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# YOHO

## NATIONAL PARK OF CANADA

### *State of the Park Report*

APRIL 2008

## EXECUTIVE SUMMARY

The Yoho National Park of Canada State of the Park Report (2008) represents the Parks Canada Agency's first effort to present a comprehensive evaluation of the state of three key elements of Parks Canada's mandate: resource protection, visitor experience and public education. The primary purposes of the report are to:








- provide an analysis of the state of the park regarding ecological integrity, cultural resources, visitor experience and public education;
- report on the results of management actions in respect to resource protection, visitor experience and public education;
- provide key input to park management planning and serve as a tool for decision-making with respect to issues associated with each of the mandate elements and their relationships; and
- communicate the state of the mandate elements to stakeholders and the public.

The report is based on monitoring and research conducted by Parks Canada and external agencies. Information from existing monitoring and research programs was used to evaluate and rate the condition of a series of measures, which in turn were used to rate the suite of indicators presented in the table below.

Since this report is based on existing research and monitoring programs that have been designed to meet a wide variety of management objectives, there are inevitable variations in data quality and quantity, and some information gaps exist. For many measures, firm targets and thresholds have not been established. Where necessary, the professional judgment of Parks Canada specialists was used to develop condition ratings.

Future state of the park reports will be based on a consistent, comprehensive, long-term monitoring program that is designed to assess the condition of all key aspects of park management, including ecological and social indicators. It is expected that this program will be implemented in Yoho National Park in 2008.

The following symbols are used in this report:






Condition		Trend	
<i>Good</i> : the condition of the indicator/measure is satisfactory		<i>Improving</i> : the condition of the indicator/measure is improving.	
<i>Fair</i> : there is concern regarding the state of this indicator/measure		<i>Stable</i> : the condition of the indicator/measure is not changing.	
<i>Poor</i> : the condition of the indicator/measure is poor or low		<i>Declining</i> : the condition of the indicator/measure is declining.	
<i>Not rated</i> : there is insufficient information to determine condition		<i>Not rated</i> : there is insufficient information to determine trend.	N/R

A summary of ratings for a range of ecological integrity, cultural resource management, visitor experience, and public education indicators is presented in the following table. In the table a red square indicates poor condition, a yellow triangle fair condition, and a green circle good condition. A grey diamond indicates that there is insufficient information to provide a rating.

Arrows indicate the trend (increasing, stable or decreasing) for the particular indicator as it relates to ecological integrity, cultural resource management, visitor experience or public education. Due to data limitations, including lack of recent inventories and evaluation, trends will not be reported for cultural resource measures and indicators.



## Heritage Resource Protection

### Ecological Integrity (EI)

Native Biodiversity		Overall, the condition of this indicator is rated as <i>fair</i> with a <i>stable</i> trend. The populations of some wide-ranging species like grizzly bears are of concern. Highway and railway mortality is a significant threat to many wildlife species.
Climate and Atmosphere		Mean temperatures are increasing, snowpack is decreasing, and glaciers are receding. Reference conditions and targets have not yet been determined, so this measure is not rated.
Aquatic Ecosystems		The general condition of aquatic ecosystems is rated as <i>fair</i> with an <i>improving</i> trend. Water quality and quantity generally reflect the expected range of natural variation. Aquatic connectivity is a concern, as several highway and railway culverts hinder or block fish movement. The effects of wastewater treatment facilities on aquatic ecology are a concern in specific locations, although recent upgrades are showing positive results.
Terrestrial Ecosystems		This indicator is rated as <i>fair</i> with a trend toward <i>declining</i> ecological integrity. Past management practices, such as wildfire suppression, have contributed to significant forest insect and disease concerns. The extent of non-native plants in the park is increasing as a result of human activity and development.
Regional Landscape		This indicator is rated as <i>fair</i> with a <i>stable</i> trend. Steady growth in regional population and ongoing development adjacent to the park are creating ecological pressures within the park through increased traffic and access from provincial lands. Although progress has been made toward reestablishing fire as a dominant ecological process to improve habitat conditions, continued work is required.





## Heritage Resource Protection





### Cultural Resource Management (CRM)<sup>1</sup> and Palaeontological Sites

Resource Condition		Cultural resources are generally in <i>fair</i> condition. Some mitigative actions have been taken to reduce threats to the integrity of cultural resources. Monitoring and conservation measures for Level II resources are undertaken relatively infrequently, as Level I resources have recently been a higher management priority. The Burgess Shale and related collections are considered to be in <i>fair</i> condition.
Selected Management Practices		Knowledge of the state of existing cultural resources is incomplete. Inventories are generally out-of-date, and lack of an up-to-date Cultural Resource Management Plan hinders overall management of Level II resources.

<sup>1</sup> National Historic Sites (Level I resources) are not included in this evaluation, as they are subject to separate management plans and reporting requirements.

## Visitor Experience (VE)

Understanding Visitors		<p>Of the 600,000 visitors to Yoho National Park each year, over half are from outside of Canada. Roughly 35% of visitors were seeking a “Premium Experience” and spending multiple nights in the mountain parks. Social science research continues to improve our understanding of park visitors.</p>
Providing Opportunities		<p>A wide range of visitor opportunities is available, from personal group interpretation to wilderness experiences offering solitude and adventure. Yoho provides good opportunities for driving, sightseeing and hiking, the most popular activities in the park. However, some assets require attention, and improvements to visitor facilities are ongoing. More evaluation is required to ensure that these offerings are meeting the needs and expectations of a changing market.</p>
Quality Service		<p>Parks Canada wants at least 50 % of visitors to be “very satisfied” with their visitor experience. In the Mountain National Parks, 82 % of visitors surveyed in 2003 rated their park experiences as “extremely enjoyable”.</p>
Connecting with Place		<p>Memorable park experiences often stem from having an emotional bond to the place. Some information on this new indicator is presented, but data are too limited to provide a condition rating.</p>

Public Education (PE)		
Understanding Audiences		While visitor satisfaction with the quality and availability of educational programs in the mountain parks is high, participation rates are generally low. More evaluation of park audiences is required.
Extending our Reach		Training is provided to commercial sector employees so they can provide useful and accurate information to visitors. Parks Canada works with a variety of organizations and businesses to improve and promote visitor information sources and educational opportunities.
Facilitating Understanding		Yoho National Park uses a range of methods to facilitate understanding, including interpretive programs, non-personal media, and certification of commercial guides. Surveys indicate reasonable success in educating visitors about key Parks Canada messages and programs.
Influencing Attitudes		Not enough information is available to rate this indicator. Studies indicate that continued public education might be an effective strategy for changing perceptions and gaining public acceptance of park management actions. More social science research is required at the park and national levels.

Ecological integrity within Yoho National Park is generally considered to be *fair*, indicating that concern is warranted. The overall trend is *stable*. Several individual measures are considered to be in *poor* condition, and some indicators and measures show *declining* trends. The long-term viability of some regional populations of wide-ranging species such as grizzly bear remains uncertain as a result of many pressures arising both from within and outside of the park. Within the park, wildlife mortality related to highways and railways is an important concern. Habitat loss related to development, fragmentation related to forest harvesting and road development, and increased human activity on adjacent provincial lands contribute to these concerns.

The overall state of cultural resource management and palaeontological sites in Yoho National Park also represents a challenge for Parks Canada. To date, the focus of management efforts has been on the Burgess Shale (Burgess Shale fossils and quarry sites are included with cultural resource management, as they are subject to similar impacts and management approaches as human-made resources) and the Kicking Horse Pass and Twin Falls National Historic Sites. The National Historic Sites are not included in this State of the Park evaluation, as they are subject to their own management plans and evaluations. The Level II cultural resources covered in this report have been a lower management priority, which is reflected in the *fair* to *poor* ratings.

While less quantitative data are available to rate visitor experience and public education, some general trends for these key elements can be inferred. Both elements have recently received

increased attention and resources from Parks Canada in recognition of their importance in connecting Canadians and international guests to the national parks. Parks Canada acknowledges that unless public understanding, appreciation and support for Canada's national parks are maintained, the future of our parks and their ecological integrity will be uncertain.

Visitor experience in Yoho National Park is rated as *good* with an *improving* trend overall. Significant progress has been made in recent years to improve or restore outdated visitor facilities, which is expected to build on an existing foundation of relatively high visitor satisfaction levels.

While there has also been progress in updating and improving educational programs and information sources within and outside of the park, public education is generally considered to be in *fair* condition with an *improving* trend

The Yoho National Park of Canada Park Management Plan presents a range of strategies to address previously identified ecological, visitor experience and public education challenges. Many of those challenges are highlighted in this report. Since the Park Management Plan was approved in 2000, many actions arising from those strategies have been implemented or are underway. These include:

- Improvements to visitor facilities at popular front-country locations, including new washrooms at Emerald Lake, Spiral Tunnels and Takakkaw Falls and new interpretive media at Spiral Tunnels.
- Reopening of the Chancellor Peak campground, which was closed for several years due to infrastructure problems.
- Development of site guidelines for commercial accommodations at Emerald Lake Lodge, West Louise Lodge and Cathedral Mountain Chalets. Redevelopment of Cathedral Mountain Chalets under the new guidelines.
- Implementation of key actions from the Field community plan, including construction of a new wastewater treatment facility to meet Parks Canada leadership targets, removal and rehabilitation of the trailer court area, and improvements to water supply infrastructure.
- Forest thinning and burning projects to reduce wildfire risk, manage mountain pine beetle and restore habitat diversity at Hoodoos campground, the village of Field and Emerald Lake Lodge.
- Improvements to popular backcountry campgrounds, including separation of tent sites from food storage facilities to reduce potential bear conflicts at Lake O'Hara, McArthur Creek and Yoho Lake. Removal of Float Creek campground, an underutilized facility located in quality bear habitat. Reconfiguration of trails to reduce potential bear conflicts in the Lake O'Hara area.
- Development of management plans for Kicking Horse Pass and Twin Falls Teahouse National Historic Sites. Major restoration work on Twin Falls Teahouse.

Cumulatively, these and other actions are expected to result in improvements to ecological integrity, visitor experience and public education in Yoho National Park. As long-term monitoring programs are further developed and sufficient time has passed for the full effects of actions to be realized, more specific measurement and reporting of results is anticipated.



The existing Park Management Plan recognizes the majority of the issues identified in this report and in most cases it provides appropriate direction to address those challenges and opportunities. In some cases, the Yoho National Park State of the Park Report highlights specific areas that may benefit from additional attention as part of the upcoming management plan review. Of note is that visitor experience is approached largely from an asset-based rather than experiential perspective. Identifying key areas that can be addressed in an integrated way to improve resource protection, visitor experience and education represents an opportunity for improvement.



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## 1.0 INTRODUCTION

Parks Canada Agency is pleased to report to Canadians on the current condition of Yoho National Park of Canada. Based on monitoring and research information, the State of the Park Report provides an assessment of the key areas of Parks Canada's mandate: heritage resource protection, visitor experience, and public education. This is the first such report for the park.

State of the park reporting will be completed every five years in conjunction with the review of the Park Management Plan. The Yoho National Park Management Plan was approved in 2000 and reviewed in 2003. The next review is scheduled for 2008 in order to coordinate the management planning cycles for the mountain national parks (Kootenay, Banff, Mount Revelstoke, Glacier, Waterton Lakes, Yoho and Jasper).

The purposes of the State of the Park Report are to:

- provide an analysis of the state of the park regarding ecological integrity, cultural resources, visitor experience and public education;
- report on the results of management actions in respect of the key elements of Parks Canada's mandate: resource protection, visitor experience and public education;
- provide key input to park management planning and serve as a tool for decision-making with respect to issues associated with each of the mandate elements and their relationships; and
- communicate the state of the mandate elements to stakeholders and the public.

The process for state of the park reporting is relatively new and evolving. Monitoring programs are being developed for each key area of the mandate. Ecological integrity (EI) monitoring is the furthest advanced and new programs are being developed to measure the condition of cultural resources, visitor experience and public education. In 2008, Parks Canada will complete work to establish a long-term suite of indicators and measures. At present, there are a number of information gaps that exist. These gaps will be filled in subsequent reports as the park's monitoring programs develop.

The selection of the current measures and indicators was based on management plan objectives. The findings in the report are important for evaluating the effectiveness of management actions and for identifying deficiencies and adaptive and integrated strategies to be addressed during the review of the management plan.

### **Achieving the Vision for Yoho National Park**

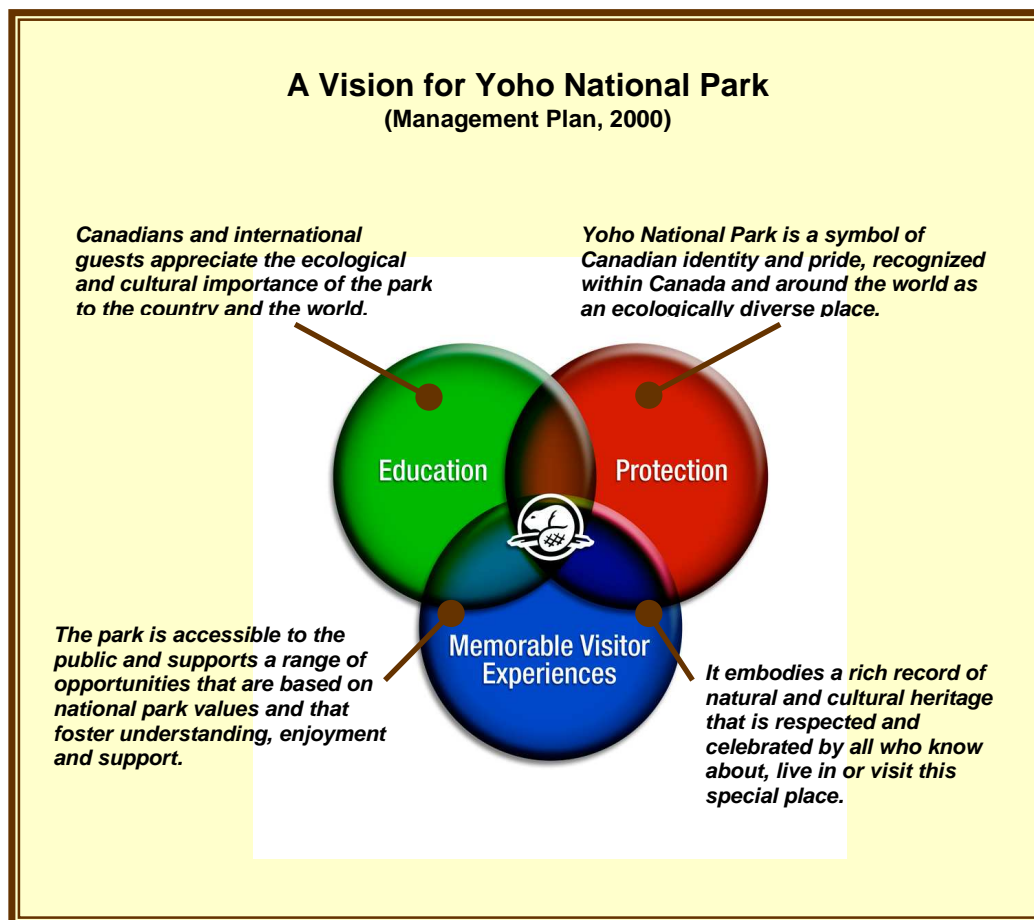
The Yoho National Park Management Plan establishes a vision that integrates protection, experience and education in ways that are mutually supportive and interdependent. Figure 1 illustrates how the vision elements achieve Parks Canada's integrated mandate. Without public appreciation and understanding of the value of Yoho's natural and human history, stewardship and protection of the park's ecological and cultural resources will not occur. Protection and presentation of Yoho's natural beauty, functioning ecosystems and heritage values are essential to providing visitors with a memorable park experience.

The management plan sets out core strategies to achieve the vision by:

- connecting Canadians to Yoho National Park through first-hand experiences and learning opportunities;
- managing human use without impairing the integrity of the park's ecological and cultural resources;
- setting limits to growth of outlying commercial facilities;
- restoring terrestrial and aquatic ecosystems;
- protecting and presenting cultural resources;
- collaborating with Aboriginal people on the protection and presentation of Aboriginal heritage in the park;
- partnering to manage shared wildlife populations and promote regional ecosystem health; and
- practicing open management through effective public participation.

The State of the Park Report provides measures of how well the vision for Yoho National Park is being achieved.

**Figure 1: Yoho National Park's vision for achieving Parks Canada's integrated mandate**



## Park Setting

Established in 1886, Yoho National Park encompasses 1,310 square kilometres representing the western slopes of the Main Ranges of the Rocky Mountains. Substantial portions of the park are in the alpine and subalpine ecoregions, dominated by steep peaks, cliffs and glaciers. A smaller area at the western end of the park is in the lower elevation montane ecoregion. Turbulent rivers, spectacular waterfalls and turquoise glacial lakes are noteworthy natural features of the park.

Many of British Columbia's plants and animals reach the eastern extent of their range in Yoho. The park's location on the western side of the Continental Divide results in relatively high precipitation, creating unique pockets of wet belt forest where coastal species such as devil's club, western red cedar and western hemlock thrive. The park is home to a broad range of wildlife, including mountain goat and grizzly bear.

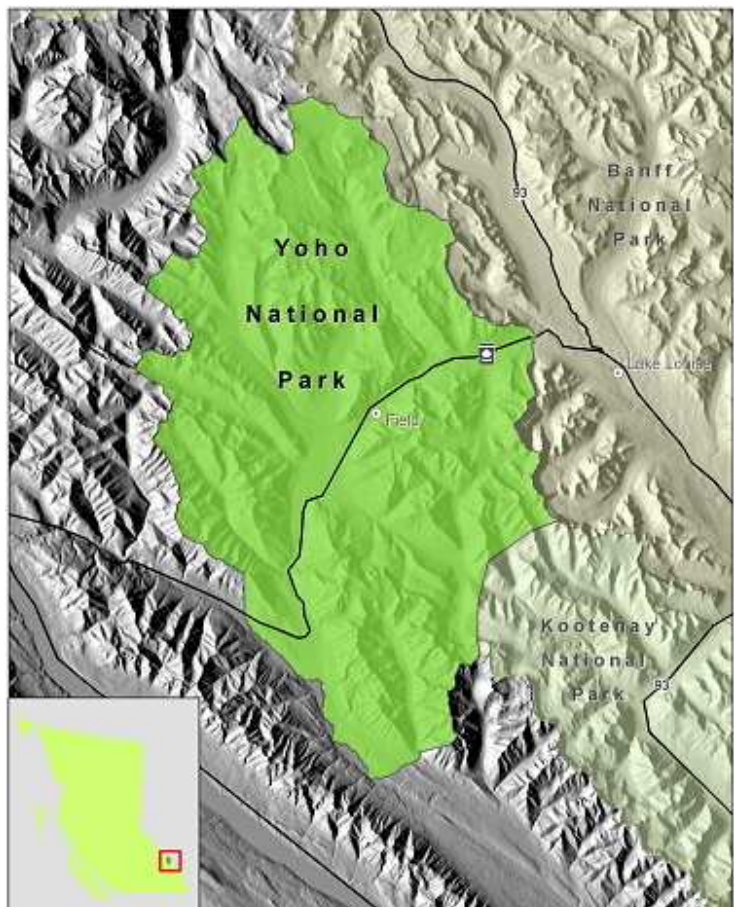
For thousands of years, the area, which is now Yoho National Park, was part of the traditional lands identified by the Ktunaxa (Kootenay) and Kinbasket (Shuswap) First Nations people. Archaeological evidence suggests the mountains were used primarily as seasonal hunting grounds. Groups also traveled across the mountains periodically to hunt bison on the plains east of the Rockies.

Much of the park's more recent history relates to the development of the Canadian Pacific Railway along the Kicking Horse Valley and through Kicking Horse Pass, which is commemorated as a National Historic Site. The Twin Falls Tea House National Historic Site is a backcountry lodge in the Yoho Valley originally developed by the railway.

The village of Field also owes its origins to the railway. Today Field is the primary service centre for park visitors and residents, providing a visitor information centre, restaurants and accommodations. The park also offers a wide range of visitor facilities and commercial accommodations at popular locations like Emerald Lake, Takakkaw Falls, Wapta Lake and Lake O'Hara.

One of the world's most important fossil finds, the Burgess Shale, is located in Yoho. Designated a World Heritage Site in 1981, the Burgess Shale Formation contains the fossilized remains of more than 120 marine animal species dating back 515 million years. The Burgess Shale World Heritage Site is now incorporated into the 20,000 km<sup>2</sup> Canadian Rocky Mountain Parks World Heritage Site composed of Yoho, Kootenay, Banff and Jasper National Parks and adjoining provincial parks.

Today, approximately 600,000 people per year visit the park. Many visitors enjoy the spectacular scenery from the Trans-Canada Highway corridor as it passes through the park along the Kicking Horse River. Many use the highway simply as a scenic route as they travel between Calgary and British Columbia. Many



others stop along the way to enjoy picnic areas, viewpoints, interpretive trails, campgrounds and the facilities in Field. Emerald Lake and Takakkaw Falls are popular sightseeing, walking and picnicking locations.

A significant number of visitors come to the park to hike, both on short day trips and longer backpacking trips. The park offers over 400 kilometres of hiking trails, mostly concentrated in the popular and well developed Yoho Valley and Lake O'Hara areas. More primitive trails and routes extend further into more remote backcountry areas where there is little human activity. Approximately 95 % of the park is declared wilderness, which provides outstanding wilderness recreation opportunities, while limiting the scope and scale of human developments.

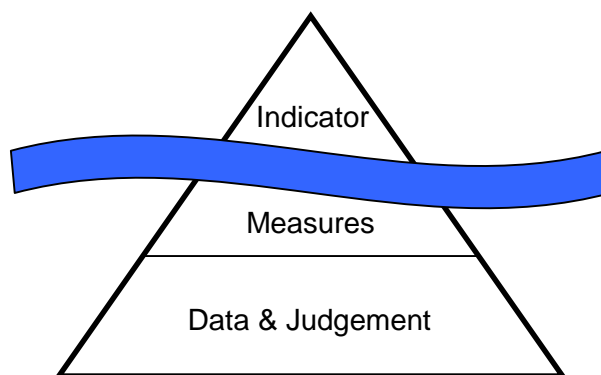
Park ecosystems are subject to pressure from a variety of sources, both within and beyond park boundaries. These include the railway and increasing highway traffic and associated wildlife mortality, the spread of non-native plants, changes to vegetation communities and wildlife habitat due to fire suppression and forest pests, and increased resource development, road development and recreational use on adjacent provincial lands.

Parks Canada is taking a number of actions to protect the ecological integrity of Yoho National Park while providing high quality experiences and learning opportunities. Integrated management that aims to protect the park's heritage resources and allow the park to continue to be a place of unparalleled visitor experience is a significant challenge requiring sound ecological and social science research, ongoing public education, and open dialogue with stakeholders. This State of the Park report represents an important step toward addressing that challenge.

## 2.0 ASSESSMENT AND EVALUATION METHODS

Parks Canada is developing a comprehensive monitoring program to assess the performance of national parks in protecting ecological and commemorative integrity, educating the public about Canada's heritage, and providing memorable visitor experiences. Within each of these three broad areas, several indicators have been identified to provide a broad representation of key factors influencing the national parks. Each indicator is an index supported by several measures that are based on data gathered through a variety of sources. In the absence of sufficient data, professional judgment based on evidence is used to assess conditions. Discussion in this report focuses on the condition of indicators, rather than the considerable background material (measures, data and professional judgement) used to inform the indicators. This approach is depicted in the 'iceberg model' shown in Figure 2.

**Figure 2. The 'iceberg model' of indicators and measures**












At the time of preparation of this State of the Park Report, the monitoring program is still under development. Some indicators and measures are based on existing long-term monitoring programs and can be readily assessed and reported on now. Other indicators and measures are more recently established and monitoring programs provide more limited data on which to base evaluations and ratings. In some cases monitoring has not yet begun and information gaps exist.

Where possible, this State of the Park Report is based on the results of existing monitoring and research programs for ecological and commemorative integrity, public education and visitor experience. Data sources include programs undertaken by Parks Canada and external agencies. In some cases, where limited data are available, the professional judgment of Parks Canada experts is used to supplement data analysis. As the long-term monitoring program develops, existing gaps will be filled and future state of the park reports will be based on increasingly more comprehensive, rigorous and statistically powerful data.

In addition to providing an assessment of the state of Yoho National Park, this report will provide a baseline for the new monitoring program against which future state of the park reports can be compared.

The indicators used to assess resource protection, visitor experience, and public education are rated based on their condition and trend. The condition and trend ratings are *italicized* throughout the document to emphasize the use of these concepts. For quick reference, symbols and colours are used to represent the condition and trend of the indicators and measures, as shown in Table 1.

**Table 1. Symbols used for indicator evaluation**

Condition		Trend	
<i>Good</i> : the condition of the indicator/measure is satisfactory		<i>Improving</i> : the condition of the indicator/measure is improving.	
<i>Fair</i> : there is concern regarding the state of this indicator/measure		<i>Stable</i> : the condition of the indicator/measure is not changing.	
<i>Poor</i> : the condition of the indicator/measure is poor or low		<i>Declining</i> : the condition of the indicator/measure is declining.	
<i>Not rated</i> : there is insufficient information to determine condition		<i>Not rated</i> : there is insufficient information to determine trend.	N/R

## 2.1 Resource Protection Indicators

Measures are rated by comparing the actual state of the measure with its desired state, or target. For some measures, targets are established in the existing Park Management Plan. In other cases, targets established by agencies other than Parks Canada can be used. Where adequate information is not yet available to set a specific target, the professional judgment of Parks Canada staff, based on evidence and validated through expert consultations, is used to determine the rating. Some indicators and measures are not rated due to lack of information.

A similar approach is used to assess and rate indicators related to cultural resource management. The primary difference is that condition and trend ratings relate to cultural resource condition

and management rather than ecological integrity. Due to data limitations, including lack of recent inventories and evaluation, trends will not be reported for cultural resource measures and indicators.

Measure ratings are combined to provide indicator ratings by using a simple majority. For example, if three of five measures are rated in good condition (green), the indicator is assigned a rating of “good”. In cases where there is no majority among measure ratings, the indicator was rated as *fair* to reflect uncertainty as well as concern.

A distinction is necessary between the trend rating assigned to an ecological indicator or measure and the characteristics of the measure. For example, a wildlife population may increase or decrease, but the trend rating and associated arrow symbol refer to whether ecological integrity is *improving* or *declining*, not to the size of the population.

## **2.2 Visitor Experience and Public Education Indicators**

The indicators used to assess visitor experience and public education are relatively new in the Parks Canada monitoring program. Few specific measures and monitoring programs are in place. As a result, ratings for these indicators are mostly based on an analysis of existing survey data, primarily from a 2003 park-wide visitor survey, supplemented by site specific survey information and the professional opinion of Parks Canada experts, based on evidence and validated through expert consultation. Parks Canada has targets for visitor satisfaction, but targets for other indicators have not yet been established. The visitor experience and public education indicators are rated based on the judgment of Parks Canada staff in Yoho National Park.

## **3.0 ASSESSMENT OF THE STATE OF HERITAGE RESOURCES, VISITOR EXPERIENCE AND PUBLIC EDUCATION**

### **3.1 Condition of Information Base**

Information used to evaluate and rate the condition of the measures and indicators in this State of the Park Report came from a variety of research and monitoring programs within and outside of the Parks Canada Agency. These programs were designed to meet differing management objectives and have been undertaken for varying periods of time with varying levels of scientific rigor. There are, consequently, variations in data quality and quantity, and information gaps exist.

In all cases, evaluation and condition ratings were based on the best data available and involved consultation with Parks Canada specialists to determine the applicability of the data. External experts were also consulted where appropriate. Where there were significant gaps in available data, the professional judgment of Parks Canada specialists and managers was used to inform condition ratings.

While the quality and quantity of information available is different for each measure, two general types of information can be described to illustrate some of the challenges associated with this issue:

- Information based on high-quality, large-quantity data derived from established long-term research or monitoring programs intentionally designed to evaluate a specific measure at the broad park level or regional scale. Data obtained through such a program are likely to be statistically powerful and, in combination with established targets and thresholds, provide a high level of confidence in condition ratings.
- Information based on limited data derived from research and monitoring programs that have been in place for a relatively short period of time or that are intentionally designed to evaluate a measure on a more local, site-specific basis. Data captured through such a

program are likely to have less statistical power for park-wide application, and specific targets and thresholds may not be established. When combined with expert evaluation and local knowledge to determine the applicability of the data to the broader park level and to address information gaps, this information can provide a moderate level of confidence in condition ratings.

For this State of the Park Report, much of the evaluation and many condition ratings are based on relatively recent or short-term monitoring work, much of which has been targeted at specific issues or locations of concern. As a result, while some measures are based on high quality, statistically powerful data from established, long-term programs, the majority of the information base falls into the second category described above.

While differences in data quantity and quality occur between individual measures and indicators throughout the information base, some general trends among broader categories are apparent. The quality and quantity of data available to evaluate and rate measures and indicators under the ecological integrity heading are generally higher than for the other categories. Existing inventories and evaluations of cultural resources provide a generally stronger basis for condition ratings than is available for visitor experience and public education measures and indicators.

Parks Canada's monitoring and reporting program continues to evolve. Over time, the program is expected to become more comprehensive and scientifically rigorous, producing higher quality and more statistically powerful data to apply to future State of the Park reporting and to inform park management decisions.

While it is acknowledged that there is room for future improvement, Parks Canada is confident that this report provides an accurate assessment of the state of Yoho National Park and identifies the key issues of concern to be considered in future management planning.

## **3.2 Heritage Resource Protection**

### **3.2.1 Ecological Integrity**

Under the *Canada National Parks Act*, the maintenance or restoration of ecological integrity is the first priority in all aspects of park management. Ecological integrity means, with respect to a park, a condition that is determined to be characteristic of its natural region and likely to persist, including abiotic components and the composition and abundance of native species and biological communities, rates of change, and supporting processes. In other words, ecosystems have integrity when their native components (plants, animals and other organisms) and processes (e.g. fire, succession, predation) are intact.

Parks Canada is developing a national Ecological Integrity Monitoring and Reporting Program, based on eight geographical regions known as bioregions. The seven mountain parks comprise the Montane Bioregion. Common indicators and measures will be monitored in each park in the bioregion. The common indicators used in this State of the Park report are:

- Native Biodiversity
- Climate and Atmosphere
- Terrestrial Ecosystems
- Aquatic Ecosystems
- Landscapes and Geology.

Each indicator is based on a number of measures, some of which are also common to the bioregion (e.g. water quality) and some of which are park specific (e.g. mountain goat population). An assessment of condition and trend is assigned to the indicator where possible, based on quantitative and qualitative data analysis and expert opinion.

Due to the summary nature of this report, not all of the measures will be addressed in detail. Specific measures are referenced to illustrate the condition and trend rating of the indicator. Background information is available on all measures.






 **Indicator: Native Biodiversity**

A park’s biological diversity is a key element of ecological integrity. Diversity imparts resilience to ecosystems. A diverse ecosystem is more resistant to stresses or changes in the environment. The best way to protect ecological integrity is by maintaining native biodiversity. Since the intent in the national parks is to conserve only native species and ecosystems, rather than exotic species introduced following park establishment, the term native biodiversity is used.

Biological diversity occurs at several different scales: genetic, species, community, and landscape. Each requires special attention to ensure its continuing viability.

The species level of biological diversity is well represented by the measures selected for this indicator. Most of the monitoring to date in Yoho National Park has concentrated on species that are sensitive to human activity, with a view to maintaining or restoring viable populations. Although there are no measures of community diversity at this time, the species level measures are likely reasonable surrogates, given that the protection of individual species often goes hand in hand with habitat maintenance or restoration that benefits a whole suite of species. The condition and trend of the measures that comprise this indicator are listed in Table 2.

**Table 2: Condition and trend of native biodiversity measures**

Measure	Condition/ Trend	Measure	Condition/ Trend
1. Mountain Goat Population		4. Wildlife Mortality	
2. Grizzly Bear Mortality		5. Native Fish Populations	
3. Grizzly Bear Habitat Security			

The condition and trend of several of the measures is based on population estimates and trends. Populations vary from year to year. Defining an acceptable range of variation is simpler for some species than for others. Species that congregate in specific areas, such as mountain goats, are easier to count than wide-ranging species like grizzly bear, or aquatic species, like westslope cutthroat trout. Where park-specific data are limited, as with mountain goats, regional analyses have helped to provide a more complete picture.

For wide-ranging species, it might be misleading to look at only the park population, since individuals occupy ranges that cross the park boundaries. The grizzly bear analysis includes data for Banff and Kootenay National Parks, since the populations in these three parks are interconnected.

The Yoho National Park Management Plan identifies several stressors that are affecting wildlife populations. Most large mammals in Yoho National Park are limited by a lack of secure montane habitat. Although much of the park consists of rock and ice, large patches of high quality habitat at lower elevations support carnivores, ungulates, and other species. Human caused mortality, disturbance, habitat loss and habitat fragmentation in the ecosystem influence how successfully large mammals can use this habitat. Park populations are also affected by surrounding landscapes. Stressors in the regional ecosystem, such as increasing human development and resource extraction, contribute to cumulative effects on ecological integrity.



The introduction of non-native species has also affected native biodiversity in the park. Non-native species can out-compete native species or, less commonly, they may hybridize with native species. Over time, the result is reduced abundance and distribution of native species. For example, non-native fish are widespread in the park. Although fish populations have not been sampled systematically since the early eighties, recent work suggests that westslope cutthroat trout, a species of special concern in British Columbia, is being threatened by hybridization with rainbow trout. The number of pure westslope cutthroat trout is declining.

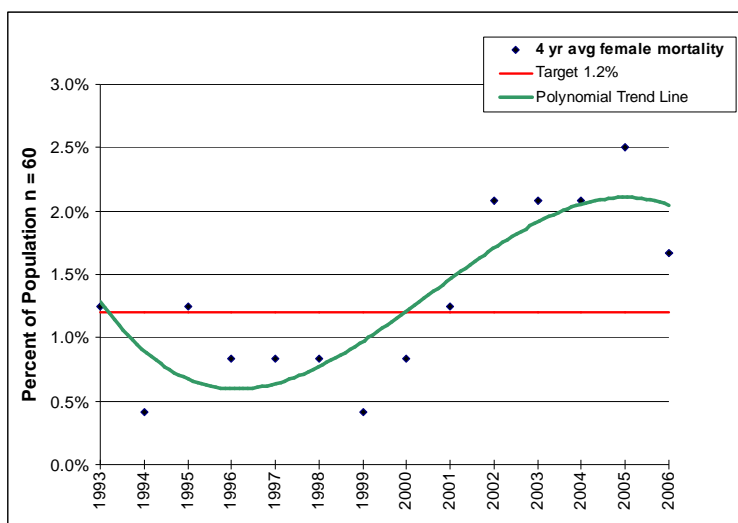
Overall, this indicator is rated as *fair* and the trend is towards *declining* ecological integrity. This evaluation indicates that concern is warranted and that park-level and regional stressors need to be addressed. Most measures, including those rated as *poor*, are affected strongly by regional pressures over which Yoho National Park has limited influence.

Parks Canada and neighbouring jurisdictions are trying to maintain or restore some components of park and regional ecosystems, particularly rare or sensitive species like grizzly bears. In general, ungulates appear to be faring slightly better than carnivores. More work is needed to address park-level and regional stressors. Three measures discussed below, grizzly bear mortality, habitat security and wildlife mortality, give an indication of the progress that Parks Canada is making in addressing these threats.

### **Grizzly Bear Mortality**

Grizzly bears are identified as a priority species in the Yoho National Park Management Plan and are often used as a surrogate measure for assessing the cumulative effects of regional land-use practices. Survival of female bears is the key parameter for population persistence as the population is small and has little capacity to recover from decline. Female grizzly bear mortality in the area of Banff, Kootenay and Yoho National Parks was within limits for population stability for the entire 1990's and into the early 2000's. Demographic analysis up to 2002 documented modest population growth (Garshelis et al 2005). Recent work suggests that to maintain a viable population, human-caused mortality for female grizzly bears should not exceed 1.2%. However, known human caused mortality of independent female grizzly bears has exceeded the proposed 1.2% target for the past six years, compromising the population's reproductive capacity (Figure 3). Recent demographic analysis characterized the population as having the lowest reproduction rate recorded for the species. Grizzly bear mortality is rated as *poor* and the trend is toward *declining* ecological integrity.

**Figure 3. Human caused, known, independent female grizzly bear mortalities based on 4-year averages in Banff, Yoho and Kootenay National Parks, 1990 - 2006.**



### Grizzly Bear Habitat Security

This measure incorporates both the physical habitat quality and levels of human activity to quantify habitat security levels. Grizzly bear habitat is secure when grizzly bears have a low probability of encountering humans, and can forage with little human-caused disturbance while maintaining their wary behaviour, a trait considered desirable. Several jurisdictions in western North America have set a target to maintain at least 68% of grizzly bear habitat in each management unit as secure habitat. For the purposes of this report, this target will be used to rate the overall condition of habitat security in the 40 landscape units in Banff, Yoho and Kootenay National Parks. Of these 40 landscape management units, 31 meet the 68% target. In Yoho National Park 5 of 6 units meet the target. Given that a considerable portion (over 22%) of the units do not meet the target, and that many of those units are concentrated in lower elevation areas with higher quality grizzly bear habitat, ongoing concern is warranted. Grizzly bear habitat security has been rated as *fair* with a *stable* trend.

### Wildlife Mortality

At least two hundred and twenty-two medium- to large-sized mammals have been killed on the Trans-Canada Highway in Yoho National Park in the last 10 years. While most park populations are likely stable or decreasing, the total number of animals killed on the highway every year is increasing slightly. Only twenty-eight mortalities along the railway were recorded over the same time period. However, the railway is not patrolled by the warden service as regularly as the highway, and the public reports mortalities along the highway more frequently.


The numbers suggest that two species have been particularly affected by the highway and railway: black bears and wolves. Although precise population estimates are not available, bears and wolves tend to have small populations when compared to other groups, such as ungulates. Sixteen wolves and 24 black bears were killed on the highway between 1997 and 2006. An additional 4 wolves and 10 black bears died on the railway.

**Table 3: Known Wildlife Mortalities on the Trans-Canada Highway in Yoho National Park (1997- 2006)**

Species	Total
Badger	1
Black Bear	24
Cougar	1
Coyote	18
Deer (Unknown Species)	8
Elk	50
Mountain Goat	1
Grizzly Bear	1
Lynx	3
Moose	21
Mule Deer	38
Bighorn Sheep	1
White-tailed Deer	39
Wolf	16
<b>Total – All Species</b>	<b>222</b>

Few measures are in place to protect wildlife. The Canadian Pacific Railway has been working with Parks Canada to improve grain management, and has committed to a major initiative to upgrade grain cars in order to reduce the potential for bears to be attracted to the railway where the potential for mortality is high.

Highway and railway mortality may keep populations artificially low and make population recovery for species at risk more difficult. Given these factors, ecological integrity in relation to this measure is rated as *poor* and *declining*.



**Indicator: Climate and Atmosphere**

Climate plays a fundamental role in shaping ecosystems. Distributions of plant and animal species, rates of glacial advance and retreat, patterns of river flows, and the frequency and magnitude of natural disturbances are all influenced strongly by climatic variables such as temperature, precipitation and snow depth.

Climate varies from year to year and decade to decade as a result of natural cycles. However, there is international consensus that the global climate is warming at an unprecedented rate, and that this warming is largely attributable to greenhouse gases released by human activity. Park weather data indicate that local climate conditions are following this global trend. If this trend continues, there will be implications for both ecological conditions and visitor experiences in the park. Vegetation and animal distribution patterns may change. New species, including undesirable pathogens, may become established in the park. Summer visitation seasons may lengthen. Winter recreational activities may be affected by changing snow depth. Iconic views of glaciers and other park ecosystems may change dramatically. Storm patterns and fire cycles may

shift. Climate can affect all aspects of the Parks Canada mandate, but the factors that affect climate are global and regional in scale and consequently not responsive to management at a national park level. Adaptation and mitigation strategies will be required as changes occur.

Parks Canada and others have collected significant data related to climate and atmospheric conditions in the park. Relevant data for key measures are outlined below. Although these data indicate some clear and important trends, there has not been specific research conducted into the effects of changing climatic conditions on the park. The measures are assigned a declining trend in relation to their potential effect on ecological integrity. Parks Canada has not yet determined targets, thresholds or reference conditions and a condition rating for this indicator is not assigned.

**Table 6. Condition and Trend of Climate and Atmosphere.**

Measure	Condition/Trend
1. Temperature	↓
2. Precipitation	N.R.
3. Snow pack	↓
4. Glaciers	↓

Weather Data:

Parks Canada operates a network of weather stations in the mountain parks, often in collaboration with the Meteorological Service of Canada or as Park Fire Information Stations. In Yoho National Park, only two weather stations have operated for long enough to provide sufficient data for analysis. These data were analyzed for temperature and precipitation trends, however the relatively short data sets made trends difficult to detect. In general, annual and seasonal mean temperatures appear to be increasing in the park. Precipitation trends were much more variable and no conclusions could be drawn.

Snowpack and Glaciers:

The warden service has been taking manual measurements of the snowpack at two snow courses in the park for over 50 years, and good datasets for this measure are available. The Field snow course is located near the village of Field, and the Kicking Horse snow course is situated near Wapta Lake. Two variables, snow depth and snow water equivalent (the amount of water in a given volume of snow), were analyzed to determine how the snowpack is changing over time. On average, snow depth and snow water equivalent have both decreased at the Kicking Horse snow course since 1947. The snowpack is declining by approximately 4 % to 6 % per decade. Similar trends have been observed at three snow courses in Kootenay National Park. At the Field snow course, the decrease in snow depth was less pronounced and snow water equivalent increased slightly. This may be due to changes in winter temperatures at lower elevations. As



temperatures warm, more winter precipitation is likely to fall as heavy, wet snow, and the snowpack may also be compacted by rain or melting.

Glaciers are internationally recognized as key indicators of climate and environmental change occurring on a regional and global level. In Yoho National Park glaciers are important elements of the park landscape that appear to be responding to changing climate. The Hanbury and Wapta Glaciers have receded 32 % and 12 % respectively since 1975.




Parks Canada will continue to monitor climate and ecosystem variables that may lead to a better understanding of potential environmental effects related to global climate change.

 **Indicator: Terrestrial Ecosystems**

The terrestrial ecosystem indicator looks at how land-based ecosystems within the park, in particular vegetation resources, are being shaped by both natural disturbances and human activities. Monitoring to date has focused largely on forest insects and disease and non-native plants. The condition and trend of the measures that comprise this indicator are listed in Table 4.

The ecological integrity of this indicator is considered to be *fair* with a *declining* trend. Vegetation communities and ecological processes are still intact. However, without active management, many of these processes play only a fraction of their historic role, and vegetation communities are affected. Past management practices, such as wildfire suppression, have caused the park’s vegetation to change over time. In turn, these changes contribute to increased susceptibility to both native and non-native forest insects and disease.

**Table 4. Condition and trend of terrestrial ecosystems**

Measure	Condition/ Trend
1. Disturbance by Forest Insect and Disease	
2. Exotic Pathogens	
3. Non-native Plants	

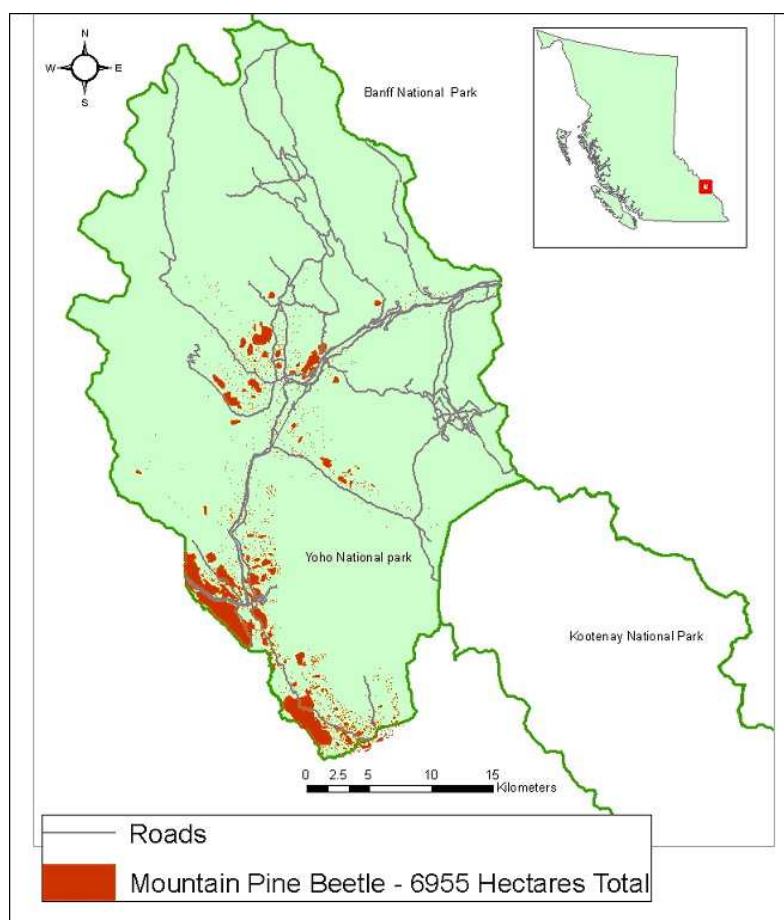
For example, whitebark pine, a common tree in subalpine forests in the Canadian Rockies, has been affected in much of its range by blister rust, an introduced (or exotic) disease. A lack of fire, which plays an important role in promoting germination of new seedlings and eliminating competing species, and mountain pine beetle are also affecting whitebark pine. The incidence of blister rust infection and tree mortalities appears to be slightly worse west of the Continental Divide and is unlikely to improve without active intervention. Continued decline could jeopardize the survival of this species. The measure for introduced pathogens is rated as *poor* with a *declining* trend.

Disturbance of native vegetation for roads, buildings, and other visitor facilities, as well as through natural and prescribed fire and forest thinning projects, increases the potential for the establishment and spread of non-native plant species. The extent of non-native vegetation, such as knapweed, has been gradually increasing in the park, although the overall area is still relatively small. This measure is considered to be *fair* with a trend toward *declining* ecological integrity.

### Disturbance by Forest Insect and Disease

The absence of fire and a changing climate have altered conditions for forest insects and diseases in Yoho National Park. This has led to changes in natural ecosystem disturbance processes related to insects and disease. For example, the mountain pine beetle, a native bark beetle, is affecting lodgepole pine stands at a scale likely not seen historically (Figure 4). The total area of mature lodgepole pine attacked by pine beetle has grown rapidly over the past five years, particularly in the west end of Yoho. Just over 5,600 ha of mature pine were affected by pine beetle during that time period. With approximately 10,000 ha of mature pine remaining in the park and little fire on the landscape in recent years, the mountain pine beetle population has further room to expand. Uncertainty about the long-term effects of the current level of infestation on forest structure and biodiversity has prompted a condition rating of *fair*, with a trend toward *declining* ecological integrity.

**Figure 4: Mountain Pine Beetle Infestation of Yoho National Park from 1980-2006.**



The first prescribed burn in the park was carried out in the spring of 2005, at Hoodoo Creek. As a more representative mix of stands is created over time through prescribed burning and wildfire, forest insect populations should return to appropriate levels.

**Indicator: Aquatic Ecosystems**

Yoho National Park contains a diversity of aquatic ecosystems, including wetlands, mineral springs, lakes, rivers and streams. Meltwater from snow and glaciers, and rainwater replenish the surface waters flowing through these systems directly or through groundwater. This indicator provides information on the physical environment in which aquatic organisms live and how that environment is changing in response to outside pressures. The assessment is based largely on river monitoring, however rivers are a good proxy for other aquatic habitats. Overall, the condition of this indicator is rated as *fair* with an *improving* trend. More work is needed to track emerging issues (e.g. airborne pollutants, climate change) and tackle existing problems (e.g. culvert improvements). The condition and trend of the measures that comprise this indicator are listed in Table 5.

**Table 5: Condition and trend of aquatic ecosystems.**

Measure	Condition/ Trend	Measure	Condition/ Trend
1. Water Quality: Chemical & Physical Condition		3. Water Quantity	
2. Water Quality: Biomonitoring		4. Aquatic Connectivity	

Surface water quality and quantity are arguably the most important factors affecting the health of aquatic ecosystems. A key objective of the management plan is to maintain water quality, water levels and flow regimes within the natural range of variability. Water quality has been selected as a representative measure for this indicator and will be discussed in more detail below.

The depth and velocity of water in a stream or river determines how much habitat is available to aquatic organisms and controls other variables, like temperature and turbidity. Sustained periods of low flows can alter aquatic community structure by, for example, causing the water temperature to rise above a level tolerated by native fish. Water quality, levels and flows generally reflect the expected range of variability. The condition and trend of these measures is rated *good* and *stable*. Some weak trends have been observed in flows in the Kicking Horse River that may be related to climate change, and may indicate a shift in the hydrological regime.

The aquatic connectivity measure provides a snapshot of how park management practices, such as culvert installation, have altered the aquatic environment. Aquatic connectivity condition is rated as *fair* with a *declining* trend. Seventy-eight percent of culverts in Yoho National Park are

hindering or blocking fish movement. Aging culverts, some of which no longer perform as intended, contribute to the declining trend of this measure

## Water Quality

Water quality in Yoho National Park is monitored through two different programs. Environment Canada, in partnership with Parks Canada, maintains a water quality monitoring station on the Kicking Horse River at the village of Field. Established in 1987, this station monitors long-term trends in water quality. A separate program to evaluate the impacts of wastewater treatment facilities on aquatic ecosystems was initiated in 1999.

Water quality at the Environment Canada station is assessed using the Canadian Water Quality Index (CWQI). This index tracks key water quality variables such as turbidity, temperature and major ions. Each is measured and the results compared to established guidelines for the protection of aquatic life. Five rankings are possible: excellent, good, fair, marginal and poor. Water quality condition is rated as *good* with a *stable* trend. Several weak trends were identified that may be related to climate change (e.g. increased nitrate, total dissolved nitrogen, sodium and chloride). Increased sodium and chloride may be related to salt management practices along the Trans-Canada Highway. More monitoring is required to better understand these trends.

Mountain waters are very low in nutrients like phosphorus and nitrogen. Nutrients can be introduced through natural processes, such as soil erosion, or through human activities (e.g. in the effluent from wastewater treatment plants, or in leachate from old septic fields). Artificial nutrient additions can change water chemistry and alter aquatic food webs, causing undesirable impacts. The first sign of nutrient addition is often increased algal biomass, followed by a change in the types and abundance of benthic macroinvertebrates that feed on the algae.

In order to evaluate the impacts of wastewater treatment facilities on aquatic ecosystems, monitoring sites above and below the wastewater treatment plants on the Kicking Horse and Emerald Rivers were established. Water chemistry, algae and benthic macroinvertebrate variables were measured. The measurements were then combined to produce an overall score for each site. Target ranges for site scores representing good, fair, poor and very poor water quality were also developed, based on the range of values observed for each variable (See Table 6).

**Table 6: Overall Site Score Target Ranges for Yoho National Park**

Water Quality Condition	Target Range
Good	4.0 – 3.5
Fair	3.4 – 3.2
Poor	3.1 – 2.8
Very Poor	2.7 – 2.5

Each site is monitored annually and assigned a rating based on the overall site score (Table 7). Water quality in the Kicking Horse River has generally been good over the past five years. Upgrades to the wastewater treatment plant completed in 2004 will ensure that this situation

continues. Water quality in the Emerald River is more often fair to poor, although its condition appears to be gradually improving. The public washroom facilities at Emerald Lake have been upgraded to a contained vault system, and the Emerald Lake Lodge is in the process of upgrading its wastewater treatment facility. In addition, a horse riding operation with the potential to affect water quality has been discontinued. This area will continue to be monitored. Based on the results of this assessment, water quality is rated as *fair* with an *improving* trend.

**Table 7: Overall Site Scores and Water Quality Ratings for Sites in Yoho National Park**

Year	Kicking Horse Upstream	Kicking Horse Downstream	Emerald Upstream	Emerald Downstream
1999	3.8	-	-	-
2000	3.5	-	-	-
2001	3.9	2.8	-	-
2002	4.0	3.5	3.2	2.8
2003	3.4	3.5	3.0	2.7
2004	3.5	3.2	2.8	2.9
2005	3.7	3.7	3.3	3.2
2006	3.6	3.8	3.5	3.3

One emerging issue that may affect water quality in the future is the long-range transport and deposition of airborne pollutants in park waters. A model is currently being developed for the mountain parks that will help to predict where contaminants carried by rain and snow are being deposited.




 **Indicator: Regional Landscapes**

This indicator encapsulates issues affecting park ecosystems at the landscape level, some of which extend beyond park boundaries. Landscape diversity includes all the ecosystems in an area, plant and animal communities, and the physical habitat. Some level of landscape diversity is desirable (e.g. the mosaic of vegetation of different ages created by periodic wildfires), however too much diversity can negatively affect habitat suitability for individual species and reduce connectivity between habitats. The condition and trend of the measures that comprise this indicator are listed in Table 8 below. Overall, this indicator is rated as *fair* with a *stable* trend.

Large tracts of forest were burned in neighbouring Kootenay National Park in 2001 and 2003, but Yoho National Park has not experienced a significant wildfire in decades. As a result, the area occupied by some vegetation communities (e.g. young forest stands, montane meadows) has declined, and the amount of dense closed forest has increased. The management plan contains a target to restore 50 % of the long-term fire cycle, or 175 hectares annually. Twenty-five year targets for the amount of forest area burned have also been set for each Landscape Management Unit (LMU).

Parks Canada has moved towards these targets with the 1,300 hectare Hoodoo Creek prescribed burn in 2005. Although the twenty-five year target for the Kicking Horse LMU was achieved through this burn, there has been almost no area burned in the remaining five LMUs. For this reason, this measure has been assigned a *poor* condition rating. The trend, however, is towards *improving* ecological integrity since progress has been made with the Hoodoo Creek burn.

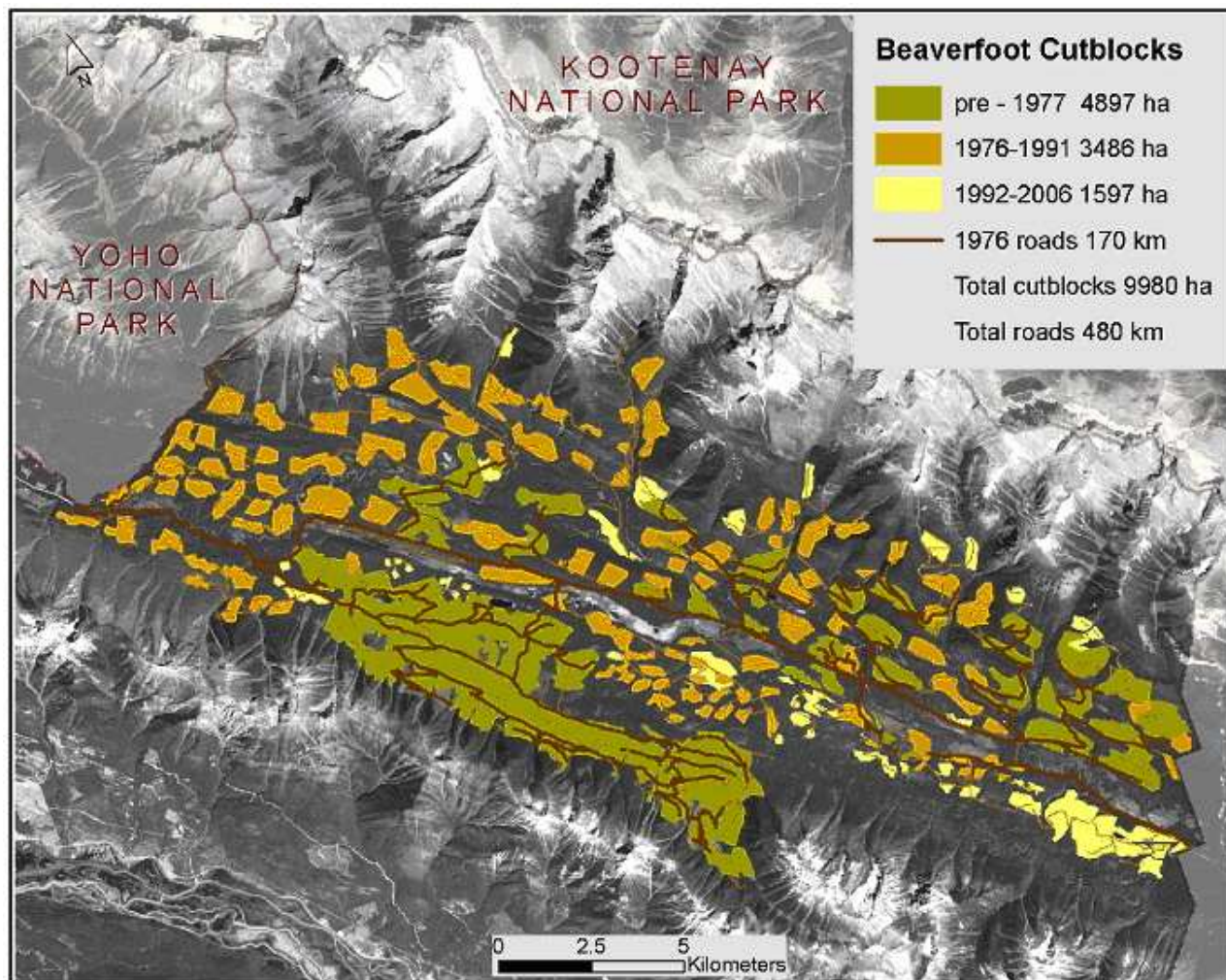
**Table 8: Condition and Trend of Regional Landscape Measures.**

Measure	Condition/Trend
1. Disturbance by Fire	
2. Regional Cutblocks	
3. Regional Population	

Habitat fragmentation, particularly in areas adjacent to park boundaries, is known to affect wide-ranging wildlife. Substantial areas of forest adjacent to Yoho National Park have been subject to commercial harvesting and related road development that fragment habitats and provide increased access to otherwise remote areas of the park. Cutblocks and associated road development in the Beaverfoot Valley adjacent to the park has more than doubled over the past 30 years (Figure 5), although the rate of development has slowed in more recent years. Through cooperation with provincial authorities, ecological impacts have been mitigated to some extent through avoidance of harvesting in sensitive areas and limitation of motorized access to some harvested areas adjacent to the park. This measure is rated as *fair* with a *stable* trend.

Human population in most areas surrounding the mountain national parks has grown considerably in recent years. Between 2001 and 2006, the populations of Calgary and Radium increased by 13% and 26% respectively. During the same time period the population of Golden declined by 4%, but rebounded by 0.5% between 2006-07. This measure provides some indication of the increased ecological pressure associated with changes in vehicle traffic, which increased by 6.2% between 2001 and 2006 in the park, and various development-related activities on lands adjacent to the park. This measure is rated as *fair* with a trend toward *declining* ecological integrity.

**Figure 5: Forest harvesting in the Beaverfoot Valley**



### **Emerging Issues and Key Planning Considerations for Ecological Integrity**

Based on the evaluations and ratings provided in the preceding section, a number of key ecological issues that may warrant additional consideration as part of future park management planning are apparent, including:

- Regional populations of rare or sensitive wildlife species, e.g. grizzly bear, are challenged by habitat change and non-natural sources of mortality.
- Highway and railway-related mortality is a significant issue for many wildlife species. Bear and wolf mortality is a particular concern. The recent commitment from the Canadian Pacific Railway to upgrade grain cars in order to reduce spillage is a positive development.
- While some progress has been made toward re-establishing fire as a key process influencing vegetation communities, additional work is needed. Non-native plant species, pathogens and insects remain concerns.

- While water quality is generally good and improving, some specific areas of concern remain, e.g. the Emerald River. Aquatic connectivity is an emerging issue as aging highway and railway culverts create impediments to fish movement.
- Ecological pressures associated with regional resource development, population growth and traffic levels are generally increasing. These issues are particularly challenging for Parks Canada, which has limited ability to influence developments beyond park boundaries.
- While the specific, local ecological impacts of climate change are uncertain, emerging climate trends indicate that increased consideration of the potential influences of climate on park management decisions is warranted.
- Existing research and monitoring programs need to be continued and expanded to provide a more comprehensive evaluation of ecological conditions, to more accurately measure the results of management actions and to better inform management decisions.

### 3.2.2 Cultural Resource Management and Palaeontological Sites

Parks Canada defines a cultural resource as a resource that has historic value. It can be a human work, a place that gives evidence of human activity, or an object or place having spiritual or cultural meaning. Cultural resources include cultural landscapes, archaeological resources, historic objects, federal heritage buildings, and other buildings and structures. In national parks, cultural resources often reflect the human interaction with the natural environment over time. Giving equal consideration to the protection of cultural resources and their natural surroundings, while still providing for meaningful visitor appreciation of these resources, adds to the management challenge.

Cultural resources consist of National Historic Sites (Level I resources) and other resources (Level II resources) that are not of national significance but still have historic value. Two National Historic Sites are located in Yoho National Park: Twin Falls Tea House and the Kicking Horse Pass. Since National Historic Sites have separate management plans to provide a framework for management and evaluation, only Level II cultural resources are considered in this State of the Park Report.



The cultural resources in Yoho National Park of Canada were evaluated using the indicators of Resource Condition, Effectiveness of Communications, and Selected Management Practices. These are consistent with categories used in Parks Canada's Commemorative Integrity Evaluations of National Historic Sites.

An assessment of condition is assigned to the indicator where possible, based on quantitative and qualitative data from several different sources, including the Asset Management System (AMS), Archaeological Resource Description Analysis (ARDA), Artifact Information System (AIS), and Built Heritage Resource Description Analysis (BHRDA), as well as expert opinion and traditional



knowledge. Due to data limitations, including lack of recent inventories and evaluation, trends will not be reported on.






Resource condition was rated as *fair*, however the condition of many resources was difficult to rate due to a lack of recent information. Further research is required before an accurate snapshot of communication effectiveness of the park’s human history messages can be captured. Substantial work is required to improve the management practices that ensure that cultural resources are properly evaluated and protected; this measure received a rating of *poor*. A significant factor influencing these condition ratings is that Parks Canada’s recent cultural resource management priorities have focused on improving the protection, presentation and management of National Historic Sites, which are not included in this evaluation.

 **Indicator: Resource Condition**

A diverse cultural heritage spanning thousands of years has left its mark on Yoho National Park of Canada. The park encompasses close to 130 archaeological sites, over 9,000 archaeological artifacts, hundreds of historic objects, numerous heritage buildings and structures, one Canadian Heritage River, and other cultural features, including abandoned mine sites, and a World War One internment camp. Yoho National Park is also home to the world famous Burgess Shale fossil beds and related historic quarry sites.

The Resource Condition indicator is assigned a rating of *fair*. Although some resources are in good condition, and a small number are in poor condition, the bulk of resources are in fair condition (there has been minor loss, damage or deterioration, resulting in minor or potential loss of integrity). In many cases, it was difficult to assess the condition of resources, because inventories were outdated or non-existent. In most cases, the judgment of Parks Canada specialists was relied upon to determine the final rating for each measure (See Table 11).

**Table 11: Resource condition measures.**

Measure	Condition	Measure	Condition
1. Landscapes and Landscape Features		4. Buildings and Structures	
2. Archaeological Sites		5. Burgess Shale	
3. Objects			

Little formal monitoring or conservation of cultural resources takes place. However, general staff awareness and diligence regarding local cultural resources has provided a basic level of protection. Cultural resources in Yoho National Park could benefit from additional attention in order to ensure that resources do not deteriorate to the point where they begin to lose their integrity.



Palaeontological resources of the Burgess Shale, and related quarry sites, are included under this indicator, as management issues and approaches are similar to those for cultural resources. While exposed fossils are subject to natural weathering and potential illegal removal from the park, these concerns are somewhat mitigated by the generally remote locations of the resources combined with improved inventories and protective measures. Curation of collected fossils is generally well done, although the sheer number of fossils collected over a long period of time makes accurate inventory and tracking a challenge.



 **Indicator: Selected Management Practices**

Management of most Level II resources within Yoho National Park has been a secondary priority for Parks Canada, as the protection and management of National Historic Sites and Burgess Shale resources has been the key focus. A Cultural Resource Management Plan for Yoho National Park was drafted in 1998, however the plan requires updating and formal approval in order to provide better strategic direction for the management of Level II resources. A recent positive development is the formation of a Cultural Resource Management Advisory Board to prioritize and administer cultural resource management expenditures within the seven mountain national parks. Selected Management Practices are assessed to be in *poor* condition (See Table 13).

**Table 12: Measures informing the condition of this indicator**

Measure	Condition
1. Inventory and Evaluation	
2. Cultural Resource Management Strategy	

Inventories do not provide an adequate picture of the cultural resources that exist in the park. Monitoring and conservation activities are not regularly scheduled. A revised Cultural Resource Management Plan would provide current direction and formalize evaluation criteria. The absence of these tools makes it difficult to identify and protect resources under threat.

**Emerging Issues and Key Planning Considerations for Cultural Resource Management**

Based on the evaluations and ratings provided in the preceding section, the following key cultural resource management issues have been identified that may warrant additional consideration as part of future park management planning.

- The management of Level II cultural resources in Yoho National Park is challenging due to the number of resources and the need to manage National Historic Sites as a priority.
- The park does not have an up-to-date Cultural Resource Management Plan. A revised plan would help set conservation and protection priorities to better guide decisions related to cultural resource management.
- Inventories and assessments of cultural resources, including archaeological and built heritage resources, are incomplete and out-of-date. Cultural resources would benefit from monitoring on a regular basis to determine if conservation measures are warranted.
- A communications plan providing a strategy and objectives for cultural resource messages is lacking. Formal monitoring and evaluation is required to determine if message delivery is effective and if audiences understand the messages.
- Completion of a Burgess Shale management plan would contribute to positive trends toward protection, presentation and management of palaeontological resources.
- A number of projects are underway nationally that will help address some of these cultural resource management challenges. A national Cultural Resource Information System (CRIS) is being developed that will provide a “one-window approach” to cultural resource information and databases. This system should facilitate better monitoring and evaluation of Parks Canada’s cultural resources.

### 3.3 Visitor Experience

Parks Canada places great emphasis on providing opportunities for meaningful visitor experiences. These opportunities will enable visitors to develop a clear and strong connection to the nature and history of the national park as well as contributing to personal wellbeing and health. Through the provision of a variety of visitor services, facilities and programs by Parks Canada and others, Canadians have enjoyed and appreciated Yoho National Park for over 120 years.

#### Indicators

Parks Canada is developing four national indicators to measure the state of visitor experience: understanding visitors; providing opportunities; quality service; and connecting visitors personally with the place. This program is new and evolving, and standardized measures and monitoring programs have not yet been developed to support the indicators. In most cases the evaluation of indicator condition and trend is based on professional judgement. New methods of data collection will be required to accurately report on these indicators in future State of the Park Reports.

This State of the Park Report represents the first opportunity to view visitor experience in Yoho National Park in terms of these indicators. Except for visitor satisfaction, no targets are available for these indicators. Past intermittent surveys, which were used for other purposes, are of limited value to broadly assess visitor experience. A limited amount of information is available related to the indicator connecting visitors personally with the place.



## Indicator: Understanding Visitors

In order to set the stage for a memorable experience, Parks Canada must first understand its visitors. This indicator examines our understanding of those for whom we are providing opportunities: their characteristics, visitation trends and how and whether these visitors can be segmented to better target opportunities for memorable experiences.

Overall, this indicator is rated as *fair* and *improving*. Since 2000 visitor information collected by Parks Canada has improved the agency's understanding of visitors and their needs. Areas where better information could be collected include backcountry visitor statistics, more detailed market segmentation information and better understanding of visitors that primarily drive through the park.

Visitors to Yoho National Park vary in their expectations, motivations and the activities they undertake. Four broad types of visitor can be identified:

- *Premium Experience (35 % of park visitors)*: Many of these are first time visits to the park, but members of these trips tend to seek out park information either before or during the visit. The trips involve higher levels of spending, and trip satisfaction is generally high.
- *Habitual/Familiar (19 % of park visitors)*: These trips are usually preceded by previous (three or more) visits within the past two years. Most visits are with Canadians and because they have past experience with the park(s), they don't often seek additional sources of information. Trip spending is generally light to moderate, and as the segment name implies, satisfaction is high.
- *Casual Experience (35 % of park visitors)*: This segment of visits could also be termed "middle of the road". In contrast to the above types of trips, they don't stand out on any particular aspect. Many of these are repeat visits, and satisfaction with the park tends to be quite high.
- *Flow Through (11 % of park visitors)*: The sample size available for this segment is too small to draw meaningful conclusions about the activities of these visitors.

Driving and sightseeing, viewing landmarks, hiking and walking are undertaken by the first three groups, but to different extents. The *Premium Experience* visitor is likely to spend more time in the mountain parks than the *Casual Experience* visitor, who in turn tends to stay longer than the *Habitual/Familiar* visitor. Table 13 shows the activities engaged in by these segments.

Yoho hosts a larger proportion of non-Canadian visitors compared to the mountain parks in general, with over 35 % of visitors coming from the United States. The park also sees a higher proportion of *Premium Experience* visits than the mountain park average.

Visitation to Yoho has been relatively constant since 2000. In 2003, there were over 400,000 independent (i.e. group tours not included) visitors to the park, the origin of which was:

- Alberta: 19 %;
- other Canadian provinces: 24 %;
- United States: 35 %; and
- other countries: 22 % (including 16 % from Europe).

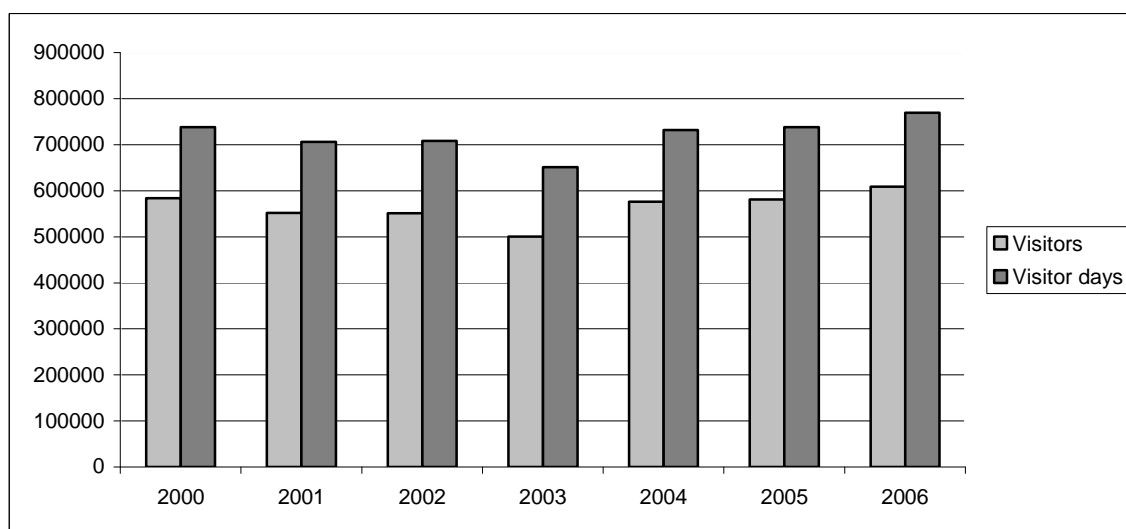
**Table 13. Percentage of visitors, by type, who reported participation in an activity**

Activity \ Visitor	Premium Experience (%)	Habitual/Familiar (%)	Casual Experience (%)
Driving/sightseeing	39	20	63
Sightseeing/landmarks	43	34	20
Hiking	36	20	31
Walking	12	22	20
Rafting	15		

Activity participation by less than 10 % of the visitor type is not reported. Data are insufficient to report on the Flow-through visitors.

Figure 9 compares the number of visitors and visitor days, including group tours, from 2000 to 2006.

**Figure 9. Visitation to Yoho National Park, 2000 – 2006**



Just over half of the visits were repeat visits, with the average visit to Yoho being 1.4 days in length. The average group size was 2.6 people, with most (75 %) making day trips to the park as opposed to staying overnight. Only one third of visitors to the mountain parks as a whole were day visitors, suggesting that most visitors to Yoho National Park seek their accommodation in other parks, likely Banff.

In Yoho, the majority of visitors participate in softer or lower effort activities such as driving and sightseeing. Approximately 30 % of visitors participate in hiking. The patterns and levels of use of the park reflect the natural attractions and related facilities that are available. Fifty % of visitors

stopped at Emerald Lake, 40 % visited Takakkaw Falls, and 34 % used the Spiral Tunnels viewpoint.

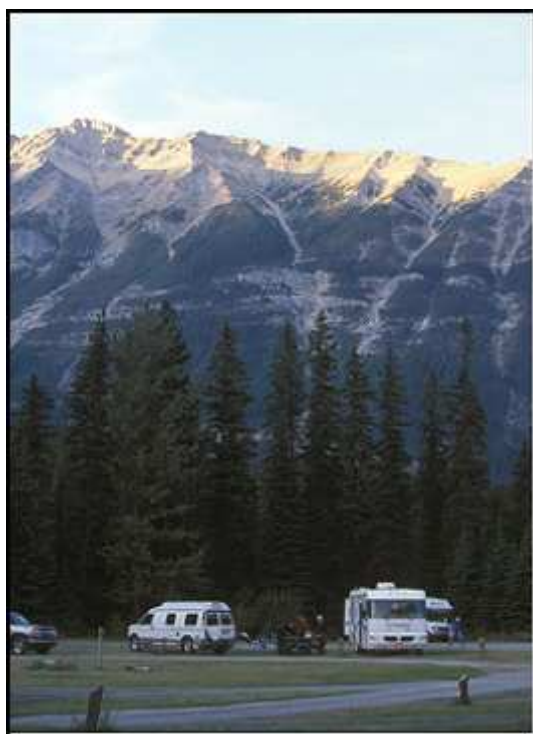
Approximately 54 % of visits occur during the summer months. Significantly fewer visits take place in the spring (23 %), fall (14 %) and winter (8 %) seasons.



### Indicator: Providing Opportunities

The second indicator of visitor experience is providing opportunities. This indicator includes consideration of the opportunities that are sought as well as those that are undertaken.

This indicator is rated as *fair* and *improving* between 2000 and 2006. Yoho National Park offers opportunities to experience the Rocky Mountains, to learn about their natural and cultural heritage, and to connect with nature. The park includes a range of spectacular natural features, including steep peaks, glaciers, turbulent rivers, waterfalls and turquoise glacial lakes.



The park provides a variety of front-country and backcountry opportunities including: four drive-in campgrounds and one walk-in campground containing 263 sites; 9 picnic sites and 20 shelters; a visitor reception centre; strolling opportunities; self-guided interpretive trails; 74 campsites in 6 semi-primitive and wildland backcountry campgrounds; 300 kilometres of hiking, biking and horseback riding trails; and river touring. Winter activities include ice climbing, snowshoeing, cross-country skiing, ski touring and winter mountaineering.

Much of the infrastructure in Yoho National Park was built decades ago. Some of these assets are reaching the end of their design life and need significant reinvestment. The work has begun, but approximately 16 % of assets in Yoho National Park remain in poor condition, while only 17 % are in good condition or better. The majority of assets are rated in fair condition.

The Village of Field provides visitor services including restaurants, a 14-room hotel, a 16-bed hostel and

several bed-and-breakfast facilities. Four commercial accommodation facilities located outside of the community provide 156 rooms as well as restaurants for guests and other park visitors. Two rustic lodges and three Alpine Club of Canada (ACC) shelters provide services to backcountry visitors.

The Trans-Canada Highway and paved roads to Emerald Lake and Takakkaw Falls provide enjoyable driving and sightseeing opportunities for many visitors. Day use areas and easy, scenic walking trails at both Emerald Lake and Takakkaw Falls are highly popular front-country visitor opportunities.

Lake O'Hara and the Yoho Valley are two premier backcountry hiking destinations that provide extensive trail networks, campgrounds, ACC shelters and commercial lodges while maintaining their wilderness character and natural beauty. For winter backcountry enthusiasts, the Wapta

Traverse is a renowned ski-touring route across a series of glaciers spanning the continental divide between Yoho and Banff national parks.

Yoho National Park is home to the Burgess Shale, one of the world’s most important fossil deposits. A guided interpretive hike to one of the remote fossil sites provides an exceptional experience for many visitors. Many other visitors learn about the Burgess Shale through interpretive displays at the Field visitor reception centre.

Table 14 summarizes the seasonality of visits to the main day-use areas. Some areas see more or less use in specific seasons compared to the yearly average. For example, the percentage of visitors experiencing the Emerald Lake area is higher in the spring and fall shoulder seasons than in the busier summer period.

**Table 14. Seasonal difference from yearly average in day-use area visits in YNP.**

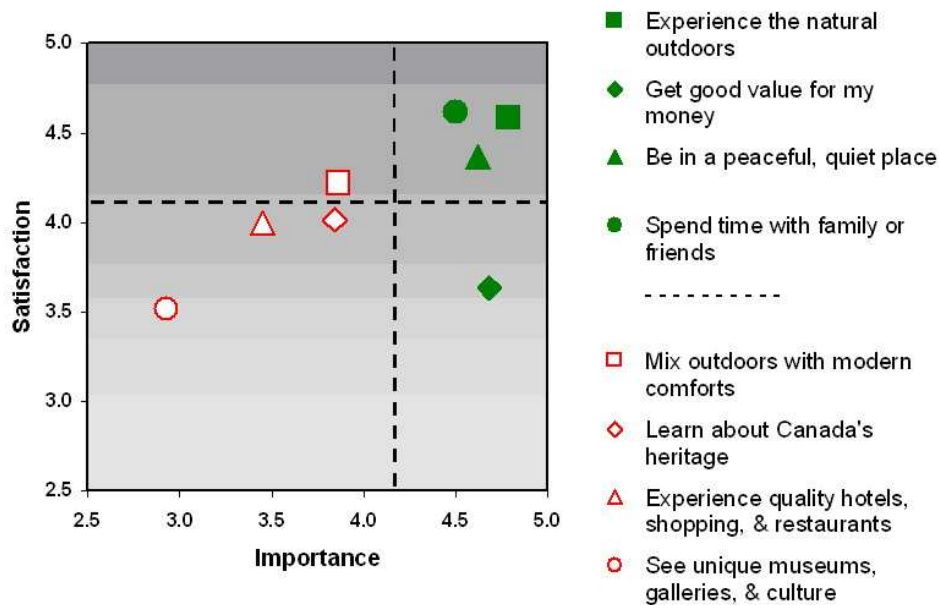
Area	Use compared to year-round average			
	Winter	Spring	Summer	Fall
Emerald Lake	↘	↗	↘	↗
Takakkaw Falls	↘	↘	↗	↗
Spiral Tunnels	↘	↗	=	↗
Village of Field	↗	=	=	=
Other	↗	↗	=	↗

Symbol indicates higher (↗), lower (↘) or approximately equal (=) use compared to year-round average

To better understand the opportunities sought by and motivations of visitors, Figure 10 shows visitors’ ratings of the importance to their travel decision of eight different opportunities. The satisfaction rating of these opportunities is also shown in the figure, and is discussed under *Quality Service* in the next section.

Generally, participation in activities in Yoho National Park does not differ substantially by visitor origin. One exception is that visitors from Alberta are more likely to visit national historic sites than visitors from other areas.

**Figure 10. Importance and satisfaction of visit opportunities**



 **Indicator: Quality Service**

Parks Canada has established targets for service quality in national parks and national historic sites: 85 % of visitors will be satisfied with their visit, with 50 % being very satisfied with their experience.

The assessment of satisfaction cannot be compared directly to these targets due to survey design, however it is clear from the information below that satisfaction with services in Yoho is high. This indicator is therefore rated as *good* and *stable*.

A comprehensive survey of visitors in 2003 showed that 84 % of Yoho National Park visitors rated their visit to the mountain national parks as extremely enjoyable compared to the mountain park average of 81 %. The survey did not ask about satisfaction with Yoho National park specifically. The average score (on a five-point scale) for satisfaction with twenty services available in the mountain national parks mirrored the mountain park average of 4.1 (See Table 16). The top ranked attributes included “My visit as a recreational experience”, “Friendliness of park staff”, and “Service in official language of choice”. The lowest ranked attributes related to value for money at attractions or activities, hotels or motels and restaurants in the park.

Figure 10 in the previous section shows visitors’ satisfaction with attributes they considered important. Generally, of the attributes that are important to visitors, satisfaction levels are high (greater than 4 out of 5 score). One attribute that is important to visitors but for which satisfaction was lower was value for money.



**Table 16. Satisfaction of Yoho visitors with mountain park service attributes**

<b>Service Attribute</b>	<b>Mean Score (1 – 5 scale)</b>
My visit as a recreational experience	4.67
Friendliness of Parks Canada staff	4.64
Service in official language of choice	4.50
The "Mountain Guide" publication	4.45
Friendliness of business staff in the park	4.37
The Columbia Icefields Snocoach Tour	4.34
My visit as an educational experience	4.26
Value for entrance fee	4.23
Education / interpretive programs	4.22
History / geography info from the business staff in the park	4.21
Guided walks / tours	4.21
Quality of education / interpretive programs	4.19
Pre-trip print publications	4.12
Availability of education / interpretive programs	4.07
Parks Canada website	4.03
Value for money at attractions / activities in the park	3.78
Tourism BC website	3.76
Travel Alberta website	3.68
Value for money at hotels / motels in the park	3.68
Value for money at restaurants in the park	3.56



**Indicator: Connecting Visitors Personally With the Place**

Parks Canada’s objective is not only to provide opportunities that are reflective of and appropriate to national parks and national historic sites, but also to facilitate a meaningful, personal connection with the place. The result of personal connections will be that Parks Canada and the national parks and historic sites it operates are relevant to Canadians in the future and that Canadians support the Parks Canada program.

The concept of “Connection to Place “ is under development and measures are not yet defined. Little objective data exists, so this indicator is not rated at this time. The following discussion presents some anecdotal information on visitors’ connection to place.

One potential measure of connection to place is the level of understanding of the importance and value of national parks and national historic sites. While relatively little information is available to fully understand this element of personal connection, more will be done in the future.



As a first step in exploring visitors' understanding, Parks Canada examined visitors' recognition of heritage themes. Visitors can learn about national parks and national historic sites from interpretive programs provided by Parks Canada and others, from displays, brochures, books and a wide variety of other sources. On average, visitors answered 3.4 of six true/false questions correctly. European visitors and those from other countries performed slightly better than did North Americans. These scores may reflect the different reasons for visiting national parks in the first place, as international visitors rated interest in learning about Canada's natural and cultural heritage as a stronger reason to visit than did North Americans.

Another possible means of gauging personal connection is the likelihood of a repeat visit. According to the 2003 survey, 53 % of total Yoho visits were repeat visits to the mountain national parks. Canadians dominated the repeat visitors group, with 96 % of Albertans and 64 % of other

Canadians representing repeat visitors. More than half of Yoho visitors surveyed indicated that they "definitely will" (36 %) or "probably will" (22 %) plan another trip to the mountain parks.

### **Emerging Issues and Key Planning Considerations for Visitor Experience**

Demographic changes, in particular an aging and more urbanized population, are likely influencing visitor expectations for national park experiences and opportunities. Anecdotal evidence suggests a trend away from long, self-supported backcountry trips toward shorter overnight trips and day hikes like those available in the Lake O'Hara and Yoho Valley areas. Demand for roofed accommodation in the backcountry, e.g. ACC shelters and backcountry lodges, may increase.

Similarly, visitor expectations for front-country facilities are likely to be influenced by demographic trends. Yoho's front-country campgrounds were generally designed for tents, rather than the large recreational vehicles that are prevalent today. Existing parking lots designed for passenger cars do not efficiently accommodate increasing numbers of motor homes and tour buses. While there have been recent, significant improvements to front-country facilities, modernizing aging campgrounds and day use areas and related infrastructure will be an ongoing challenge for Parks Canada.

Improving Parks Canada's understanding of the needs and expectation of visitors through development of targets, thresholds and monitoring tools will greatly aid in infrastructure and facility investment decisions. Similarly, there may be an opportunity to match the many front-country or day-use area opportunities in Yoho with Parks Canada's desire to reach new Canadians, a segment that often takes advantage of facilities accessible by vehicle.

In order to understand and facilitate connection to place, Parks Canada is seeking, through the Banff EcoIntegrity project, to create relevant educational opportunities for regional residents that effectively communicate key themes and messages. The results of this program may also be applicable to Yoho National Park. The project aims to understand:

- the means and motivations for visiting;
- the learning opportunities to which visitors would be receptive; and

- the subjects visitors are interested in learning about.

Research was also done to understand what regional residents feel, think and do with respect to Banff and Parks Canada, and how this compares with what Parks Canada would like them to feel, think, and do. With this understanding, Parks Canada can design relevant communications programs and products that effectively form a bridge between visitor interests and needs, and the goals of Parks Canada in the mountain national parks.

### 3.4 Public Education

For most visitors, a visit to a national park is a departure from their daily routine and an opportunity for learning. Parks Canada and its partners provide information, opportunities and facilities so that people can have safe, enjoyable and rewarding experiences. One of the three “pillars” of the Parks Canada mandate is Public Education. With interesting, useful and accurate information, people can not only enjoy their visits more but also appreciate the importance of heritage places and contribute to their integrity and sustainability. Parks Canada’s education programs in Yoho National Park are many and varied. Parks Canada also seeks to connect with Canadians at home, at leisure, at school, and in their communities.



Visitors may be reached through campground or roving interpretive programs delivered in the park.

Alternatively, information is available at the visitor centre in Field, and through displays and other interpretive material. Interpretive media are also available at day-use areas along the Trans-Canada Highway and the roads to Emerald Lake and Takakkaw Falls.

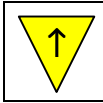
Parks Canada’s outreach efforts include delivery of school programs and the development of lesson plans for the British Columbia curriculum. Parks Canada and its partners facilitate tourism industry training opportunities through the Mountain Park Heritage Interpreters Association and by delivering *Discover Yoho* programs to local businesses. Initiatives such as the Field wildfire protection project and management of mountain pine beetle through prescribed burning include education and interpretation components to complement resource management efforts. Guided interpretive hikes to Burgess Shale fossil sites provide a significant educational opportunity for many visitors.

### Indicators

**Parks Canada is developing four national indicators to measure the state of Public Education: Understanding Audiences, Extending our Reach, Facilitating Understanding, and Influencing Attitudes. They are still in development and no measures have yet been determined. New methods of data collection will be required to accurately report on these indicators in the future.**

As with Visitor Experience, this State of the Park Report represents first opportunity to view public education in Yoho National Park in terms of these indicators. Past intermittent surveys, which were used for other purposes, are of limited value to broadly assess public education. A limited amount of information is presented in this section. No data are available about the total

number of people who participate in the various programs, the level of understanding that may be imparted, or the long-term influence on attitudes, understanding and behaviour.



## Indicator: Understanding Audiences

Traditional methods of public education need revisiting, as today's visitors are seeking to direct their own experiences and to learn through hands-on opportunities. The market segments identified in the visitor experience section provide an insight into the use patterns, needs and expectations of the park's visitors.



Parks Canada is making strides in improving our knowledge of the audiences we want to reach, but further work remains. While visitor satisfaction with the quality and availability of educational programs in the mountain parks is high, participation rates are generally low. In the past few years, research in Banff National Park has contributed to our understanding and the results of this work are applicable to other mountain park visitors, including those that come to Yoho. As a result, this indicator is rated as *fair* and *improving*.

One important segment is the Habitual Users, the repeat regional audience that comprises 19 % of Yoho park visitors. Surveys in Banff National Park, which are likely applicable to Yoho, indicate a low participation rate by this group in current learning programs. Only 21 % of participants in educational/interpretive programs are Albertans, compared to 29 % for other Canadians and 24 % for Americans. Surveys of visitors from Alberta indicate that close to 50 % are motivated to learn more about the park, but not necessarily by attending interpretive programs and not when they are focused on an activity such as skiing. These data indicate that new approaches need to be developed to engage these audiences. One example of such efforts is "Survival on the Move", a CD about the effectiveness of wildlife crossing structures which is made available with the purchase of a seasonal park pass in Banff National Park.

For Yoho visitors, the most common sources of pre-visit or en-route information include:

- past experience (43 %);
- maps (40 %);
- advice from friends and relatives (36 %); and
- travel guidebooks (35 %).

While in the park, Yoho visitors rely on information from:

- maps (46 %);
- Parks Canada information centres (41 %);
- Parks Canada's *Mountain Guide* visitor information guide (32 %); and
- travel guidebooks (30 %).

Yoho visitors were more likely to use maps, travel guidebooks and the internet as pre-trip information sources compared to the overall population of mountain park visitors. They were also more likely to use maps and local visitor information centres as in-park information sources.



## Indicator: Extending Our Reach

Parks Canada alone cannot reach more than a limited percentage of visitors. For the majority, their primary information contact is often with hotel and retail store clerks, likely in neighbouring Banff National Park where many Yoho visitors stay overnight. Many of these service workers are new and temporary residents with limited knowledge of the park.

The condition and trend of this indicator is rated as *fair* and *improving*. Since 2000 significant improvements were made in how Parks Canada and its partners have reached visitors to Yoho National Park.

The concept of heritage tourism is one way Parks Canada extends its reach to visitors and potential visitors. The preparation of a heritage tourism strategy is a prerequisite of redevelopment at the four commercial accommodations outside of the community of Field in Yoho



National Park. These strategies are the key means of reaching visitors through other operators. The strategies outline the businesses' staff training and on-site guest interpretation and information programs. Parks Canada's own heritage tourism strategy is incorporated in the official community plan of the village of Field.

In addition, Parks Canada works with local organizations and businesses, including the Friends of Yoho, the Alpine Club of Canada, the Burgess Shale Foundation, Travel Alberta, publishers of maps and guidebooks, and the Canadian Pacific Railway to promote and improve visitor information sources and educational opportunities. Parks Canada also delivers the *Discover Yoho* program to local businesses to raise and improve their awareness and knowledge of Yoho National Park and the messages and information that are important for visitors.

Nationally, Parks Canada has identified three priority markets: new Canadians, those living in urban areas, and youth. Approximately 18 % of Canadians were not born in Canada (expected to rise to 30 % by 2026) and almost 80 % of Canadians live in urban centres<sup>2</sup>. These segments of the population represent important new markets for Parks Canada to build a constituency of support for the Agency and to ensure that Parks Canada remains relevant to Canadians in the future.

On a national level, Parks Canada is extending its public education reach into the nation's school systems through an online Teachers Corner resource and through the coordinating efforts of nine regional Education Specialists. In British Columbia, examples of participation in the classroom include development of four edu-kits for use by Columbia Valley teachers and participation in Wild Voices for Kids, a partnership of sixteen organizations that provides students with tools and knowledge to become effective and responsible stewards.

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<sup>2</sup> Statistics Canada defines an urban area as having a minimum population of 1,000 with a population density of at least 400 persons per square kilometer.



## Indicator: Facilitating Understanding

Parks Canada facilitates public understanding of the park's heritage through its own educational and interpretive programming noted above and through partnerships with local organizations.

The success in facilitating public understanding in Yoho National Park is rated as *fair* and results have been *improving* since the Park Management Plan was developed. The initiatives discussed below contribute to public education, but reaching regional British Columbia residents remains a challenge.

The Mountain Parks Heritage Interpretation Association (MPHIA) interpreters' certification course is one very successful program. Since 1997, 292 professional interpreters have been accredited through this program, and almost 1300 others have received training. The program trains local guides to become knowledgeable ambassadors for the mountain parks, in effect multiplying the capacity of park staff to facilitate understanding.



Yoho National Park provides opportunities for its visitors to learn about its unique cultural and natural significance. Visitors can receive messages about this significance from interpretive programs, displays and panels, information brochures, and other information sources.

In a 2003 survey respondents were presented with six true/false statements that reflect six key messages Parks Canada hopes to communicate to its visitors. On average, Yoho respondents correctly identified 3.4 out of six statements. The results varied slightly by visitor origin, ranging from 3.0 for Americans to 3.9 for overseas visitors. As with the overall mountain park results, these scores may reflect the higher propensity of visitors from some origins to seek learning opportunities.

Anecdotal measures of Parks Canada's success in facilitating understanding include support for the use of prescribed fire and forest thinning for protection of facilities, mountain pine beetle management and ecological restoration. Surveys conducted to gauge public understanding and support for bear/human management issues in the Lake O'Hara area showed positive results. Additionally, to the degree that new non-personal interpretive media and increased roving interpreters are a proxy for facilitating public understanding, these efforts should improve the understanding of Yoho National Park visitors.



## Indicator: Influencing Attitudes

This measure is under development and limited data are available for this report. As a result, this indicator is not rated.

As discussed above, acceptance of the use of fire and forest thinning as an ecosystem management and restoration tool appears to be growing. Similarly, there appears to be general public support for bear/human management initiatives in the Lake O'Hara area. This may be in part due to Parks Canada's efforts in increasing understanding, which in turn can influence attitudes. Conversely, speeding and highway mortality continue to be a problem on the Trans-Canada Highway through Yoho National Park. Parks Canada has had limited success in changing driving behaviour and attitudes of highway users toward wildlife mortality.

### **Emerging Issues and Key Planning Considerations for Public Education**

A key issue is the absence of targets, thresholds and measurement tools to assess progress in educating the public. This is expected to improve in the future.

While visitor satisfaction with the quality and extent of educational programs is high, participation rates are low. Progress is needed in engaging visitors, particularly regional repeat visitors, in Parks Canada educational programs.

Key national trends that influence outreach education include:

- increased urbanization means there are opportunities for Parks Canada to connect urban Canadians and youth with their natural and cultural heritage;
- increased urban populations means more people live in areas at a distance from most protected heritage areas; accessibility of Parks Canada visitor experiences may be an issue to this growing segment; and
- increased ethnic diversity results in a different and sometimes more complex value system and varied ways of relating to nature and culture.

The combination of changing visitor characteristics and rapidly evolving technology presents both challenges and new opportunities for sharing the parks' natural and cultural heritage with more visitors, both on site and in their homes.

### **4.0 COMMON MOUNTAIN PARK ISSUES**

Although each of the mountain national parks has some specific characteristics that are not shared with the others, there are enough similarities that a number of common issues have been identified in the state of the park reports, including:

- Each park has species at risk. Grizzly bears have been the focus of management action for the last 10 – 15 years and continue to require attention. The precarious situation of caribou populations has become critical in recent years in Banff, Jasper, Mt. Revelstoke and Glacier National Parks and throughout their range in Alberta and British Columbia.
- Roads, railways, effluent, water diversions and impoundments affect aquatic ecosystems in all parks. The natural characteristics of many waterbodies have been altered by a legacy of fish stocking with non-native species.

- Terrestrial ecosystems have been modified by a legacy of fire suppression. Currently, non-native plant species account for up to 10 % of all plant species in a park. Invasive species are threatening native biodiversity in some locations.
- Climate change is affecting all parks and is most noticeable in glacier recession. Long-term monitoring will help identify ecological impacts and influence decisions about what can or should be done to mitigate, or adapt to, the impacts. The recent expansion of mountain pine beetle populations and the decline in caribou populations may prove to have been influenced by climate trends in addition to other factors.
- Cultural heritage has frequently been secondary in national park management. The rich legacies of past associations with the mountains, such as thousands of years of aboriginal history preserved in archaeological sites, and the protection of cultural artifacts, provides opportunities for broadening the stories that are told.
- Although there are fluctuations, visitor use of all parks is stable or slowly increasing. Much of the increase is attributable to the growth of the regional population rather than to international visitors. Coupled with other domestic demographic characteristics – an aging population, a growing urban population, a wider diversity of cultural backgrounds, an increasing proportion of first generation Canadians and a prediction of an overall decline in the Canadian population – the trends require more social science research to guide park management responses.
- Comparatively little is known about the effectiveness of public education programs. The combination of changing visitor characteristics and rapidly evolving technology presents both challenges and exciting new opportunities for sharing the parks' natural and cultural heritage with more visitors, both on site and in their homes. Many are repeat visitors and many visit several parks. Programs will have to respond to these circumstances.
- Changing land uses surrounding the parks require continued multi-jurisdictional approaches to issues such as the protection of species at risk and the control of forest insects and disease. The increases in the provincial park systems in Alberta and BC have provided increased area of complementary park management.



## 5.0 EVALUATION OF MANAGEMENT ACTIONS

Since the Yoho National Park of Canada Management Plan was approved in 2000, Parks Canada and its partners have implemented a wide range of actions to maintain ecological integrity, protect cultural resources, and improve visitor experience and educational opportunities. While not intended to be all-inclusive, Table 17 highlights actions and results related to key strategies and initiatives presented in the Park Management Plan. Two examples are described in more detail in the adjacent sidebars. Annual implementation reports provide additional detail about these and other park management actions and results.

Parks Canada takes an integrated approach to the protection of ecological and cultural resources and provision of quality visitor experiences and educational opportunities. Where possible, planning initiatives and management actions recognize the relationships between these aspects of the Parks Canada mandate.

Integration may take the form of a single project that simultaneously addresses protection, visitor experience and education objectives. Several discrete projects undertaken over a broader area may together represent an integrated approach to park management. While the individual projects may be focused on resource protection, visitor experience or public education, the cumulative objective is overall improvement in all areas of the mandate.

### Hoodoo Creek Prescribed Fire

In May and June of 2005 Parks Canada implemented a prescribed fire within a 20 km<sup>2</sup> area of forest near Hoodoo Creek campground. Decades of fire suppression had created a forest that was vulnerable to catastrophic wildfires and prone to the widespread occurrence of disease and forest insects such as the mountain pine beetle. The 2005 prescribed burn began the process of restoring natural fire cycle to the landscape of Yoho National Park.

A total of 14 km<sup>2</sup> of forest was burned by the time the fire was completely extinguished on June 25. New plants were quick to emerge from roots that had been protected underground. Windblown seeds hastened the establishment of other colonizing species. A new landscape mosaic has been created, consisting of forest patches of various ages, sizes and species. This restored landscape pattern will provide a diversity of habitat for many different species of wildlife, and will reduce the risk of a catastrophic wildfire occurring in the vicinity of a popular camping and hiking area. The new forest that is rejuvenating at the burn site will also provide excellent educational opportunities for visitors to learn about the process of fire, and to experience the changing conditions as a new forest emerges from the ashes.

### Field Community Wastewater Treatment Plant

The Yoho National Park Management Plan recognised water quality as an important issue. The Field Community Plan subsequently called for improvements to the local wastewater treatment plant before any new commercial or institutional development could occur.

A \$3.2 million upgrade of the Field wastewater treatment plant was completed in 2004. The plant was designed and constructed to meet the leadership targets for effluent quality established by Parks Canada. Effluent quality is measured against targets for phosphorus, ammonia, bacterial counts (fecal coliform), levels of solids in the effluent, and five-day oxygen level. This plant has far exceeded all of the established targets, with two exceptions. Phosphorous initially remained marginally above the target, but still less than 10% of the levels before upgrades. A membrane failure in 2005 led to the temporary elevation of some parameters. After the membrane filter system at the plant was redesigned in 2005, effluent quality continued to improve and the plant is currently meeting all Parks Canada targets

The successful implementation of this project has resulted in significant improvements to the water quality in the Kicking Horse River, and has set the stage for further community development in the town of Field that could potentially enhance the visitor experience in the future.

Results presented in the following table are generally based on qualitative evaluation, as many actions are recently implemented or ongoing. Where feasible, quantitative results are presented. As long-term monitoring programs are further developed and sufficient time has passed for the full effects of actions to be realized, more specific measurement and reporting of results is anticipated.

**Table 17: Summary of Management Actions**

<b>Challenge/ Opportunity</b>	<b>Management Actions</b>	<b>Results</b>
<p>Maintain or improve visitor experience and learning opportunities in popular frontcountry areas while addressing related environmental concerns.</p>	<p>Restoration of Chancellor Peak campground after an extended closure.</p> <p>Water supply infrastructure improvements in the community of Field.</p> <p>Forest thinning and prescribed burns to protect facilities at Field, Hoodoo Campground, and Emerald Lake.</p> <p>Replacement of outdated day use area washroom facilities at Spiral Tunnels, Emerald Lake and Takakkaw Falls. New interpretive media at Spiral Tunnels.</p> <p>Improvements to water and wastewater infrastructure at Kicking Horse campground.</p> <p>Development of site guidelines for commercial accommodations at Emerald Lake Lodge, West Louise Lodge and Cathedral Mountain Chalets.</p> <p>Redevelopment of Cathedral Mountain Chalets.</p> <p>Enhanced problem wildlife program and Living With Wildlife program, focused on reducing bear/human conflicts.</p>	<p>Improved visitor experience and learning opportunities at day use areas, campgrounds, the community of Field and outlying commercial accommodations.</p> <p>Reduced fire risk to facilities and the community of Field.</p> <p>Reduced water quality impacts related to day use area wastewater disposal.</p> <p>Reduced potential for bear/human conflicts and loss of bears through management actions.</p>
<p>Maintain quality backcountry wilderness experiences while addressing related environmental concerns.</p>	<p>Improvements to backcountry campgrounds, including bear-proof food storage facilities, at McArthur Creek, Yoho Lake and Lake O’Hara.</p> <p>Reconfiguration of Odaray trail to reduce potential bear conflicts.</p> <p>Removal of little-used Float Creek backcountry campground in important bear habitat.</p>	<p>Quality wilderness experiences maintained or improved in popular backcountry areas.</p> <p>Reduced potential for bear-human conflict and improved bear habitat.</p>
<p>Maintain the natural structure and function of aquatic ecosystems by addressing existing impacts.</p>	<p>Replacement and upgrade of the Field wastewater treatment facility.</p> <p>Ongoing improvements to the Emerald lake Lodge wastewater treatment facility.</p> <p>Implementation of a zero possession limit for westslope cutthroat trout.</p> <p>Inventory of highway and railway culverts impairing aquatic connectivity.</p>	<p>Wastewater treatment plant meets all leadership targets in the Park Management Plan.</p> <p>Reduced impacts on water quality and native fish populations.</p> <p>Inventory provides guidance for future culvert remediation projects, which will improve aquatic connectivity.</p>
<p>Restore natural processes affecting vegetation and associated wildlife habitat values.</p>	<p>Implementation of a major prescribed burn near Hoodoos campground.</p> <p>Forest thinning and slash burning at Hoodoos, Emerald Lake and Field.</p> <p>Inventory and control of non-native plants in priority areas.</p>	<p>1350 hectares subject to prescribed fire at Hoodoos. Increased habitat diversity benefiting most wildlife species.</p> <p>Decreased potential for spread of invasive plants.</p>

**Table 17 (cont'd): Summary of Management Actions**

Challenge/Opportunity	Management Actions	Results
<p>Improve understanding of factors influencing the park's ecological integrity, visitor experience and public education to inform park management decisions and to measure and report on progress.</p>	<p>Ongoing ecological monitoring and research related to various terrestrial and aquatic species and ecological processes.</p> <p>Improved social science, including various visitor surveys and trail and traffic counters.</p> <p>Ongoing development of a consistent, scientifically rigorous long-term monitoring and reporting program incorporating social, ecological and cultural resource indicators.</p> <p>Production of the first state of park report for Yoho National Park.</p>	<p>Better understanding of ecological and social factors and the relationships between people and the environment.</p> <p>Better understanding of visitors' activities, expectations and satisfaction levels to inform infrastructure investment and human use management approaches.</p> <p>As long-term monitoring program evolves, increased consistency and sound information to inform management decisions.</p> <p>Better public understanding and support of park management issues and progress.</p>
<p>Improve protection and presentation of cultural resources.</p>	<p>Development of management plans for Kicking Horse Pass and Twin Tea House National Historic Sites.</p> <p>Extensive restoration and conservation work at Twin Falls Chalet.</p> <p>Staff participation in David Thompson bicentennial initiatives.</p> <p>Draft management framework for Burgess Shale developed.</p>	<p>Increased protection, public understanding and appreciation of historic sites, and improved visitor opportunities.</p> <p>Improved public understanding and appreciation for historic events.</p> <p>Improved protection and management of Burgess Shale.</p>
<p>Improve collaboration with aboriginal people, including improved presentation of aboriginal cultural heritage.</p>	<p>Participation in treaty negotiations with provincial, federal and local aboriginal authorities.</p>	<p>Progress toward resolution of long-standing treaty issues.</p> <p>Improved relationships with local aboriginal people.</p>
<p>Strengthen heritage presentation and outreach programs so that Canadians and international visitors appreciate and understand the nature and history of the park, what the park can offer and what activities are appropriate.</p>	<p>Through cooperation with the Friends of Yoho and the Canadian Pacific Railway, interpretive media at Spiral Tunnels viewpoint was renewed.</p> <p>Staff participation in trade fairs and educational outreach programs in Golden.</p> <p>Improvements to the park website, including additional pre-trip planning information and information related to ecological initiatives.</p>	<p>Increased public understanding, appreciation and support for natural and cultural heritage and related park management initiatives.</p> <p>Better public understanding of available visitor opportunities and appropriate activities.</p>

## 6.0 SUMMARY ASSESSMENT

The state of heritage resources in Yoho National Park is considered to be generally *fair*. However, some individual indicators and measures are rated as *poor* or show *declining* trends. Visitor experience and public education are both rated as *fair* with an *improving* trend. For all categories there are some challenges and opportunities for improvement.

The following discussion summarizes the key issues identified in the Yoho National Park State of the Park Report, and evaluates whether or not the current Park Management Plan addresses key areas of concern adequately. Issues that may require attention during the upcoming review of the Park Management Plan are identified.

The report indicates that there are challenges related to the maintenance of ecological integrity in Yoho National Park. The long-term viability of some regional wildlife populations of wide-ranging species such as grizzly bear remains uncertain as a result of pressures from within and outside of the park. Within the park, wildlife mortality related to highway and railway traffic is a significant factor. Historical fire suppression activities have contributed to a reduction of habitat values and increased native and exotic pathogens, such as mountain pine beetle and whitebark pine blister rust. Development-related habitat loss, fragmentation related to forest harvesting and road development, and increased human activity on adjacent provincial lands contribute to ecological concerns.

The current Park Management Plan recognizes these threats to ecological integrity and identifies strategies and actions to address them. As discussed in the preceding section, many actions have been initiated and are expected to result in long-term improvements. In particular, continued work on restoration of fire as a dominant ecological process in Yoho National Park is an important step that is expected to result in tangible improvements to the future ecological integrity of the park.

Highway and railway-related wildlife mortality, identified as a concern in the current Park Management Plan, continues to increase gradually, and may require additional attention during the upcoming management plan review. This is a particularly challenging issue, as Parks Canada has minimal ability to influence increasing traffic levels on the Trans-Canada Highway. The recent commitment by the Canadian Pacific Railway and Transport Canada to update grain cars in order to reduce the attraction of bears to the tracks is a positive development.

Aquatic ecosystems are faring relatively well in Yoho National Park, with an overall fair and improving ecological integrity rating. Major upgrades to the Field wastewater treatment plant are showing positive results. Ongoing improvements to wastewater infrastructure at Parks Canada day use areas and campgrounds and commercial accommodations are expected to further improve conditions.

The current Park Management Plan broadly captures the full range of challenges related to aquatic ecosystems identified in this report and presents strategies or actions that are likely to maintain a positive trend. Impacts to aquatic connectivity as a result of highway and railway culverts are a gradually increasing concern as culverts age and outfalls are eroded. Efforts to inventory and correct problematic culverts are underway.

Although there is a lack of long-term local data to confirm climate trends, and considerable uncertainty regarding the specific impacts of climate change on local ecosystems, concern regarding climate-related measures is warranted. There is widespread consensus that climate change is occurring and that there will be potentially significant ecological changes as a result, some of which may already be evident. More local monitoring will increase understanding, and

may help to identify local effects. A review of the Park Management Plan should consider strategies to monitor and adapt to changes in climate.

The overall state of cultural resource management in Yoho National Park also represents a challenge for Parks Canada. The recent focus of Parks Canada's cultural resource management efforts has been on National Historic Sites, which are not included in this evaluation as they are subject to their own management plans and reporting processes. The Level II cultural resources represented in this report have been a lower management priority, which is reflected in the fair or poor ratings for most measures.

The existing Park Management Plan recognizes the cultural resource management issues identified in this report and presents several actions to address known deficiencies. In particular, the need to improve cultural resource management practices through more rigorous inventory, evaluation and planning processes is apparent in both the State of the Park Report and the existing Park Management Plan.

The State of the Park Report highlights the need to acquire more information related to all visitor experience and public education indicators in order to maintain or improve performance in those areas. Although condition and trend ratings can only be made with anecdotal information and expert opinion (and quantitative information in a few cases), some general issues and trends can be inferred from available data and local specialist knowledge.

Yoho National Park provides a wide range of visitor opportunities and facilities, contributing to an overall fair and improving rating for visitor experience. While visitors to Yoho are generally satisfied with their experience, some opportunities for improvement are apparent. Many existing popular visitor facilities and associated infrastructure are outdated or in poor condition. Considerable work has been undertaken in recent years to address these deficiencies. This positive trend is expected to continue in the future.

The current Park Management Plan recognizes the need to provide high quality visitor experiences and provides strategies and specific actions to meet that objective. While substantial progress has been made in restoring or upgrading visitor facilities in recent years, there is an opportunity to better integrate visitor experience and ecological integrity objectives. Emphasizing the visitor experience as an outcome, rather than focussing primarily on visitor infrastructure, will lead to improvements in this area.

This State of the Park Report confirms the importance of developing a consistent, comprehensive and scientifically rigorous monitoring program to measure and report on progress related to ecological integrity, culture resource protection, visitor experience and public education objectives. While the existing management plan identifies indicators and the need for improved monitoring and reporting specific to ecological integrity, similar approaches need to be applied to cultural resources, visitor experience and public education.

Finding ways to better connect Canadians and international visitors to Yoho National Park in order to improve understanding, appreciation and support for national parks is an ongoing challenge for Parks Canada. The Yoho National Park State of the Park Report indicates that there are opportunities for improvement to ecological integrity, cultural resource management, visitor experience and public education that, when addressed in an integrated fashion, will help to meet that challenge.

The existing Park Management Plan recognizes the majority of the issues identified in this report and in most cases provides appropriate direction to address those challenges and opportunities. While many actions have been implemented, continued attention and long-term monitoring are required to ensure successful outcomes. In some cases, this report highlights specific areas that may benefit from additional attention during the upcoming management plan review.

## 7.0 BIBLIOGRAPHY

Achuff, P. 1991. Non-native plant management in western region national and historic parks: issues analysis and recommendations, phase II. Western Regional Office, Canadian Parks Service, Calgary, AB, Can.

BAFU – LLYK Wildlife Mortality Database (2007, January). Lake Louise, Yoho and Kootenay Field Unit, Kootenay National Park, Radium Hot Springs, BC, Parks Canada, Resource Conservation (producer and distributor).

Beane, M.J. 1989. Inventory and assessment of priority lakes in Yoho National Park. Environment Canada Parks pp. 175.

Bowman, M.F. Undated. Draft Report. A Monitoring Protocol for Aquatic Eutrophication in Mountain National Parks of Canada. Unpublished Report.

Bowman, M.F. 2004. Effects of Low-Level Eutrophication on Ecological Integrity of Rivers in the Rocky Mountain National Parks of Canada. A thesis submitted to the Faculty of Graduate and Research in partial fulfillment of the requirements for the degree Philosophy of Science. Edmonton, Alberta.

British Columbia Ministry of Water, Land, and Air Protection. No date. Domestic & Wild Sheep: Reducing the Risks of Disease Transfer. Brochure. British Columbia Ministry of Water, Land, and Air Protection, Victoria, British Columbia.

Canadian Forest Service. Pacific Forestry Centre, Victoria B.C. Yearly Forest Health Survey data. 1985-2006

Columbia Basin Trust. 2006. Climate Change in the Canadian Columbian Basin: Starting the Dialogue. Downloaded from:

<http://www.cbt.org/Files/ColumbiaBasinClimateChangeDialogueBrochure.pdf>

Environment Canada. 2000. Climate change and Canada's national park system [electronic resource]: a screening level assessment. Parks Canada, Department of Canadian Heritage. <http://www.abelearn.ca/documents/CC%20and%20Canadas%20National%20Park%20System.pdf> Accessed 27 Jan 2007.

Garshelis, D.L., Gibeau, M.L., Herrero, S. 2005. Grizzly Bear Demographics in and around Banff National Park and Kananaskis Country, Alberta. *Journal of Wildlife Management* 69, 277-297.

Gibeau, M.L., S. Herrero, B.N. McLellan, and J.G. Woods. 2001. Managing for grizzly bear security areas in Banff National Park and the Central Canadian Rocky Mountains. *Ursus* 12:121-130.

Hood, J.L., J.W. Roy, and M. Hayashi. 2006. Importance of groundwater in the water balance of an alpine headwater lake. *Geophysical Research Letters*, 33.

IPSOS REID. 2007. Social Science Research Report for Yoho National Park. Report prepared for Parks Canada. Vancouver, British Columbia.

IUGG (CCS) – UNEP - UNESCO. 2005. *Fluctuations of Glaciers 1995-2000, Vol. VIII*. Haeberle, W., M. Zemp, R. Frauenfelder, M. Hoelzle, and A. Käab (eds.). Zurich: World Glacier Monitoring Service. 288p.

Kelly, E.N., D.W. Schindler, V.L. St. Louis, D. B. Donald, and K. E. Vladicka. 2006. Forest fire increases mercury accumulation by fishes via food web restructuring and increased mercury inputs. *Proceedings of the National Academy of Sciences*, 103(51) 19380-19385.

Lake Louise, Yoho, Kootenay Field Unit. 2007. Non-Native Vegetation.[computer data]. Parks Canada Agency. Accessed 02 Apr 2007.

- Lake Louise, Yoho, Kootenay Field Unit. 2007. Vascular plant species list.[computer data]. Parks Canada Agency. Accessed 02 Apr 2007.
- Lake Louise, Yoho, Kootenay Field Unit. 2007. Area disturbed by MPB.[computer data]. Parks Canada Agency. Accessed 19 March 2007.
- Lake Louise, Yoho, Kootenay Field Unit. 2007. Area disturbed by fire.[computer data]. Parks Canada Agency. Accessed 23 Jan 2007.
- Luckman B. & T. Kavanaugh. 2000. Impacts of Climate Fluctuations on Mountain Environments in the Canadian Rockies. *Ambio* 29 (7): 371-377.
- Mattson, D.J. 1993. Background and proposed standards for managing grizzly bear habitat security in the Yellowstone ecosystem. *Managing Grizzly Bear Habitat Security*. 17pp.
- Mayhood, D.W. 2000. Provisional evaluation of the status of westslope cutthroat in Canada. pp. 579-585 in L.M. Darling, editor. *Proceedings of the Biology and Management of Species and Habitats at Risk, Kamloops, BC, 15-19 February 1999*. BC Ministry of Environment, Lands and Parks, Victoria BC, and University College of the Cariboo, Kamloops, BC. 974 p.
- McCaughey, W. W. and W. C. Schmidt. 2001. Taxonomy, distribution, and history. Pages 29-40 in D. F. Tomback, S. F. Arno, and R. E. Keane, eds. *Whitebark pine communities: ecology and restoration*. Island Press, Washington, D. C.
- McGuire, T.M. and J.F. Morrall. 2000. Strategic highway improvements to minimize environmental impacts within the Canadian Rocky Mountain National Parks. *Canadian Journal of Civil Engineering*. 27: 523-532.
- Ministry of Water, Land and Air Protection [MWLAP]. 2002. Indicators of climate change for British Columbia, 2002. Ministry of Water, Land and Air Protection, Water, Air and Climate Change Branch, Victoria, British Columbia, Canada.
- Murdock, T. Q., and R. Lee. 2001. Changes in snow depth and snow water content. Technical document, Indicators of climate change for British Columbia, 2002. <[http://www.env.gov.bc.ca/air/climate/indicat/pdf/snow\\_tdoc.pdf](http://www.env.gov.bc.ca/air/climate/indicat/pdf/snow_tdoc.pdf)>. Accessed 19 Dec 2006.
- Ogilvie, R. T. 1990. Distribution and ecology of whitebark pine in western Canada. Pages 54-60 in *Proceedings of a symposium on whitebark pine ecosystems: ecology and management of a high-mountain resource, 29-31 Mar 1989, Bozeman, MT*. USDA Forest Service General Technical Report INT-GTR-270.
- Parker, M.A. 2000. Fish passage – culvert inspection procedures; in *Watershed Restoration Technical Circulation no. 11*. Ministry of Environment, Lands and Parks, Vancouver, British Columbia. 24 pp.
- Parks Canada Occurrence Tracking System (2007, January), Kootenay National Park, Radium Hot Springs, B.C., Resource Conservation (producer and distributor).
- Parks Canada. 2000. Yoho National Park of Canada management plan. Minister of Public Works and Government Services Canada, Ottawa, Ontario, Canada.
- Parks Canada Agency. 2003. 2003 Survey of Visitors to Banff, Jasper, Kootenay and Yoho National Parks of Canada. Sponsored by Parks Canada and the Mountain Parks Visitor Survey Partnership with a contribution by Alberta Economic Development.
- Parks Canada. 2004. Draft Fire Management Plan 2004. Fire and Vegetation Department. Radium Hot Springs, B.C.
- Parks Canada Agency. 2005a. Monitoring and reporting ecological integrity in Canada's National Parks, volume 1: guiding principles.

Parks Canada Agency. 2007. Monitoring and reporting ecological integrity in Canada's National Parks, volume 2: a park-level guide to establishing EI monitoring.

Parks Canada Agency. 2007. Evaluation of cultural resources in the Mountain National Parks rating guide March 2007.

Pole, M.J. 1991. Inventory and assessment of Amiskwi, Ice, Otterhead, Ottertail and Porcupine Rivers. Yoho National Park. Unpublished Parks Canada report. pp. 76.

Poole, K. 2006. Mountain Goat Survey in Management Units 4-35 and 4-16, Kootenay Region, British Columbia, August-September 2006. Prepared for B.C. Ministry of Environment and Parks Canada. Unpublished Report.

Reichwein, P.A. 1998. Background Paper: Cultural Resource Management, Management Plan Review Yoho & Kootenay National Parks. Parks Canada Agency.

River Forecast Centre. 2006. Historic snow survey data for British Columbia [Computer data]. Government of British Columbia, Ministry of Environment, Water Stewardship Division. <<http://www.env.gov.bc.ca/rfc/archive/historic.html>>. Accessed 19 Dec 2006.

Smith, C. M. 2006. Whitebark pine and white pine blister rust in the Rocky Mountains of Canada and Northern Montana. Canadian Journal of Forest Research.

Statistics Canada. Population and dwelling counts.

<<http://www12.statcan.ca/english/census06/data/profiles/community/Details/Page.cfm?Lang=E&Geo1=CSD&Code1=5939007&Geo2=PR&Code2=59&Data=Count&SearchText=Golden&SearchType=Begins&SearchPR=01&B1=All&Custom=>> Accessed September 14, 2007.

Stelfox, J.G. 1990. Radium Bighorn Sheep Herd Cooperative Management Plan. Report prepared for: Kootenay National Park, Radium Hot Springs, B.C. and B.C. Wildlife Branch, Cranbrook, British Columbia.

Taylor, C.J. 1998. Yoho Fire Lookouts Built Heritage Resource Description and Analysis. Parks Canada, Western Canada Service Centre. Calgary, Alberta.

Taylor, C.J. 2000. A History of Campgrounds in the Mountain National Parks of Canada. Built Heritage Resource Description and Analysis. Parks Canada, Western Canada Service Centre. Calgary, Alberta.

Taylor, M. and S. A. Helms. 2006. Mountain parks road-stream crossing assessment report. Prepared for Parks Canada. 54 pp.

Tymstra, C. 1991. Fire History of Yoho National Park, British Columbia and Implications for Fire Management. M.Sc. Thesis, Dept. of Forestry, University of Alberta.

Water Survey of Canada. 2006. Archived Hydrometric Data [computer database HYDAT] Government of Canada, Environment Canada. [http://www.wsc.ec.gc.ca/hydat/H2O/index\\_e.cfm?cname=main\\_e.cfm](http://www.wsc.ec.gc.ca/hydat/H2O/index_e.cfm?cname=main_e.cfm)