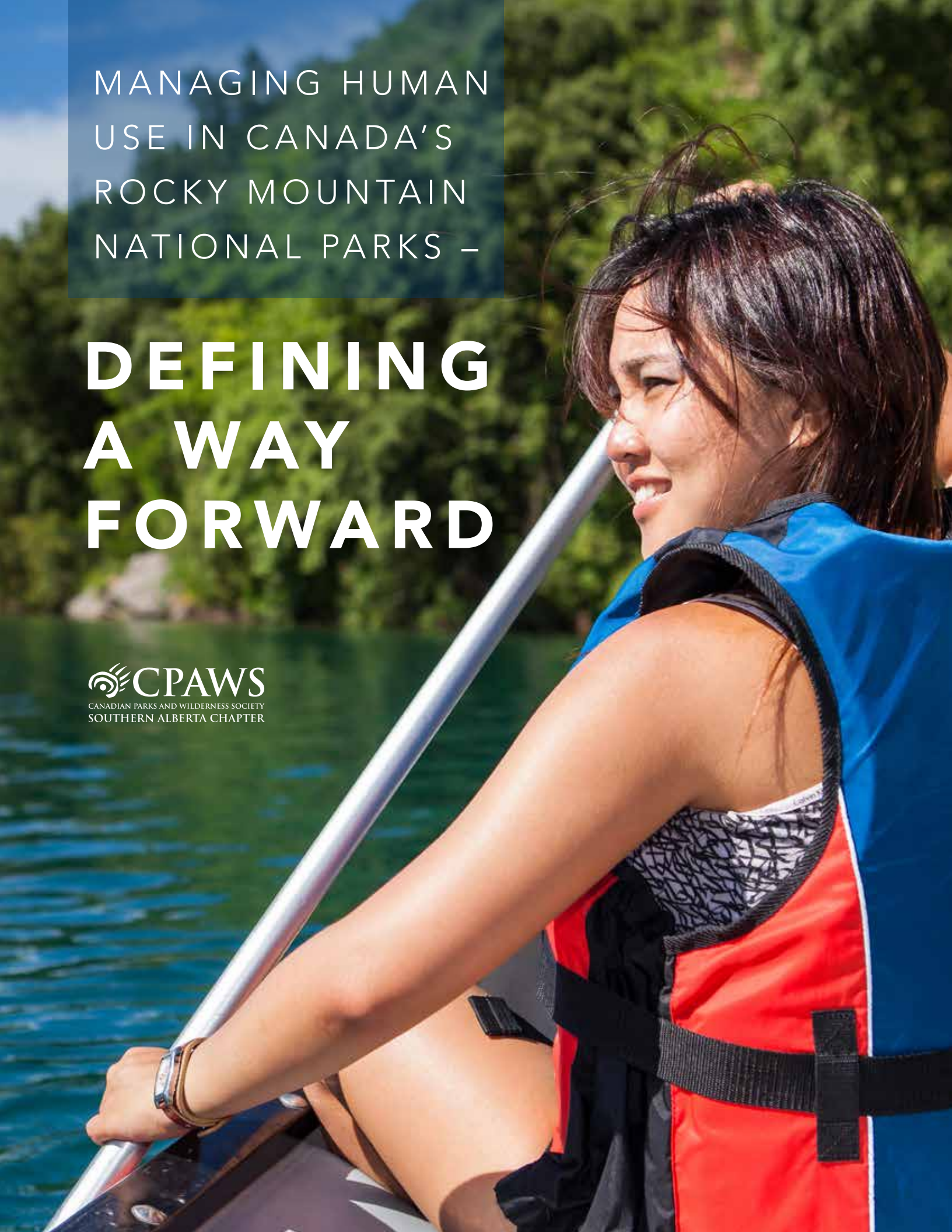


MANAGING HUMAN  
USE IN CANADA'S  
ROCKY MOUNTAIN  
NATIONAL PARKS –

# DEFINING A WAY FORWARD

 **CPAWS**  
CANADIAN PARKS AND WILDERNESS SOCIETY  
SOUTHERN ALBERTA CHAPTER







## TABLE OF CONTENTS

<b>1. Executive Summary</b>	<b>3</b>
<b>2. Introduction</b>	<b>7</b>
<b>3. Overview of Visitor Use Management Strategies</b>	<b>18</b>
<b>4. Recommended Process and Priorities for Defining a VUM for Canada's Rocky Mountain National Parks</b>	<b>47</b>
<b>5. Creating a Visitor Use Management Strategy Step by Step</b>	<b>56</b>
<b>6. Case Study: Visitor Management in Yosemite National Park</b>	<b>64</b>
<b>7. References</b>	<b>74</b>
<b>8. Appendix 1: Visitor Impacts to Protected Areas</b>	<b>77</b>
<b>9. Appendix 2: Examples of Ecological Indicators</b>	<b>78</b>

Photo: Krista Joy Montgomery



# Executive Summary

**1**



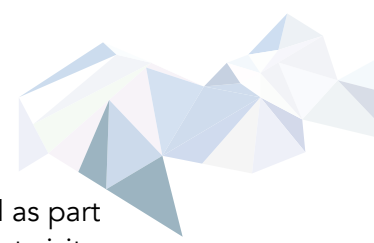


Photo: Andy Holmes

CANADA'S PROTECTED AREAS form a diverse array of lands and waters that prioritize everything from maintaining ecological integrity to wildlife conservation, while also meeting a suite of social and cultural objectives. The *Canada National Parks Act* states that the maintenance or restoration of ecological integrity is the first priority when it comes to the management of national parks. In recent decades, however, it has become increasingly apparent that monitoring and managing ecological attributes of parks is not enough. With millions of people visiting some parks each year, the impacts of “over tourism” are becoming more acute and intense. Although Parks Canada has implemented various management actions to address visitor use, these have not been part of an overarching strategy across a larger landscape. Thus, management has had limited effectiveness in addressing the many impacts of mass tourism across ecosystems.

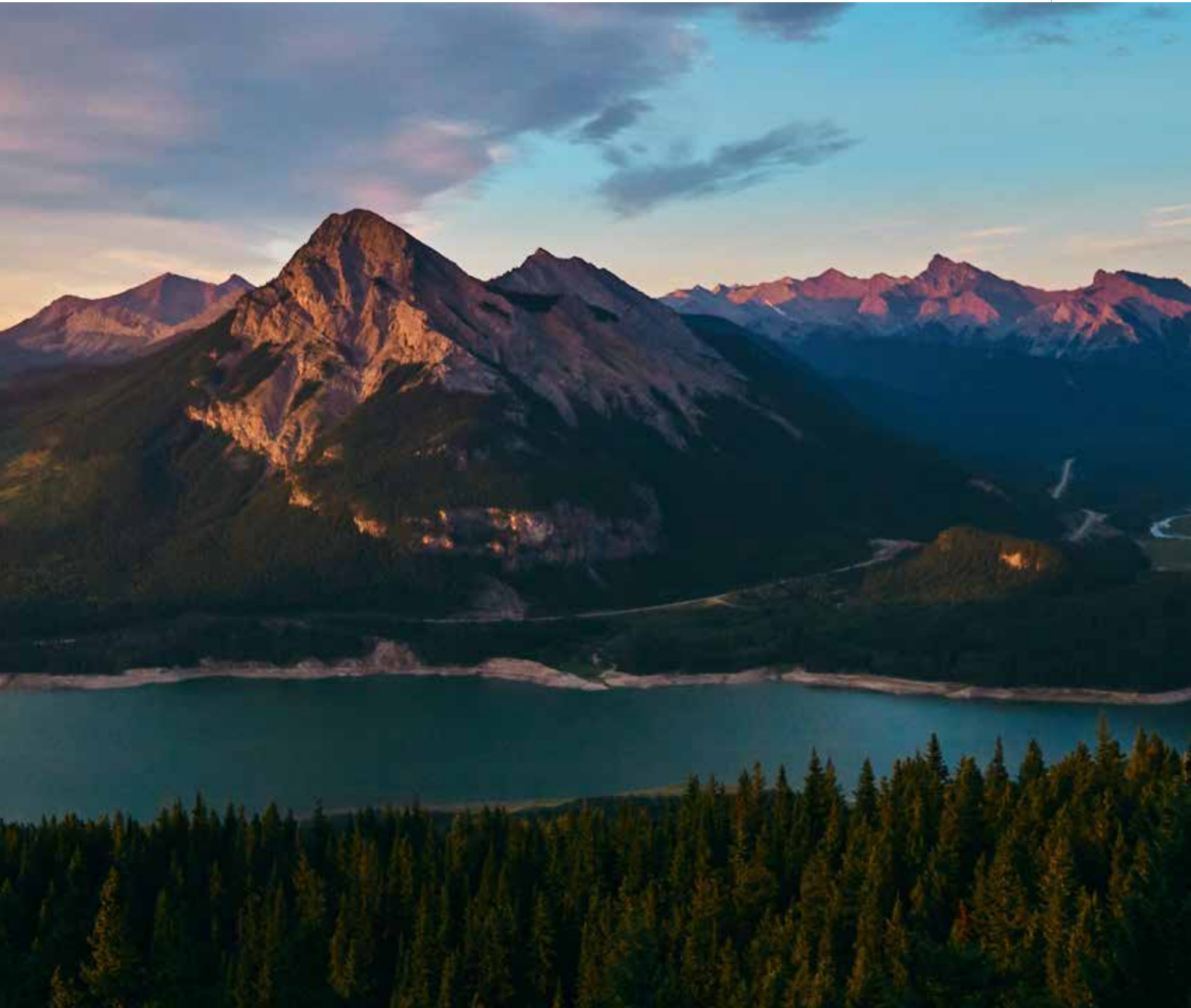
In Canada, the United States, and Australia, various programs over the years have examined and attempted to manage visitor use. This report reviews some of these approaches and considers their application within a Canadian context. Regardless of the framework used, some commonalities exist. A successful visitor use management framework requires robust human use data and social science to understand levels of visitation, where people go and what forms of recreation, they participate in. Social science can also inform visitor expectations and motivations to visit a park, which can shape management programs. This information is then placed within the context of monitoring focusing on ecological objectives to create a holistic understanding of the park. All frameworks acknowledge that there are data gaps in our understanding of





park ecological, social, and cultural values; these data gaps may be addressed as part of a frameworks that starts by creating visitor use objectives and goals. A robust visitor use management framework requires a robust monitoring program within the context of adaptive management. This last component is critical to fill data gaps, facilitate experimenting with management options, and allow flexibility in management response to continually refine management strategies to have the greatest positive effect on the park experience and its ecological attributes.

Photo: Haley Tuong





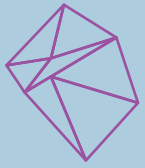
This report explores various large landscape approaches from implementing a carrying capacity to creating a holistic visitor use management framework and an integrated framework for developing ecological indicators of visitor use. Each of the approaches reviewed has components applicable to the Canadian Parks system and the Rocky Mountain National Parks in particular. We close by proposing a step-by-step process that engages with stakeholders throughout and results in a visitor use management strategy for Landscape Management Units in the Rocky Mountain National Parks:

1. Identify the Landscape Management Unit objectives and evaluation subjects relevant to visitor impacts on natural values
2. Prioritize natural assets and threats
3. Select indicators and establish thresholds
4. Establish management strategies
5. Implement, monitor, evaluate, and adjust

While implementing a visitor use management strategy may seem onerous, it can be done within the context of existing management planning and operational efforts. In most cases, stakeholders not only bring expertise and perspective to the conversation, but also may bring data and capacity. Creating a visitor use management framework is a team effort. Current visitation patterns show that the time to address visitor use meaningfully and strategically is now. Parks Canada has an opportunity to be a leader and create visitor use management frameworks that enhance the visitor experience and restore the ecological integrity of our most cherished National Parks.

Photo: Jordan Grider





# Introduction

**2**

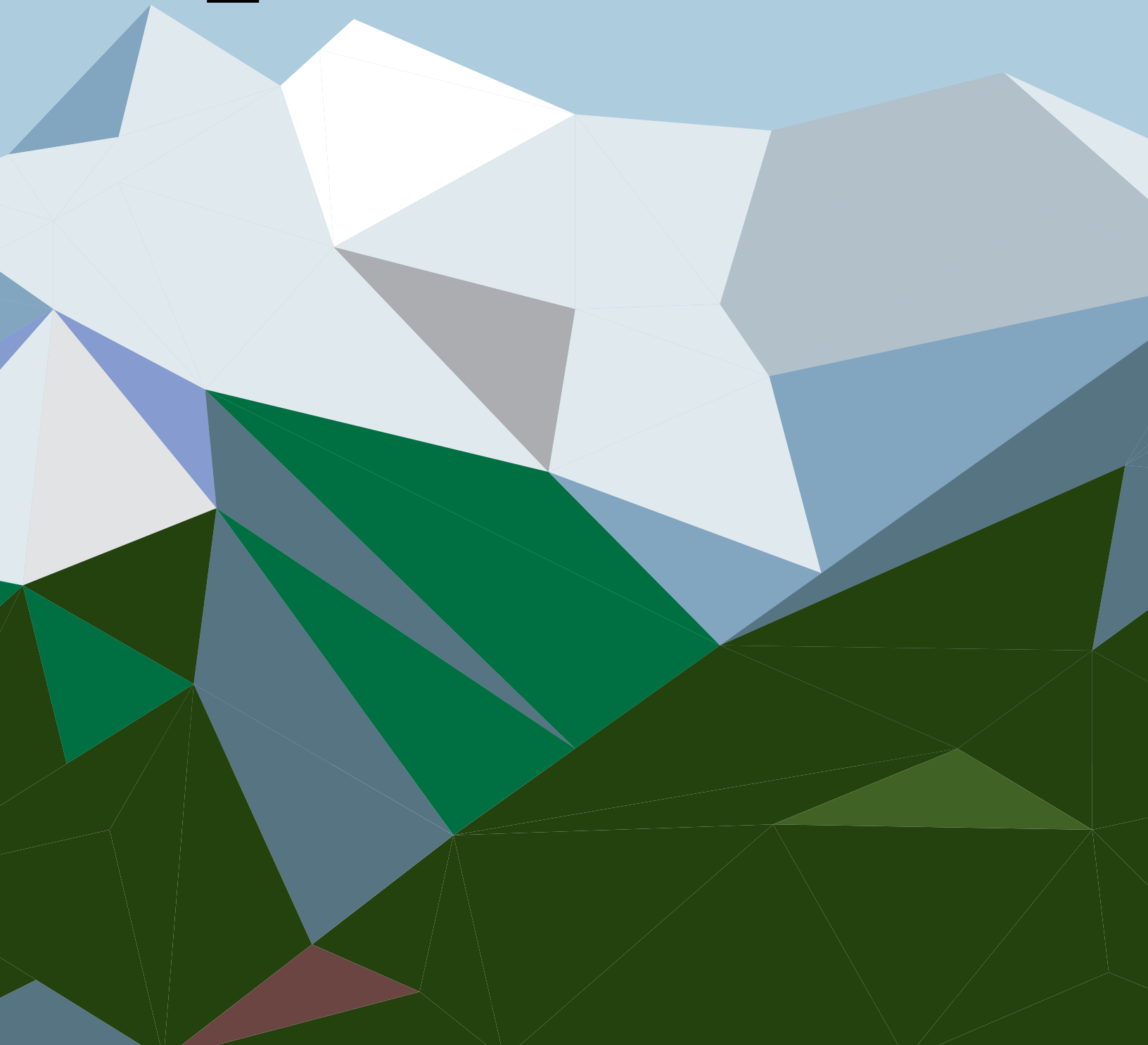




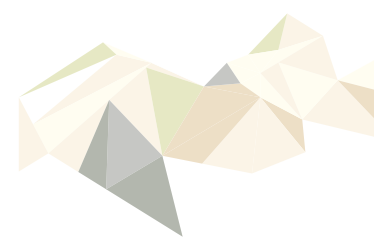


Photo: Andy Holmes

CANADA'S PROTECTED AREAS are a diverse series of ecosystems that are managed by provincial, federal, and Indigenous governments. Visitation varies from a few dozen people per year to many million. Most protected areas are designated to conserve ecological and cultural resources, and the *Canada National Parks Act* states that the "maintenance or restoration of ecological integrity, through the protection of natural resources and natural processes, shall be the first priority of the Minister when considering all aspects of the management of parks" (Statutes of Canada, 2020). High levels of visitation may compromise those objectives, however, and there are examples in recent history of management decisions that did not effectively prioritize ecological integrity above commercial developments. Some of these decisions have been based on objectives to increase visitation, thus further compounding issues with over tourism.

This paper examines potential strategies and frameworks for managing high levels of human use in ways that complement existing park management processes and commitments, within the context of the need to prioritize ecological integrity. The paper first reviews approaches from around the world and then provides a recommended step-by-step process for Canadian parks to strategically address high levels of visitation while addressing ecological and cultural management objectives. This paper is for park managers, academic students and researchers, and environmental non-profits who advocate for effective management of parks and protected areas. Alberta and British Columbia's Rocky Mountain National Parks are currently in the process of updating their 10-year management plans. Within this context, this paper speaks largely to management in the Rocky Mountain National Parks. Recommendations, however, may apply to any protected area in Canada with dramatically increasing levels of visitation that may be compromising resources.





## The Rocky Mountain National Parks

The contiguous National Parks of Banff, Jasper, Kootenay and Yoho, as well as Mount Robson, Mount Assiniboine, and Hamber provincial parks are designated as the Canadian Rocky Mountain Parks World Heritage Site. In their statement of significance, the World Heritage Committee says these parks exemplify the outstanding physical features of the Rocky Mountain Biogeographical Province from glacial geologic processes to world-class palaeontological sites (World Heritage Committee, 2020a). Waterton-Glacier National Park is also a World Heritage Site and is recognized as the world's first International Peace Park, holding unique significance in Canada's National Park system. It boasts a distinctive climate and physiographic setting at the mountain-prairie interface and tri-ocean hydrographical divide. Similar to the Rocky Mountain Parks, Waterton-Glacier was originally designated because of its superlative mountain scenery, high topographic relief, glaciers, and abundant diversity of wildlife (World Heritage Convention, 2020b).

In 1885, Banff became Canada's first designated National Park; Kootenay and Yoho followed in 1920, Jasper in 1930, and Waterton in 1932. With their World Heritage Status, striking natural features, high rates of visitation and amenities that are particularly valued and salient in public and scientific imaginations, these parks are

Photo: Andy Holmes





defined as “iconic” (Miller, Carter, Walsh, & Peake, 2014). Indigenous people inhabited and traveled through these lands for thousands of years and have a rich cultural history associated with the land contained in these parks; the Indigenous relationship with these lands is foundational to their significance. As they are managed to protect large scale ecological processes and contain human developments and recreational opportunities, they are classified as Category 2 protected areas (International Union for the Conservation of Nature, 2016).



Photo: Andy Holmes

## Visitation to the Rocky Mountain National Parks

These iconic parks have always been popular destinations for local and international visitors. In 2018-2019, Parks Canada recorded close to 16 million visitors to the seven mountain parks (Banff, Jasper, Kootenay, Yoho, Waterton Lakes, Mount Revelstoke, Glacier). Visitation to the most visited of the mountain is reflected in Table 1. Some atypical features within the boundaries of these National Parks include towns (Banff, Lake Louise, and Jasper), ski hills, and golf courses. While these human use developments are not permitted in newer Canadian National Parks (National Parks Act, Section 36, 2015), they are a part of the character of these National Parks and in some cases contribute significant historic perspectives and learning opportunities for visitors (e.g., Cave and Basin National Historic Site). These features are also partly responsible for driving the high levels of visitation.

Over the past decade visitation has increased dramatically beyond objectives defined in current management plans. With this increase in visitation, many park users and managers have observed an array of environmental, social, and cultural impacts. The need for a visitor management strategy has become abundantly clear.



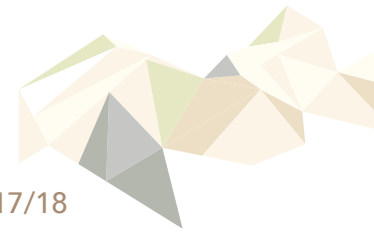


Table 1: Visitation to the Rocky Mountain National Parks from 2011/12 to 2017/18

Park	Visitation 2017-18 <sup>a</sup>	Increase (dates)
Banff	4,089,309	29.6% (2011/12 – 2017/18) <sup>b</sup>
Jasper	2,445,991	24.9% (2011/12 – 2018/19) <sup>c</sup>
Kootenay	515,787	20.1% (2011/12 – 2018/19) <sup>d</sup>
Yoho	694,842	26.1% (2011/12 – 2018/19) <sup>e</sup>
Waterton Lakes	412,860	34% (2011/12 – 2016/17) <sup>f</sup>

a (Parks Canada, 2019a)

d (Parks Canada, 2019d)

b (Parks Canada, 2019b)

e (Parks Canada, 2020)

c (Parks Canada, 2019c)

f (Parks Canada, 2019e)

There are benefits to this increase in visitation. As more tourists are attracted to protected areas to participate in nature tourism or ecotourism ventures, the economic contributions of both forms of tourism are rapidly becoming significant to the international tourism industry (Deng, Qiang, Walker & Zhang, 2003). Nature-based tourism contributes billions of dollars to national economies each year. Visitors to the Rocky Mountains generated \$1.09 billion in direct tourism expenditures in 2012, representing 15% of total direct tourism expenditures in Alberta (Grant Thornton and Econometric Research Limited, 2016). The economic financial contribution of international tourism was apparent with the recent COVID-19 pandemic, when close to 85% of the population of Banff faced unemployment as tourist-based businesses closed to reduce the spread of the virus and visitation to the mountain towns was stopped (Conboy, 2020).



Photo: Andy Holmes





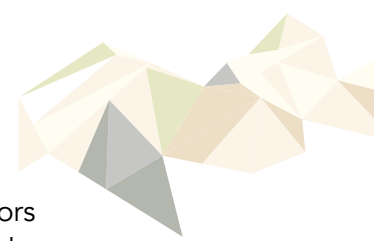
## The Need for Holistic Approaches

Visitation to parks and protected areas can affect economic, environmental, and social realms (Herath, 2002), therefore all three should be considered in the planning and management processes, both the human and ecological dimensions of park tourism must be researched, understood, and balanced for management to be successful (Duffus & Dearden, 1993). Even though ecosystem conservation should remain the primary goal of management efforts, developing management strategies must take into consideration the factors that motivate people to spend effort and money to visit a protected area for various reasons, such as recreation, learning, or spirituality (Orams, 2000). Balancing these social and ecological needs inevitably requires trade-offs between conservation, animal welfare, visitor satisfaction, and economic profitability (Reynolds & Braithwaite, 2001).

National Parks are designed to offer an array of experience for visitors. While addressing ecological integrity is the priority, it is typically considered in the context of recreational and spiritual opportunities for people, as well as economic health for local communities. Continuing to provide a diversity of visitor experiences in National Parks is essential for cultivating support for their existence and management funding (Weiler, Moore, & Moyle, 2013). The successful design and management of national parks, therefore, depends on finding an acceptable position along the continuum between extra-preservationist agendas that allow virtually no tourism, and extra-touristic agendas that encourage high levels of visitation and associated infrastructure development to service visitor needs, as well as minimizing visitor impact to ecological resources (Miller et al., 2014).



Photo: Chris Rees



Lawson and Manning (2002) describe three dimensions associated with the visitors recreational experience in a wilderness or park setting: 1) social conditions (i.e., the number of other people encountered); 2) resource conditions (i.e., the amount of human impact in an area); and 3) management conditions (i.e., regulations limiting the number of people). Assumptions regarding visitor needs and perceptions of these conditions are often made throughout the management process and based on the manager's perception rather than scientific information. Scientific efforts can provide protected-area managers with more reliable information through three different categories of research: identification of participants (their needs and demographics), satisfaction management (investigating supply and demand), and conducting impact and trade-off analyses (including social and biological impacts; Reynolds & Braithwaite, 2001). Determining the attitudes and preferences of users in a particular area is also necessary if public support of management plans and associated regulations is important.

Even though the National Park experience can be sacred for some, educational for others, and adventure based for others, it is increasingly evident that humanity and its diverse technologies have great influence, both positive and negative, on the natural environment these parks are designed to protect (Miller et al., 2014). With the increase in number of visitors to these protected areas and a growing diversity of activities they engage in, resource degradation is evident in several popular locations across the Rocky Mountain parks. Recreation and tourism development is one of the factors leading to the decline of threatened species, and overuse may also reduce the quality of the visitor experience (Fefer, De-Urioste Stone, Daigle, & Silka, 2016). This can lead to the loss of biodiversity, along with unacceptable social impacts (e.g., crowding) that degrade both the visitor experience and the health of ecosystems (Fefer et al., 2016). Visitors can impact the ecological integrity and function in parks and protected areas in myriad ways from soil compaction and trail braiding to displacing wildlife from important habitats. For example, increased visitation and operating times at the Sunshine Gondola in Banff has led to dramatic increases of traffic on the access road, reduced the effectiveness of the Healy Wildlife Corridor, and increased disturbance to wildlife (Hunt, 2018). A comprehensive table outlining potential impacts to ecological resources by visitors is in Appendix 1. Visitor management is becoming increasingly important (Fefer, De Urioste-Stone, Daigle, & Silka, 2018), and should be based on systemic information gathering and analysis, including how many visitors there are, where they go, and what they do (Castley, Hill, & Pickering, 2009).



## Visitor Management in Banff National Park

As visitor activities evolved in Canada's National Parks, Parks Canada was criticized by some for failing to manage the explosive growth in recreation, leisure, and tourism (Graham et al., 1988). The issue, however, is complicated by the fact that increasing visitation has provided the single most important factor in agency budget justification since the 1950s (Shultis & More, 2011). Therein lies one of the significant challenges with managing high levels of visitation – more visitors leads to a higher budget, which demands additional funds to manage high levels of visitors. In the 1980s, Parks Canada formally adopted a service quality goal that was closely tied to client satisfaction and the concept of financial self-sufficiency based upon tourism (Eagles, 2001). Essentially, the parks needed to offer a product that visitors were satisfied with, which would attract more visitors, and increase funding from the federal government. By the late 1990s, a decline in park visitor use emerged in both Canada and the United States (US). This motivated both the US National Park Service and Parks Canada to increase marketing efforts to attract visitors to parks, which would ensure maintained funding for their management. Park agencies implemented programs to address declining visits in areas they assumed were responsible (e.g., children becoming dependent on electronic media, increased urbanization, and immigrants being unaware of the opportunities parks provided). These assumptions did not address barriers defined by data, which for some parks included park fees and possibly crowding (Shultis & More, 2011). Across the Parks Canada Agency, the emphasis became focused on enhanced visitor experiences



Photo: Braden Jarvis





to strengthen the sense of connection between visitors and parks and increase a sense of stewardship (Shultis & More, 2011). Enhanced visitor experience in some cases meant the provision of new recreational activities to attract new users to the parks (e.g., Gran Fondo and Triathlon races in Banff National Park and the Glacier Discovery Walk in Jasper National Park), even though demand data and ecological impact data was often lacking in the decision making process.

The mandate of Parks Canada recognizes the inherent need to connect visitors to the park and its natural environment, which forms a central principle of all national park management plans. While the intention is clear, measurable objectives to address visitor experience rarely are.

The current management plans fall short of describing precisely how impacts of visitors on the National Park environment will be addressed.

While Banff National Park is the most visited in the Rocky Mountain park system, all Rocky Mountain National Parks struggle with effectively managing visitors to ensure high quality visitor experience while protecting ecological integrity. Even if visitation had declined in these parks, it was still high enough to compromise grizzly bear habitat security and result in an array of management issues (Gibeau, Herrero, McLellan, & Woods, 2001). In 2017, Parks Canada announced free entry to all national parks to celebrate Canada's 150<sup>th</sup> birthday. The Canadian Rocky Mountain parks, which were already experiencing high levels of visitation, were challenged to implement effective



Photo: Adam Liszewski



Photo: Natalia Kitovska

programs, such as reservation systems and shuttle buses, to manage the anticipated increase in visitation (Fletcher, 2016). By 2018, environmental organizations were calling on Parks Canada to implement visitor quotas in busy areas. In response, Parks Canada chose voluntary management tactics that included encouraging people to visit during less busy times, marketing shuttle bus systems, and awareness campaigns (Cecco, 2018). Traffic and trail congestion in the Lake Louise area has continued to increase over the last decade resulting in visitor frustration and lack of access to popular sites. Parks Canada implemented a shuttle bus to Lake Louise and Moraine Lake and in 2020 introduced a shuttle bus reservation system<sup>1</sup> (Ellis, 2020).

Part of the reason the above measures were not effective in addressing over-tourism is that they were not part of an overarching strategy defining goals and objectives at the landscape scale. With overarching direction and objectives, managers may identify

<sup>1</sup> This bus service was cancelled for the 2020 summer to reduce the spread of COVID -19.



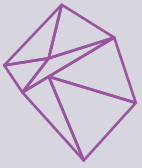
an array of management options that address site specific and adjacent area visitation concerns. The management toolbox should be more diverse than simply establishing quotas for a trail or site or sending visitors to other less heavily used areas without fully understanding the ecological impacts of more dispersed visitation.

Commercial tourism businesses are a necessary part of effective park management and planning. As private entities, they are bound to their individual business plans. Tourism and the environment are linked in parks and protected areas in unique ways. Due to their protected status, it is important for tourism operations to minimize or reduce their negative environmental impacts. This is not always the case, however. For example, Lake Louise ski hill was recently fined \$2 million for felling 38 whitebark pine trees (a federally listed endangered species; Graveland, 2020), and Numtjah Lodge was fined \$27,000 for destroying migratory bird nests in 2016 (Foubert, 2018). Some commercial operators have also threatened or pursued legal action when Parks Canada has attempted to implement management strategies that prioritize wildlife. These specific examples highlight a handful of bad practices, but most commercial businesses more often operate in ways that enhance the visitor experience while respecting ecological resources and generating a deep appreciation of the parks unique resources. In fact, there are many opportunities for the tourism industry to benefit from biodiversity-friendly, sustainable development products and services that meet park management conservation objectives (Damnjanovic & Dokovic, 2013). In addition, visitor attitudes towards the park and its environment are influenced by environmental and cultural interactions provided by tourism operators and park staff (Damnjanovic & Dokovic, 2013).

Working with tourism operators in a collaborative fashion not only eases the management burden on Parks Canada staff, but also ensures the perspectives and needs of the business community are integrated in ways that benefit everyone.

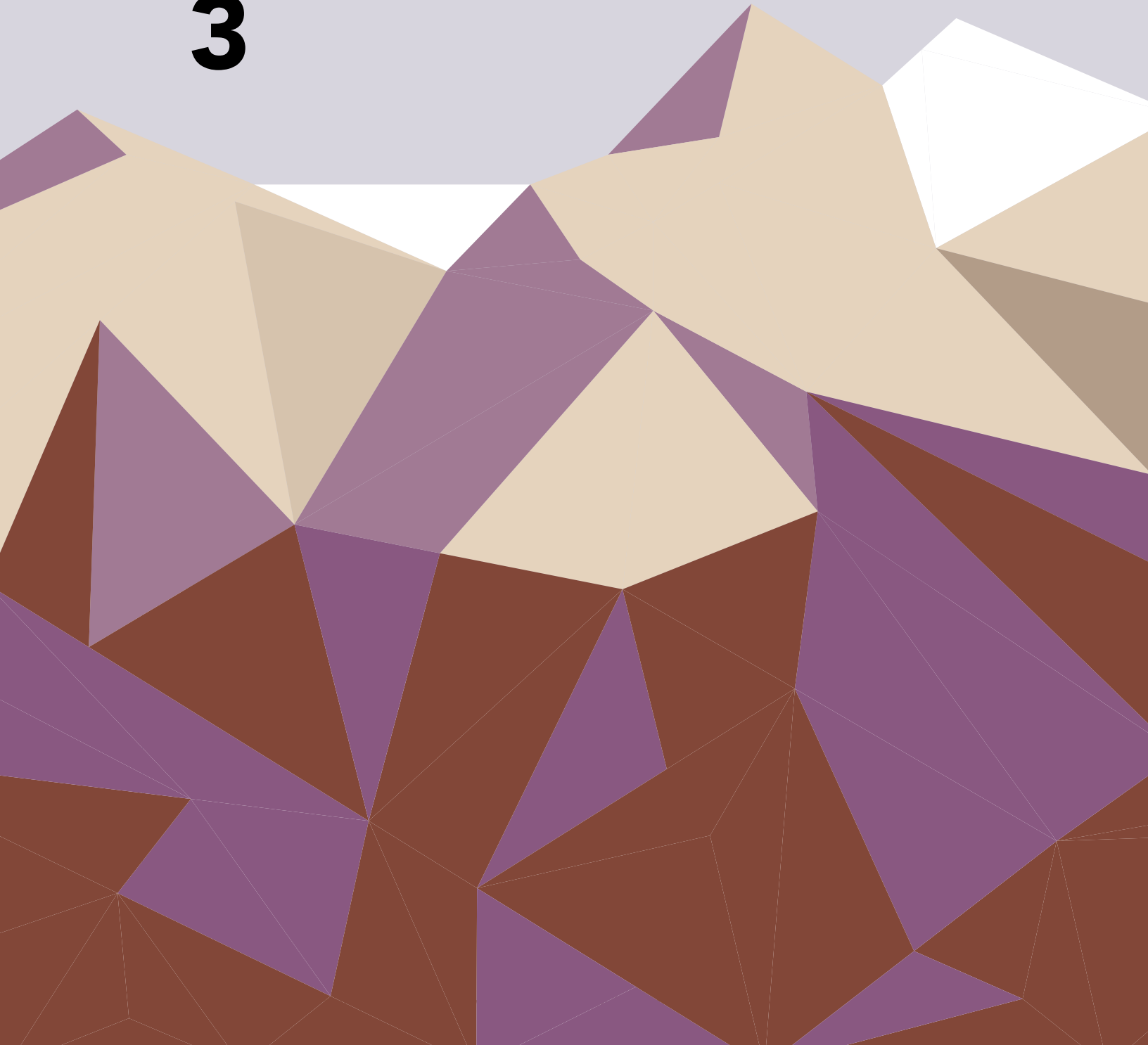
Eagles (2001) predicted that the future of park management would better integrate ecological, social, economic, and cultural roles of parks within broadly-based policy, planning, and management structures. Visitor management is a key component of the successful protection of the ecological, social, economic, and cultural values of parks. Parks Canada has taken some strides forward in this regard, but now is the time to build on those efforts and put them into the context of the bigger picture to increase management effectiveness, as well as operational efficiency. The next sections of this document provide a review of options and propose a process to integrate a visitor use management strategy in park management.

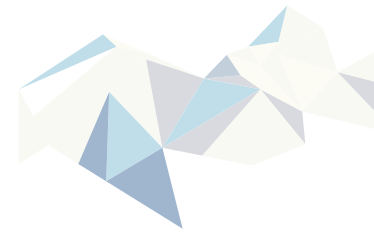




# Overview of Visitor Use Management Strategies

**3**





## Definitions

Visitor use management is the process of managing human use to maintain or achieve desired conditions or experiences (Miller, Fefer, Kraja, Lash, & Freimund, 2017). The US National Park Service has been working with other federal land management agencies to refine visitor management strategies for the past several decades. They currently apply a Visitor Use Management Framework (VUMF), which is:

*The proactive and adaptive process for managing the characteristics of visitor use, and the natural and managerial setting, using a variety of strategies and tools to achieve and maintain desired resource conditions and visitor experiences (Cahill, Collins, McPartland, Pitt, & Verbos, 2018).*

VUM strategies can be designed to complement rather than replace current management approaches, thus contributing to protecting and enhancing the benefits and values inherent in the visitor experience (Weiler et al., 2013). Visitor use management approaches have been explored and implemented around the world, including in Canada, over the past several decades.

In the American VUMF, visitor use refers to human presence in an area for recreational purposes, including education, interpretation, inspiration, and physical and mental health (Interagency Visitor Use Management Council, 2016). A “visitor” is defined as *a person who visits the lands and waters of a park or protected area for the purposes mandated for the area. A visitor is not paid to be in the park and does not live permanently in the park* (Eagles, McLean, & Stabler, 2000). This definition does not apply to the Rocky Mountain National Parks because all of them, with the exception of Kootenay, contain a town and permanent residents within their boundaries. Residents



Photo: Maxime Dore



of these national parks are still visitors in a way as once they leave town boundaries to recreate around their home, they become visitors in the national park. It is important for park managers to work with local people and communities to benefit from tourism linked to conservation, which helps demonstrate the economic value of the natural resources being conserved (Candrea & Ispas, 2009). Local communities in Canada's national parks are essential to local and provincial economies and provide an array of services for park visitors. Therefore, the Canadian Parks and Wilderness Society (CPAWS) proposes the following amendment to the definition of *visitor* for the purposes of any Visitor Use Management Strategy applied to the Rocky Mountain National Parks:

*A visitor is a person who visits the lands and waters of a park or protected area for the purposes mandated for the area. A visitor is not paid to be in the park. Visitors may be permanent or temporary residents of communities within the park and recreate on park lands outside of town boundaries.*

This definition includes residents of the towns within the park boundaries, but does not encompass their activities while working in the park (e.g., Parks Canada staff when at work, Alberta Transportation staff, or construction workers). A visitor use management strategy pertains specifically to all people engaging in any form of recreational activity in the park, as well as commercial operators conducting business on park lands.



Photo: Andy Holmes



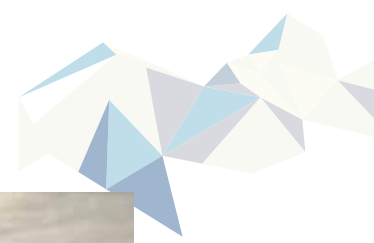


Photo: Andy Holmes

Farrell and Marion (2002) describe an ideal visitor management framework as one that:

- Is quick, easy, inexpensive, and cost-effective to implement;
- Is able to successfully assess and/or minimize visitor impacts;
- Considers multiple underlying causes of impacts;
- Facilitates selection of a variety of management actions;
- Produces defensible decisions;
- Separates technical information from value judgements;
- Encourages public involvement, shared learning, and consensus building; and
- Incorporates local resource uses and resource management issues.

An overarching visitor use management strategy will allow park managers to collaboratively develop a long-term strategy for providing access, connecting visitors to key experiences, protecting resources, and managing visitor use (Interagency Visitor Use Management Council, 2016). This overarching strategy can also contribute to Parks Canada's commitment to celebrate and promote diversity, equity, inclusion, and accessibility by creating a process whereby data is gathered from different user groups and programs are created to address broad-based user needs within the ecological context of the landscape. Using a guiding framework or overarching strategy will help Parks Canada managers make informed decisions through each stage of the management process, including data collection, policy, planning, implementation, and monitoring (Fefer et al., 2016). Decision-making frameworks provide a structure for organizing information and therefore assist protected area managers in making rational, defensible trade-offs between resource protection and visitor access. Frameworks incorporate a means of assessing visitor impacts and determining management actions and strategies to minimise or prevent impacts caused by visitation (Farrell & Marion, 2002).



## The Importance of Social Science

Maximizing visitor opportunities while minimizing impacts to ecological integrity requires an interdisciplinary approach that integrates ecological and social data to create meaningful and effective management objectives (Cahill et al., 2018). Social science helps to better understand and define human use related issues; it can be leveraged to better understand if there is a need to act and inform future management direction (Cahill et al., 2018). One challenge with VUM is that many protected areas lack basic social or biological data that can act as a baseline of existing conditions. Human use data includes information about what visitors are doing and experiencing, where they are going, what their motivations are for visiting particular areas of the park, and what they expect (Miller, Fefer, Kraja, Lash, & Freimund, 2017). Other aspects included in human use research include knowing who is coming to the park, when they are coming, why they are coming, what they are doing during their visit, and why they do or do not return (Eagles et al., 2006). Social science can also inform what barriers people perceive or face before they visit the park (e.g., language barriers on websites, assumptions about the accessibility of infrastructure, or feelings of not being welcomed).

Social science is integral to effectively managing visitation in a protected area as it can help inform best practices for establishing and implementing monitoring programs (Cahill et al., 2018). All of this data helps shape park management actions to enhance the visitor experience, as well as informing the economic and ecological impact of visitation (Eagles et al., 2000).

Other research avenues may include environmental impact assessments for proposed developments, which should include data from effective visitor monitoring protocols (Eagles, 2013). Social science can also be used to address the values inherent in the visitor experience, which can help define support for parks and protected areas (Weiler et al., 2013). New studies may focus on understanding the root causes of current visitor use issues, the relationship of these issues to visitor use, and visitors' preferences for potential management actions or other possible solutions (Cahill et al., 2018).

Parks Canada currently reports on visitor satisfaction in the Rocky Mountain National Parks state of parks reports. Current satisfaction-based survey questions are narrowly focused and target visitors who recreate in towns or front country campgrounds, which excludes many adventure visitors from data sets. Also, these surveys do little to increase our understanding of visitor impacts on ecosystems and visitor expectations of management actions. The concept of satisfaction with services and programs is a complex construct that considers visitor motivations, expectations, knowledge, and the interactions between visitors and the various elements of the destinations (Eagles, 2013). In addition, satisfaction with a National Park can be based on site-specific elements or with the entire park. To report on visitor satisfaction more accurately, Parks Canada should develop a more discriminate, valid, and reliable satisfaction measurement (Eagles, 2013). Those elements can then inform human use management tactics and overarching strategies.



Examining visitor motivations is important when planning and managing parks because it relates directly to benefits sought in recreational activity choices. Social science can contribute informed and legally defensible decision making for managing visitor use. Proactively managing visitor use supports the ability of Parks Canada to encourage access, improve on and offer a variety of visitor experiences, and protect resources (Cahill et al., 2018). Measuring intrinsic motivations (i.e., the desire for individuals to participate in a given activity or pursuit for their own sake, can be useful for planning and marketing outdoor recreational opportunities (Eagles et al., 2006). A diversity in resource and social conditions in protected areas may be desirable (Damjanovic & Dokovic, 2013); understanding expectations of what activities visitors expect to engage in and what activities they see as appropriate for the Rocky Mountain National Parks can inform visitor management approach.

An example of how to measure visitor motivations is provided by Eagles et al. (2006):

**Management Goal:** Develop a profile and understanding of visitors to a parks system, including what motivates them to visit.

**Objective 1:** Determine what motivates people to visit Alberta's Provincial Parks and Protected Areas.

*Tactic:* Use pre- and post-visit surveys that focus on the motivations for visitation.

**Objective 2:** Determine whether the motivations of visitors to a parks system are satisfied during their visit.

*Tactic:* Use pre- and post-visit surveys to determine whether motivations for visitation are satisfied during their visit.

**Objective 3:** Determine whether there is a relationship between outdoor recreational activities participated in and motivation.

*Tactic I:* Use a visitor survey that focuses on recreational activities participated in and motivation to determine the relationship between motivation, participation, and satisfaction.

*Tactic II:* Develop a list of common motivations for participating in recreational activities at the parks system.

*Tactic III:* Use motivations in future planning initiatives to meet the needs of visitors.





Social science used to be a Parks Canada National program managed by 35 individuals across the country. In 2012, a massive federal government budget cut removed 1,689 agency staff overall and reduced the visitor analysis unit to less than 10 people based in Ottawa; all field unit staff were removed. This dramatically impacted the ability of social science data to be collected and meaningfully inform management (Eagles, 2013). Many parks collect only visitor entrance data and have little to no visitor monitoring at all (Eagles, 2013). There are differences between the individual Rocky Mountain Parks in this regard, however, all parks lack direction at the National level to implement successful, robust visitor monitoring programs. Without this National direction, social science is funded with whatever funds may be available, programs lack scientific robustness due to lack of priority, and specialized social scientists are not hired. This contradicts the fact that most of the management plans focus on some aspect of the visitor experience.

On the Parks Canada website detailing research priorities for the Research and Collection Permit System, Social Science Studies are listed as a priority for Banff and Jasper National Parks (Parks Canada, 2017). This stream includes:

- Human use management – visitor experience and satisfaction, thresholds associated with crowding, potential user conflict.
- Demand management and marketing – ecological and visitor experience thresholds for front country and backcountry areas, economic viability and public acceptance of transit, heritage tourism opportunities.
- Effective communications – measure success and shortcomings of awareness and educational activities, outreach activities.
- Insights about visitors, stakeholders, and the public – values, attitudes, and behavioural changes as a result of stewardship initiatives.
- Measuring performance and economic impacts – monitor program effectiveness and make optimal investment decisions.



Photo: Brian Jones



These research priorities are listed for third party researchers interested in conducting work in the National Parks, which implies there is little commitment on behalf of Parks Canada to do the research if nobody else comes forward with research proposals. In addition, there is no commitment on behalf of Parks Canada to integrate research results into park management. The state of parks report reflects little to no social science being conducted in National Parks in the past ten years. Yet, social science or interdisciplinary research projects have been conducted by various academic institutions. When the research is proposed by independent scientists, regional Parks Canada staff should have the capacity to discuss with researchers how their project will inform management decisions. Research questions should be based on a well-defined management need, and research results should influence management direction. A visitor use management strategy can provide clear direction and agency commitment to meaningfully integrate results and recommendations.

The lack of a social science department in the Rocky Mountain National Parks has impacted the ability of the parks to effectively meet management objectives or even define management objectives that will effectively address the human dimensions of visitation. Rebuilding social science capacity will take time and it will be important for Parks Canada to collect data in a cost-effective manner while adopting standards that guide management action (Eagles, 2013). Any park monitoring program should achieve a balance between precision, accuracy, and efficiency. The required effort should not be a deterrent. This is likely some of the most important work Parks Canada can engage in to improve the visitor experience and ensure ecological integrity.

Photo: Louis Paulin



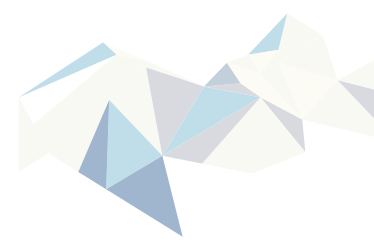
Potential research questions that may serve visitor management strategies include (Miller et al., 2014), but are not limited to:

- Specialized tourism – impacts of project and programs focused on wildlife tourism, ecotourism, pro-poor tourism, pro-women tourism, community-based tourism, heritage tourism
- Empowerment – implications for minorities and disadvantages persons finding new jobs and roles in the tourism sector
- Cultural relocation – consequences of traditional cultures being displaced through increased park visitation
- Enforcement – effectiveness of park management efforts to inhibit illegal activities by locals and tourists
- Public contact – effectiveness of park education and outreach programs to disseminate an environmental ethos to tourists, locals, and businesses
- Quality of life – impacts of increased tourism on the well-being of tourists, locals, and businesses
- Tourist motivation – implications of change in tourist awareness of, and motivations to see, iconic species and places
- Species/ecosystem health – implications of disturbance by increased visitation and demand for resource extraction for iconic and other species and ecosystem vulnerability/resilience
- Touristic attractions – management implications of increases in tourist visits to developed facilities (e.g., gondolas, wildlife viewing platforms)
- Tourist safety and risk management – effectiveness of trail signage in alerting park visitors to dangerous routes or areas
- Social carrying capacity – approaches to resolving conflict between high volumes of trail users and people seeking a quieter experience
- Social media and technology – citizen science, monitoring and interpretation implications of GoPro cameras, apps, social media geo-tagging remote locations driving increased use



Photo: Giordana Provenzano





### Review of Different Visitor Use Management Strategy Approaches

Most VUM strategies provide a guiding framework that aid managers in making informed decisions through each stage of the management process, including data collection, policy, planning, implementation, and monitoring (Fefer et al., 2016). Visitor use management strategies are similar to existing Parks Canada management plans in that they follow a “management-by-objectives” framework that guides park managers in identifying, planning for, and managing for specific park and experience attributes (Fefer et al., 2018). In the case of visitor use, management objectives are broad, narrative statements that define the type of recreation conditions that will be provided and maintained. These include descriptive and prescriptive components pertaining to the condition of natural and cultural resources, the type of recreation experiences, and the type and intensity of management action.

In 2010, management plans for the Rocky Mountain National Parks set an objective to increase visitation by 2% annually (3% annually for Kootenay National Park). Although this objective was set without any supporting social data and did not consider the potential ecological impacts of increasing visitation to this extent, various visitor experience and marketing projects were implemented to address this objective. The increase in visitation was vastly exceeded in each park. This success demonstrates how a quantifiable objective defined in the management plans directs programming, as well as how monitoring can be used to measure whether the objective is achieved. To increase overall park management effectiveness, visitor monitoring needs to be integrated into this general framework (Castley, Hill, Pickering, Hadwen, & Worboys, 2008). Integrating social and ecological data into this quantifiable objective would have demonstrated a higher level of holistic landscape scale planning and increased management effectiveness overall.



Photo: Matthew Shiskaruk



Parks Canada has already applied several visitor management tactics at the site-specific scale in the Rocky Mountain National Parks. For example, shuttle buses to Lake Louise in Banff and Lake O'Hara in Yoho have been in place for several years. Overnight use in all Rocky Mountain parks is managed through camping permits for designated campgrounds in Zone III (natural environment), Zone IV (outdoor recreation), and Zone II (wilderness)<sup>2</sup>. Yet little management effort has targeted day use areas and trails where even visitation levels are not accurately measured. An overarching strategy would put existing site-specific actions into the context over overall visitation and associated impacts in an area, including day use management. The current piecemeal approach cannot effectively address the interactive, complex, and highly dynamic nature of protected areas (Millet et al., 2017).

A visitor use management framework does not require something completely new and does not discount existing efforts that are essential to managing for ecological-based objectives in the parks, rather it complements existing efforts.

It is essential for decision making to be supported by science to maintain credibility and defensibility (Fefer et al., 2018). Yet, social science has long been poorly incorporated and undervalued in land management decision-making, and a challenge with visitor use management is that many protected areas lack basic descriptive human use and social data serving as a baseline of existing conditions (Miller et al., 2017). Few protected areas have information about what their visitors are doing and experiencing, or even where they are going (Miller et al., 2017).

<sup>2</sup> Zone II Wilderness Areas are the only ones specifically defined in the National Parks of Canada Wilderness Area Declaration Regulations as "areas that exist in a natural state or that are capacity of returning to a natural state". All other zones are reflected in Parks Canada management plans and policy but not legislation.





With the exception of the quantifiable increase in visitation objective referred to above, current management plans and monitoring efforts in the Rocky Mountain National Parks focus more on the ecological components of the landscape, such as water quality, grizzly bear habitat security, avian population distribution, and invasive plant species.

Incorporating visitor use data in management plans more directly addresses the impacts visitors have on ecological attributes, but it also provides direction for Parks Canada staff to intentionally manage for specific visitor experiences at various scales across the park.

The sections below discuss several approaches to visitor use management. Regardless of the exact approach, all visitor use management and planning frameworks share a set of basic principles (Fefer, De-Urioste Stone, Daigle, & Silka, 2016):

1. Formulating management objectives with indicators and standards of quality.
2. Monitoring strategic, quality indicators over time.
3. Identifying steps to implement management practices to maintain the set standards.



Photo: Ali Kazal





## Recreation Opportunity Spectrum

Traditionally, park management applied a product-based focus to visitor activity planning and management. This approach centered on providing facilities, services and programs, which led to operation-oriented management focusing on the facility or resource being offered rather than on the experiences or benefits provided (Graham, Nilsen, & Payne, 1988). The Recreation Opportunity Spectrum (ROS) was the first recreation management framework developed. The ROS links supply (resource) and demand (tourism) and maximizes recreational opportunities. The ROS uses an integral logic based on relative remoteness from artificial features and modifications, combined with user density and evidence of management action. The result is a plan that identifies a spectrum of setting opportunities ranging from pristine wilderness to high density-urban (Graham et al., 1988). Although widely applied, in Canada and Australia, the ROS is now considered outdated and largely regarded as more of a concept than a framework (Fefer et al., 2016).

Although an ROS is a powerful tool and model, it requires a definition of user demand for various opportunities as determined through user surveys; this data is rarely available. The 2010 Banff National Park management plan attempted to apply a similar approach with its “view from the edge”, “step into the wild”, and “rocky mountain wilderness adventure” experience definitions (Parks Canada, 2010). Although a great start, these different experiences were not based on visitor use data or directly tied to management plan objectives or programs, thus weakening the application of the ROS in the Rocky Mountain National Parks. This approach is also limited in its effectiveness to manage impacts associated with intensive growth in park visitation and recreation because it overemphasizes recreational opportunity in comparison to ecological integrity (Castley, Hill, & Pickering, 2009).

Photos: (l) Anita Jeanine, (r) Andy Holmes





The core elements of this framework are 1) defining recreation opportunities, 2) monitoring indicators to determine change in condition as a result of human use, and 3) implementing management action to ensure resource and social standards are met (Castley, Hill, Pickering, Hadwen, & Worboys, 2008).

### Implementing Carrying Capacity

The concept of “carrying capacity” - initially defined as the environmental limits necessary to support populations of species - was expanded over 30 years ago to include humans and the limits of their use in parks (Eagles, 2001; Marion, 2016). Carrying capacity entails defining a numeric limit on the amount of visitor use an area can sustain while offering quality recreational experiences based on ecological, social, physical, and managerial attributes and conditions (Farrell & Marion, 2002). Carrying capacity includes both descriptive, quantitative components (e.g., type and intensity of visitor use) and evaluative components (i.e., the judgment about the acceptability of different levels of impacts. Farrell & Marion, 2002). These quotas have long provided the predominant framework for planning and management decision making (Marion, 2016).

Although appealing in its seemingly ease of application, this approach is not effective at all sites because it cannot mitigate impacts to ecological resources in high traffic areas. Generally, the relationship between human use levels and ecosystem impact is curvilinear. Low use levels generate the most significant impacts and disturbance to the ecosystem. As human use increases to medium and heavy levels, the intensity of impacts plateaus. Once human use begins to impact the ecosystem, more use has less and less of an effect (Cole & Landres, 1995). In order to preserve ecosystem integrity, it is more beneficial to limit visitation at very low use levels



Photo: Kurniawan



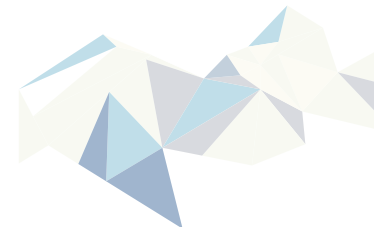
Photo: Neil Rosenstech

before irreversible damage to the ecosystem is done and substantial cuts to use levels or environmental rehabilitation efforts are required. Thus, limiting use is often an ineffective means for achieving resource protection objectives in higher use areas and recreation sites (Marion, 2016). Carrying capacity management also fails to consider the variety of visitor experiences and how/where/when those experiences are available. Carrying capacity appears appropriate because one of the critical criteria for judging success in park management continues to tilt towards the volume of human use. This criterion is thought to directly engage public and political support, even if there is little data to support that assumption (Shultis & More, 2011).

Quantifying maximum acceptable visitation in an area may be difficult in part because the ecological and social values used to define it may not align with each other. Carrying capacity is not holistic enough to bridge this gap while addressing other potential management solutions, nor is it sufficiently comprehensive to address the diversity of situations and scales required to effectively manage visitor use. Although carrying capacity was often considered pivotal to the visitor experience, some research suggests that congestion does not necessarily cause deterioration in the visitor experience or reduction of benefits, even in wilderness settings (Weiler et al., 2013). Visitors may actually expect high volumes of people at particular locales, in which case social carrying capacity could be triggered long after ecological carrying capacity has been exceeded and site degradation has occurred. Carrying capacity on its own overemphasizes the amount of use and fails to consider other potential causes of impact.

Carrying capacity also draws attention away from the broader range of management strategies available to resource managers (Farrell & Marion, 2002). Carrying capacity has been oversimplified in practice, places too much emphasis on limiting visitor use when other management parameters could be manipulated, has in some cases failed to successfully minimize visitor impacts and has not actively incorporated public involvement or local resource needs (Farrell & Marion, 2002). Conversely, a visitor use management strategy addresses all parts of the visitor experience; from before a person enters the park to the moment they leave.





### Visitor Activity Management Process (Canada)

The Visitor Activity Management Process (VAMP) was created to manage the tension between park conservation related resources and visitor needs; VAMP represented a fundamental change in orientation in Parks Canada from a product or supply basis to an outward-looking market-sensitive one (Graham et al., 1988). VAMP was designed as an additional, complimentary management process to the existing Natural Resources Management Process. With this approach, management became operation oriented, focusing on the facility or resource being offered rather than on the recreation experiences or benefits provided. VAMP was used to rationally determine what was needed to support the human use portion of Parks Canada, defining what activities were appropriate in a park and how the public may understand, appreciate, and enjoy the park (Graham et al., 1988). Access, economic value, social impacts related to visitor and traditional use, infrastructure development, regional integration, and projected life-style costs were integral parts of this process. Visitor use and resource protection were integrated through the natural resource management process that identified resource opportunities and constraints. The end product was a series of structured decisions represented in management plans.

Challenges with VAMP included the inability of the framework to be integrated spatially or within the existing parks zoning system (Graham et al., 1988). The model also put management direction and data on the same level; the process was not data-driven, but data served as an aid in decision making. Even though this framework had a strong focus on management requirements from a social aspect, it paid little attention to ecological integrity or condition because it dealt primarily with service delivery for social components of protected area management (Castley et al., 2008).



Photo: Hayden Scott



Photo: Will Tarpey

### **Visitor Experience and Resource Protection (United States)**

The Visitor Experience and Resource Protection framework for recreation planning (VERP) was created to address visitor use management and the increasing complexity of recreation and tourism activities in protected areas. It stemmed from the need for each national park to establish a systematic approach to identify recreation carrying capacity based on biological, social, and managerial components (Fefer et al., 2018). VERP creates a potential early warning system by assessing indicators against benchmarks using a transparent process. VERP is proactive in that it defines conditions rather than reacting to problem areas. The four phases of this framework are:

1. Build the foundation
2. Define existing resource and visitor use conditions
3. Prescribe a range of visitor experience and resource conditions, including zoning, and identifying indicators and thresholds
4. Monitor and manage

The level to which National Parks in the United States applied VERP varied based on their needs. Parks also adapted the framework to address the contextual details and



complexity of planning and management within their jurisdiction (Fefer et al., 2018). A review of the applicability of VERP found the following:

- Staff capabilities and motivations are essential to the successful application of a long-term visitor use planning initiative;
- Public engagement is necessary and widely valued, but some park staff had concerns about implementation of the engagement process;
- Extent of decision-making support is an indicator of how well science is incorporated into the planning process; and,
- Having an internal staff person who is knowledgeable, dedicated, committed, and can champion the plan is key for successful development, implementation, and monitoring.

VERP acknowledges that data gaps will exist, especially in the field of visitor use patterns. Data gaps can be filled through productive partnerships with the academic community, which can conduct research and provide recommendations to inform decision-making. Well-maintained research programs are essential to the National Park Service in the US as a resource to conduct and facilitate relevant park research (Fefer et al., 2018).

VERP requires a higher level of technical expertise to monitor ecological components, implies greater support from management agencies, and has poor linkages to identifying the root causes of impacts (Castley et al., 2008). Park managers have also been challenged by a lack of focused staff expertise. Parks typically have several staff with expertise in the realm of natural and physical science, but very little social science expertise. This lack of expertise may also extend to park employees in general who are not trained in visitor-use planning or taught the value of social science and visitor opinion in planning procedures. To implement VERP, park agencies may need to rethink their internal arrangement to address visitor use management more formally.

Planners have also raised concerns that managers did not fully understand how to incorporate research into planning or that managers did not see the value in it; managers did not always adopt scientific data because the results did not align with their goal (Fefer et al., 2018). This has been seen in management of the Rocky Mountain National Parks with the approval of large scale developments like the Glacier Discovery Walk in Jasper, or the lack of specific visitor use management objectives to increase grizzly bear habitat security in high human use areas in Banff National Park.





### Visitor Use Management Framework (United States)

The Visitor Use Management Framework (VUMF) was designed by a collaborative Interagency Visitor Use Management Council comprised of all public land and water management agencies in the United States (e.g., parks, forest service, Bureau of Land Management, and others). The VUMF helps national park managers maximize benefits for visitors while supporting the parks' purpose, significance, and fundamental resources and values (Cahill et al., 2018). The current VUMF includes a process whereby park managers 1) identify the *desired condition* for an area and its resources, visitor experiences and opportunities, and facilities and services; 2) develop an understanding of how visitor use influences achievement of the desired condition; and 3) create an adaptive management and monitoring plan of visitor use that works to meet overall goals of park management and the VUMF itself (Cahill et al., 2018). The VUMF is integrated into existing park management plans and policies and is designed to complement existing efforts and monitoring.

The VUMF is proactive in that it defines a desired condition, which forms the basis of management action. This is different than many current approaches that are more reactive and responsive to specific issues at problem-areas. This VUMF can accomplish several management plan objectives, including (Cahill et al., 2018):

- Enhance opportunities to connect visitors to a park's fundamental resources and values;
- Assess the appropriateness of new visitor activities;
- Help align public expectations with visitor opportunities;
- Minimize impacts to resources and experiences caused by visitor use;
- Manage visitor demand at popular destinations; and
- Balance trade-offs between different visitor use management strategies.

The VUMF has four phases that operate in a circular feedback system (Cahill et al., 2018):

1. Build the foundation – define why the project is needed, develop approach.
2. Define VUM direction – describe the conditions to be achieved or maintained and how conditions will be tracked over time.
3. Identify management strategies – To manage visitor use to achieve or maintain desired conditions.
4. Implement, monitor, evaluate, and adjust – Implement management strategies and actions, and adjust based on monitoring and evaluation (Figure 1).



Often, visitor management objectives are not addressed in a strategic way due to data gaps or a lack of robust social science understanding visitor satisfaction, expectations, and motivations. Yet, social science is particularly important for informed decision making for managing visitor use (Cahill et al., 2018). Gathering human use data improves understanding of visitor use patterns and is especially important in Canadian national parks as most visitation occurs over the 4-month period of the summer and school holidays (Eagles et al., 2000). The VUMF sets direction and allows existing data to aid management decision making, which defines data gaps clearly. The management agency can then decide whether filling those gaps is essential to addressing management objectives and at what scale data should be collected.



Photo: Marcelo Vaz

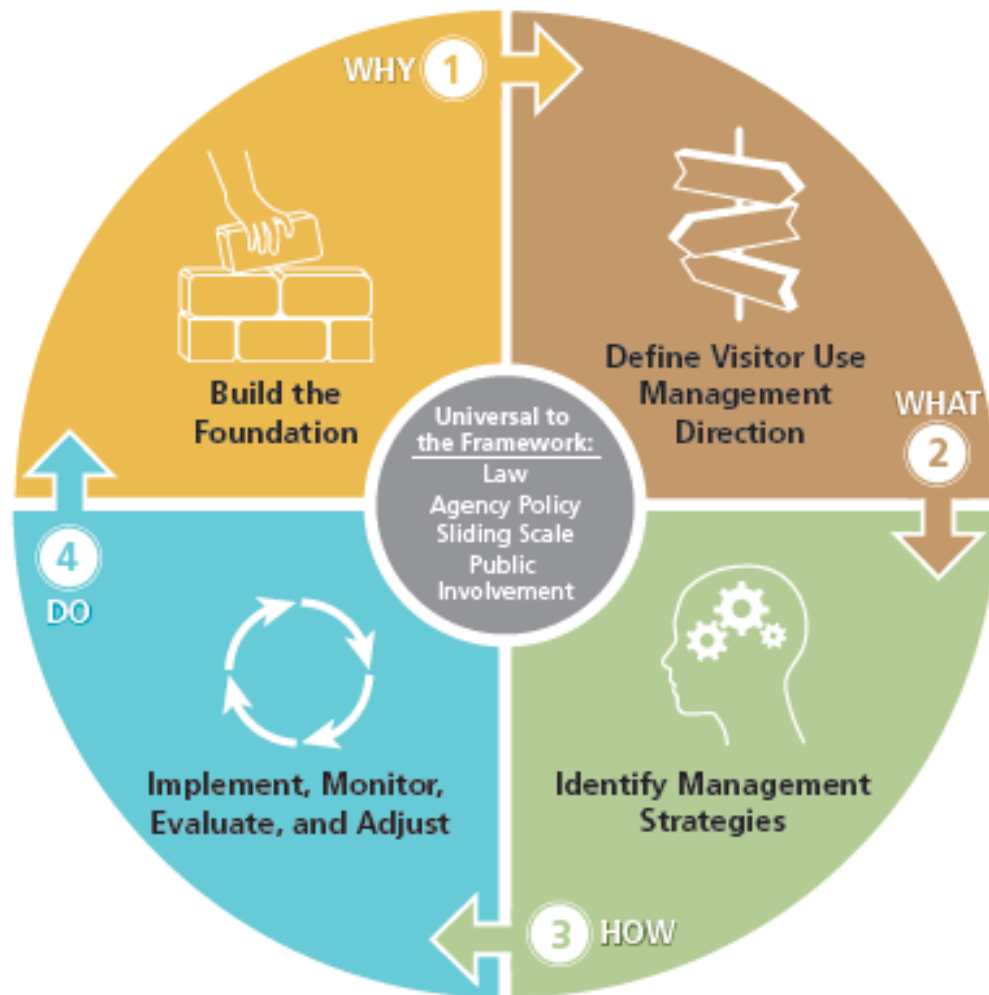


Figure 1: Overview of the Visitor Use Management Framework applied in US National Parks. Figure copied from Interagency Visitor Use Management Council (2016).

# 1

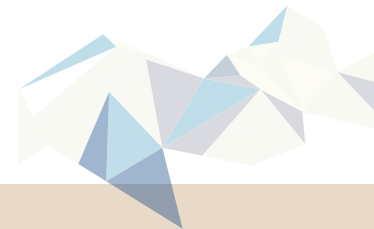
## **Step 1: Build the foundation**

In the information gathering phase of the project, park managers work with invested stakeholders to define the VUMF purpose and need. This entails reviewing the area's purpose, applicable legislation, policies, and other management direction. The majority of this work is already done in existing park management planning documents.

Social science is a critical component to this step because it helps better understand and define issues and provides valuable insight into trends in resource conditions and visitor experience that can inform management. It is also useful in determining the geographic and temporal scope of a project (Cahill et al., 2018). If social science data is lacking, then one of the management objectives may be to develop a more thorough social science data set.

**Outcome:** Understand why the project is needed and develop the project approach.





## 2

### *Step 2: Define visitor use management direction*

Interested stakeholders work with park managers to define the desired conditions for the project area. This includes defining appropriate visitor activities, facilities, and services, as well as defining indicators and thresholds.

The desired condition should contain ecological and social elements. What does the environment look like? What kind of visitor experiences are available where and when? Social science can contribute to these answers by defining visitor motivations for visiting the park and their expectations upon arrival. This is particularly important for the day use areas where visitor management is less prescriptive, and a variety of activities are available. Working with a variety of stakeholders throughout this process can address data gaps, perceptions about the visitor experience, as well as diversity, equity, inclusion, and accessibility aspects that may be relatively new to park operations.

**Outcome:** Describe the conditions to be achieved or maintained and how conditions will be tracked over time.

## 3

### *Step 3: Identify management strategies*

By comparing and documenting the difference between the desired and current conditions, park managers and stakeholders work with other experts (e.g., academic researchers) to define tactics that will address present deficiencies to achieve future conditions. Part of this process requires clarifying how visitor use and its specific impacts are related to the discrepancies; social and ecological science are used to help define the relationship between amounts of use, types of use, and resource or experiential conditions (Cahill et al., 2018). Taking an interdisciplinary approach strengthens the results of this step by identifying areas where ecological resources are more impacted than the visitor experiences or vice versa. This can help target and prioritize management actions in ways that meet the more pressing need. Once management strategies and tactics are identified, a monitoring plan to measure management success is developed.

**Outcome:** Identify strategies to manage visitor use to achieve or maintain desired conditions.



# 4

## *Step 4: Implement, monitor, evaluate, and adjust*

During this step, the management actions and monitoring programs are implemented. All monitoring is documented on an ongoing basis as managers evaluate the effectiveness of management actions in meeting desired conditions. Management actions should be adjusted based on the results of monitoring. This iterative process ensures park managers are proactive in managing visitor use while also being flexible and responsive to monitoring results by changing management actions to move towards a defined desired condition.

**Outcome:** Implement management strategies and actions and adjust based on monitoring and evaluation.

### *Using the sliding scale of analysis*

Considering the application of a VUMF in the Rocky Mountain National Parks is a daunting task in part because of the geographic extent of the area. Defining the scale at which a VUMF will be applied is critical. The VUMF created by the Interagency Visitor Use Management Council incorporates flexibility to ensure the framework can be applied across multiple spatial scales and with varying levels of resource investment. The sliding scale of analysis considers issues along four measures: issue complexity, impact risk, needs for stakeholder involvement, and level of controversy and/or litigation potential (Cahill et al., 2018). The amount of investment required by the park agency is dependent on where the project sits on the sliding scale, but the same fundamental elements are used regardless of the project area or other factors (Interagency Visitor Use Management Council, 2016). The following criteria are used to identify the level of investment required:

- **Issue complexity** – What level of uncertainty about the issue is being addressed? This requires managers to explore the issue holistically and not underestimate its complexity.
- **Impact risk** – Are there considerable threats to the quality of resource conditions and visitor experiences? Answering this question requires identifying any special interest groups, rare species and ecological processes, and irreplaceable visitor experiences. The location on the scale depends on the nature of impacts, their causes, and potential effects.
- **Stakeholder involvement** – What is the level of stakeholder interest in the issue? This analysis should recognize the importance of building trust and moving a decision forward through two-way communication with stakeholders, partner groups, and government agencies. If there is little stakeholder interest, it is still important to understand how they feel about the project.
- **Level of controversy** – The more controversy or likelihood of litigation, the higher the level of analysis required.



An example of applying this sliding scale of analysis to the national park is provided in Table 2. This example is based on a fictional project objective to reduce human use in wildlife corridors around a town site.

Table 2: Example of Applying the Sliding Scale of Analysis – assessment questions

Rating Question	Rationale	Risk level (high, medium, low)
<p><b>What is the likelihood that the situation involves sensitive, rare, or irreplaceable natural resources?</b></p>	<ul style="list-style-type: none"> <li>Wildlife movement data show that carnivores use corridors around the townsite, including grizzly bears and wolves. There are also endangered bird nesting areas in one corridor.</li> <li>Data shows that all corridors around town are essential for multi-species movement.</li> <li>Research also shows that human use in wildlife corridors disrupts wildlife movement, causes habitat displacement, and can lead to increased human-wildlife conflict.</li> </ul>	<p>High</p>
<p><b>What is the likelihood that the situation involves sensitive, rare, or irreplaceable cultural resources?</b></p>	<ul style="list-style-type: none"> <li>Archaeological surveys show that there are a variety of sites of cultural significance from pre and post colonization times around the townsite. Some sites are essential components of the visitor experience around town.</li> <li>Additional Indigenous sites of significance may be present and unknown.</li> <li>Data regarding human use levels and/or the visitor experience at some sites is lacking.</li> </ul>	<p>Medium</p>
<p><b>What is the likelihood of imminent and significant changes to the natural or cultural resources?</b></p>	<ul style="list-style-type: none"> <li>Visitor use patterns on trails in wildlife corridors are understood for most designated trails. Visitor use on non-designated trails is less understood.</li> <li>Human-wildlife conflict has increased in some areas close to town, putting wolves and bears at risk of habituation.</li> <li>Cultural resources have been upgraded in recent years, increasing their value to the visitor experience.</li> </ul>	<p>Low</p>





<p><b>What is the likelihood of imminent and significant changes to visitor experience?</b></p>	<ul style="list-style-type: none"> <li>• Trails around the town are popular with residents and visitors. Data shows they are used at most hours of the day and night for a variety of activities. Changing how people use these trails could have adverse effects on the experience for residents and visitors.</li> <li>• There is little data available on visitor expectations pertaining to trails around town in wildlife corridors.</li> </ul>	<p>High</p>
<p><b>How will the issue affect other aspects of land management in the area or surrounding areas?</b></p>	<ul style="list-style-type: none"> <li>• Changes to human use in wildlife corridors around town could impact potential development proposals adjacent to town.</li> </ul>	<p>Medium</p>
<p><b>What is the geographic extent of the issue's impacts?</b></p>	<ul style="list-style-type: none"> <li>• This is a local project with site specific implications.</li> </ul>	<p>Low</p>
<p><b>What is the relative interest of stakeholders affected by the action?</b></p>	<ul style="list-style-type: none"> <li>• Stakeholders in and around the town site include commercial tourism operators, local businesses, environmental non-profit organizations, and residents.</li> <li>• All stakeholders are likely to be interested in understanding how management actions will impact their operations and park management.</li> <li>• Stakeholders are likely to want to be part of the decision-making process for this project.</li> </ul>	<p>High</p>
<p><b>Is the impact temporary (low) or long lasting (high)?</b></p>	<ul style="list-style-type: none"> <li>• The project aims to establish new human use patterns in wildlife corridors around the town site. It has long term implications on how people use these lands.</li> </ul>	<p>High</p>



Using the ratings assigned to the above questions, managers can evaluate the following sliding scale criteria (Table 3).

Table 3: An Example Showing How to Apply Assessment Questions to the Sliding Scale of Analysis

Criteria	Rationale	Risk level
<b>A. Issue Uncertainty</b>	The project objective can be more clearly stated. Data gaps need to be identified and prioritized.	Medium
<b>B. Impact risk</b>	The risk is largely associated with visitor experience and public access to wildlife corridors. There may be push-back from residents if areas are closed or limit human use.	Medium
<b>C. Stakeholder Involvement</b>	Stakeholders will want to be engaged through this planning process. They are likely to have strong and varied views.	High
<b>D. Level of controversy</b>	There are potentially high levels of controversy due to diverse stakeholder views and opinions. Ensuring management decisions are evidence-based and monitored will be integral.	High
<b>Location on sliding scale</b>		<b>Med - High</b>

In this example, the final location on the sliding scale is medium-high, which implies that a rigorous level of analysis and consultation is required for some aspects of this project. There is a high level of stakeholder interest in the issue, there could be implications for the management planning process, and visitor use patterns could be impacted. Other projects, like a campground or parking area expansion, may score differently on the sliding scale because there may be less stakeholder interest, less environmental implications for species at risk, and no impact to the management plan.

This sliding scale of analysis allows flexibility to address issues based on the level of uncertainty, risk of impacts to resources and visitor experiences, degree of stakeholder interest, and level of controversy or potential for litigation (Interagency Visitor Use Management Council, 2016). The success of a VUMF is still contingent on the political will and organizational ability to implement planning efforts informed by management-by-objective frameworks (Miller et al., 2017).



## Integrated Framework for Developing Ecological Indicators of Visitor Use (Australia)

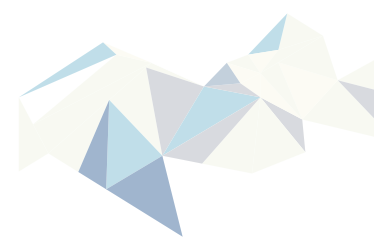
Efforts to address visitor management in Australia have examined how to focus the implementation of monitoring efforts at different scales while meeting visitor use management requirements in individual protected areas (Castley et al., 2009). This framework integrates a general evaluation framework within general ecological monitoring frameworks. This framework also provides a process for prioritizing sites for visitor monitoring and identifying appropriate indicators that could be used by protected area agencies. The framework consists of six steps, which follow a similar process to the VUMF:

1. Identifying management objectives and relevant evaluation subjects
2. Classifying natural assets and threats to those assets
3. Prioritizing sites for visitor monitoring
4. Selecting ecological indicators of visitor impacts
5. Developing monitoring programs for indicators
6. Using results to improve future management (adaptive management)



Photo: Christopher Czernak





To use this framework, managers need to have information on:

- Baseline values for natural sites selected for visitor monitoring
- Appropriate monitoring protocols and techniques
- Appropriate techniques and procedures for data analysis and interpretation
- How to integrate monitoring data into an adaptive management framework

This process relies on the selection of appropriate ecological indicators that tie to visitor use. Indicators should cover structural, compositional, and functional aspects of the protected area; examples of ecological indicators are in Appendix 2.

This approach facilitates sustainable tourism opportunities by recognizing the inherent instability in ecological systems and defining indicators based on important systems that are subject to continual change. Monitoring and management need to be flexible to allow for such fluctuations while not reducing the resilience of the system in the long term (Castley et al., 2009). This framework recommends prioritizing visitor impact monitoring based on 1) the importance/value/significance of natural, social, and cultural assets, 2) the vulnerability of those assets, and 3) the pressure/threat on those assets from visitor use (Castley et al., 2008). Potential capacity and expertise gaps are addressed by prioritizing management efforts in areas that may have the greatest impact, thus ensuring effective park management with limited resources.

The key strengths of the Australian approach are (Castley et al., 2008):

1. Integration of monitoring and evaluation into the management cycle enabling learning from progressively improved management;
2. Selected indicators provide information for relevant core evaluation subjects, including the severity of the threat from visitor use, determining baseline values, and measuring change in condition;
3. The framework is based on existing management approaches and systems;
4. Sites for visitor monitoring are selected by prioritizing their value and vulnerability, and identifying the types of visitor activities;
5. Site based monitoring provides information on change in condition from visitor use.

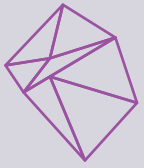


### **Protected Area Visitor Impact Management (Central and South Americas)**

The Protected Area Visitor Impact Management (PAVIM) framework is a simplified management framework that was designed for Central and South America protected areas to assess visitor impact problems and identify management strategies (Farrell & Marion, 2002). This framework was created as a quick, easy, and inexpensive assessment that would be more cost-effective than the American or Australian frameworks. PAVIM identifies management opportunities and visitor impact problems but uses an expert panel to replace indicators during the problem analysis step (Farrell & Marion, 2002). The expert panel works with protected area managers and staff to analyze impact problems, select management actions, and assess strategy effectiveness. Although there is a risk of subjectivity and potential bias that comes with the expert panel (Castley et al., 2008), the panel can be designed to be interdisciplinary by including people with social science and visitor impact management backgrounds, as well as people knowledgeable about local hunting issues, traditional use, and other cultural resources. Experts can include local residents, agency representatives, scientists, non-government organizations, and others (Farrell & Marion, 2002). The expert panel still uses data across disciplines as a decision-making tool, but ultimately relies on professional and personal experience and opinion. PAVIM permits rapid implementation and management of visitor impact problems (Farrell & Marion, 2002). This approach builds on strong stakeholder involvement and has the capacity to consider multi-disciplinary assessments but requires high levels of local knowledge.

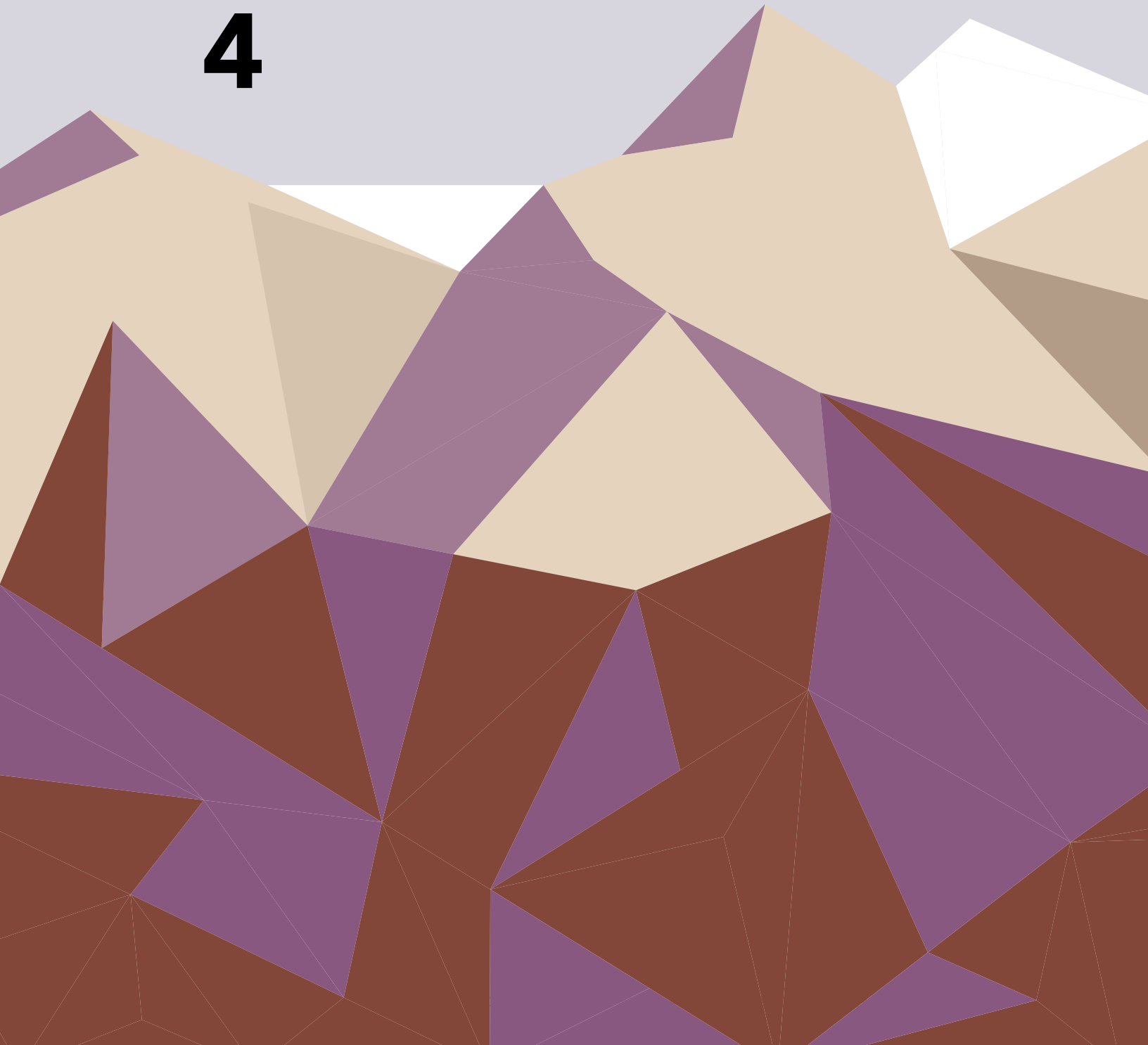


Photo: Alex Shutin



# Recommended Process and Priorities for Defining a VUM for Canada's Rocky Mountain National Parks

4







**A**n effective visitor management program should include well-defined goals, achieve positive outcomes, and use resources efficiently (Fefer et al., 2016).

The resulting visitor management strategy for Canada's Rocky Mountain National Parks should be unique to the landscape, visitation patterns and associated impacts, agency capacity, and funding realities.

Many visitor management frameworks focus on threats to the ecological resource base but may be of limited value as tools for enhancing the experience of visitors (Weiler et al., 2013). Thus, goals should be interdisciplinary and describe ecological outcomes as well as social/visitor experience related outcomes. Although most goals have an impact focus (i.e., reducing ecological impact from visitation), it is important to incorporate benefits as well (i.e., benefits to visitors from partaking in recreational activities; Weiler et al., 2013). To truly address visitor use management, park agencies should fully embrace the concept of large-scale plans that consider site-specific visitor use within the context of the larger protected area landscape (Miller et al., 2017).

We propose that Parks Canada create a process that considers the visitor experience within the context of existing efforts to manage for and monitor ecological integrity. This process should result in a visitor management strategy that manages the physical, social, and environmental characteristics of a site from a holistic perspective. The approach should provide a clear specification of the overarching goals, underlying questions, theoretical and management constructs of primary focus, and appropriate methodologies (Miller et al., 2014). Thinking and working at multiple spatial scales can be accomplished through a top-down, bottom-up approach that integrates site-specific issues within the context of overarching management direction.



Photo: Roberto Nickson



Photo: Ryan Christodoulou

We recommend Parks Canada approach the creation of a visitor use management strategy at the spatial level of Landscape Management Units (LMU). LMUs are management areas defined by Parks Canada that are approximately the size of an adult female grizzly bear home range. Each LMU has a grizzly bear habitat effectiveness and security target, which is a measure that combines habitat quality with human use levels. While not perfect, LMUs may be the most suitable scale for a visitor management strategy because they already integrate social and ecological metrics to define management objectives. Parks Canada should engage with stakeholders and internal staff to define a desired condition, goals, and objectives for each LMU. LMUs can be prioritized based on known threats associated with high levels of visitation. Within LMUs, a visitor use strategy should identify sites most at risk from visitor impacts and then define site specific management strategies to address those risks and move the LMU closer to the desired condition. Dispersing use to other sites can be a consequence of site-specific management (Marion, 2016); placing sites within the LMU spatial scale ensures that visitation is managed at high use sites and not inadvertently dispersed to sensitive low use sites. Taking a site-based approach based on overarching goals helps address localised visitor impacts that cannot be detected by general ecological monitoring across larger spatial scales (Castley et al., 2008).

A successful visitor management strategy is based on the political will and organizational ability of an organization to implement a management-by-objectives framework; success of any framework is more likely to be hindered by the organizational structure where the framework operates than the principles behind the framework (Fefer et al., 2016).

Parks Canada will require champions and dedicated staff time associated with this effort at both the National and Park levels.



## Developing Meaningful Indicators to Inform Management Decisions

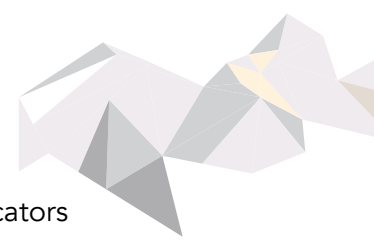
Ecological indicators are defined as “quantitative or qualitative variables that provide useful information about changes in the natural environment. They are used to help compile a picture of the status and trends in the condition of the environment and provide information that can be used to assess the extent to which management has been effective” (Castley et al., 2008). No single indicator is likely to cover all aspects of an issue, therefore, managers typically develop a set of indicators that compliment each other. The number of indicators is dependent on the capacity of the agency, as well as scope and complexity of the project. Accurate, timely, and cost-effective evaluation of ecological integrity depends on using appropriate monitoring programs with suitable indicators (Castley et al., 2008).

Indicators stem from clearly identified plan objectives. For example, in the current Banff National Park Management plan, Parks Canada defines as indicator for Enjoyment/Satisfaction. In parks and protected areas research, satisfaction is based on two fundamental components: 1) appropriate levels of environment quality, and 2) suitable levels of consumer service (Eagles, 2013). To define “appropriate” and “suitable”

Photo: Andy Holmes







requires ecological and human use data that is measured against a set of indicators to determine if program strategies are meeting management objectives. The targets defined in the Banff Management Plan to measure visitor enjoyment and satisfaction, include:

- At least 90% of visitors, in all market segments, are satisfied with all elements of their experience (services, facilities, programs, and value-for-money).
- All visitors feel welcomed and well oriented to the opportunities they seek.
- Visitors and residents feel that conservation measures enhance their enjoyment of the park.
- Availability of, and participation in, "voluntourism" increases by 10% by 2014.
- There is increased participation in, and satisfaction with, new and renewed winter visitor experience products.

These indicators are problematic for several reasons. First, only a few of them are associated with a quantifiable component that can be used to measure management effectiveness over time. Second, none of them were measured or reported in the State of Parks report. While the intention is there, it is inadequately described, not measured, and not reported on. Thus, these indicators have become meaningless in the management planning process. In addition, these indicators did not attempt to compare visitor satisfaction with data pertaining to the environment quality or levels of consumer service.

In the proposed visitor use management strategy, stakeholders, academics, and park managers would work together to 1) define the desired condition; 2) define appropriate and effective indicators; 3) develop a monitoring plan that would assess management effectiveness in meeting the desired condition.

Setting condition thresholds and indicators are useful for monitoring dynamic ecosystems; indicators may not be static and should be subject to revision and modification based on the best available information (Castley et al., 2009). Indicators that recognize three characteristics of diversity: structural (landscape patterns, habitat structure), composition (landscape types, ecosystems, species), and function (landscape processes and trends) may focus the manager's attention on effective management actions. Indicators of change in condition from visitor use at specific sites are selected through a process that considers the type and intensity of visitor use and site characteristics (Castley et al., 2008). There is inherent flexibility in the entire process from setting objectives to identifying indicators and framing the management response. This flexibility should be embraced as an opportunity to experiment with new approaches knowing that they will likely be modified based on new evidence and data.



## Management Strategies for Meeting Desired Conditions Defined in a Visitor Use Management Strategy (VUMS)

In general, ecological monitoring includes determining the importance and value of natural resources, including rarity, diversity, and habitat condition (Castley, et al., 2019). These same concepts can be applied to the visitor experience to integrate human use management in existing park management processes and decision making. This is achieved through understanding and identifying the diversity of human uses and their potential impacts on social and ecological systems (Castley et al., 2019).

A visitor use management strategy applies a variety of management tactics to meet desired conditions, which are defined through stakeholder consultation and supported by data.

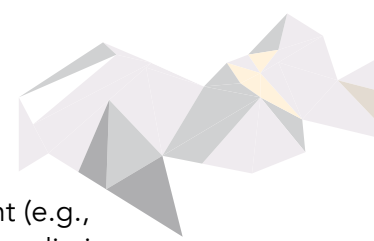
Although some people inherently turn to managing the volume of people at a site, a VUMS creates the space to think more creatively about different strategies to meet visitor impact reduction and experience objectives. Management actions seek to avoid or minimize visitor impacts by either use-related factors (e.g., amount and type of visitor use), or environmental factors (e.g., ecosystem resilience related to vegetation or soil, topography).

There are five core strategies for managing visitors: 1) manage use levels (either spatially or temporally); 2) modify the location of use; 3) increase resource resistance; 4) modify visitor behavior; 5) close and rehabilitate the resource (Marion, 2016). Examples of responses are contained in Table 4 (Farrell & Marion, 2002). Wilderness management principles suggest that indirect management actions, such as encouraging use elsewhere or using persuasive communication to focus on low impact outdoor practices and ethics, should be applied first. Direct action that limits and enforces use should be a last resort and only applied when other options have been shown to be ineffective to manage high impact visitor behaviours (Marion, 2016).



Photo: Anita Jeanine

## Recommended Process and Priorities for Defining a VUM for Canada's Rocky Mountain National Parks



Site management strategies such as site hardening, infrastructure development (e.g., washrooms, parking areas), or group size and length of stay limits can be used to limit visitor use in some areas, or open up and enhance visitor experiences in other areas (Weiler et al., 2013). Managers can attempt to contain human use on a sustainable infrastructure of trails, campsites, and recreation sites, focus intensive traffic on the most durable artificial or natural substrates, or separate visitors to promote solitude and prevent conflict (Marion, 2016). Dispersing use and site hardening are measures designed to ensure a site's traffic levels do not result in impacts to the resource for more than one year. Trails can also be designed, constructed, and maintained with adequate numbers of tread grade reversals and drainage features (Marion, 2016). Trails can also be designed with a variety of accessibility requirements in mind; however, it is important to consider that trails designed for ease of access for people with limited mobility are likely to see the highest levels of use. Therefore, address objectives around access may conflict with addressing objectives around sensitive specie management. This demonstrates the necessity of bringing stakeholders together to examine the landscape together and discuss where activities may be most appropriate from both ecological and social perspectives. Managing visitor expectations can be accomplished through proactive communication. If park visitors are given information about the health benefits of different recreation opportunities, and the potential impact of those activities on ecosystems, as well as how activities are being managed to reduce impacts, then they can select the most appropriate location, type, and style of activity to achieve their own personal health benefits and goals (Eagles, et al., 2006).



Photo: David Wirzba





**Table 4: Potential Management Responses to Ecological and Social Issues of Concern**

Issue of Concern	Potential management response
Lack of appreciation for visitor experiences provided in national parks and their potential impact on species	<ul style="list-style-type: none"> <li>• Persuasive communicating about the benefits of park experiences and the importance of habitat</li> <li>• Educational programming (e.g., leave no trace)</li> <li>• Park ambassador programs</li> <li>• Partnerships and endorsements that foster appreciation of park experiences</li> <li>• Regulations and enforcement prohibiting or requiring certain practices and equipment when traveling and camping (e.g., not feeding wildlife, safe food storage).</li> </ul>
Loss of habitat or species, or loss of visitor experiences	<ul style="list-style-type: none"> <li>• Zoning, site design, and management</li> <li>• Co-creation of new experiences in partnership with stakeholders and/or Indigenous groups</li> <li>• Modify the location of use by concentrating on sustainable expansion-resistant trails and campsites to limit the aggregate area of impact</li> <li>• Disperse use on durable substrates at levels that prevent formation of user-created trails and campsites</li> <li>• Restrict certain types of use to specific locations (e.g., equestrian trails and campgrounds)</li> <li>• Increase resource resistance and resiliency by constructing, reconstructing, or maintaining impact-resistant trails and campsites.</li> <li>• Close and rehabilitate the area</li> </ul>
Increased visitor competition for park resources	<ul style="list-style-type: none"> <li>• Developing new opportunities in alternate locations</li> <li>• Embracing technology and offer innovative, virtual experiences</li> <li>• Exploring and expanding commercial opportunities in and near national parks</li> </ul>
Lack of research to inform management action	<ul style="list-style-type: none"> <li>• Measure and demonstrate benefits/impacts of visitation</li> <li>• Integrate social science into management through adaptive management</li> <li>• Apply an interdisciplinary approach to monitoring that collects human use and ecological data as part of the same program</li> </ul>
High levels of human use at a site	<ul style="list-style-type: none"> <li>• Redistribute, discourage, or limit use (e.g., set an access point or travel zone quotas)</li> </ul>

(Weiler et al., 2013; Marion, 2016)



## Monitoring as Essential to a Visitor Use Management Strategy

Monitoring is essential to the success of any VUM strategy, particularly where robust data is absent from the decision-making process. Scientific monitoring in many protected areas is often limited to conservation issues as socioeconomic dimensions are not always considered as core management issues (Ruschkowski, Valdeig, Jakob, & Homann, 2008). Monitoring, however, also helps assess the costs and benefits of tourism in protected areas. Visitor monitoring programs should implement effective data collection protocols and standards that guide when and what kind of management action is required (Eagles, 2013). Indicators/standards and monitoring programs put in place to measure them over time are two elements continually ranked as highly important in a visitor management strategy (Fefer et al., 2016). Effective monitoring requires a high level of organizational capacity; thus visitor management frameworks should consider the organizational environment in which the framework will be implemented (Fefer et al., 2016).

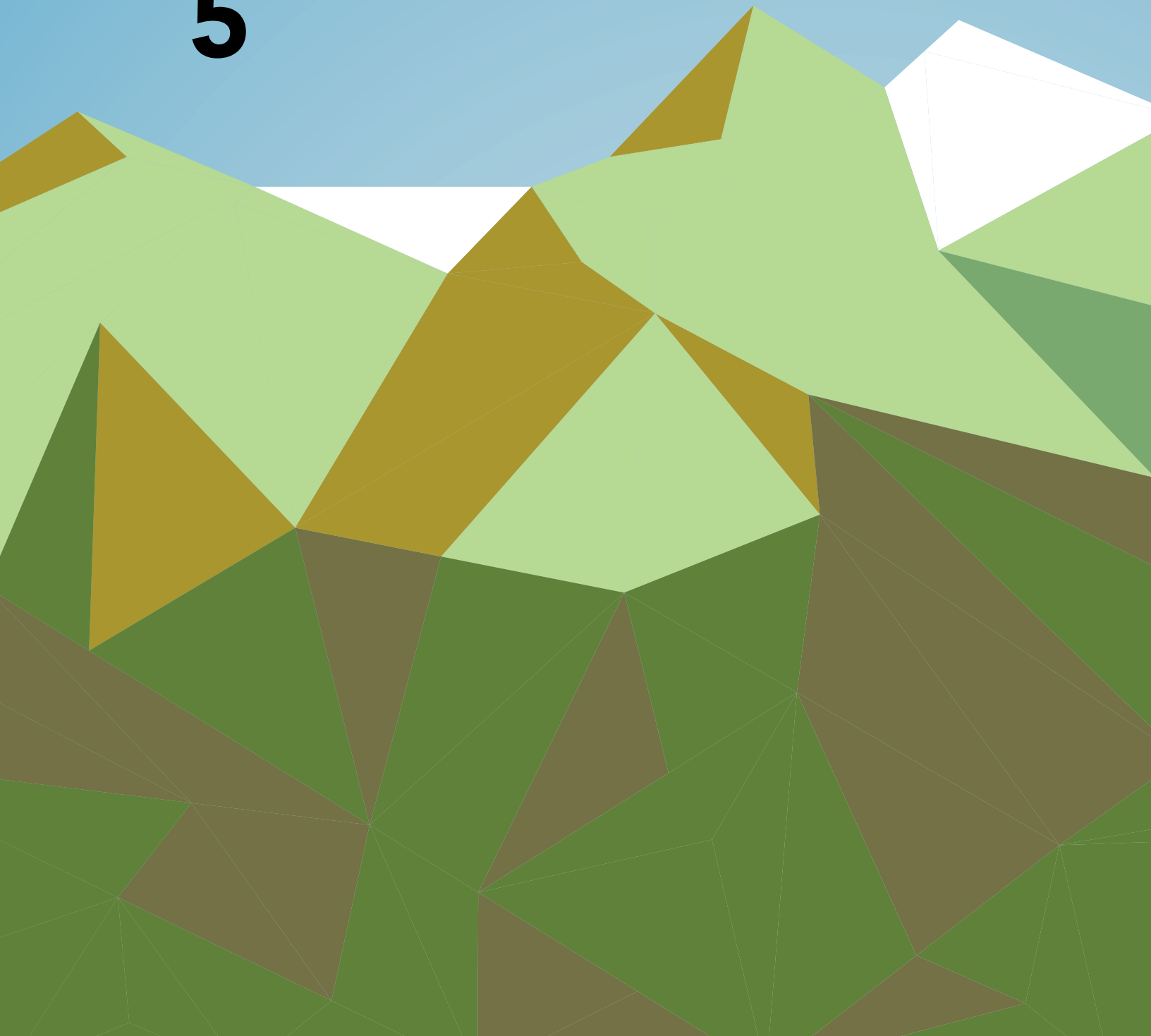
Both the Australian and United States visitor management frameworks work through a process of identifying the vulnerability of assets and defining management actions that improve ecological and social conditions to meet management objectives. These processes help to identify which variables to monitor over time. Based on this information, Parks Canada can select management strategies to address threats caused by high visitation on identified assets of importance. In this process, assets may include infrastructure elements such as washrooms, roads, and campgrounds, as well as ecological elements such as grizzly bear habitat, aquatic connectivity, and species population density. Park managers should select assets and indicators based on the desired condition for each LMU. At the same time, Parks Canada should ensure monitoring information contributes to management strategies aimed at sustaining and enhancing the national park experience (Weiler et al., 2013).

Monitoring human use patterns, expectations, and motivations can help inform where and when issues are most concerning and what management actions might be most applicable in different places and times (Cahill et al., 2018). Managers, businesses, and organizations should be aware that benefits of successful management plans and frameworks are long-term. We should not expect to experience positive benefits of this work immediately after practices are implemented, the greatest successes are more likely to happen after many years of continued effort (Candrea et al., 2009). It is for that reason that annual monitoring is so critical as it will help measure incremental improvements over time and allow for tweaks to management strategies that maximize success over the long term.

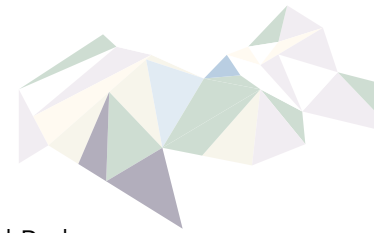


# Creating a Visitor Use Management Strategy Step by Step

**5**







The need for a human use monitoring strategy is timely given the current management planning process in the Canadian Rocky Mountain National Parks. The COVID-19 pandemic of 2020 and associated physical distancing restrictions have also presented Parks Canada with a unique opportunity to test various human use restrictions and their support as part of a visitor monitoring program. Empirical data regarding visitation and visitor use can help inform management action (Ruschkowski et al., 2008). Our proposed process considers the creation of a broader set of objectives that go beyond conservation, an openness to governance via partnerships and involvement of local people, adaptive management styles, and viewing parks as community assets (Weiler et al., 2013).

Visitor use continues to impact the natural environment in protected areas worldwide, and it is vital that visitor management is based on systemic information about visitor use patterns (Castley et al., 2019). Understanding the impacts of visitor use is critical for effective management, and visitor monitoring needs to be incorporated into general reporting mechanisms (Castley et al., 2009). We recommend Parks Canada take an interdisciplinary approach that blends human use data with conservation objectives to improve protected area management tools (Ruschkowski et al., 2008). Parks Canada can set a precedent for park management that is collaborative, holistic, and appealing to a broad base of Canadians.

In developing new visitor management frameworks, managers should first consider the organizational environment in which it will be implemented and the organizational capacity available to create it (Fefer et al., 2016). Capable and motivated staff are essential to the successful application of a long-term visitor use planning initiative (Fefer



Photo: Kalen Emsley



et al., 2018); for the Rocky Mountain National Parks, this capacity and prioritization should come from both the national and regional levels. A regional park planner assigned to this project will need to work closely with park ecologists, visitor experience specialists, and stakeholder consultation teams.

Effectively addressing human use through a comprehensive strategy will likely require more capacity than Parks Canada is able to allocate. This should be viewed as a strength rather than a weakness because it necessitates collaboration with external experts. Managers and academics may come from different perspectives during process during creation and implementation of a VUM framework (Fefer et al., 2018), but a planner with direction to collaborate internally and externally can ensure that the resulting product is integrative and inclusive addressing multiple concerns in a balanced way. Partnerships can amplify Parks Canada's capacity. For example, graduate students can conduct human use research and commercial businesses may have relevant data they could provide during the planning process.

Working collaboratively with a variety of internal staff, stakeholders, and Indigenous groups will strengthen the plan and improve its applicability on the landscape.

Implementing a management strategy for a single location without recognizing its context in a larger protected area may simply move problems to a different location or even create a new problem (Miller et al., 2017). For example, reducing a parking lot size may increase traffic congestion and roadside parking and the creation of publicly created trails between other parking locations and trailheads (Miller et al., 2017). For





Banff National Park, CPAWS recommends starting with the four LMUs that experience the highest level of visitor impacts: Town of Banff, Sunshine/Egypt, Lake Louise, and Skoki. Grizzly bear habitat security is below targeted levels in all these LMUs (Hunt, 2018). Human use data and monitoring can provide valuable input in determining geographic and temporal scope of priority sites within each LMU. A visitor use strategy created at this scale can ensure that management actions consider the above unintended consequences prior to implementation.

Effective management actions target the most influential factors, account for causal and contextual factors, and typically employ more than one strategy or action (Marion, 2016). Applying adaptive management and a science-based process were rated as the two most important factors to successfully implement a visitor use management strategy; the most limiting factors to success were inadequate funding and resources, and management biases and assumptions (Fefer et al., 2016). These programs are successful when they can demonstrate that the desired condition is achieved, and when managing agencies can demonstrate how they learn and adapt over time (Fefer et al., 2016).

The following is a proposed process taking the most applicable components of the Australian management framework (Castley et al., 2008) and the Visitor Use Management Framework from the U.S. (Interagency Visitor Use Management Council, 2016). The steps detailed below are recommendations for the entire process and contain several components that can be addressed through academic or stakeholder partnerships.





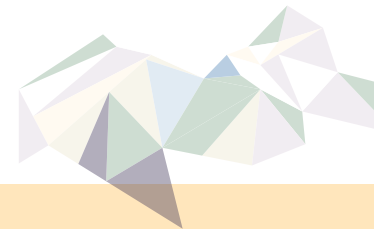


Figure 2: Visitor Use Management Strategy Process



**Step 1: Identify park and/or LMU management objectives and evaluation subjects relevant to visitor impacts on natural values.**

1. Review park purpose and significance, review LMU management objectives as defined in the Park management plan, National Parks Act, and other relevant policies
2. Define the desired condition of each LMU. Specify management objectives based on legislation, policy, stakeholder and manager input, and desired condition.
3. Assess severity of threat from visitor use based on existing data.
4. Working with stakeholders and Indigenous people:
5. Identify data gaps.
6. Develop an outdoor recreation classification scheme that relates to the desired condition and is based on visitors' desired experiences. This classification scheme can be based on recreational experiences at the park scale.
7. Develop a project action plan that focuses on the process required to create a VUM strategy for each LMU.



## Step 2: Prioritize natural assets and threats

Working with stakeholders, academics, and Indigenous people:

1. Define appropriate visitor activities, facilities, and services for each LMU (based on desired condition and recreation classification scheme).
2. Categorize flora, fauna, and physical features of the LMU as high, moderate, or low value based on data (where possible) and expert opinion where data is not available.
3. Classify the fragility of the assets as resistant/resilient, moderate, or fragile.
4. Prioritize assets to be addressed based on parks capacity, relevance to ecological function, rarity, and other features defined as important by stakeholders, federal policy, and/or park employees.
5. Identify and prioritize visitor related impact problems that violate the desired social, resource, and managerial conditions for each LMU's prioritized assets. Identify threats to the prioritized assets based on data or expert opinion if data is not available.
6. Prioritize assets for monitoring by identifying those assets that are most impacted or used by visitors (based on the importance and fragility of assets and the types of visitor activities and the severity of impacts).

## Step 3: Select indicators and establish thresholds

1. Select indicators based on the characteristics of the asset as well as on the type of visitor activity. It will be necessary to involve academics, scientists, and ecologists in the selection of indicators.
2. Identify for which indicators monitoring is already occurring. For new indicators, identify aspects of change in the asset's condition that can be measured.



Photo: Gabriel Santiago



#### **Step 4: Establish management strategies**

1. Compare current condition to desired condition and document the differences between them.
2. For visitor use related impacts, clarify the links to visitor use characteristics.
3. Working with stakeholders and Indigenous people:
4. Identify visitor use management strategies and action to achieve desired conditions.
5. Where necessary, identify visitor capacities and additional strategies to manage use levels within capacities.
6. Develop monitoring strategies to measure indicators and impacts of management actions over time.

#### **Step 5: Implement, monitor, evaluate, and adjust**

1. Implement management strategies.
2. Conduct monitoring activities and document changes over time. Engage stakeholders and Indigenous people in monitoring activities early and as often as possible.
3. Alter management strategies to improve effectiveness of management actions in achieving desired conditions.



Photo: GR Motez



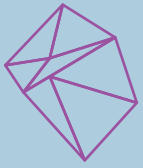


Extremely high levels of visitation in Canada's Rocky Mountain National Parks (Banff, Kootenay, Yoho, and Jasper) are resulting in an array of ecological, social, and cultural impacts. Managing these impacts requires a holistic approach that integrates human use data with ecological data to create park experiences that are meaningful for people while addressing conservation objectives.

Parks Canada is legally bound to the Canadian people to manage its land base to preserve ecological integrity. The agency is also mandated to provide recreational opportunities for Canadians to learn and connect to our inspiring natural areas. Managing visitor use strategically is an essential component to that. A visitor use management framework for our busiest parks can address multiple objectives while examining the park holistically. Engaging stakeholders throughout this process will increase its relevancy and effectiveness.

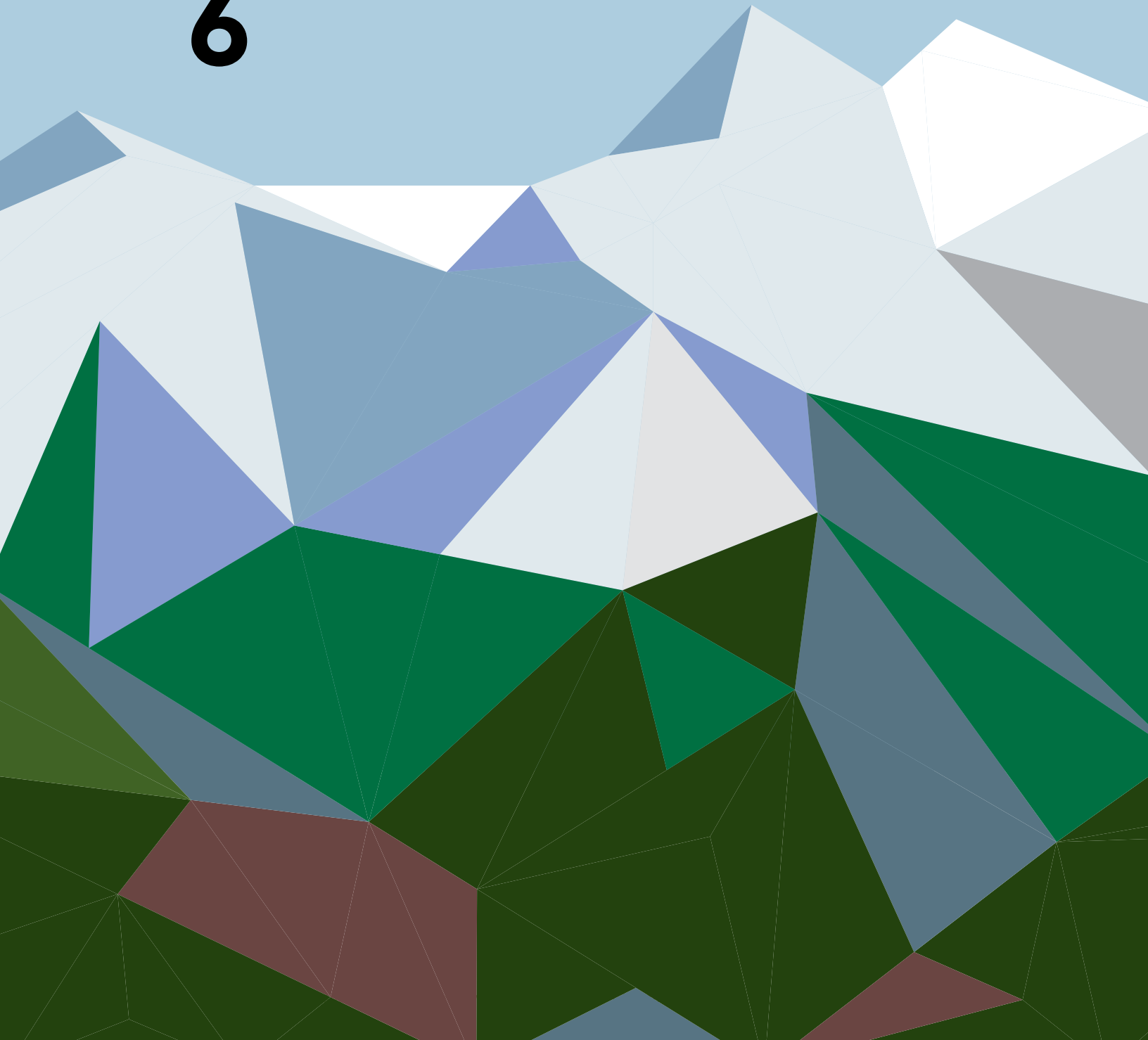
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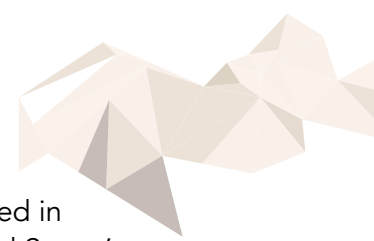




# Case Study: Visitor Management in Yosemite National Park

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Yosemite National Park in California (hereafter Yosemite) was first protected in 1864 and covers just over 3,100 square kilometers. It is one of the United States' most popular national parks with deep valleys, grand meadows, ancient giant sequoias, and vast wilderness areas (U.S. Department of the Interior, Yosemite National Park, 2020). Although the park is open year round, 75% of visits occur from May to October; the total annual visitation average from 2001 to 2016 was 3.7 million with over 5 million visitors in 2016 (U.S. Department of the Interior, Visitation Statistics, 2017).

Yosemite has a very sophisticated monitoring program that involves the collection of visitor use levels and data on the associated impacts, with the goal of guiding future management decisions. In sensitive areas, some of the activities monitored include: the development of informal trails in meadows, soundscape monitoring, trail use monitoring, wilderness encounters, and distribution of people (Eagles, 2013). Monitoring in Yosemite takes place under a variety of projects from federally mandated projects under Wild and Scenic Rivers legislation to site-specific projects focused on areas of high visitor use. This case study discusses the following approaches to visitor monitoring in Yosemite:

1. Visitor Use and Impact Monitoring Program, which is a federal requirement for wild and scenic rivers
2. Management of visitor use on Half Dome, which is focused on a particular trail subject to extremely high levels of use
3. Wilderness stewardship plan and environmental impact statement, a park-wide program implemented by Yosemite staff
4. Transforming the Journey Mobility Plan, a new program that is still being discussed by Yosemite staff



Photo: Hari Nandakumar



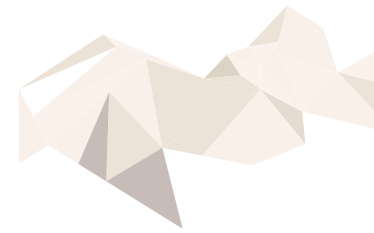


### **Visitor Use and Impact Monitoring Program – Federal Requirement**

To address the growing impacts associated with a growing level of visitation, Yosemite Managers created the Visitor Use and Impact Monitoring Program (VUIMP). This program is connected to federal designation of the Merced and Tuolumne Rivers under “Wild and Scenic Rivers” legislation. Monitoring impacts to river values informs management decisions and provides integrated protection of these rivers. The VUIMP provides a publicly accessible report card of the river’s resources and monitoring results (U.S. Department of the Interior, Visitor Use and Impact Monitoring Program (VUIMP), 2017). The monitoring program measures values that are susceptible to human impact, such as water quality, cultural sites, and biological resources. Park managers defined at least one measurable indicator for each value and then developed a systematic measurement protocol to monitor them. Trigger points are also defined for each value and call for increasing management intervention as the resource degrades. When a trigger is reached, park managers respond by implementing the actions listed in the Wild and Scenic River planning documents. Management actions include increased monitoring, secondary measurements and studies, visitor education and outreach, and ecological restoration. This program is similar to existing Parks Canada monitoring programs focused on ecological attributes and resources.

Photo: Aniket Deole





### Management of Visitor Use on Half Dome – Site-Scale

One of Yosemite's most popular backcountry hikes, Half Dome, has been the focus of an exemplary multi-year monitoring and adaptive management effort. The Half Dome trail is in a zone classified as wilderness but hosts thousands of visitors over the summer months. The Half Dome recreation experience is tightly tied to visitors' expectations of their wilderness experience and to legally designated park zoning, but with extremely high levels of visitation, people began to lose the wilderness experience and the associated freedom to travel at their own pace. The access to the Half Dome summit is facilitated by a cable system for visitors without technical rock-climbing ability. In addition to a changing visitor experience, increased Half Dome trail use led to dramatic increases in visitor distress incidents, rescues, and fatal accidents (Reigner et al., 2012). To address competing management plan objectives of recreational access, wilderness preservation, and visitor protection, Yosemite executed a long term monitoring and adaptive management program (Reigner, et al., 2012).



Photo: Mika Korhonen



Managing visitor use at Half Dome aimed to address three primary objectives: facilitating public access, preserving the wilderness character of the site, and ensuring visitor safety. Park managers were uncertain what management strategies would address these diverse objectives; by applying an adaptive management framework, they could experiment, evaluate, plan, and amend actions based on data and results to ensure effectiveness.

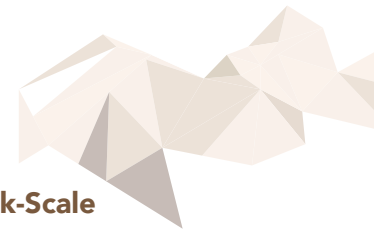
The first step involved defining indicators and standards of quality; indicators were designed to provide variables to measure the effects of management actions, and standards serve as benchmarks by which to judge achievement of management objectives. With any project, a range of potential standards exist depending upon social, ecological, and managerial priorities for a site. The selection of standards was ultimately a judgement made by park managers, but it was informed by public norms, administrative capabilities, and ecological constraints (Reigner et al., 2012).

Initial monitoring efforts filled data gaps and helped quantify visitor use and formulate standards. This served as a baseline characterization of use levels and conditions, which informed the identification of applicable management actions. Three main indicators were used to reflect the objectives stated above in empirically observable variables: “visitor demand” was defined by the number of people on the cable system at one time; “wilderness character” and “visitor safety” were both defined by the number of visitors ascending or descending route outside of the cables and the average amount of time visitors took to ascend and descend the cable route (named total travel time). Regression and ANOVA statistical analyses were used to estimate statistical relationships among the indicators.

Results suggested that wilderness character and visitor safety were compromised as visitor use on the cables increased; when 30 or more visitors were on the cables, at least one person traveled outside of the cables. In addition, visitors took significantly longer to ascend and descend when use levels exceeded 30 people total. These results defined a management standard (i.e., 30 people maximum on the cables) that ensured the maintenance of free-flow conditions on the cables while maximizing visitor access. Extrapolating this standard led to the suggested limit of 400 visitors per day for Half Dome to reconcile competing access, preservation, and safety objectives.

That represented a 42% reduction in visitor use on weekend days. Managers responded by enacting a permit program for the 2010 summer season allowing only 400 visitors to access Half Dome on Fridays to Sundays. Monitoring the same indicators after the implementation of management action showed that total travel time was reduced, thus addressing the wilderness character and visitor safety objectives. Visitor use dispersed to non-permit days during the week. Eventually, the permit system was applied to weekdays as well. With a precedent already set, the public supported the reservation system overall. These standards, and their related daily use levels formed the basis for visitor use planning and management action on Half Dome (Reigner et al., 2012).





### Wilderness Stewardship Plan and Environmental Impacts Statement – Park-Scale

In 2016, Yosemite managers began working with stakeholders to develop the Wilderness Stewardship Plan and Environmental Impact Statement. The purpose of this plan was to “review the management direction of the 1989 Yosemite Wilderness Plan and update it as necessary to better align with contemporary use patterns and National Park Service policy” (National Park Service, 2016). The policy applied to Wilderness Zones within the park, which are backcountry focused. Through newsletters, stakeholders were invited to two separate workshops, one on visitor use and capacity, and the other on horse outfitting in the backcountry. One of the purposes of the plan was to work with stakeholders to ensure that all facilities in designated Wilderness Zones were the minimum structures required to administer the area to preserve wilderness character, rather than address user convenience. Another early commitment was a new trail classification system to guide decision-making related to trails assessment, maintenance and use types. These general ideas were put out to stakeholders for input.

In the next round of stakeholder consultations, the National Park Service circulated more detailed concepts about managing visitor use. Currently, the park is split into 53 travel zones following watershed drainages. Using a model that combines social density and ecological fragility, park managers have assigned capacity for each zone to define each the number of nightly visitors in each zone. Zone capacities are managed through a trailhead system quota. In recent years, however, use has exceeded quotas in many zones.



Photo: Mika Korhonen



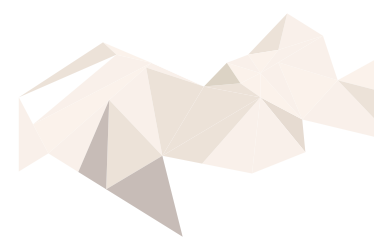
Moving forward, park managers presented the following common management tools to park stakeholders for discussion:

- Trailhead quotas – Limits use based on where a user begins their trip. Provides flexible but loose control over use because after the first night in a Wilderness Zone, a visitor can go wherever they wish.
- Pass and exit quotas – Limit the total number of hikers entering and exiting the Wilderness zones from outside the park boundary through a specific corridor or mountain pass.
- Destination quotas – Work with trailhead quota system to further manage frequency of use and more tightly manage the capacity of specific destinations by requiring a permit for both the trail and the destination.
- Zone quotas – Tight control of use within specific travel zones by setting limits on how many nights a user can camp in a specific zone.
- Designated campsites – Limit and control individual campgrounds rather than whole destinations. The goal is to concentrate use impacts in a few, popular campgrounds rather than rarely used campgrounds.

This public consultation process is still underway. The final plan and approach have not yet been determined.



Photo: Oleg Chursin



### Transforming the Journey Mobility Plan – Park-Scale

The above plan focuses on recreation in the backcountry. Current day use visitation in Yosemite is also problematic. A new plan, still in the drafting stage, focuses on day use areas by considering how people move through and around the park. This plan attempts to address the social and physical aspects of mobility to change how people experience Yosemite. The project started with an intensive study of visitors and local stakeholders to better understand their values, associated beliefs, and behaviours. By understanding visitors' values and beliefs and how they related to visitors' decision making, park staff were better able to develop concepts for improving the visitor experience, solving mobility challenges, and engaging stakeholders and visitors based on the visitors' mindset. This approach starts and ends with the visitors' perspective and is a different way of examining recreation management in a park.

This work resulted in proposed improvements to the visitor experience and transportation system, as well as a system that empowered stakeholders in an inclusive movement to build energy and support for transformation. This program put human needs - rather than the needs of the vehicle - at the centre of planning. For example, the plan focused more on what visitors expected and wanted from their experience at a location rather than how big a parking lot needed to fit people in.

The program identified four phases for the next steps:

- 1. Engaging citizens and building a movement** – Capturing feedback from the public, creating new opportunities for transparency, innovation, and participation. This phase introduced a paradigm shift encouraging park users and stakeholders to think about people rather than vehicles.
- 2. Designing for all stages of the visitor experience** – This involves exploring new ways to improve the visitors' experience before, during, and after their visit.
- 3. Shifting modes of arrival and transit to and within the park** – This phase involves examining appropriate new technologies, services, and systems to help move around and within the park.
- 4. Enabling the gateways** – Working with gateway communities to harness their passion, interest, and perspective in mobility planning and to realize benefits from changes.

In the short term, this project will benefit the park and its visitors by designing rapid improvements to the visitor experience. In the long term, a human-centred mobility system allows park staff to redirect resources towards improving the visitor experience rather than managing traffic or dealing with conflict between use and preservation objectives.

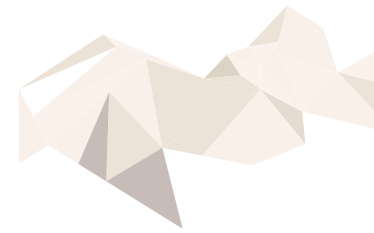




Photo: Sheng Li

Project recommendations included:

- Developing and circulating communication tools that help shape visitor values and beliefs in relation to the project or strategy. Conduct outreach activities that are accessible inside and outside of the park.
- Steward a movement that is citizen-driven and connects to a wider array of stakeholders inside and outside of the park.
- Shift transportation choices in the park towards products, systems, and services that are visitor-centric and support park values while encouraging commerce inside and outside the park. Make alternative modes of transit more desirable, accessible, and cost-effective. E.g., human-powered transport systems, micro-transit systems.
- Work with gateway entrepreneurs to create new services and experiences for visitors that align with park management objectives and enhancing ecological integrity.
- Design the visitors' entire journey, reaching visitors well before their trip begins. Refine and improve real-world signage, information, iconography, and wayfinding systems.
- Continuously identify insights and fill data gaps.

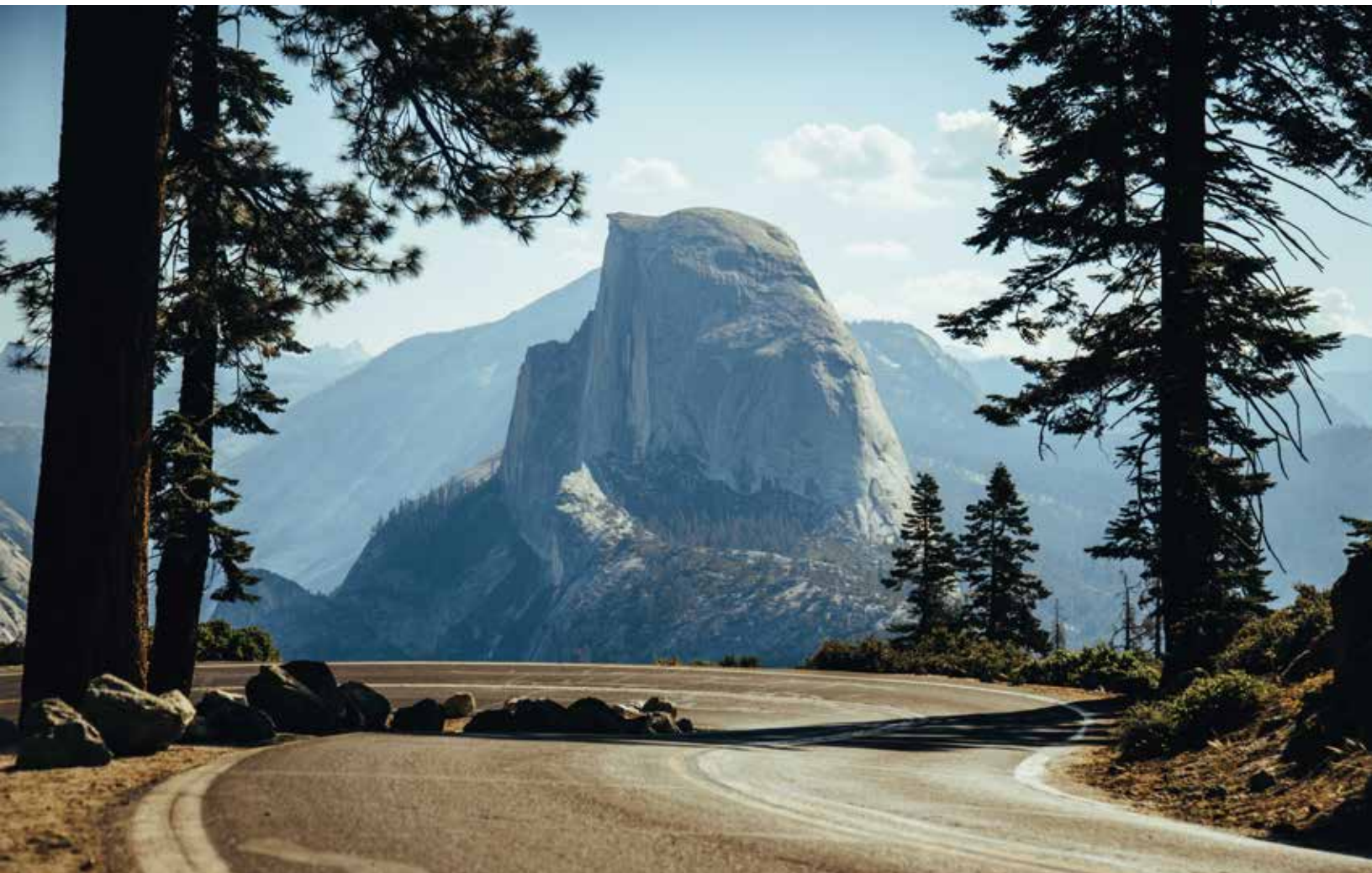


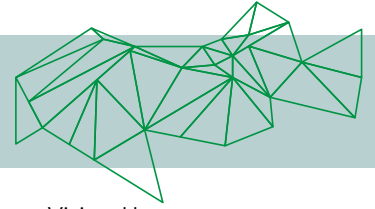
### Concluding Thoughts

Through these four different programs at different park management scales, Yosemite National Park is attempting to address many of the same problems that Canada's most popular national parks also face. Park managers have learned some lessons along the way that may also be useful for Parks Canada to consider.

Park Managers found that human use and travel patterns changed in Yosemite when some individual problems were addressed. With the Half Dome permitting system in place, visitation got redirected to other parts of the park (Ed Dunlavey, Yosemite Conservation Projects Liaison, Personal Communication, June 16, 2020). This reinforces the need for landscape scale approaches with site-specific management tools to effectively manage human use, which may be addressed through the Wilderness Zone planning or the Mobility plan. Park managers emphasize the need to implement various ways to change the public perception of what is accessible and when, as well as to continue monitoring programs that help managers understand how human use is moving and shifting.

Photo: Trent Irwin





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## APPENDIX 1: VISITOR IMPACTS TO PROTECTED AREAS

There are a variety of indirect and direct ways that human use can impact terrestrial and aquatic ecosystems in protected areas. The table below is a summary from Castley et al. (2008); this list is not comprehensive.

Ecosystem Component	Impact	Human Use Cause
<b>Soil</b>	<ul style="list-style-type: none"> <li>• Change in structure and composition (e.g., through compaction)</li> <li>• Physical erosion of soil</li> <li>• Reduced soil moisture and microbial activity</li> </ul>	<ul style="list-style-type: none"> <li>• Construction</li> <li>• Trail use (compacts soil, redirects water, damages vegetation)</li> </ul>
<b>Geologic Features</b>	<ul style="list-style-type: none"> <li>• Physical damage (e.g., graffiti)</li> <li>• Reduced visual appeal</li> </ul>	<ul style="list-style-type: none"> <li>• High impact uses (e.g., rock-climbing, mountain biking, equestrian use)</li> </ul>
<b>Landscape</b>	<ul style="list-style-type: none"> <li>• Altered vegetation</li> <li>• Altered landscape shape/features</li> </ul>	<ul style="list-style-type: none"> <li>• Camping, vegetation trampling, campfires, off trail use</li> </ul>
<b>Wildlife</b>	<ul style="list-style-type: none"> <li>• Disruption of activity (e.g., breeding, feeding, other behaviours)</li> <li>• Disruption of habitat</li> <li>• Direct/Increased mortality or injury</li> <li>• Reduced health or reproductive rates</li> <li>• Change in species or community composition</li> </ul>	<ul style="list-style-type: none"> <li>• Visitor behaviour (light, sound, photography; viewing wildlife too close)</li> <li>• Visitor use intensity (crowding)</li> <li>• Light and sound from human developments</li> <li>• Physical disruption to vegetation and soils</li> <li>• Introduction of invasive weeds</li> <li>• Wildlife-vehicle collisions</li> <li>• Collecting</li> </ul>
<b>Vegetation</b>	<ul style="list-style-type: none"> <li>• Loss of ground cover</li> <li>• Reduced growth and reproduction</li> <li>• Reduced biomass</li> <li>• Loss of species</li> <li>• Introduction of invasive species</li> <li>• Change in community composition and age</li> </ul>	<ul style="list-style-type: none"> <li>• Camping</li> <li>• Trail trampling</li> <li>• Mountain biking or other vehicles</li> <li>• Campfires</li> </ul>

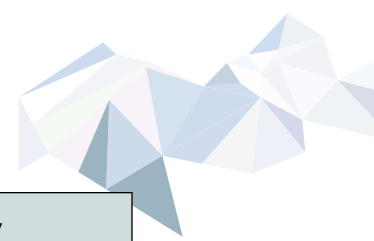




## APPENDIX 2: EXAMPLES OF ECOLOGICAL INDICATORS

A variety of ecological indicators can be used in visitor use management strategies. The table below is adapted from Castley et al. (2008). Ecological integrity is measured with a combination of indicators. These indicators are examples and would likely require refinement specific to the LMU for which a visitor use management strategy is being created.

<b>Ecological Component</b>	<b>Indicator</b>	<b>Spatial Scale</b>
<b>Vegetation</b>	% of area degraded/transformed	Regional
	Changes in species composition	Community
	Changes in community structure	Community
	% cover of introduced weeds	Population
	Numbers of seedlings of focal species	Population
	Level of fragmentation/rate of habitat loss	Regional
	Extent of seed production	Population
<b>Soil</b>	Degree of compaction	Community
	Changes in the soil horizon	Community
	Extent of bare ground	Community
	Number and length of formal/informal trails of various uses	Regional
	Extent of soil erosion	Regional



<b>Wildlife</b>	Changes in behaviour (e.g., vigilance or foraging success)	Community
	Reduced fecundity or increased mortality	Community/ Population
	Displacement (decline in observations of species at sites)	Community
	Shifts in community composition	Community
	Degree of habituation	Community/ Population
	Loss of species	Community/ Regional
<b>Species diversity</b>	Biodiversity indices (richness, evenness)	Community/ Regional
	Numbers of invasive species	Community
<b>Biodiversity pattern</b>	Shifts in community structure	Community
	Extent of habitat types or fragmentation	Regional
	Connectivity indices	Regional
	Vegetation structure	Community
<b>Biodiversity process</b>	Water runoff patterns	Regional
	Nutrient load	Community
	Litter accumulation and decomposition	Regional

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The Canadian Parks and Wilderness Society (CPAWS) is Canada's only nationwide charity dedicated solely to the protection of our public land and water, and ensuring our parks are managed to protect the nature within them. Since 1963 we've played a lead role in protecting over half a million square kilometres—an area bigger than the entire Yukon Territory! Our vision is that Canada will protect at least half of our public land and water so that future generations can benefit from Canada's irreplaceable wilderness.



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