figure 19 clarifies the changes that are proposed in comparison with the current management guidelines.

### ***Parks Canada***

In the past, protected areas – especially national parks – were seen as a commodity for recreationists, with little consideration for the system's (natural and social) carrying capacity and no aspiration to conserve the ecological diversity of the region (Manning & Dougherty, 1999; Nelson, 1982). As stated in the recently published Report of the Panel on the Ecological Integrity<sup>22</sup> of Canada's National Parks (PEICNP) (Parks Canada Agency, 2000b), over 14 million visitors per year spend some time in Canada's National Parks.

Parks Canada (1999b: 11) states its purpose as follows:

To fulfil national and international responsibilities in mandated areas of heritage recognition and conservation; and to commemorate, protect and present, both directly and indirectly, places which are significant examples of Canada's cultural and natural heritage in ways that encourage public understanding, appreciation and enjoyment of this heritage, while ensuring long-term ecological and commemorative integrity.

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<sup>22</sup> "An ecosystem has integrity when it is deemed characteristic for its natural region, including the composition and abundance of native species and biological communities, rates of change and supporting processes" (Parks Canada Agency, 2000a: 9).

Its guiding principles say that opportunities, appropriate to the purpose of each park and historic site, will be provided to enhance public understanding, appreciation, enjoyment and protection of the national heritage. However, "Parks Canada recognizes the need for control and management of appropriate activities. Public demand alone is not sufficient justification for provision of facilities and services in support of appropriate activities" (Parks Canada, 1999b: 18). The PEICNP has emphasized this problem by saying that

National parks must provide meaningful and responsible park experiences without compromising ecological integrity. Appropriate uses and facilities are welcome within national parks, but – perhaps a greater challenge – Parks Canada must also make the hard decisions to phase out, reduce or mitigate uses and facilities that are not found to be appropriate (Parks Canada Agency, 2000a: 11).

The Panel has, furthermore, made several recommendations in its final report related to that topic:

(10-7) ... Parks Canada cease product marketing to increase overall use of parks and concentrate instead on social policy marketing and demarketing when appropriate (Parks Canada Agency, 2000b: Appendix G: 21).

(11-1) ... Parks Canada develop a policy and implement a program for assessing allowable and appropriate activities in national parks, with ecological integrity as the determining factor (Parks Canada Agency, 2000b: Appendix G: 21).

The PEICNP has clearly stated that Parks Canada does not have a dual mandate of visitor use and keeping the parks unimpaired for future generations: "There is no dual mandate ... Parks staff must receive a clear signal and acknowledge that there is no dual mandate but rather one single mandate" (Parks Canada Agency, 2000b: 2–5). The new Canada National Parks Act – proclaimed on February 19, 2001 – has therefore included legislation emphasising that "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" (Parks Canada Agency, 2001: 9).

Parks Canada (1988, 1999b) makes a clear distinction between allowable and appropriate activities, suggesting that some activities that are allowed in National Parks are not appropriate in some settings. An allowable activity is "One which does not contravene the National Parks Act and Regulations or Parks Canada and which may



also be appropriate to the conditions in a specific heritage area" (Parks Canada, 1988:

4). An appropriate activity

... is consistent with these [Parks Canada Policies] and the protection of ecological and/or commemorative integrity of protected heritage areas; is especially suited to the particular conditions of a specific protected heritage area, and provides the means to appreciate, understand and enjoy protected heritage area themes, messages and stories (Parks Canada, 1999b: 118).

The National Parks Policy (Parks Canada, 1999c: 38) restricts the recreational use of the parks to

Only outdoor activities which promote the appreciation of a park's purpose and objectives, which respect the integrity of the ecosystem, and which call for a minimum of built facilities will be permitted. ... As new or modified forms of outdoor recreation emerge, each will be assessed for its appropriateness nationally before consideration in the park management planning process. Individual park management plans will then specify the types and ranges of both new and existing appropriate outdoor recreation activities and their supporting facilities.

The Guiding Principles and Policies (Parks Canada, 1999b) clearly state that only activities consistent with the objective of the national park will be offered, whereas other needs should be located outside the park. As long as the external environment satisfies the same clientele and similar interests and experiences are attained, the activity will not be appropriate for the park and should, therefore, not be encouraged by the park authority. The Banff-Bow Valley Task Force (1996: 50) underlines this statement: "To the greatest extent possible, the effect of human use in the communities should remain within their boundaries. It should not affect the ecological integrity of the rest of the park".

With a lack of directives regarding mountain biking in national parks, a tentative approach was taken until the Western Region issued an interim directive in 1983 (Bronson, 1985; Pearce, 1992). The directive was considered provisional in order to observe the development of the activity and its potential impacts on other users, wildlife and the biophysical environment. Areas were specified where mountain biking was deemed to be appropriate without an official assessment of the allowability of mountain biking. Since the main concerns at the time were environmental impacts, mountain biking was mostly allowed on fireroads, where little damage can occur due to a hardened surface. The interim directive was revised in 1984 to increase mountain biking opportunities (Bronson, 1985). Mountain biking could be prohibited on certain trails according to Section 7 of the National Park General Regulations, which state: "7. (1) The

superintendent may, where it is necessary for the proper management of the Park to do so, designate certain activities, uses or entry and travel in areas in a Park as restricted or prohibited” (Parks Canada, 1998).

An assessment of the allowability of mountain biking in National Parks was completed in 1985, which found the activity to be acceptable: “Under Parks Canada policy, trail bicycling is an appropriate recreational activity in national parks...” (Bronson, 1985: 11). The terms and conditions of the assessment were as follows:

1. as long as the wilderness experience of other users be not compromised.
2. trail designation will comply with several criteria concerning biophysical impacts and user conflicts.
3. no new facilities will be developed for the activity.
4. monitoring of the impacts of mountain biking will continue and a report will be prepared after three years.
5. “Parks Canada will liaise with adjacent land and resource management agencies in order to deal with joint concerns” (Bronson, 1985: 12).

The assessment did, however, not examine the different types of mountain biking but presumably focused solely on the cross-country mountain biking.

### ***United States National Park Service***

The National Park Service (NPS) was created in 1916 when President Wilson signed the Organic Act that made the agency “responsible for protecting the 40 national parks and monuments then in existence and those yet to be established” (National Park Service, 2001). The Organic Act created the National Park Service so that it may “promote and regulate the use of the ... national parks ... which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations” (National Park Service, 1999a).

The US National Park System covers an area of approx. 335 890km<sup>2</sup> and is comprised of a variety of different nominations:

- National Park<sup>23</sup>
- National Monument<sup>24</sup>
- National Preserve<sup>25</sup>
- National Historical Park<sup>26</sup>
- National Memorial<sup>27</sup>
- National Battlefield<sup>28</sup>
- National Cemetery<sup>29</sup>
- National Recreation Area<sup>30</sup>
- National Seashore<sup>31</sup>
- National Lakeshore<sup>32</sup>
- National River<sup>33</sup>
- National Parkway<sup>34</sup>
- National Trail<sup>35</sup>
- Affiliated Areas<sup>36</sup>

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<sup>23</sup> “These are generally large natural places having a wide variety of attributes, at times including significant historic assets. Hunting, mining and consumptive activities are not authorized” (National Park Service, 2000a).

<sup>24</sup> “The Antiquities Act of 1906 authorized the President to declare by public proclamation landmarks, structures, and other objects of historic or scientific interest situated on lands owned or controlled by the government to be national monuments” (National Park Service, 2000a).

<sup>25</sup> “National preserves are areas having characteristics associated with national parks, but in which Congress has permitted continued public hunting, trapping, oil/gas exploration and extraction” (National Park Service, 2000a).

<sup>26</sup> “This designation generally applies to historic parks that extend beyond single properties or buildings” (National Park Service, 2000a).

<sup>27</sup> “A national memorial is commemorative of a historic person or episode; it need not occupy a site historically connected with its subject” (National Park Service, 2000a).

<sup>28</sup> “This general title includes national battlefield, national battlefield park, national battlefield site, and national military park” (National Park Service, 2000a).

<sup>29</sup> “There are presently 14 national cemeteries in the National Park System, all of which are administered in conjunction with an associated unit and are not accounted for separately” (National Park Service, 2000a).

<sup>30</sup> “Twelve NRAs in the system are centered on large reservoirs and emphasize water-based recreation. Five other NRAs are located near major population centers. Such urban parks combine scarce open spaces with the preservation of significant historic resources and important natural areas in location that can provide outdoor recreation for large numbers of people” (National Park Service, 2000a).

<sup>31</sup> “Ten national seashores have been established on the Atlantic, Gulf and Pacific coasts; some are developed and some relatively primitive. Hunting is allowed at many of these sites” (National Park Service, 2000a).

<sup>32</sup> “National lakeshores, all on the GreatLakes, closely parallel the seashores in character and use” (National Park Service, 2000a).

<sup>33</sup> “There are several variations to this category: national river and recreation area, national scenic river, wild river, etc.” (National Park Service, 2000a).

<sup>34</sup> “The title parkway refers to a roadway and the parkland paralleling the roadway. All were intended for scenic motoring along a protected corridor and often connect cultural sites” (National Park Service, 2000a).

<sup>35</sup> “National scenic trails and national historic trails are the titles given to these linear parklands (over 3,600 miles) authorized under the National Trails System Act of 1968” (National Park Service, 2000a).

- Other Designations<sup>37</sup>

Though distinct in character, [these nominations] are united through their inter-related purposes and resources into one national park system as cumulative expressions of a single national heritage; that, individually and collectively, these areas derive increased national dignity and recognition of their superb environmental quality through their inclusion jointly with each other in one national park system preserved and managed for the benefit and inspiration of all people of the United States ... (National Park Service, 1999b).

Similar to Parks Canada, the NPS allows only recreational activities that are “appropriate to the purpose for which the park was established” and only when it “can be sustained without causing unacceptable impacts to park resources and values” (National Park Service, 2000b). Activities that the NPS encourages in its jurisdiction...

- Are appropriate to the purpose for which the park was established; and

- Are inspirational, educational, or healthful, and otherwise appropriate to the park environment; and

- Will foster an understanding of, and appreciation for, park resources and values, or will promote enjoyment through a direct association with, interaction with, or relation to park resources; and

- Can be sustained without causing unacceptable impacts to park resources or values.

...

However, not all of these activities will be appropriate or allowable in all parks; that determination must be made on the basis of park- specific planning. Service- wide regulations addressing ... off- road bicycling ... that special, park- specific regulations be developed before these uses may be allowed in parks (National Park Service, 2000b).

The National Park Service has further direct regulations dealing with bicycle use in parks that fall under its authority:

The use of a bicycle is prohibited except on park roads, in parking areas and on routes designated for bicycle use ... Routes may only be designated for bicycle use based on a written determination that such use is consistent with the protection of a park area's natural, scenic and aesthetic values, safety considerations and management objectives and will not disturb wildlife or park resources (US Government, 2000).

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<sup>36</sup> “The Affiliated Areas comprise a variety of locations in the United States and Canada that preserve significant properties outside the National Park System” (National Park Service, 2000a).

<sup>37</sup> Includes for instance the presidential White House.

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These regulations also prohibit the possession of bicycles in areas established as wilderness by the Federal Government.

The NPS will, however, in addition to regulate mountain biking in its parks “monitor new or changing patterns of use or trends in recreational activities, and assess their potential impacts on park resources” (National Park Service, 2000b). The emerging recreational activity will be prohibited until the NPS has decided that “it will not result in unacceptable impacts on park resources” (National Park Service, 2000b).

The following chapter will examine the mountain biking situation in the Canadian Rocky Mountains in order to evaluate the policies of land-use agencies.

## Chapter 6: Research Method

### *Introduction*

Nilsen (1994) predominantly based this research on the VAMP framework and the appropriateness model, both explained previously. (See Figure 20.) Those two frameworks were chosen due to the absence of input from the natural sciences (time constraints did not permit a focus on the aspects of environmental impacts associated with mountain biking) and the non-reliance on indicators. Although indicators might be useful on a local scale and within one jurisdiction, they were too complex to determine at the proposed regional scale. Both frameworks depend strongly on the agencies' policies and mandates, which are one of the cornerstones of this research.

The study area consisted of the southern section of the Canadian Rocky Mountains, reaching from Fernie, British Columbia, all the way to Edson, Alberta. (See Map 1.) The region was chosen due to a high density of National Parks and other protected areas within a small area that is close to major population centres. The qualitative data were collected by interviews with land managers, protected area staff and mountain bike riders.

The respondents representing the protecting and land-use agencies and a few local mountain bike riders in Banff/Lake Louise and Jasper National Parks were chosen in cooperation with Alex Kolesch (Land Use Planner, Jasper National Park) and Wayne Tucker (Backcountry Recreation Specialist; Banff, Jasper, Yoho, Kootenay, Waterton Lakes, Mount Revelstoke and Glacier National Parks). (See Appendix A.) The remaining mountain bike riders were located through local bike stores. All respondents speaking for land-use agencies were presented with a copy of a condensed version of the project proposal and the appropriate information sheet. (See Appendix B and C.) Local mountain bike riders were provided with the information sheet in Appendix D to ensure their awareness of the research purpose. All respondents were encouraged to ask questions if details were unclear.

### *Qualitative Research Method*

The emergent approach to qualitative research was used in interview situations, so as to allow the researcher to revisit points made by the respondent during the interview and to follow up points that resulted from tangents in the conversation: "the interview is a data

collection tool of great flexibility, which can be adapted to suit a wide variety of research situations” (Punch, 1998: 176). The interview was, however, based on an interview protocol with general questions in order to standardise the interview and thus be able to compare different respondents and situations. (See E and F.) More detailed questions were asked as the interview developed, so as to steer the interview towards points of interest to the interviewer.

The open-ended interviews took place in locations chosen by the respondents (the settings included the respondent’s office, home or a café) so that they would feel comfortable during the meeting. Recordings were taken on audiocassette whenever the respondent gave his/her permission to do so. If no permission was given (only in very few cases) the interview was subsequently paraphrased on paper. The number of respondents came to 36, with a total of approximately 750 minutes of interviews recorded and subsequently summarised for use in the final paper. Some respondents could not find enough time in their schedules to fit in an interview in the time period of the author’s presence in the area, in which case the interview was completed via electronic mail or by phone.

The research methods mentioned above were used in order to provide a situational analysis of mountain bike opportunities in the Canadian Rocky Mountains.

## **Chapter 7: Situational Analysis**

### ***Introduction***

The policies discussed in the previous chapter sound reasonable, but all policies have to be judged by the actual situation they have helped to create. An examination of available mountain bike opportunities in the study region is necessary in order to assess the effectiveness of these policies. The following questions will be examined to determine the effectiveness of the current mountain bike strategy in the Canadian Rocky Mountains. What needs and demands of mountain bike riders are being met? What kinds of riders use the trails? Where can mountain bike riders go to legally enjoy their ride? What is the history of trail access in the area? What initiatives affect trail access? What do local mountain bike activists think about their local opportunities?

### ***Kootenay and Columbia Valley***

The Columbia Valley is located on the Pacific side of the Rocky Mountains separating the Purcell Mountain range from the Rocky Mountains. (See Map 2.) The mountain slopes rise steeply on either side of this valley, thus providing some interesting elevation changes for mountain bike riders. The economy of the Columbia Valley is based primarily upon the recreation and tourism sector, with some municipalities also relying more or less on forestry and mining. The Kootenay Valley is situated within Kootenay National Park and is the connecting route to the Bow Valley and Banff National Park.

### ***Invermere/Radium Hot Springs***

Invermere is a popular tourist area with a population of 2,687 that caters for both summer (Windermere Lake) and winter activities (Panorama Resort). Since tourism is the main economic force in the region, 72.5% of the workforce is employed in the service industry in Invermere (Statistics Canada, 1996). The town is especially popular for Albertans due to the relative proximity and a possible combination of beach and activity holidays.

The village of Radium Hot Springs is ideally situated to accommodate tourists who are visiting the Rocky Mountain national parks; almost all inhabitants who are currently in the workforce (population 530) are therefore employed by the tertiary sector (Statistics Canada, 1996).



### *Mountain Bike Trails*

The riders of Invermere have only a few options when it comes to mountain biking. The Canyon trail area is a popular riding site that is easily accessible by bicycle from town. The majority of trails surrounding the canyon are, however, located on private land, with the inherent risk that the land-owner could prohibit mountain bike riding. Furthermore, the area is also being proposed for real estate development. The Invermere municipality is considering the purchase of some of the available land to conserve the canyon area for local recreational purposes, but, if that plan is to go ahead, they will have to set some of it aside for developing subdivisions in order to pay for the purchase.

Panorama Resort, which started the development of mountain bike trails in the 2000 summer season, is also a reasonable distance for Invermere residents. Although opening the ski lifts for summer use in support of the mountain biking activity is not in itself economically viable, it does enhance the value of the surrounding real estate, the main money-maker of ski resorts.

The nearby Kootenay National Park and other nearby protected areas are not viable destinations for riders in Invermere, due to the absence of trails that are conducive to mountain biking.

The BC Forest Service has designated a few of its logging roads as open to mountain bikes and has also developed a multi-use single track around Lake Enid, although only two kilometres long and interrupted by cattle gates. These suggestions by the BC Forest Service are, at best, appropriate for beginners, but not sufficient for experienced mountain bike riders. Due to the lack of good riding opportunities, some riders began constructing a very demanding downhill trail on Swansea Mountain on the other side of the valley. The BC Forest Service has designated Swansea Mountain off-limit for mountain bike riders from the end of the logging road onwards due to a very popular hiking trail.

### *Land-Access Issues*

When mountain bike riders in Invermere, as their group grew larger, started spending more weekends in other municipalities (i.e., Fernie, Golden) with a large trail system, the riders organised themselves and founded the Kootenay Trail Builder Association (KTBA). The idea was to create a trail system that was attractive enough to keep riders

and their money in Invermere. "Because really, it [trail development] does need to be done. There are a lot of dollars that are driving right on by this area every day by people that have their bikes and would love to stop and ride" (Schultz, pers. comm. 2000). The KTBA was set up in the fall of 1999 with the objective "to open mountain bike trails to all ages and skill levels. These trails will be designed, built and maintained by the volunteers that make up the KTBA with support and permission from Forestry..." (KTBA, 2000: 1). Since then, the approximately 30 volunteers have spent approximately 600 hours building five trails on Steamboat Mountain, a mountain near Radium Hot Springs just minutes from Invermere. Steamboat Mountain has caught their attention because of its narrow spine and 762m change in altitude, which is any downhillers'/freerider's heaven. The trail crews have encountered relatively little erosion, due to the low precipitation run-off. Steamboat Mountain has also been selectively logged about ten years ago, which makes the actual trail building easy due to a lack of undergrowth.

Although the KTBA started building trails on Steamboat Mountain without discussing it with the Resource Officer, Recreation of the Invermere Forest District, the association is now working in conjunction with the BC Forest Service to receive consent from the District Manager under Section 102 of the Forest Practices Code. "The KTBA is ... trying to do everything by the book" (Schultz, pers. comm. 2000).

### **Golden**

Located at the junction of Highways 1 and 95, Golden is in a prime location as it can easily be reached from Revelstoke in the west, Calgary in the east and Cranbrook in the south. The population of 3,968 is mostly (76.3%) employed in service industries (Statistics Canada, 1996), but still has the atmosphere of a resource-extracting town.

### *Mountain Bike Trails*

#### Moonraker Trail System

The Moonraker trail system in the West Bench area has been constructed by the Golden horseback riding community and has been designated by the BC Forest Service as multi-use trails. As such it is providing 40 km of mostly cross-country, single-track trails that are rideable in any given sequence due to the loop form of the trail system. "The West Bench/Moonraker trail system is a great way to spend the day riding and exploring.

Picturesque scenery past lakes and views of the Columbia Valley add to the riding experience" (Harris, 2000: 21).

#### Mount 7

The mountain situated across the valley from the Moonraker trails has been developed for intermediate and expert cross-country and downhill riding. The 1,280m change in altitude makes it one of the longest downhill rides in the Canadian Rocky Mountains "... providing riders and paragliders an excellent launching pad for fast descents back to town" (Harris, 2000: 22). A 2WD-accessible forest service road, winding around the mountain and leading almost to the paraglider launch (also the start of some mountain biking trails), makes the mountain a paradise for downhill and freeride enthusiast who do not want to ride their heavy mountain bikes up the gruelling climb but prefer to shuttle their bikes up the mountain.

Mount 7 is also the site of the annual Mount 7 Psychosis downhill race, which is probably the longest downhill race in Canada. Scott Hicks, founder of the two-year-old event, BC Forest Service employee and professional downhill racer, had the intention of organising this fun event, in order "... to make people more aware of what Golden has to offer" (Delker, 2000: 15). The event attracted 25 racers in 1999, the first year of the race, but the popularity has risen extensively with 116 racers taking part in 2000. The projections for the following season have made a cap of 250 riders and pre-registration necessary in order to control and regulate the amount of use on race day and to keep the logistics associated with organising such an event on a reasonable level. Scott Hicks stresses that the race and related trail building activities have the support of the local community on race day and during the preparation stages with, for instance, wood donations for building obstacles, etc.

#### ***Kicking Horse Mountain Resort***

The new resort opened in December 2000 and is anticipating the construction of mountain biking trails in order to increase the attractiveness of the resort for summer use. These new trails will most probably connect with the Moonraker system to produce an even larger trail system accessible from the resort. No plans to open ski lifts for summer use were being devised at the date of writing this report.

*Land-Access Issues*

“The mountain bike scene is growing bigger and bigger every year thanks to a crew of local hardcores and an active mountain bike club who are maintaining old trails and cutting new routes” (Bethel, 2000: 19). The local Golden Mountain Bike Club, which is backed by Summit Cycle, the bicycle shop in Golden, is in close contact with the Jon Wilsgard, the Recreation Officer of the BC Forest Service, in order to go through the formal establishment process for new trails. Although the trail network on Mount 7 has been approved by the BC Forest Service, it has not yet been formally established as BC Forest Service status trails because timber harvesting is still scheduled for some areas, which are being crossed by already existing trails. The mountain bike club realises that timber harvesting takes precedence before the recreation mandate of the BC Forest Service and is prepared to rebuild some of the trails once the area has been harvested (Hicks, pers. comm. 2000). A co-management agreement between the BC Forest Service and the club will then have to be finalised to cover questions of maintenance and liability. The trail system on Mount 7 will then be mapped with a Geographical Information System, its obstacles upgraded and the trail entrances appropriately signed before adding it to the official BC Forest Service trail list.

The Moonraker trail system, on the other hand, is an official BC Forest Service trail network, which is being maintained entirely with volunteer outings from both the horseback riding and mountain bike community.

“We would be really foolish, as a ministry, to ignore mountain biking ... There are areas where mountain bikes are ripping up trails pretty well, ... and that’s why I’d rather focus them in certain areas” said Jon Wilsgard (pers. comm. 2000) on his efforts to work with local mountain bike riders. However, due to a shortage of funds, the BC Forest Service does not construct any new trails (for any of the popular recreational activities), but is prepared to work with volunteers (such as the mountain bike club) to maintain and cut new trails as long as the relevant procedures are being followed (explained in Chapter 5). Wilsgard (pers. comm. 2000) stated that “If they are not playing the game, I am not willing to protect their assets [referring to illegal trail building]”. His experience has been that “... the mountain bike contingent is extremely open to lending their volunteer support.”

Although some land-use agencies are concerned about the risk of being held responsible for accidents caused by riding on trails that have been built on their managed property, Wilsgard (pers. comm. 2000) regarded the danger as part of the mountain biking activity and as such as due diligence:

“If some of these people want to have narrow, narrow bridges or chasms they want to go over with, then I don’t think the Forest Service should have the responsibility for someone going over the edge, so to speak. But, to accommodate the sport ... we’ve got to be able to provide these opportunities ... Properly built trails and properly built structures out there to facilitate the fun nature of the sport is entirely possible”.

### **Kootenay and Yoho National Parks**

#### *Mountain Bike Trails*

All designated mountain bike trails are old fire roads that are not maintained and see relatively little mountain biking use. Should the use stay constantly at low levels, these trails will eventually grow over and become single-track trails suitable for cross-country riders.

Designated fire roads in Yoho National Park include the Kicking Horse, Amiskwi, Otterhead, Ottertail and Ice River, whereas Kootenay National Parks allows mountain biking on only two fire roads, the East and West Kootenay fire roads.

#### *Land-Access Issues*

Due to the small population living in Yoho National Park and the distance of the Kootenay National Park to large population centres, there seems to be no problem with illegal mountain biking in these two national parks.

#### *Central East Slopes*

The Central East Slopes are probably the most visited and used area of the Canadian Rocky Mountains due to their close proximity to Calgary, the popularity of Banff National Park and excellent infrastructure (Highways 1, 4 and 22). (See Map 3.) Kananaskis Country and the Canmore area, reachable in just one hour, are the playground of mountain bikers from Calgary, whereas Banff National Park is a jewel for any outdoor

recreationist. As Eastcott (1999: 22) declares, "Mountain biking in the central east slopes include everything from paved bicycle paths and gravel roads to doubletracks and breathtaking single-tracks".

### **Banff National Park**

Canada's oldest national park is renowned worldwide for its splendid scenery and seemingly endless recreation opportunities. Banff National Park was developed to secure hot springs for the general public and prevent pending private ownership. After a series of expansions, Banff National Park now encompasses 6641 km<sup>2</sup> and is part of the Rocky Mountain National Park system. Banff National Park includes two townsites with a population of 6,098 (Banff townsite) and 1,305 (Lake Louise townsite) that cater almost entirely to tourism demands (Statistics Canada, 1996). Banff National Park, as an internationally renowned playground for a number of activities, is in the limelight of public and scientific attention. With several million visitors going through Banff National Park, it has become one of Canada's greatest tourist attractions.

As Ben Marriott (pers. comm. 2000) stated, "Not a lot of people come here as a mountain bike destination, they may bring bikes and do a trail or two while they are here". Mountain bike riders that are riding in Banff National Park can be grouped into four categories: the local population, the seasonal population, riders from surrounding areas and tourists. The seasonal population is mainly comprised of young riders in the hotel business; they rarely stay longer than a season and are therefore less concerned with their environmental impact. The main day-to-day use of designated and informal trails are by the local and seasonal population and by the population of nearby townsites (i.e., Canmore and to a lesser degree Calgary), as they frequently ride in the evenings after work as well as on weekends. Tourists visiting Banff National Park either rent or bring their own mountain bikes and maybe ride a couple of the designated trails; they might occasionally find and ride an informal trail.

### *Mountain Bike Trails*

Although Parks Canada has closed a number of trails to mountain biking, the local riding community is still left with some interesting and enjoyable trails. It would exceed the scope of this report to list and describe all the trails. Information on the trails designated

for mountain biking is available at all Parks Canada information centres in Banff National Park.

### *Land-Access Issues*

With the exception of Banff and Lake Louise townsites, all trails in Banff National Park are closed to mountain biking unless they have been designated as open. Mountain biking opportunities are therefore limited in the national park.

The Land-Access issues for mountain bike riders in Banff National Park have centred on a few key trails that have either already been closed or are in the process of being closed or where mountain bike riders face restriction of some sort or another. These trails demonstrate the past and present approaches of Parks Canada when trying to manage human use problems.

### Bryant Creek Trail

This trail, which is very popular with mountain bike riders, was closed to mountain biking only in the spring of 1998. Bryant Creek trail leads up the valley over the Assiniboine Pass to the base of Mount Assiniboine, the “Matterhorn of the Rockies”. The trail was an ideal cross-country trail, combining easy access to the backcountry with challenging riding and a beautiful area.

Of concern to Parks Canada is general human use on either side of the Middlespray Valley (Banff townsite and Bryant Creek), an area critical for the regional grizzly bear population. The decision was taken without consultation with the mountain biking community to prohibit mountain bike use of this specific trail in order to reduce general human use of the area. “The decision on mountain bikes in ... Bryant Creek was solely based on bringing down numbers” (Syme, pers. comm. 2000), so as to reach the habitat effectiveness targets for the Bryant area and begin moving towards improving the use of habitat deemed good for grizzly bears. A subsequent survey undertaken just prior to the closure was used as justification, as it identified mountain bike riders as the primary users (approximately 60 percent) of the Bryant Creek Trail (Eastcott, pers. comm. 2000; Syme, pers. comm. 2000; Tucker, pers. comm. 2000).

Opponents to the closure maintain that although monitoring of human use was undertaken prior to the closure, the decision was already well known. As a result,

mountain bike riders increased their use of the trail. "I mean I rode it [Bryant Creek Trail] that summer more than I ever had, just because I knew it was going to be the last time and a lot of people did" (Marriott, pers. comm. 2000). Certainly, one reason for choosing to marginalize mountain bike riders was the perception that mountain bike riders were a fragmented group of individualists with little lobbying power. "Hikers are very well organised, they are very vocal. If we closed a major trail in this park to hikers, there would be a very big fuss" (Eastcott, pers. comm. 2000). However, one positive aspect resulting from the Bryant Creek Trail closure was the formation of the Bow Valley Mountain Bike Alliance (BVMBA), as Parks Canada now has an organisation of stakeholders for consultation.

Wayne Tucker (pers. comm. 2000) states that, since the closure was executed, user numbers have gone down from the initial 5,800 before closure, to around 1,200 user events per month; then again, these numbers are most likely skewed due to increased mountain bike use during the season prior to the closure. An increase in the grizzly bear population has also been observed since closing the Bryant Creek Trail to mountain bikes; this increase can, however, not be scientifically attributed to the lower use levels of the area.

Hopefully we are going to go to a more equitable allotment, so if we do put limits on areas, hopefully we address the quota through equitable means. Meaning we will look at the volume of hiker use, horse use and mountain bike use and try to figure something out, so that we don't target one user group and say 'No more mountain bikes' (Tucker, pers. comm. 2000).

Parks Canada Staff has ruled out the use of a quota system, as an equitable approach to the problem of general human use, as the logistics are not available for such an operation (Syme, pers. comm. 2000; Tucker, pers. comm. 2000).



### ***Mount Norquay***

The situation on Mount Norquay is somewhat different from the Bryant Creek Trail closure, as the trails “were never actually legal trails, but we just sort of turned a blind eye to it ... about five years ago when people started riding them” (Eastcott, pers. comm. 2000). The Mount Norquay area is an ideal location for downhill and freeriding, since the open vegetation facilitates the construction of trails, the hillside is steep and it has the infrastructure to permit shuttling. The local population initially used the informal trails, but some trails (e.g., Screamer on the front face of Mount Norquay) had become renowned outside of the national park and attracted visitors from as far as Calgary, prompting the closure by Parks Canada.

Parks Canada staff has identified several reasons supporting the closure of certain areas of Mount Norquay:

1. The trails are located within a planned wildlife corridor (Banff-Bow Valley Task Force, 1996) with the aim to provide large carnivores (especially grizzly bears, wolves and cougars) with a bypass around the town of Banff. Parks Canada has already begun creating the bypass and reversing development by removing a cadet camp and bison paddock, by closing several equestrian trails and by lobbying for the removal of the Banff air strip. The levels of human use that were created by the informal trails on Mount Norquay and especially the practice of shuttling, which increases the amount of runs possible per day, is conflicting with the planned wildlife corridor and had to be reduced. “I am under no illusions that when we close Norquay we are going to shut down all the use. But if we shut down 95% or 90% of it we’ll probably have reached our objective of preserving the wildlife corridor” (Eastcott, pers. comm. 2000).
2. The trails are situated on a steep slope and have therefore seen extensive physical damage due to erosion and destruction of vegetation, especially on steep sections and sidehills.
3. The activity is not being seen as appropriate by Parks Canada: “Ripping down a hill at 70 km/h with your head down hasn’t been seen as a National Park type experience” (Tucker, pers. comm. 2000).

Parks Canada chose a very different approach to the situation at Mount Norquay than for the Bryant Creek Trail closure and actively worked with and consulted the BVMBA as

stakeholders. Many local mountain bike riders have supported Parks Canada's decision to close the informal trails on Mount Norquay:

... the Norquay situation had to change, it was an inappropriate scenario within a National Park ... From a visual perspective, I have no doubt that seeing truckloads of guys with hardcore bikes, armour and full-face helmets, does not communicate the vision of National Parks recreation that the Park Service [Parks Canada] wants to see. And I think many cyclists agree with that ... Some of us have already been somewhat self-limiting on those trails about feeling them inappropriate and not riding them, but ... that is a fairly small minority (Baker, pers. comm. 2000).

Parks Canada started a campaign just before the closure to educate mountain bike riders about the reasons behind the decision and asking for their co-operation "in not using these trails to ensure that wildlife can use the Cascade wildlife corridor effectively" (Parks Canada, 2000b). (See Appendix G and H.) Park Wardens also stopped mountain bike riders they encountered on these particular trails and explained Parks Canada's position. "We don't want to get into a enforcement situations where people aren't aware of what the rules are. We want to give everyone the opportunity to make a wise choice and say: 'ok, it's for the preservation of the park and I am going to respect it...'" (Eastcott, pers. comm. 2000). As of mid-August 2000, Parks Canada is enforcing the closure, which has already resulted in a number of tickets for mountain bike riders.

#### Moraine Lake Highline Trail

The Moraine Lake Highline Trail is "the most demanding of the Lake Louise area trails" (Parks Canada, 1997: 4) heading through parts of Paradise Valley and climbing onto the ridge of Mount Temple before descending to Moraine Lake. The trail is also free of snow in early spring, making it one of the earliest rideable trails in Banff National Park. A restricted activity order was put in place in July 1999 due to a habituated grizzly bear that has shown no fear of human encounters and has caused considerable distress to users around Moraine Lake. The restricted activity order limited hiker access to groups of six and equestrians to groups of two, but prohibited mountain bike use whenever the order was in place. However, the order was only lifted in October 1999 when there was more than 15cm of snow on the trail and the mountain biking season was over, it was again put in place in the Spring of 2000.

A workshop by Parks Canada that was held in conjunction with the BVMBBA recommended the restriction of mountain bike riders travelling in a group of less than

three with no less than 60m distance between the individual riders. In addition to those restrictions the workshop also suggested a drop-out trail to circumvent the three kilometres closest to Moraine Lake where the incidents have happened and the commission of a study by Dr. Steve Herrero to determine the appropriate number of mountain bike riders per group to deter grizzly bear attacks (Marriott, pers. comm. 2000).

The study (Herrero & Herrero, 2000) was commissioned by Parks Canada to review literature and data on grizzly bear and mountain bike encounters and to devise management options acceptable to the mountain bike community and Parks Canada. Bear-cyclist encounters on the Moraine Highline Trail make up 12 percent of encounters recorded in a North American database assembled by the authors of the study. This number, however, has to be treated with caution since the scope of the database is limited and the fact that 76% of riders do not report interactions with bears (Schmor, 1999).

The study results show that the section between 0.8 km and 3.8 km of the Moraine Lake Highline Trail is grizzly bear habitat of high or very high quality and that in addition the trail characteristics (generally flat with some climbs), trail conditions (fair to good) and visibility (low lateral visibility) increase the risk of encounter. The mainly levelled trail and good trail conditions permit mountain bike riders to attain high speeds, which is likely to increase the risk of bear-cyclist encounters in conjunction with the low lateral visibility. Three of the four past encounters on the Moraine Lake Highline Trail have occurred in this sections (Herrero & Herrero, 2000).

The authors have established six possible management options in the study:

**Option 1**

Implement for cyclists the same seasonal minimum group size (6 people) requirement that exists for hikers (six per group) on the trail...

**Option 2**

Restrict cyclists from between 0.8 km to 3.8 km (measuring from Moraine Lake) during berry season...

**Option 3**

Same as Option 2, but build a stub trail from near the “pass” down to join with the Moraine Lake Road...

**Option 4**

Close the trail section from 0.8 km to 3.8 km to all human use during the berry season...

**Option 5**

Similar to Jasper National Park’s approach regarding cyclists on high risk trails, try to educate cyclists (and other users of the MLHLT [Moraine Lake Highline Trail]) about how to reduce the chance of encountering grizzly bears...

**Option 6**

Allow trail use, including cycling, on the MLHLT with no seasonal or group-size restrictions from the junction with the Paradise Valley Trail to before where the quality of grizzly bear foraging habitat is highest, starting at the 3.8 km point ... At approximately the 4.0 km point, and before entering the highest quality habitat where most all [sic] the previous grizzly bear – people confrontations on the MLHLT have occurred, construct a stub trail down to join with the Moraine Lake Road below” (Herrero & Herrero, 2000: 20-21).

However, the probably most important finding of the study for the mountain biking community is that “there is no ecological rationale that we are aware of for managing cyclists to lessen habitat disturbance (i.e., increase habitat effectiveness) without also managing other user groups (e.g. hikers) and developments” (Herrero & Herrero, 2000: p. 17); suggesting that there is no scientific basis for managing the mountain biking activity in isolation of other recreational use. “We want to be treated within the same basic parameters as other recreationalists in the Park – that is all we have ever asked for. We do not like to be singled out unfairly and especially without supporting science” (Marriott, pers. comm. 2000).

As a result of the study, the Moraine Lake Highline Trail will be closed to all users during the berry season and Parks Canada is commissioning an environmental study on the construction of the proposed dropout trail (Marriott, pers. comm. 2001).

### Informal trails

Parks Canada staff is also concerned with the emergence of informal trails that are being used for mountain biking.

“What people have done more, as a result of closures, frustrations with Parks policies or whatever reasons, they have gone out and seek their own trails ... As these areas [Bryant Creek Trail, Moraine Lake Trail etc.] are closed ... there is more and more pressure on the existing trails” (Marriott, pers. comm. 2000).

Some mountain bike riders follow game trails, old horse packing trails, power lines and other easily accessible terrain in order to find new riding experiences. As knowledge of the informal trails spreads, trail use increases, which in turn increases the visibility of the trail, attracting more users. One mountain bike rider, who wants to stay anonymous, stated that he/she was riding a small game trail one summer, only to realise that it had changed from a trail that could hardly be seen to a conspicuous trail that anyone can find and ride over the course of the summer. The majority of informal trails are situated in close proximity to Banff townsite for reasons of convenience.

### ***Initiatives***

#### *Bow Valley Mountain Bike Alliance*

The Bow Valley Mountain Bike Alliance (BVMBA) is an advocacy group, which is particularly concerned about the mountain biking opportunities in the Bow Valley area. The BVMBA was created in 1997, in response to the Bryant Creek Trail closure. The alliance works with two mission statements:

“To promote the safe, courteous and continued use of trails within the greater Bow Valley area by encouraging bike riders to adhere to the International Mountain Bike Association’s rules, and by educating bike riders of the special considerations needed to preserve the area’s ecological integrity, including the goal of minimizing the risk of impact on wildlife.

To work with Land Managers on all policies pertaining to trail use (including reconsideration of certain trails currently closed to bicycles yet accessible to other user groups) to ensure decisions are made using a consistent and fair process, considering all user groups, and based on scientific rationale” (Bow Valley Mountain Bike Alliance, 1999: 2).

The BVMBA is “... very cognizant of the fact that there are a lot of places in Banff National Park ... we don't think are suitable for mountain bike activity. We don't encourage that, we don't try to get trails opened in areas like that”, states Ben Marriott (pers. comm. 2000) of the BVMBA. However, the association is trying to organise the mountain biking community in the Bow Valley area in order to successfully challenge certain trail closures and to work jointly with Parks Canada staff to avoid any further closures. As such the association has initiated the development of volunteer trail patrols with the following objectives:

- “- ride open trails in Banff National Park
- direct cyclists to open trails
- discuss with cyclists and other trail users, when appropriate, riding and trail-use principles (NOT in an enforcement context) and collect information about how cyclists determine which trails to ride in Banff National Park, length of time they have been riding in Banff, and general awareness of the IMBA rules of the trail.
- offer assistance to cyclists (minor repairs, band-aids, directions, or any other reasonable forms of assistance: NOT first-aid situations unless individual volunteers have appropriate training)
- provide the coordinator with a brief report of trail activity during the shift. The report may include any items of interest: the number of riders with whom the patrol interacted, any hazards or disrepair on the trail, any other events of note such as user conflicts, wildlife considerations, etc.” (Bow Valley Mountain Bike Alliance, 1999: 4).

The report to Parks Canada includes descriptions of encountered trail conditions, wildlife, user numbers and type of users; in addition to the observation made by the trail patrol volunteers the coordinator presented an analysis of the data and

recommendations to Parks Canada staff (Bow Valley Mountain Bike Alliance, 2000). (See Appendix I.)

The BV MBA is also trying to educate the seasonal population of Banff townsite (e.g., at “One Hot Summer”, an event to welcome seasonal workers at the beginning of the summer tourism season) in order to communicate certain values with reference to living in a national park (Baker, pers. comm. 2000).

### **Canmore**

“Welcome to Canmore, where you’ll find mountains of opportunity” (Bishop, 2000: 1). The old mining town of Canmore has made the transition from “industrial town to residential community and visitor centre” (Pole, 1997: 58), which has been greatly facilitated by the proximity to Banff National Park. The cheaper accommodations and numerous activities that Canmore has to offer draw a significant number of visitors from Banff National Park. Canmore is known worldwide as the host of the 1988 Winter Olympic cross-country ski event and as location of the Tissot/UCI Mountain Bike World Cup in 1998-2000. The latter event attracts “700 mountain bikers of all abilities, 300 volunteers and support staff, and 20,000 enthusiastic mountain-biking fans” (Sadavoy, 2000: 4) to Canmore and offers a boost to the local economy.

### ***Mountain Bike Trails***

Contrary to the situation in Banff and Jasper National Parks, Canmore is seen as a mountain biking destination in itself as it has received national and international attention due to hosting a variety of races, such as the cross-country World Cups, various Canada Cups and the 24 Hours of Adrenaline, an endurance relay race.

### ***Benchland, Harvey Heights and Alpine Club Trails***

These trails, situated north of the Bow River, are open early in the season and can be interconnected to provide a variety of different rides. They offer technical sections, long and fast downhills and gradual climbs that reward the rider with some spectacular views. As those trails are near town, they often get busy in the early evenings.

Some mountain bike riders have built a small freeriding park in the woods behind Harvey Heights, including teeter-totters, ladders and other structures.

### *Three Sisters and Quarry Lake Trails*

After riding through highly developed sections, coming from Canmore, the area overshadowed by the Three Sisters offers a number of easy cross-country trails.

### ***Land-Access Issues***

#### *Proposed Human Use Restrictions in Wildlife Corridors*

While there have been reports of user conflicts in Canmore, the major issue that concerns mountain bike riders is trail restrictions due to concerns over the effect of human use on wildlife corridors.

Commercial, recreational, and residential development within the Bow Valley has increased to the extent that it is important to take steps to ensure that wildlife habitat does not become increasingly fragmented and that functional wildlife linkage corridors between habitat patches are addressed. Due to the finite land base remaining for habitat and corridor functions, there is concern over the impact that recreational human use within these critical areas may have on their future ability to provide the necessary components for use by wildlife. Suitable remaining habitat exists on limited patches of private, municipal and provincial lands in the valley with various jurisdictions having planning and regulatory authority over the lands (Bow Corridor Ecosystem Advisory Group, 1999: 1).

The Bow Corridor Ecosystem Advisory Group (BCEAG), an inter-agency group consisting of the Municipal District of Bighorn, Town of Canmore, Banff National Park and the Alberta Provincial Government, is lobbying for trail use restriction in certain areas of “critical wildlife areas” (BCEAG, 1999: 1). The BCEAG will rely on education and voluntary compliance with the restrictions. Many of these permanent or seasonal closures, however, affect trails close to the town of Canmore that are very popular for short rides in the evening after work (Cooke, pers. comm. 2000). These trails are, furthermore, the first trails that are rideable in the spring, “while the peaks around Canmore hold snow well into the early summer months, the valley bottom bike trails dry out to offer mountain bikers a hearty variety of scenic rides, gruelling climbs and thrilling descents” (Bishop, 2000: 13).

The restrictions apply to all the recreation activities, but there is a feeling of despair in the community, as a large amount of development has previously been allowed in the area, which eventually led to the pressure on the wildlife corridors (Eastcott, pers. comm.



2000; McConnel, pers. comm. 2000). “We lose trails all the time ... the golf course swallowed up a lot of trails, so do housing developments” (Cooke, pers. comm. 2000).

### ***Initiatives***

Although there is a strong local cycling community in Canmore, many riders do not realise the threat their riding opportunities are facing. The Canmore World Cup Legacy group was formed in 1999 to “protect the environment while supporting responsible mountain biking” (Fawcett, 2000: 9). However, much of the 40-45 members’ time is spent maintaining trails. The group’s members will only adhere to any restrictions set by the BCEAG if the group deems them logical and necessary (Davies, pers. comm. 2000).

### **Kananaskis Country**

Kananaskis Country is a collection of various protected areas extending over an area of 4,000 km<sup>2</sup> in the front ranges and foothills of the Canadian Rocky Mountains. (See Appendix J for a map of Kananaskis Country.) The region is being managed as a multiple use area accommodating a variety of uses, such as timber harvesting, cattle grazing, gas drilling, recreation and tourism (Alberta Environment, 2001).

The protected areas of Kananaskis Country are managed according to diverse objectives and management intents. “Although there is no formally approved set of policies for managing just mountain biking activity, the management plans of the protected areas in Kananaskis Country do accommodate mountain bike use along with other non-motorised use where appropriate” (Cockerton, pers. comm. 2001).

Mountain biking has been restricted on some trails in Kananaskis Country, for instance, in Peter Lougheed Provincial Park, because of high user levels (user conflicts) or topographic constraints or because the trails lead into fragile alpine areas. However, “there will be an effort made to maintain a lot of different opportunities for biking throughout much Kananaskis Country” (Cockerton, pers. comm. 2001).

Calgarians represent 75% of all users in Kananaskis Country; weekends and both spring and summer evenings are busiest, as recreationists travel to Kananaskis Country after work for a short time period. Local mountain bike use is limited to staff in Kananaskis and Nakiska Village and is most likely occurring on an insignificant level (Cockerton, pers. comm. 2001).

### ***Mountain Bike Trails***

The mountain bike trails are dispersed over quite a wide area in Kananaskis Country. However, there are a number of particularly popular areas. The trails in Kananaskis Country mainly follow the five major valleys or their tributary valleys.

#### **Spray Valley**

Recreational use, including mountain biking, has significantly decreased in the Spray Valley after the closure of Bryant Creek Trail in Banff National Park. Mountain biking still occurs around the Spray Reservoir and on the cross-country trails at Mount Shark trailhead.

#### **Kananaskis Valley**

This valley features some of the more classic trails in Kananaskis Country, such as Skogan Pass, Jewell Pass, Prairie View Trail and Stoney Trail.

#### ***Elbow Valley and the Foothills Portion of Kananaskis Country***

This area features the most extensive trail system of Kananaskis Country and also experiences probably the highest amount of use due to its proximity to Calgary (Cockerton, pers. comm. 2001). Popular mountain bike trails in the Elbow Valley and the Foothills include Moose Mountain, Moose-Packer's Trail, Sulphur Springs Trail and the Telephone Trail.

#### ***Jumpingpound Valley***

The Jumpingpound Valley offers the most spectacular ridge trails in the region; individual rides can be connected to create truly epic rides. The more popular trails include Jumpingpound Ridge, Cox Hill, Jumpingpound Mountain Loop and Powderface Ridge.

#### ***Sheep valley***

Sheep Valley is one of the main entrances to the front ranges of Kananaskis Country and includes a number of mountain bike trails, such as Sheep River, Around Misty Range, Blue Rock and Indian Oils Trails.

#### ***Canmore Nordic Centre***

The Centre was host to the 1988 Calgary Winter Olympics' Nordic ski events and has since been designated a Provincial Park, in order to obtain additional provincial funding.

The only viable option of keeping the Nordic Centre open was to designate it as a Provincial Park. The Canmore Nordic Centre Provincial Park has, consistent with its history, placed the provision of outdoor recreation opportunities as its main objective “so long as the preservation objectives are achieved” (Alberta Environment, 2000a: 5).

“The Canmore Nordic Centre’s 72 kilometres of marked trails are a must for any visiting mountain biker. The Centre offers a virtual maze of trails, ranging from fire-road cruising to steep single-track” (Martel, 2000: 13). The Canmore Nordic Centre has also gained an international reputation within the mountain biking community for hosting three Grundig/UCI Mountain Bike World Cups and other numerous events.

### ***Land-Access Issues***

#### ***User conflicts***

There seem to be relatively insignificant issues associated with mountain biking in Kananaskis Country. In general, there are remarkably few user conflicts on trails, most likely due to behavioural changes from the mountain biking community. In addition, core areas have been set apart for particular activities. The Sheep Valley, for example, was created as a focal point for horseback riding, thus discouraging mountain bike use of the area. In this way, a self-selection process has been adopted that reduces user conflicts (Cockerton, pers. comm. 2001).

#### ***Resource damage***

Some resource damage has been observed, such as shortcuts on Prairie View Trail in the Kananaskis Valley Region “and, closer to the Town of Canmore, informal trail development” (Cockerton, pers. comm. 2001).

#### ***Wildlife Displacement***

Seasonal trail closure due to bear activities are frequent in the summer months. Especially in high use areas, such as the Canmore Nordic Centre. The Centre was closed for a few months last summer, when a grizzly bear attacked a mountain bike rider on one of the trails.

Kananaskis Country will implement the recommendations presented by the BCEAG in the near future under the parks act in wildlife corridors near the Bow River, i.e., Nordic

Centre, Bow Valley Wildland Park. (See section on Canmore.) These include restrictions to human use, such as

- eliminating trail duplications and
- seasonal restrictions to general human use.

Although mountain biking may have been the primary use of some of these trails, they are not being singled out, as restrictions apply to all recreational activities (Cockerton, pers. comm. 2001).

### ***North Eastern Slopes***

The North Eastern slopes comprise a variety of ecozones, such as the foothills, the front ranges and the eastern main ranges. (See Map 4.) In contrast to the Eastern Central Slopes, the riding areas in the Northern Eastern Slopes are often in remote locations and more difficult to reach. "In keeping with the nature of the land, many of the trips are long wilderness explorations with little in the way of technical riding" (Eastcott, 1999: 262).

The rides around towns are typically shorter and more technical and are used more often than longer endurance rides.

### **Jasper National Park**

Jasper National Park, covering an area of 10,878 km<sup>2</sup>, is the largest national park in the Canadian Rocky Mountains. It is also the third most-visited Canadian national park and includes Jasper townsite with a population of 4,500. Jasper National Park does not experience the same level of use as Banff National Park, but is nevertheless experiencing similar problems associated with mountain biking. (See Figure 21.) The mountain bike riders in Jasper National Park can be grouped into three groups that differ in the degree of use and the kind of trail they are riding on:

1. Local mountain bike riders cycle regularly, often after work and use a wide variety of trails ranging from trails recommended by Parks Canada to informal trails.
2. Riders from the surrounding areas (e.g., Hinton, Edmonton) that have ridden all the recommended trails extensively and are beginning to discover the informal trail network.
3. Tourists that pick up a trailmap from the Information Centre and ride only recommended trails (Klettl, pers. comm. 2000; MacLeod, pers. comm. 2000).

Lemke (1999: 6) also divides mountain bike riders in the national park into three groups but chooses a different classification system:

<sup>1</sup>. Local hard-core riders; <sup>2</sup>. Seasonal 18-25 year olds; and <sup>3</sup>. Family groups ... Seasonal 18-25 year olds arriving from outside the park tend to lack high environmental standards. Fortunately, this user group does not translate to high use numbers on the trails and the local bike community are quick to approach and educate those that are acting irresponsibly.

Mountain bike riders in Jasper National Park are mostly cross-country riders, as the topography does not lend itself to freeriding or downhill (i.e., there is no easily accessible steep terrain).

There is tons of cyclists out there that want to go ride a bike, and there is a little bit of that group that wants to go off a stunt... That is not the typical cyclist ... This downhill world is not really here [Jasper NP] (MacDowell, pers. comm. 2000).

However, a few riders wearing body armour can be seen at times, suggesting that a fringe group is engaging in that type of mountain bike riding (Kolesch, pers. comm. 2000). The local biking community is trying to discourage freeriding and downhill in the national park; one of the local bicycle shops, for instance, is organising trail-building trips to nearby Valemount, BC, for riders interested in building and riding that type of trail (MacDowell, pers. comm. 2000; MacLeod, pers. comm. 2000).

### ***Mountain Bike Trails***

Mountain biking has increased in popularity since the mid-1980s and has emerged as the most popular activity in Jasper National Park next to hiking. This has resulted in a rather respectable trail system compared to other Rocky Mountain national parks, one which is attracting mountain bike riders from as far as Edmonton. Trails in Jasper National Park are varied and include short technical rides as well as long endurance trips that lead deep into the backcountry and offer some amazing single-track riding. Mountain bike guides and brochures describing a selection of rides are available from the Parks Canada Information in the Jasper townsite and from the local bicycle shops.

### ***Land-Access Issues***

"I think compared to other Mountain Parks, Jasper has been pretty wide open in terms of mountain biking, the ability to go biking, ... the amount of trails, quality of trails and all that. In terms of mountain biking it is probably the best park to be in" (MacLeod, pers. comm. 2000).

### ***Resource Damage***

Several trails in Jasper National Park have experienced biophysical damage due to mountain biking. Some steep slopes have eroded caused by the impact of skidding, whereas other trails have been widened due to riders and other recreational users avoiding muddy sections. Local mountain bike riders, however, will quickly point out that most of the Benchland trails west of the townsite have been badly affected by equestrian use (Décor, pers. comm. 2000; Klettl, pers. comm. 2000; MacDowell, pers. comm. 2000).

### ***User Conflict***

“Serious conflicts between mountain bikers and other trail users affecting ones overall Park experience are infrequent in Jasper National Park” (Lemke, 1999: 7). It seems that trail etiquette between user groups has improved over the last few years; some issues, however, still remain.

### ***Wildlife Displacement***

The occurrence of 15 aggressive encounters between mountain bike riders and grizzly bears in Jasper National Park from 1987 to 1992 can be considered as competition for the use of the same habitat. Parks Canada is currently conducting a wildlife corridor project in order to determine the impacts human use poses on wildlife movements. In the course of the project, video cameras were installed on game trails to monitor animal movement; researchers soon realised that many of the surveyed game trails were being “poached” by locals for recreational purposes (Kolesch, pers. comm. 2000).

### ***Informal Trails***

The majority of the informal trail network around the townsite of Jasper was not developed by mountain bike riders, but has evolved over time from game trails and old packhorse trails. (See Figure 22.) “Having grown up here [Jasper] I have been bush whacking all over the montane here for a couple decades so I know of hundreds of little trails” (MacLeod, pers. comm. 2000). The local community is protective of “their” informal trails and is trying to keep them a local secret. When a seasonal hotel employee promoted a trail map featuring a few informal trails in the national park a few of the community leaders took the initiative and discussed the issue with the hotel manager

who then removed the maps. "We sort of police our own people" (MacDowell, pers. comm. 2000).

"Fortunately, Jasper National Park is not near a large urban centre therefore the unofficial trail system experiences a very small fraction of use compared to Banff being located near a large city" (Lemke, 1999: 12).

### ***Initiatives***

Parks Canada and the local mountain biking community are working together towards educating riders in Jasper National Park on all of the aspects mentioned above. (See Appendix K.) Efforts are also under way to organise a mountain bike advocacy group in order to communicate more effectively with Parks Canada (Klettl, pers. comm. 2000; MacLeod, pers. comm. 2000).

### **Hinton**

The town of Hinton, with a population of approximately 10,000 (Statistics Canada, 1996), is situated just a 15 minutes drive from the northern entrance to Jasper National Park. It is, therefore, often viewed as the gateway to Jasper National Park and acts as a service and supply town for the mountain resorts, in addition to the local primary industries of mining and timber extraction.

Mountain biking is not a frequent activity in protected areas or, for that matter, any area of that region (May-McDonald, pers. comm. 2000). There is a small group of riders that has formed nine years ago as the Cutline Cruisers, a mountain bike club aiming to promote mountain biking and create new trails, but numbers have dwindled over the years. Despite the low popularity of the sport, Hinton has been the host of various races including the Provincial Mountain Biking Championships since 1999.

### ***Mountain Bike Trails***

Trails are dispersed across the area surrounding Hinton, most of them known just to a handful of riders. Some riders are building informal trails, but do not actively promote their use. "We just go out and build them. This year [2000] is the first year I have asked for permission to go and build trails" (Froehler, pers. comm. 2000).

### ***Land-Access Issues***

The Hinton area has not seen the same amount of mountain bike use as, for instance, Jasper or Banff National Parks. The main issue concerning Alberta Environment planners is the impact of snowmobile and ATV use in protected areas. Mountain biking has not yet developed enough popularity to be considered a problem.

It is really not something that we have dealt specifically here, because we have had bigger issues that have taken our attention regarding land-use management ... There is much more of a priority for us to deal with those issues [off-highway vehicles and equestrian use] than mountain biking ... You will see more impacts on the landscape from off-highway vehicle use than you will find from mountain biking (May-McDonald, pers. comm. 2000).

The anticipated level of use is low for the relatively new Whitehorse Wildland Park, bordering the east boundary of Jasper National Park, because the general population has limited access to the area. "That area [Bow Valley and Kananaskis] is not going to sustain the numbers that are going in there forever, so it is very possible that in this region [Edson district], for the next ten years, that things will start to turn around" (Melanson, pers. comm. 2000). The Whitehorse Wildland Park Management Plan (Alberta Environment, 2000c: 29) takes this change in user levels into account and assures that "management will reflect these changes and adapt to the need for better facilities".

However, mountain bikes provide a faster access to remote areas in the backcountry and activities, such as fishing in the backcountry, have increased with the advent of the mountain bike, which could negatively affect the fish population of backcountry lakes (May-McDonald, pers. comm. 2000; McCracken, pers. comm. 2000).

### ***Southern Canadian Rocky Mountains***

The economy of the Elk Valley region depends mainly on the primary sector, notably coal, timber and natural gas. (See Map 5.) Tourism, however, "is increasing in importance" (Eastcott, 1999: 139). Mountain biking is just one of a number of outdoor activities that are popular in the region. Fernie was studied for this research, since it has experienced an increased, seemingly uncontrolled, growth of mountain biking.



## **Fernie**

“The combination of great scenery, low-key atmosphere and a wide variety of trails makes Fernie a perfect base of mountain bike adventures. The riding scene here is one of the most dynamic in the Rockies with lots of active riders, frequent races and lots of rider-built trails” (Eastcott, 1999: 140). The town of Fernie has received increased attention from mountain bikers, largely due to the opening of a ski lift for the transportation of mountain bikes at the Fernie Alpine Resort, thus making downhill mountain biking less strenuous.

### ***Mountain Bike Trails***

Local riders have purposely built the majority of mountain bike trails in and around Fernie, often without applying for the necessary permissions. Highway 3 is the dividing line between the main areas that are conducive to mountain biking and that have seen trail development. Crestbrook Forest Industries Ltd. owns most of the land east of the highway, whereas the area west of the highway encompasses Mt. Fernie Provincial Park and land administered by the BC Forest Service. The Fernie Alpine Resort operates under a recreational lease according to the regulations of the BC Forest Service.

### **Fernie Mountain**

Trails on Fernie Mountain include 4x4 roads and single-tracks. The trails on the mountain face are mainly difficult uphill rides that are inevitably followed by a challenging descent.

### **Fernie Alpine Resort**

The resort started its mountain bike operations in 1996 due to a widespread demand (local riders were beginning to illegally construct trails on lease land) and in order to increase the quality and popularity of their summer operations. The operation of resorts during the summer season is not economically viable, but increases the price of realty and accommodation (Simmonds, pers. comm. 2000).

A simple, four-bar system attached to the back of a chair is used to transport the mountain bikes up the mountain. Up to 300 people – locals and visitors from as far as the United States – and their bicycles are being transported this way each day, with prices varying between \$8 for a single ride and \$19 for unlimited day rides. The price of

a season pass varies depending on the possession of a winter season pass (Simmonds, pers. comm. 2000).

The resort wants to appeal to the general public and therefore offers a wide variety of trails for all levels. (See Appendix L for a map of mountain bike trails.) However, there is a considerable amount of very challenging, single-track downhill descents (Simmonds, pers. comm. 2000). The trails at the Fernie Alpine Resort has been the host of several mountain bike races, including nine BC Cup races and will host a Canada Cup race next season.

The resort has leased the area for recreational use from the BC Forest Service and is, therefore, responsible for the resource. Keith Simmonds (pers. comm. 2000), Inside Operations Manager at Fernie Resort, states that trail degradation is frequent, “there is always going to be erosion if you are going downhill...” and dealt with by daily morning and evening trail patrols. Patrick Gilmore, Geologist and member of the Fernie Mountain Bike Club, says that the steep freeride trails offered by the Fernie Alpine Resort are quickly becoming erosion traps, as lift makes multiple runs less demanding and therefore increasing the pressure on the trails. “I am quite amazed at how quickly those trails degrade and I know that is not sustainable ... I am quite amazed the ski area is getting away with that ... they have a recreational lease on Crown Land” (Gilmore, pers. comm. 2000).

#### Mt. Fernie Provincial Park

Although the provincial park regulations state that “Bicycles must keep to roadways” (BC Ministry of Environment, Lands and Park, n.d.), there are approximately a dozen challenging single-track trails used regularly by local riders.

#### Fernie East

The area east of Highway 3 is private property and is operated by Crestbrook Forest Industries Ltd. as a managed forest. The company is currently pursuing to achieve certification of their operation practices under ISO 14001, a voluntary environmental management certification system. Adequate public Land-Access is one of the criteria of the certification. Crestbrook Forest Industries Ltd. is therefore striving to accommodate public use of the area, including mountain biking (Thorner, pers. comm. 2000).

## ***Land-Access Issues***

### *Unauthorised Trail Construction*

The unregulated development of trails in Fernie has led to a regionally well-known trail system. However, this has led to the construction of trails, following the trend of downhill mountain biking and freeriding that are highly prone to erosion pressures. “We are concerned about ... the increased use and then the increased amount of trails, especially trails on steep slopes that are prone to erosion” (Thorner, pers. comm. 2000).

Crestbrook Forest Industries Ltd. is working with the Fernie Mountain Bike Club to regulate trail cutting to appropriate areas, to advise the trail builders on potential harvesting areas and to re-establish trails after harvesting operations (Thorner, pers. comm. 2000).

### *Adoption of Mountain Bike Trails by ATVs and Motorcycles*

Another concern (Thorner, pers. comm. 2000) is the adoption of mountain bike trails by all terrain vehicles (ATVs) and motorcycles in inappropriate areas.

## ***Noxious Weed Transmission***

Crestbrook Forest Industries Ltd. is especially alarmed by the dissemination of noxious weeds, especially knapweed, by mountain bike riders. Those weeds can be transported on the mountain bikes from one area into another and cause vast infestations if not noticed early (Thorner, pers. comm. 2000).

### *Liability*

As with other regions, liability has evolved to be one of the major issues when considering mountain biking use. Crestbrook Forest Industries Ltd. allows the activity but does not officially authorise it, thus limiting liability to negligence on the part of the company.

## ***Initiatives***

### *Fernie Mountain Bike Club*

The Fernie Mountain Bike Club was not created to fight pending closures, but rather to maintain the existing trail system and create new cross-country trails. The newly-cut

mountain bike trails mostly follow old game trails or old packhorse trails; very little ground work is thus required. The main problem encountered by the club is trail degradation resulting from erosion. Although the oldest single-track trails are not much older than seven or eight years old, their steepness encourages degradation and makes erosion control difficult.

Since the club emerged in 1999, members actively participate in the Elk Valley Integrated Forest Task Force, a regional land-use planning board that is comprised of representatives from industry, government agencies and recreational and environmental groups.

### ***Comparing the Situation to that of Marin Municipal Water District, California***

The Marin Municipal Water District is one several areas in the United States where mountain bike riders have experienced extensive reactions against the mountain biking activity. Since the United States often faces problems before they become apparent in Canada, the situation will be briefly described.

What happened in Marin County, the origin of the mountain biking movement, can be seen as symptomatic for many areas in the US that have seen a great number of mountain bike riders. The Marin Municipal Water District (MMWD) is situated just north of the Golden Gate Bridge and encompasses an area of approximately 22,000 acres, including Mount Tamalpais, the birthplace of mountain biking. Some land within the MMWD, such as Mt. Tamalpais State Park, Golden Gate National Recreation Area and Marin County Open Spaces, lends itself to recreational activities and has been used for various popular outdoor activities (e.g., hiking, fishing, horseback riding and jogging) before the advent of mountain biking. The main mandate of the Marin County District is to maintain "... an environment conducive to the production of high quality water for District consumers" (Edger, 1997: 5). The provision of recreational opportunities is merely secondary and is limited to activities that provide "... a quiet, nature-oriented experience for visitors" (Edger, 1997: 5).

By the mid-1970s the peace of the MMWD was beginning to be disturbed by the emergence of mountain biking and the ensuing user conflicts and safety concerns resulting from "aggressive, rude, and dangerous riding behavior" (Edger, 1997: 6). Since the land managers did not create directives for the management of mountain biking, the

MMWD used a regulation that permitted the prohibition of activities causing a hazardous condition. Seven tickets were issued to violators in 1977 by rangers enforcing this regulation. It took another seven years before rangers could make use of regulations specific to mountain bikes for the District. These regulations, devised in 1984, were all restrictive in nature, limiting the speed of riders at 15 miles per hour and prohibiting mountain biking on trails, only leaving District fire roads open for riders. Additions to the set of laws included a further speed limit for riding around blind curves and when passing other users and the prohibition of possessing mountain bikes on trails. Enforcement was achieved by patrolling trails and by using radar guns to analyse speeds and fines were high: US\$125 for illegal possession and US\$200 for speeding (1989 levels). From 1989 to 1990, citations in connection with mountain biking in the MMWD has increased from 122 to 216 per year (Edger, 1997).

Although the situation in MMWD has increasingly worsened for mountain bike riders, the local bike advocacy group – Bicycle Trails Council of Marin – cooperated with the MMWD to conduct informal communication posts, sometimes together with rangers, to educate riders about the rules of the MMWD and responsible riding (Edger, 1997).

In 1992, MMWD rangers were informed about the existence of an illegal trail in a remote area of the watershed, which was believed to have been built by and for mountain bike riders. The New Paradigm Trail was restored to its previous state with the help of local environmental groups, but was re-opened and illegally used again the following summer. Another illegal trail, the Cascade Canyon Trail, was discovered and consequently blocked in 1996 (Edger, 1997). Due to the vastness of the area, it is likely that a number of illegal trails have yet to be discovered.

### ***Summary***

As this chapter has shown, the mountain biking opportunities vary greatly within the region of the Canadian Rocky Mountains. The difference in the level of trail system development seem to depend on a variety of factors, such as the proximity to large urban centres, the mandate of the land-use agency, the relationship between the mountain biking community and land managers and the level of visitor use. The issues and problems appear to vary accordingly and are, therefore, presumably influenced by the same factors. The majority of problems were reported in protected areas, reflecting

the mandates and main objectives towards conservation rather than the accommodation of recreational opportunities.

The main issue of importance is the perceived effect of general human use on the local wildlife, i.e. wildlife displacement. Public safety was of particular importance only to the Moraine Lake Highline Trail in Banff National Park. Another issue of concern to land managers seems to be the emergence of informal trails, especially around townsites. However, in some cases (e.g., Jasper National Park) informal trail networks have existed for a number of years and have only been discovered recently by Parks Canada. In contrast to the 1980s, when the mountain biking activity was in the early stages of development, user conflicts and resource damage are less significant. This might be due to research on the physical impacts of mountain biking, due to an increased popularity of the activity leading to wider acceptance in the population and consequently to behavioural changes.

The case study regions have demonstrated a wide diversity of issues and problems ranging across the Canadian Rocky Mountains. Whereas the western areas are experiencing a controlled growth in mountain biking opportunities, mainly due to efforts by the local mountain bike communities in cooperation with the BC Forest Service, the area surrounding Fernie has seen uncontrolled growth that has resulted in serious erosion problems.

Whereas Yoho and Kootenay National Parks have seen relatively little use by mountain bike riders, Banff and Jasper National Parks experience large visitor numbers that have caused wildlife displacement and public safety issues on specific trails. Informal trails, which are mainly used by residents and seasonal employees, are clustered around the townsites situated within the national parks. Although Banff and Jasper National Parks are experiencing similar problems (yet in varying levels of intensity), they have adopted different management approaches. Compared to Hinton, where there is little mountain biking activity in the surrounding area, Canmore has seen a large amount of use and development and has become one of Canada's most renowned mountain bike destinations.

If the situation in the Canadian Rocky Mountains is compared with the conditions in the Marin Municipal Water District, the birthplace of mountain biking, one possible future

outcome in the management of the mountain bike activity can be visualised. The scenario that has evolved in California might seem somewhat exaggerated, yet possible should the use of protected areas in the Canadian Rocky Mountains increase at a similar rate.

Findings:

A few findings will be summarized in the following bullet points:

- major cities (Calgary and Edmonton) dictate the use distribution of recreational activities in the Canadian Rocky Mountains.
- mountain biking opportunities are becoming restricted in the traditionally developed areas, whereas user groups in new areas are developing new trail systems.
- mountain bikers are constructing illegal trails or using game trails as they are becoming more frustrated with the local situation.
- trail restrictions are due to an increase in human use, not because of the intrinsic impacts of the mountain biking activity.

## Chapter 8: Management Strategies and Actions

### *Introduction*

Use is increasing and management needs to be geared towards anticipating, planning for, and controlling use in the future years ... we need to plan for the future of bicycle use on a county-wide ... or agency basis (Chavez, 1996a: p. 21).

The advent of new recreation activities are often a challenge for land managers who have to balance conflicting activities and other mandates of their agencies, such as the preservation of ecological integrity. Although mountain biking emerged as a fringe sport in the 1970s, it has outlived the fad stage and reached the attention of the general public in the early 1980s. However, even after approximately 20 years of mountain bike use in the Canadian Rocky Mountains, most agencies have not devised specific mountain bike policies or management strategies. Many agencies are merely reacting to problems, rather than using proactive management measures. Although the majority of this study's respondents from land-use agencies stated that no specific management actions were taken to control mountain biking in their jurisdiction, many management strategies indirectly affect the mountain biking community.

Chavez (1996a, 1996b) and Chavez *et al.* (1993), in examining the management strategies of the USDA Forest Service and the USDI Bureau of Land Management, determine three management options: direct, indirect and bridge-building management techniques. Figure 23 demonstrates possible strategies and actions that land managers can adopt to control mountain biking in the Canadian Rocky Mountains. These might differ among regions and agencies due to a variety of factors, such as level of use, agency mandate, proximity to major population centres and degree of organisation by the local mountain biking community.

Chapter 7 has demonstrated some of the tools employed by land-use agencies in order to manage issues associated with mountain biking, Figure 24 illustrates some of these tools taken to manage certain issues associated with mountain biking. One can conclude from the situational analysis that, the higher an area is protected, the more stringent are the actions taken to limit negative impacts of mountain biking and human use in general.



### ***Banff National Park***

Banff National Park has changed its management strategy since the Bryant Creek Trail closure, which featured very little-to-no input from the mountain biking community, to include more bridge-building tools in conjunction with rigorous direct actions. It also indirectly controls the type of mountain biking that legally occurs in the national park, as only trails with cross-country characteristics are designated for mountain bike use. The problem of informal trails, especially around Banff and Lake Louise townsites, can only be managed successfully by bridge-building tools and by further incorporating the local mountain bike community in the decision-making process.

### ***Jasper National Park***

Contrary to Banff National Park, Parks Canada has “recommended” (Parks Canada, 2000a) a number of trails for mountain biking, but any trail established by Parks Canada is open to mountain bike riders unless declared closed. (Note the difference in management approach to Banff National Park.) “Jasper has been a lot more open toward bikes than Banff has. Largely because they are in the middle of nowhere” (Eastcott, pers. comm. 2000). As a consequence, mountain bike riders riding on a designated hiking trail cannot be charged under the National Parks Act and regulations, unless a Superintendent’s order is in place. These orders are, however, not applicable as a general management tool and are used only in exceptional circumstances (Bradford, pers. comm., 2000; Kolesch, pers. comm., 2000).

At the local level, ... the adoption of policy really is pretty much *ad hoc*. Mountain biking kind of ... evolved and became traditional over time and then we tried to formalise that tradition by saying: ‘Here are some trails where you can or cannot mountain bike’ (Kolesch, pers. comm., 2000).

### ***Kananaskis Country***

The only management tool applied by Alberta Environment is the separation of less compatible recreational activities, such as horseback riding and mountain biking, in order to prevent conflicts. Consequently user groups have concentrated themselves on their respective areas, thus eliminating contact and conflict. Horseback use, for example, is concentrated in the Sheep Valley, whereas the most popular mountain bike areas in Kananaskis Country are the Jumpingpound and Elbow Valleys.

***Invermere/Radium and Golden***

Mountain biking in Columbia Valley of British Columbia is still in the initial development stage with considerable potential for further growth. However, the main factor influencing development is the cooperation between the mountain biking community and the Recreation Officer of the BC Forest Service. Both, the Golden Mountain Bike Club and Jon Wilsgard (Resource Officer, Recreation) have made an effort to collaborate on certain projects, which has led to the development of a diverse trail system on the Crown Land surrounding the town of Golden.

The mountain biking community in Invermere, on the other hand, is only starting to request permission for trail building. The successful development of a new mountain biking destination, as envisioned by the KTBA (Kootenay Trail Builder Association) will therefore depend on the ongoing relationship between the club and Kreg Sky, Resource Officer (Recreation) of the BC Forest Service.

Management and planning recommendations are given in the following chapter in order to help land managers in using proactive strategies for controlling mountain biking opportunities.

## **Chapter 9: Planning and Management Recommendations**

This research project has been undertaken in order to enable land managers to make informed choices on their management strategies. It has demonstrated a few issues that need to be dealt with when managing mountain biking and planning recreational opportunities. Although the recommendations will differ depending on the specific situation of the area or protected area, a few fundamental recommendations will be given to help land managers deal with the mountain biking and the connected concerns.

### ***1. Communicate with the Mountain Biking Community***

The success of any management action will depend on the support of the local mountain biking community. However, communication should continue throughout the period of restriction. The land manager should explain the nature of the management action, its reasons and projected outcome. The clarification of issues will be an incentive to local mountain bike riders to observe future restrictions.

### ***2. Educate Residents and the Seasonal Population***

All recreationists, especially the seasonal population, should be educated about their impact on the biophysical environment and about specific areas that are critical habitat for keystone species.

Although chapter 4 has demonstrated that mountain biking in ideal conditions does not have a greater negative impact than hiking, the activity can cause considerable environmental degradation if riders are inexperienced and if they ride in adverse (e.g., wet conditions). The main causes of damage to the biophysical environment are wildlife disturbance, skidding and spinning of the rear wheel and leaving the established trail. It is therefore necessary to promote a low impact riding technique (e.g., the Rules of the Trail of the International Mountain Bicycling Association) in order to minimise the degradation of the trails and the surrounding environment. (See Appendix M.)

### ***3. Monitor Recreational Trends***

Outdoor recreation activities are dynamic in nature as new trends and new technologies emerge that can change the characteristics of the activity. As mentioned in chapter 3 mountain biking has already evolved into three different types, with freeriding only being developed a few years ago. The monitoring of recreational trends is one prerequisite to

assure a frequent review of appropriateness and proactive management and to identify potential impacts early.

#### **4. Use Science to Support Management Actions**

Actions to manage mountain biking are often taken without supporting scientific experiments or reviews. Although a reduction of user levels was ultimately achieved, in the case of the Bryant Creek Closure, there was no scientific evidence for the success of the restriction. Irregularities in the use survey prior to the closure did not gain community support. Management actions should be supported by appropriate scientific research whenever possible.

#### **5. Use Adaptive Management and the Precautionary Principle**

Adaptive management<sup>38</sup> and the precautionary principle<sup>39</sup> should be employed in those cases when scientific research is not available. Accordingly, learning should become an integral part of the planning process when there is no scientific precedent to achieve the policy objectives. Continuous monitoring and evaluation should follow experiments, in order to be able to choose the best alternative. “Adjustments, in light of knowledge gained through experience, are critical components of the process” (Parks Canada Agency, 2000b: 3–2).

#### **6. Establish Sacrifice Areas**

Increased human use poses severe problems in many fragile ecosystems within protected areas of the Canadian Rocky Mountains. On the other hand, a high density of protected areas within a small area that is close to major population centres (e.g., the Banff/Canmore/Kananaskis region) make protected areas ideal playgrounds for recreationists. It is therefore necessary to actively provide recreational opportunities in less fragile sacrifice areas – either within or outside of protected areas – in order to alleviate the stress imposed on fragile ecosystems.

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<sup>38</sup> “In its broadest sense, adaptive management is done whenever the dual goals of achieving management objectives and gaining reliable knowledge are accomplished simultaneously; it is a scientifically defensible means of, liter-ally, learning while doing” (Parks Canada Agency, 2000b: 1-17).

<sup>39</sup> “the principle emphasizes the need for care and caution when changes to the natural environment are contemplated” (Parks Canada Agency, 2000b: 1-17).

Chapter 7 has demonstrated that the majority of illegal trails are built in close proximity to townsites. It would, however, still be necessary to undertake a user preference study of mountain bike riders (as presented in Appendix N) and combine the results with GIS data on the landscape and preferred wildlife habitat in order to separate human use areas from good wildlife habitat.

### ***7. Manage General Human Use***

Many problems (e.g., wildlife displacement) that have been identified in chapter 7 are associated with general use rather than just mountain biking. It is therefore necessary to find alternative ways of reducing total user numbers than drastic measures targeting and marginalizing only the mountain biking community.

### ***8. Limit Development in Wildlife Corridors***

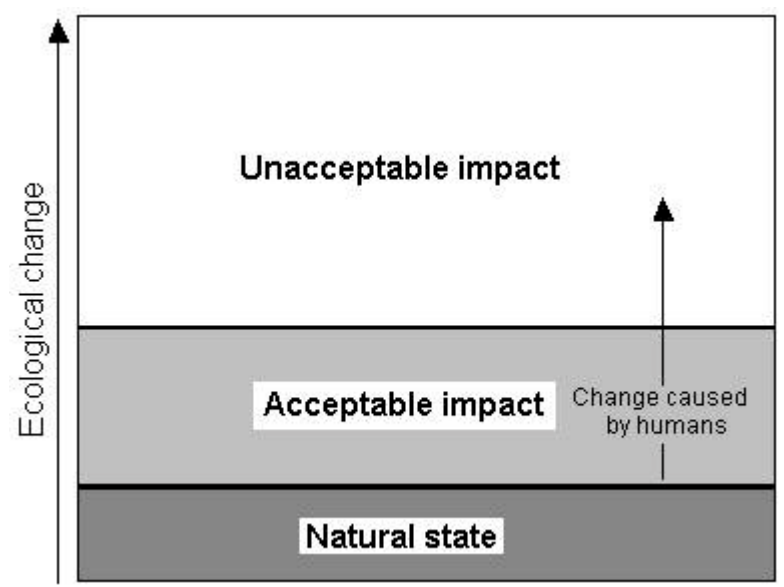
Banff National Park has already started the removal of developments (e.g., a bison paddock and airport) from important wildlife corridors. Other areas, however, still promote development projects yet start restricting recreational within the same wildlife corridors.

### ***9. Collaborate with Neighbouring Land Managers***

Management decisions taken in one jurisdiction are likely to affect neighbouring areas, since use will shift to alternative mountain biking opportunities. Regional collaboration is hence needed in order to successfully manage mountain biking in the Canadian Rocky Mountains.

## Appendix

**Figure 1:** Diagram explaining the LAC concept



Source: Hammitt & Cole (1998)

Figure 2: Basic decision-making process in recreation management

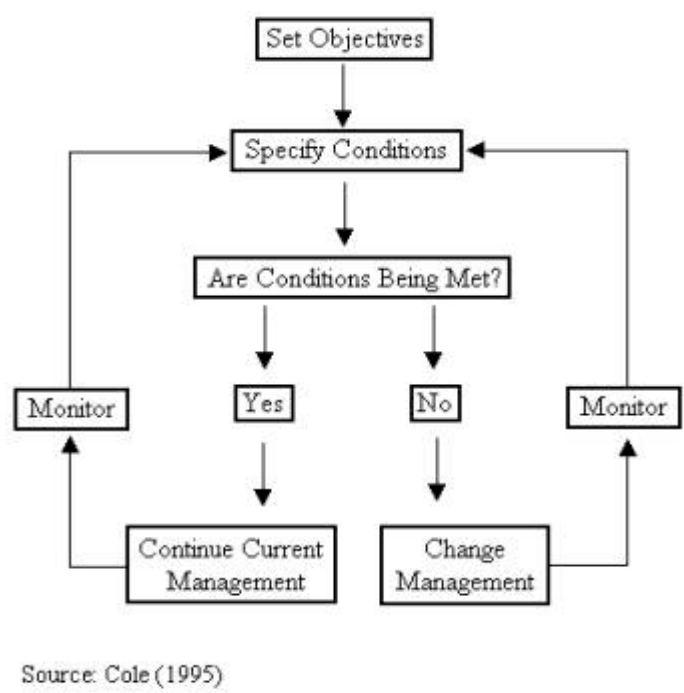
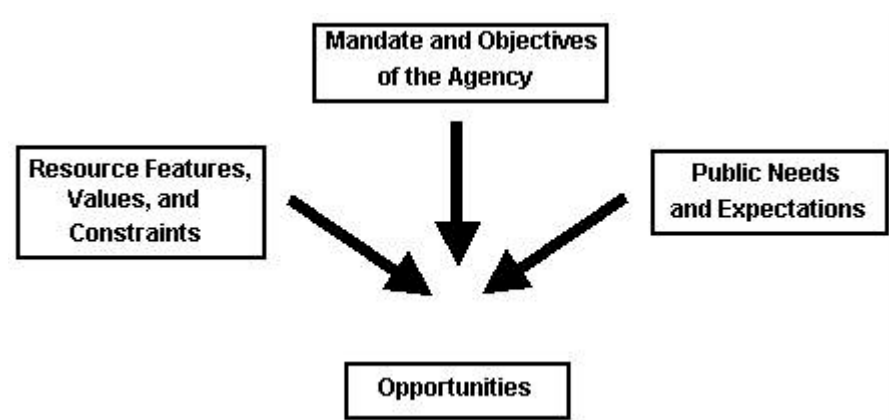


Figure 3: Simplified VAMP framework



Adapted from Nilsen (1994)

Figure 4: Evolution of the Bicycle

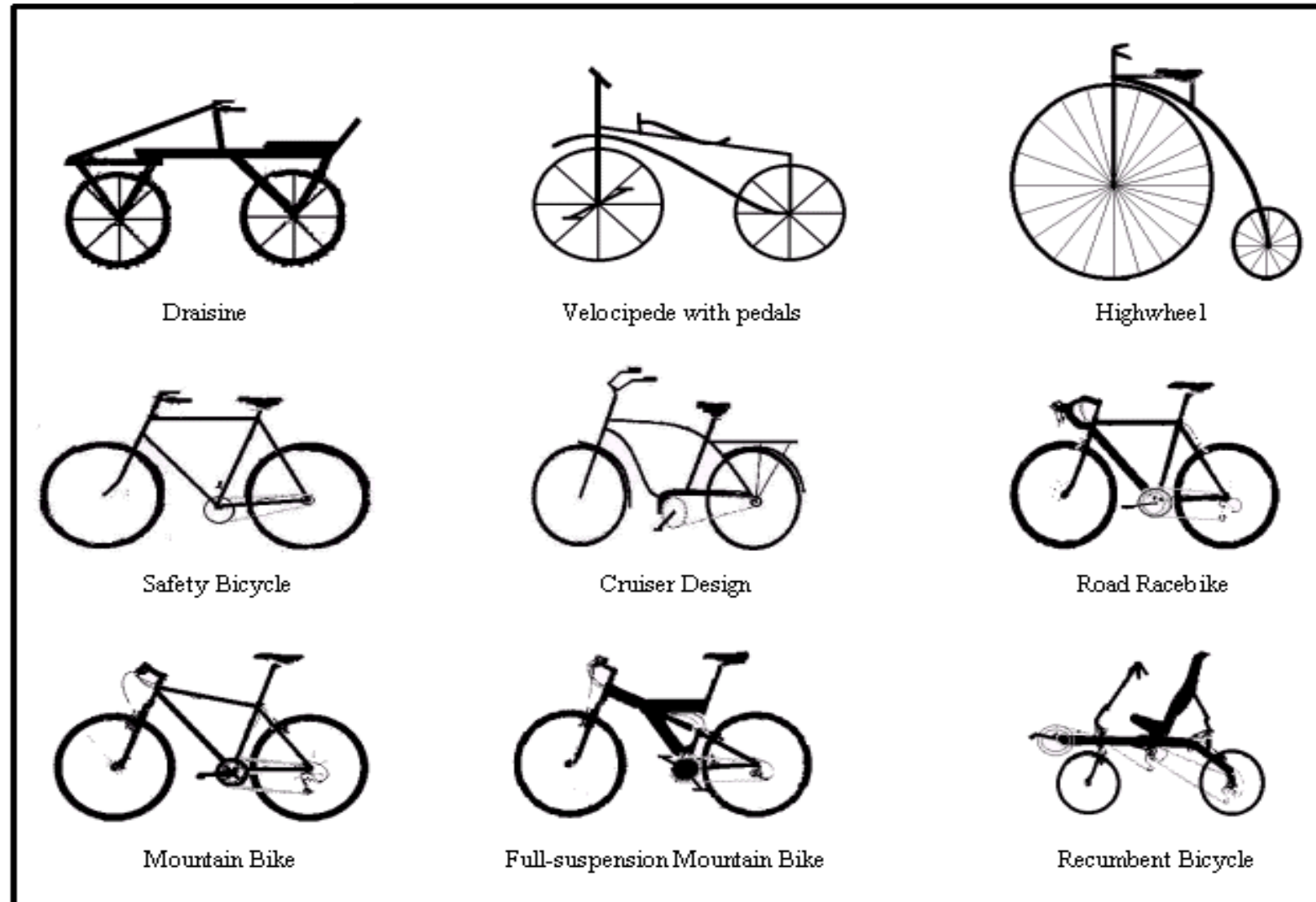


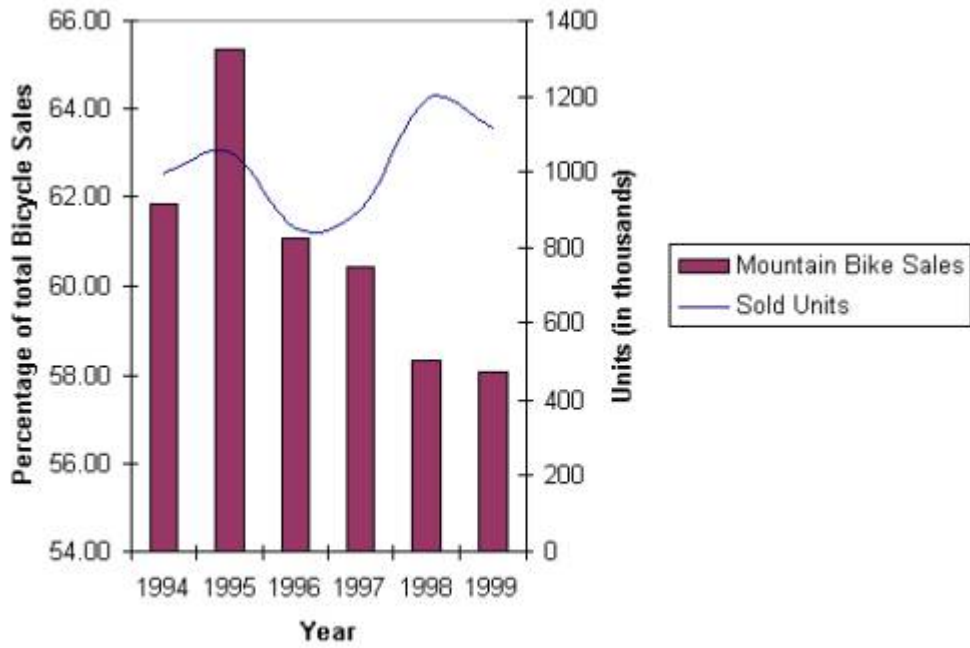


Figure 5: Technological advances since 1972

Year	Event	Year	Event
1972	Construction of probably the first fat tire clunker with derailleur.	1990	Durango, U.S., holds the first official (UCI sanctioned) Mountain Bike World Championships.
1976	The first custom-built mountain bike frame was built.		Metal-matrix composite technology is introduced into bicycles.
1977	Appearance of the first mountain bikes with custom-built frame, latest components, front and rear derailleurs.		GripShift, a new twist shifter, is added to some commercially available mountain bikes.
1979	Creation of the first mountain bike company: "MountainBike".		Construction of the first serious suspension fork (Rock Shox) by Paul Turner.
1982	Univega and Schwinn build factory-made mountain bikes.	1991	Tour de France VTT, the mountain bike equivalent to the Tour de France, is started.
	Specialized introduces the first production mountain bike called the Specialized Stumpjumper.	1992	Merlin introduces the first full-suspension cross-country bike that weighs less than 20 pounds.
1984	Shimano introduces the first Deore XT component group.	1994	Air is used for the first time in suspension forks.
1985	Brian Skinner produced the first mountain bike with rear suspension.		Female NORBA racing licence holder double since 1990, reaching a number of 2000.
	Development of Toe Flips for easier step in through pedal rotation.		NORBA participation increases by 140% to 23,000 since 1990.
	Gary Klein patents his oversized aluminum frames.		A US\$ 10 surcharge on adult mountain bikes is proposed to "offset the impact cyclists have on the environment".
1986	The first mountain bike with a titanium frame is built.	1995	Mountain bikes constitute 65% of the bicycle market.
	Index shifting is brought onto the market.		The noun "Mountain bike" is included in the Merriam-Webster Collegiate Dictionary.
1987	Photos of the first full-suspension bike (10 inches of front and rear travel) with disc brakes appear. However, no rideable model is available.		The Pan-American Games now contain a mountain bike event.
	First unofficial World Championships are held in Mammoth.		Shimano presents the V-brakes.
	Iditabike, a 200 mile race through Alaska, is started for the first time.	1996	Cross-country mountain biking becomes an Olympic sport.
1988	First production series of an aluminum frame.	1997	The first production thermoplastic carbon-fibre mountain bike is released.
	Introduction of the clipless pedal to mountain bikes.		The term "freeriding" is coined.
	First full-suspension mountain bike is presented at the Long Beach Trade Show.	1998	More full-suspension mountain bikes are available than mountain bikes with no suspension.
	The International Mountain Bicycling Association (IMBA) is set up.		Dow hill entries for races start to exceed cross-country entries.
	The Grundig Challenge Series, the forerunner of the Grundig World Cup Series, starts.	1999	CamelBak constructs its hydration pack that greatly increases possible travelling distances.
1989	Creation of a carbon-fibre bike by Yeti.	1999	Anatomically friendly saddles start coming up on the market.
	Mountain bike sales outnumber the sale of road bike models in the U.S. for the first time.		Shimano introduces its computer, Flight Deck, that is linked to the shifting mechanism.
	Coil-sprung seatposts make their way on the market.	2000	The scene discusses the use 29-inch-w heels.
Presentation of under-the-bar shifting by Shimano and Suntour.	The Freeride World Championships due to be held in Whistler, B.C., are canceled due to a lack of sponsoring.		

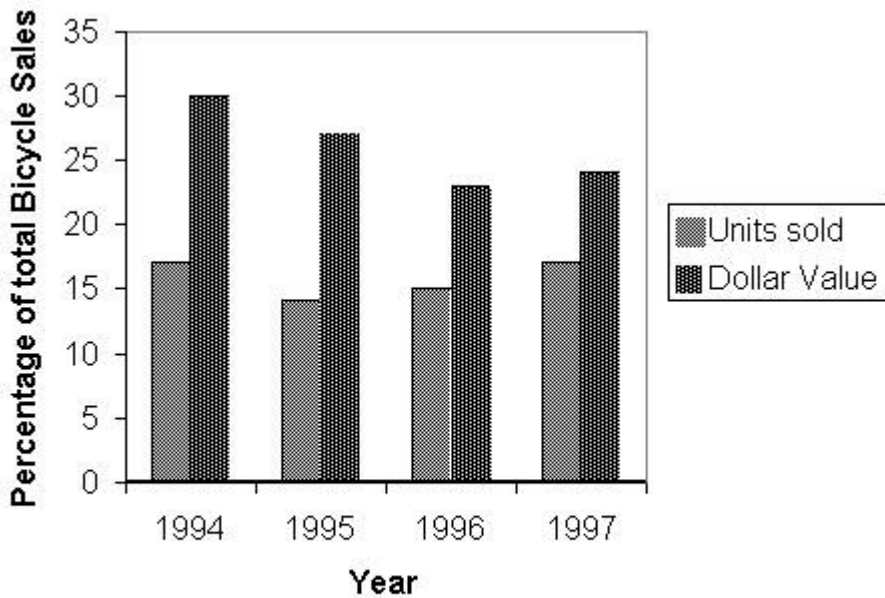
Sources : Berto (1999), Hope (1997), Mountain Bike (January, 2001)

**Figure 6:** Mountain Bike Sales in Canada, 1994-1999



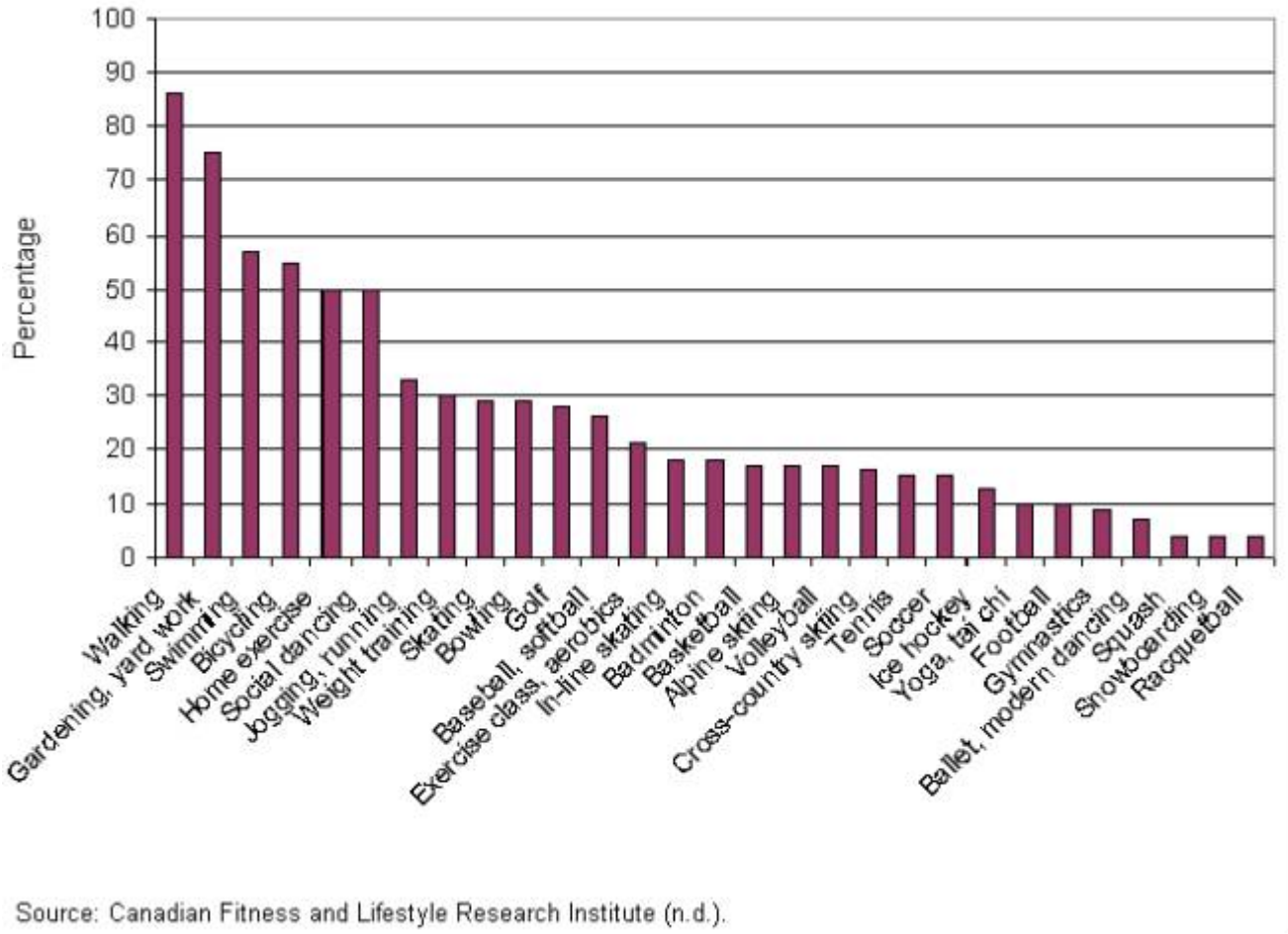
Source: CSGA - Sport Vision (2000).

**Figure 7:** Mountain Bikes sold in Canadian Bicycle Shops, 1994 -1997



Source: CSGA - Sport Vision (2000).

**Figure 8:** Favourite Recreational Activity of Canadians in 1998

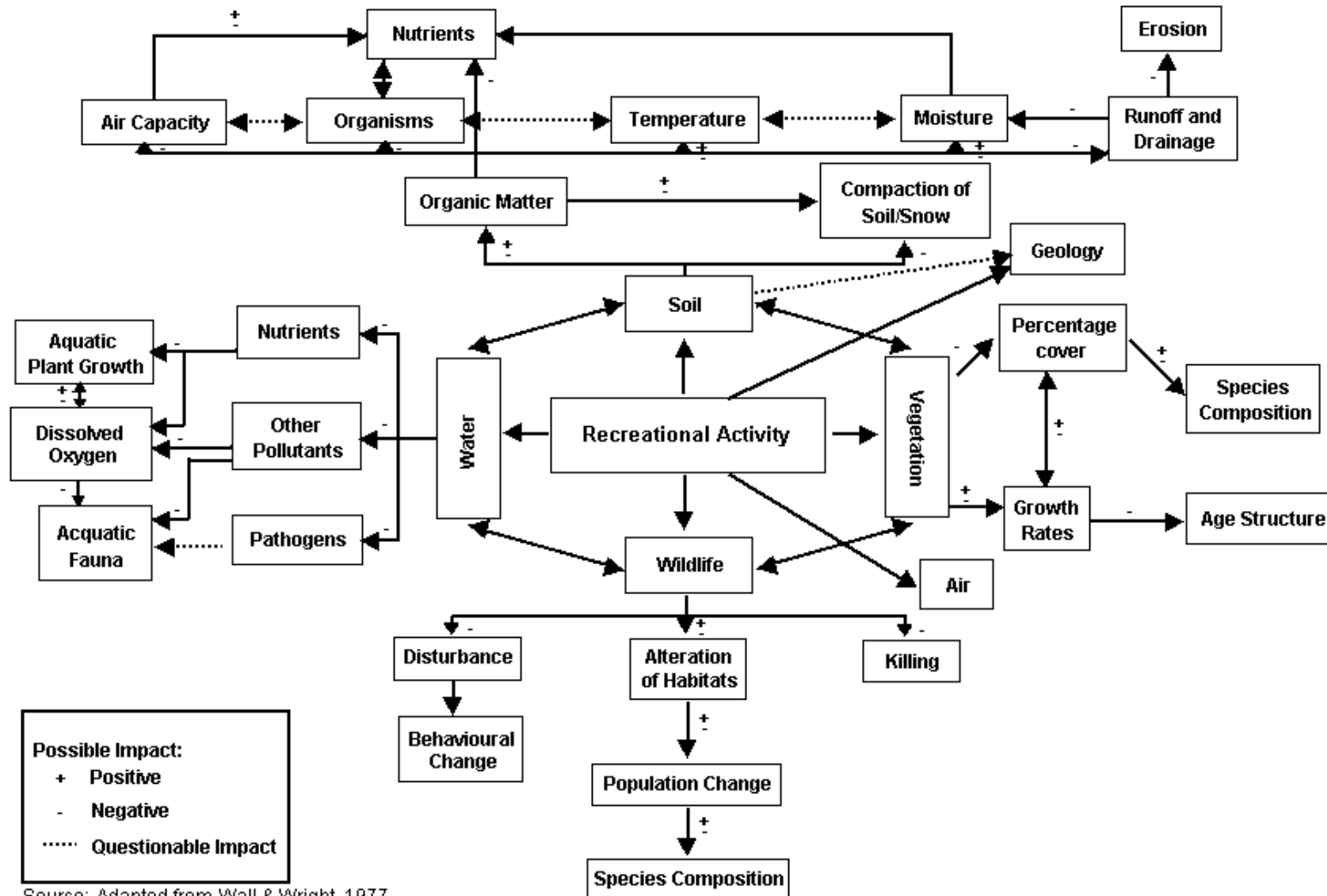


**Figure 9:** Indicators of physical damage

Trail proliferation	Trail incision and soil loss
Trail widening	Area of barren core
Vegetation cover loss	Area of barren ground
Visible erosion	

Source: Weir (2000).

Figure 10: Biophysical Impacts of Recreational Activities



Source: Adapted from Wall & Wright, 1977.

Figure 11: The Forces Acting on the Bicycle and the Soil

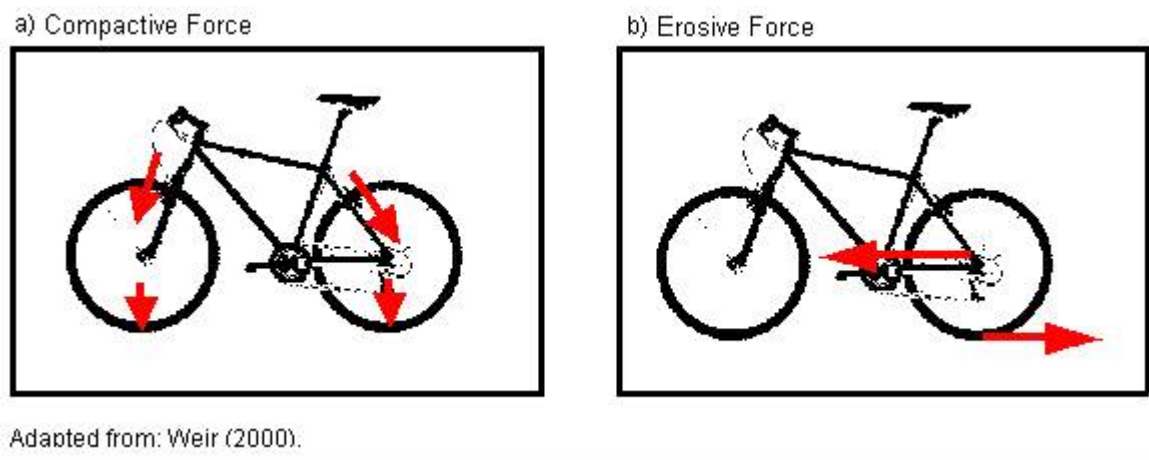


Figure 12: Recreational Impacts on the Vegetation Layer

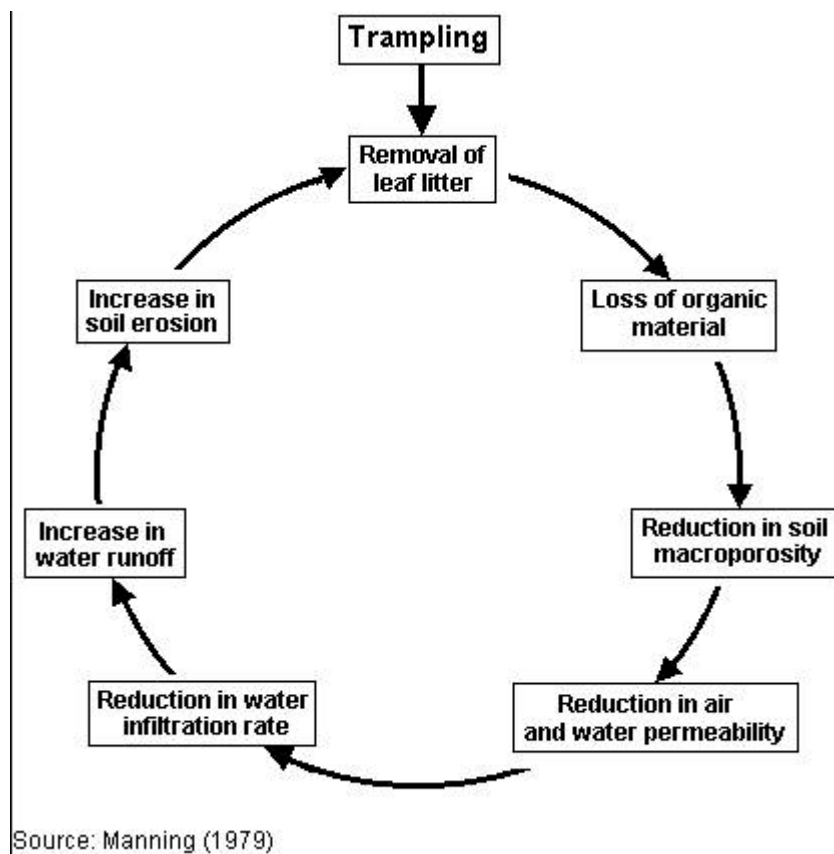


Figure 13: Schematic Representation of Vegetation Loss in

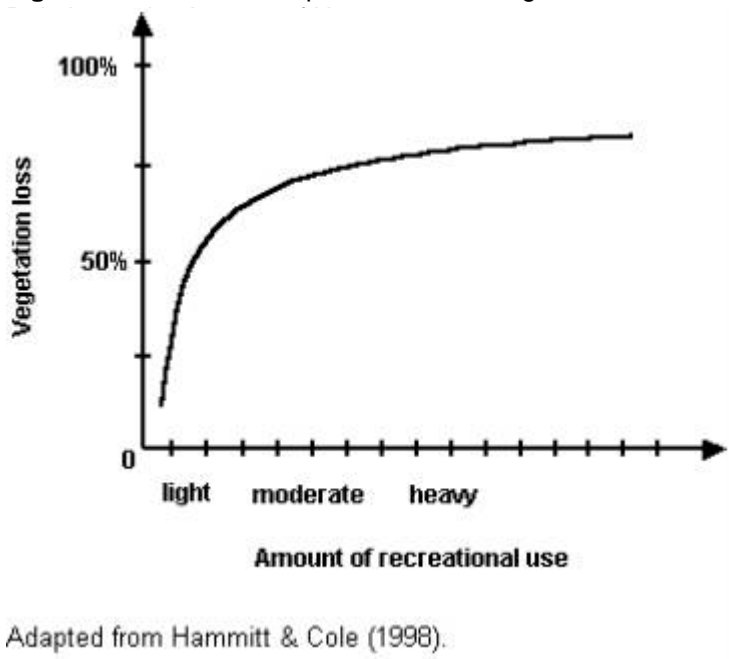


Figure 14: Behavioural Responses of Wildlife to Disturbance

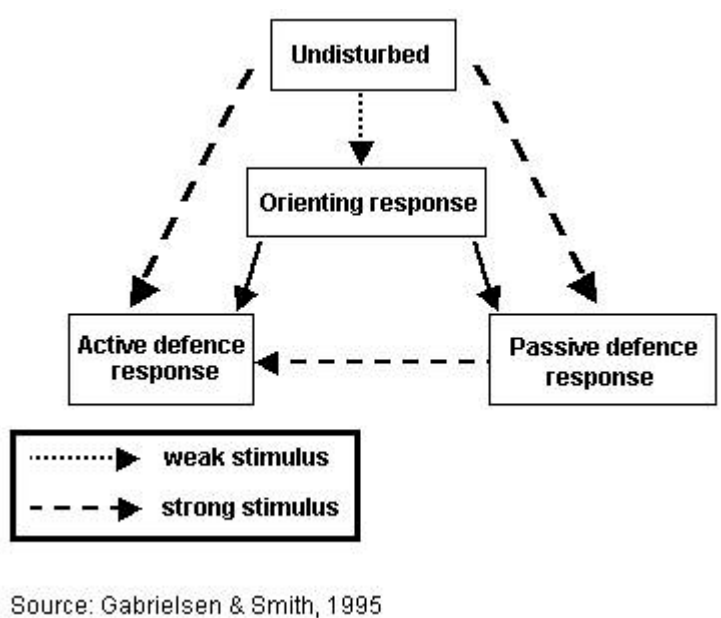


Figure 15: Physiological Adjustments of Wildlife Responses to Disturbance

	<b>Active Defense Response</b>	<b>Passive Defense Response</b>
	Behavioural activity	Inhibition of activity
<b>Increase</b>	Blood flow to skeletal muscles	Blood flow to skeletal muscle groups
	Metabolism	Blood to the digestive system
	Heart and respiratory rates	Heart and respiratory rates
	Body temperature	Body temperature
	Blood flow to the brain and heart	Brain and heart blood flow
	Blood sugar	
	Oxygen consumption	
	Respiration depth	
<b>Decrease</b>	Blood flow to the gut	
	Gut motility	
	Digestive secretions	

Source: Gabrielsen & Smith (1995).

Figure 16: Potential Impacts of Recreational Activities on Other Users

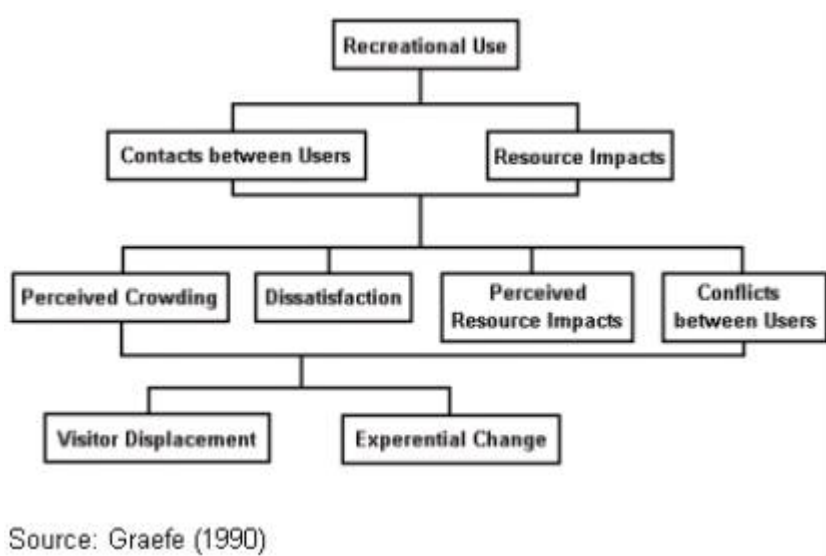


Figure 17: Recreation Management Objectives of Various Provincial Protected Areas in Alberta

	<b>Ecological Reserves</b>	<b>Wilderness Areas</b>	<b>Provincial Parks</b>	<b>Recreation Areas</b>
<b>Outdoor Recreation</b>	Non-consumptive, nature-oriented recreational use may be permitted subject to management guidelines	Provides wilderness travel and camping opportunities; the recreational experience is characterised by solitude, challenge and personal interaction with the environment.	Provides opportunities in areas of outstanding recreational potential in a natural, historical and cultural setting.	Provides opportunities in natural, modified or man-made settings. In an integrated resource management setting provides opportunities for a variety of dispersed outdoor recreation opportunities, including both mechanised and consumptive uses.

Adapted from Swinnerton (1993).



Figure 18: Policies of Protected Areas Regarding Mountain Biking

Activity	Provincial Nature Reserves	Wildland Provincial Parks	Natural Environment Provincial Parks	Heritage Rangelands	Recreation Areas
Cycling, Mountain Biking					

Not Permitted  
 Conditional Use  
 Permitted Use

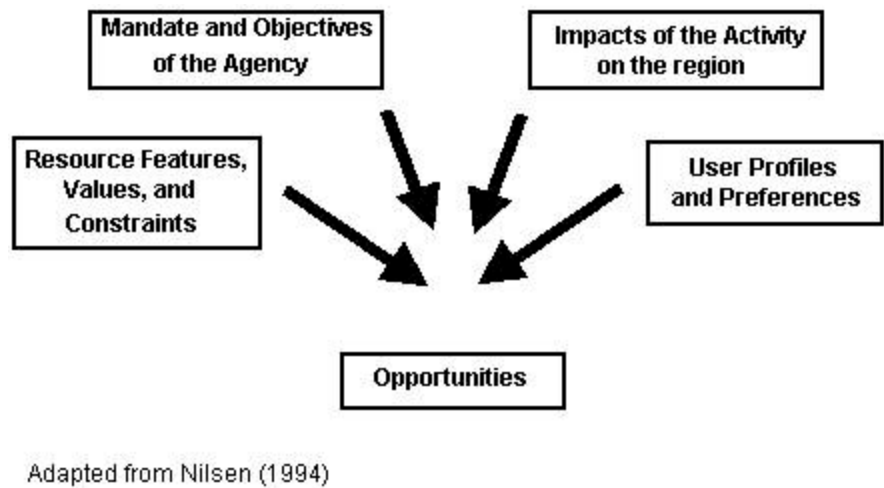
Adapted from Alberta Environment (1998b)

Figure 19: A Comparison of Current and Proposed Management Guidelines regarding Outdoor Recreation Facilities and Mountain Biking

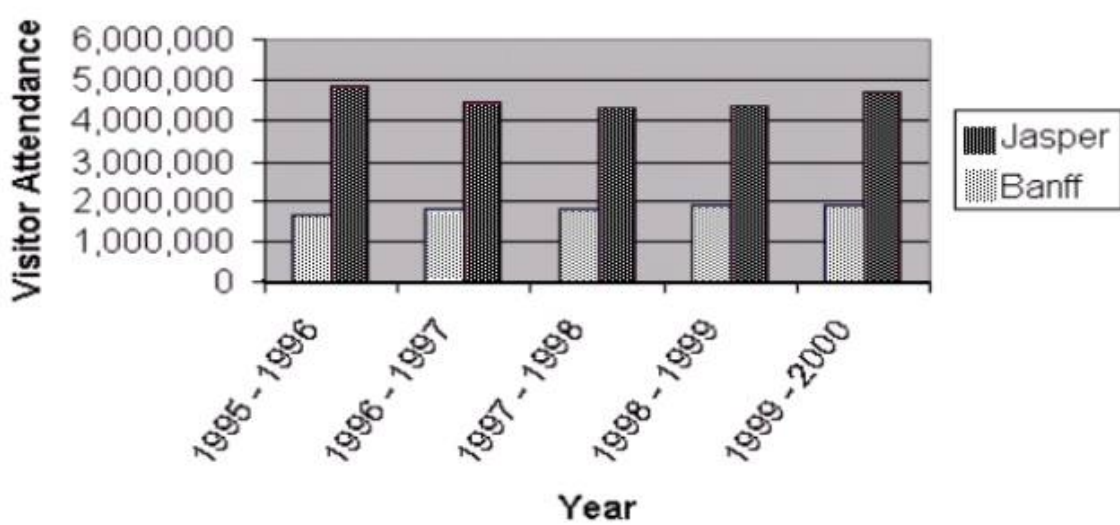
	Current Management Guidelines	Proposed Management Guidelines	Change
<b>Outdoor Recreation Facilities</b>	Prohibited in Wilderness Areas and Ecological Reserves. Restricted to trails and primitive facilities in Wildland Parks, Willmore Wilderness Park and Natural Areas. A wide range of facilities are permitted in Provincial Parks and Recreation Areas.	Prohibited in Nature Reserves. Limited to trails, trail bridges and backcountry campsites in Wildland Parks. Limited in Natural Environment Parks to those facilities that enhance heritage appreciation, recreation and tourism use associated with protection	Clear separation of Natural Environment Parks and Recreation Areas will clarify the intent of these sites. No change for Wildland Parks or Nature Reserves. The range of recreation facilities available in Natural Environment Parks will be narrower than cur
<b>Cycling, Mountain Biking</b>	Prohibited in Wilderness Areas and Willmore Wilderness Park. Generally restricted to roads and designated trails in Provincial Parks. Cycling may be permitted on routes as specified in the management plan in Ecological Reserves, Wildland Parks and Provinc	Prohibited in Nature Reserves. May be permitted on specific routes in Wildland Parks where use is already well established at the time of designation. Restricted to roads and designated trails in Natural Environment Parks. May be permitted in Wildland Par	Prohibited in Nature Reserves.

Adapted from Alberta Environment (1998b)

Figure 20: Framework used in this study



**Figure 21:** Number of Visitors to Banff and Jasper National Parks, 1995 - 2000



Source: Parks Canada (2000c)

**Figure 22:** List of Several Informal, Yet Well-Known, Trails in Jasper National Park

Trail Name	Description
Ho-chi-min	Multi-use, cleared by hikers and cross-country skiers, originally a horse trail, public knowledge of description.
Bike Toss	Trail through wildlife corridor, used by wildlife through blowdown section, used by hikers, experience human use since 1907.
Signal Mountain	Hikers coming from Skyline use as shortcut, old pack trail since 1930's.
Marmot Downhill	Partially on old pack trail, bike specific.
Razor Back	Multi-use old hiking/horse trail.
Ganges	Multi-use (hikers, joggers, dogs), partially follows old cross-country ski trail.

Adapted from Lemke (1999).

**Figure 23:** Possible Management Strategies

<b>Direct Management</b>	<b>Indirect Management</b>	<b>Bridge-building Management</b>
Closures and other restrictions	Educational materials and information	Personal interaction and cooperation
Law enforcement	Trail use designation	Communication
Speed limit		Trail maintenance by user groups
Facilitate trail construction		Volunteer patrols
Trail maintenance		Workshops
Trail design		
User group separation		

Figure 24: Summary of Strategies and Actions taken in the Canadian Rocky

Wildlife Displacement

Strategy	Management Action	Kootenay and Yoho National Parks	Banff National Park	Canmore	Kananaskis Country	Jasper National Park
Direct	Closures and other restrictions	n.a	✓	✓	no	✓
	Law enforcement	n.a	✓	no	no	✓
Indirect	Education and information	✓	✓	✓	✓	✓
	Trail use designation	✓	✓	no	no	✓
Bridge-building	Personal interaction and cooperation	n.a	moderate	some	n.a	some
	Communication Workshops	n.a	moderate	some	no	moderate

Public Safety

Strategy	Management Action	Banff National Park	Kananaskis Country	Jasper National Park
Direct	Closures and other restrictions	✓	✓	✓
	Law enforcement	✓	no	no
Indirect	Education and information	✓	✓	✓
Bridge-building		no	no	no

User Conflicts

Strategy	Management Action	Invermere /Radium	Golden	Kootenay and Yoho National Parks	Banff National Park	Canmore	Kananaskis Country	Jasper National Park
Direct	Closures and other restrictions	✓	✓	no	✓	no	✓	✓
	Facilitate trail construction	✓	✓	no	no	no	no	no
	User group separation	no	no	no	no	no	✓	no
Indirect	Education and information	no	some	some	extensive	no	some	extensive
	Trail use designation	✓	✓	✓	✓	no	✓	✓
Bridge-building	Communication	no	✓	no	✓	no	✓	✓
	Volunteer patrols	no	no	no	✓	no	no	no
	Workshops	no	no	no	no	no	no	✓

Resource Damage

Strategy	Management Action	Invermere /Radium	Golden	Kootenay and Yoho National Parks	Banff National Park	Canmore	Kananaskis Country	Jasper National Park	Hinton	Fernie
Direct	Closures and other restrictions	no	no	no	✓	no	no	no	no	no
	Trail maintenance	no	no	✓	✓	✓	✓	✓	no	no
	Trail design	no	no	no	no	no	no	no	no	no
Indirect	Education and information	no	✓	✓	✓	no	✓	✓	no	no
Bridge-building	Communication	no	✓	no	✓	no	no	✓	no	no
	Trail maintenance by user group	✓	✓	no	no	no	no	no	✓	✓
	Workshops	no	no	no	no	no	no	no	no	no

Informal Trails

Strategy	Management Action	Invermere /Radium	Golden	Kootenay and Yoho National Parks	Banff National Park	Canmore	Kananaskis Country	Jasper National Park	Hinton	Fernie
Direct	Closures and other restrictions	no	no	no	✓	no	no	no	no	no
	Trail maintenance	no	no	✓	✓	✓	✓	✓	no	no
	Trail design	no	no	no	no	no	no	no	no	no
Indirect	Education and information	no	✓	✓	✓	no	✓	✓	no	no
Bridge-building	Communication	no	✓	no	✓	no	no	✓	no	no
	Trail maintenance by user group	✓	✓	no	no	no	no	no	✓	✓
	Workshops	no	no	no	no	no	no	no	no	no

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