

AN EXAMINATION OF THE ZONING POLICY AND PRACTICES OF THE PARKS CANADA AGENCY

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ABSTRACT

This project examines the current zoning system used by Parks Canada by investigating its application on the strategic policy level and the park planning level. The analysis is based on interviews with thirteen employees from the Parks Canada as key informants. In summary, most informants felt that zoning generally achieves its goals, but also suggested a number of improvements for updating zoning to reflect and advance the overall mandate and policy direction of the Parks Canada. At the park level, zoning should include specific targets towards a desired future state or vision of each area being zoned. A quantitative decision tool for site-level evaluation of zoning would be helpful in assessing existing zoning during management plan reviews. This research provides an external perspective on the role of zoning in Canada's national parks and how zoning could be enhanced to more directly address the mandate of the Parks Canada.

Keywords: management planning; zoning; quantitative decision tools; national parks; Parks Canada; protected area management.

“National parks are kind of like your grandma’s china that your sister has: you’re glad it’s being protected, you’re glad it’s still here, but you don’t need to go touch it every day.”

—*Key Informant #13*

“Canada’s treasured and historic places will be a living legacy, connecting hearts and minds to a stronger, deeper understanding of the very essence of Canada.”

— *Parks Canada Vision Statement*

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1: INTRODUCTION

National parks are essential to protect and maintain biodiversity and representative natural landscapes across Canada. Currently, Canada has 42 National Parks located across the country, including parks at the northern and southern-most points in Canada. These parks, which are governed by the *Canada National Parks Act* (2000) and managed by the Parks Canada Agency, hosted 12.5 million person-visits in 2010-11 (Parks Canada, 2011b). Canada's first national parks were initially established to provide people with a recreational experience, which was based on the idea of the natural world providing a place for a relaxing holiday. For example, Banff Hot Springs Reserve (now Banff National Park of Canada) was established in 1885 to draw tourists to the west via the new Canadian Pacific Railway. Over the course of the 20th century, the concept of a Canadian national park has evolved from a purpose of purely providing recreational space for tourism, to a greater emphasis on ecosystem conservation (Searle, 2000; Parks Canada, 2011a).

All of Canada's parks are managed by the federal Parks Canada Agency. Currently, Parks Canada's mandate consists of three elements: the protection of natural and cultural heritage resources; facilitating opportunities for visitor experience; and providing public education (Parks Canada, 2008). Section 11(1) of the *Canada National Parks Act* (S.C. 2000, c. 32) requires that each national park follow a management plan that has been tabled in the House of Commons

within five years of park establishment (*Canada National Parks Act*, 2000; Wright & Rollins, 2009). Park management plans are one instrument that the Parks Canada uses to implement policies intended to carry out the Parks Canada mandate. The park management plan is the primary tool for guiding the management of each individual park, and it is through this plan that the primary decisions regarding park resources and human park use are made.

Park zoning is an essential part of the park management plan. At the strategic national policy level, the framework for park zoning is designed to allow park planners to guide resource management and visitor use activities, while balancing conservation priorities with human use (Parks Canada, 2008; Wright & Rollins, 2009; Eagles et al., 2002). At the site level, zoning is a process used to describe specific geographies, management priorities, and policies within a protected area. Based on traditional planning concepts of dividing landscapes into categories for the separation of incompatible land uses, park zoning focuses explicitly on the conservation values of the ecosystem, and the capacity for visitor use (Wright & Rollins, 2009). Typically, a zoning policy contains a spectrum of categories that are used to spatially delineate the park into areas with varying levels of intensity of human activity and associated development. At one end of the spectrum are highly developed areas such as communities, visitor centres or high use car campgrounds; at the other end are strictly preserved wilderness areas with no development and little human use (Eagles et al., 2002).

1.1 Goal and Objectives

The overarching goal of this research project is to examine the current application of zoning in Canada's national parks and reserves and to determine how well zoning contributes to achieving the specific components of Parks Canada's mandate. Specifically, this project aims to assess the current approach to zoning at both the strategic national policy level and the site level as part of the park management plan process, explore the strengths and weakness of zoning, and investigate the potential for incorporating decision-making tools to inform the process and resulting zoning scheme.

The main objectives of this study are:

- 1) To determine how zoning achieves the components of Parks Canada's mandate from both a strategic planning and site/operational perspective;
- 2) To outline the current approach to zoning and identify how the national policy is implemented at the site level; and
- 3) To explore the use of quantitative decision support tools in the zoning process.

2: MANAGEMENT PLANNING IN THE NATIONAL PARKS OF CANADA

2.1 Canada's National Parks

Protected areas are a landscape scale conservation tool used to preserve areas of significant natural and cultural resources. The International Union for the Conservation of Nature (IUCN) broadly defines a protected area as "an area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means" (IUCN, 2009).

The official mandate of the Parks Canada Agency is: "On behalf of the people of Canada, we protect and present nationally significant examples of Canada's natural and cultural heritage, and foster public understanding, appreciation and enjoyment in ways that ensure the ecological and commemorative integrity of these places for present and future generations" (Parks Canada, 2010). This mandate is presented as an integrated set of goals (Figure 1), whereby each element is closely linked to the others in order to fulfil Parks Canada's fundamental responsibilities (Parks Canada, 2010).



Figure 1 Parks Canada's Mandate (Parks Canada, 2008)

The Parks Canada Guiding Principles and Operational Policies (GPOP) (1994) state that protecting ecological integrity takes precedence in acquiring, managing, and administering national parks. Parks Canada's goal of maintaining ecological integrity and the use of ecosystem based management principles contribute directly to the protection of ecosystems and species, and ultimately, to the protection of biodiversity (Parks Canada, 1994a). Thus, ecological integrity is a fundamental goal for managing national parks and meets the first element of the Parks Canada mandate, in addition to ensuring the long-term preservation of biodiversity and ecosystem processes in Canada (Parks Canada, 2008).

2.1.1 Canada National Parks Act

Several key pieces of legislation and policy govern the management of Canada's National Parks. The *Canada National Parks Act* is the primary statute to which all other management policies must conform (Wright & Rollins, 2009). In 1988, major amendments were made to the *Canada National Parks Act*, including a new reference to ecological integrity. This revised *Act* explicitly stated in s. 5(1.2) that the maintenance of ecological integrity was to be the first priority with regards to park zoning and visitor use management (*National Parks Act*, R.S.C. 1985; Searle, 2000; Fluker, 2009).

This significant amendment provided “a new paradigm for the management of protected areas” (Woodley, 2009). During the 1990s, Parks Canada also overhauled its policy to realign management goals with the maintenance of ecological integrity in landscapes protected within the parks (McNamee, 2009). In 2000, a new *National Parks Act* was passed in response to recommendations from the Banff-Bow Valley Task Force (1996) and the Panel on Ecological Integrity (2000), combined with pressure from non-government organizations (such as?). One of the most significant changes in the new *Act* was the addition of a new ecological integrity provision in s. 8 (2), accompanied by a definition of ecological integrity in s 2(1). Section 8(2) states:

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.

This new section broadened the direction for Parks Canada to maintaining ecological integrity and to restoring it in degraded parks. It also directs the minister to consider ecological integrity in all aspects of park management (McNamee, 2009).

Section 11(1) of the current *Canada National Parks Act* requires that each park adopt a management plan within five years of establishment as a national park. It also specifies that zoning is to be included in the management plan:

The Minister shall, within five years after a park is established, prepare a management plan for the park containing a long-term ecological vision for the park, a set of ecological integrity objectives and indicators and provisions for resource protection and restoration, zoning, visitor use, public awareness and performance evaluation, which shall be tabled in each House of Parliament (S. 11(1) *Canada National Parks Act*).

The *Act* also states that management plans must be reviewed every five years and typically, a plan review also includes a review of the zoning for the park. The five-year review is important as it enables park managers to evaluate whether the direction set by the current plan is valid or whether amendment is needed (Parks Canada, 2008). Any amendments to a park management plan (including zoning) require public consultation and must be tabled in Parliament.

2.2 Protected Areas Management

Protected areas management has undergone many shifts in focus over the last century, and currently aims to maintain ecological integrity. It is now widely recognized that protected areas management requires a multidisciplinary approach that draws on ecological principles, in addition to social and economic

imperatives (Hobbs et al., 2010). Reflecting this, guiding principles currently used within the Parks Canada management include: ecological integrity; ecosystem based management; and adaptive management.

The focus on the maintenance and restoration of ecological integrity as a primary goal in managing national parks recognizes that ecosystems are inherently dynamic, and require management decisions to be made regarding a particular ecosystem's state (Woodley, 2009). Therefore, active management must manage for ecological integrity to keep park ecosystems within the desired thresholds of disturbance, and is especially challenging given high human impacts in some areas (Hobbs et al., 2010; Woodley, 2009). It is important to note that the concept of ecological integrity shifts the focus of management from "cause to effect and from past to future" (Hobbs et al., 2010). Under this goal of ecological integrity, Parks Canada has not attempted to eliminate every form of human disturbance, but rather given park managers direction to determine which ecosystem states are preferred in order to provide clear guidance in future directions for a park (Hobbs et al., 2010).

Managing for ecological integrity is implemented through the principles of ecosystem-based management (EBM) (Parks Canada, 2008). Grumbine (1994) defined EBM as management that "integrates scientific knowledge of ecological relationships within a complex sociopolitical and values framework toward the general goal of protection native ecosystem integrity over the long term". The concept was included in the 1994 Parks Canada GPOP, which recognized this need for a broader approach to park management (Slocombe & Dearden, 2009).

Given the difficulty in predicting the response of ecosystems to potential climate change and other stressors, the need for an adaptive approach to the management of protected areas is widely recognized (Woodley, 2009; Hobbs et al., 2010). Parks Canada's interpretation of adaptive management dictates that "future management actions will depend on the outcome of the preceding phase of actions and their nature and scope will be informed by what has been learned during the planning cycle" (Parks Canada, 2008). Adaptive management also forms the basis for management plan review, including monitoring the implementation of plans, evaluating results, and adjusting management actions (Parks Canada, 2001).

2.3 Park management planning

The park management plan is the primary tool for directing management activities at the individual park level (Wright & Rollins, 2009). This management plan is "a document which sets out the management approach and goals, together with a framework for decision making, to apply in the protected area over a given period of time" (Thomas & Middleton, 2003). A management plan ensures that the park has a clearly defined direction for resource preservation and visitor use (Prato & Fagre, 2005; Lockwood, 2006). Management planning also includes involvement of many stakeholders, often with widely diverging values and opinions.

Parks Canada has a well-developed management planning process that is undertaken for each national park to define specific goals and objectives for park management at a site level. The management planning process is critical to

ensuring implementation of Parks Canada's mandate and achieving institutional priorities and goals (Parks Canada, 2008). Management planning by Parks Canada is grounded in general principles and is carried out within an extensive legislative framework. This includes the *Canada National Parks Act*, the *Species at Risk Act* (S.C. 2002, c. 29), and various Parks Canada policies that provide the foundation for the planning and management of national parks from a top-down organizational perspective. Policy direction for Parks Canada's management planning process is set out in the GPOP, with the most detailed direction found in the Guide to Management Planning section. In addition to requirements specific to planning, the process is also informed by broad principles for public engagement, strategic environmental assessment, zoning, and cultural resource management (Parks Canada, 2008).

2.4 Zoning

Conventionally used as a growth control tool in urban planning, the concept of zoning is "to establish a territorial structure by allocating specific lands for specific uses and purposes" (Walther, 1986). The prime aim of early zoning efforts was the geographic separation of nuisances and incompatible uses, especially isolating industrial uses from residential areas (Hodge, 1998), and originated as a way to deal with public health and safety issues in urban areas (Goldberg & Horwood, 1980; Hodge, 1998). Formal zoning by-laws began to emerge in urban areas in Europe and North America in the early 1900s (Goldberg & Horwood, 1980), and zoning is now a standard practice globally in

both rural and urban areas. In the context of natural resource management, zoning is a planning technique that has traditionally been applied to land management issues such as protection, administration, resource allocation or evaluation (Walther, 1986). Zoning has also become a common exercise in land use planning practices all over the world. More recently, zoning has become a key prescriptive tool for the administration and management of parks and protected areas (Wright & Rollins, 2009).

2.4.1 Protected Area Zoning

Based on traditional concepts of dividing landscapes into categories for separating incompatible land uses, park zoning focuses more explicitly on the conservation values of the ecosystem, and the capacity for visitor use (Wright & Rollins, 2009). Zoning is a widely-used and long-established method of park management (IUCN, 2003), and is applied to identify and implement various management strategies. According to Young & Young (1993 as cited by Thomas & Middleton, 2003):

Zoning defines what can and cannot occur in different areas of the park in terms of natural resource management; cultural resources management; human use and benefit; visitor use and experience; access; facilities and park development; maintenance and operations. Through management zoning the limits of acceptable use and development of the park are established.

Protected areas zoning can be examined at two levels: at the strategic or higher level, where a zoning policy is prescribed that typically provides a guiding framework for an entire park management agency, and at the site level, where a zoning plan is developed and implemented for a specific park.

At a strategic level, a zoning system is developed by a park management agency to provide a standard approach nationally in support of the agency's objectives and actions, and address existing or expected patterns of access and use in parks (Eagles et al., 2002; OMNR, 2009). Typically, a protected area zoning system involves a spectrum of categories that spatially delineate the landscape into areas with varying levels of intensity of human activity and associated development. At one end of the spectrum are highly developed areas such as park communities, visitor centres or high-use car campgrounds; at the other end are strictly preserved wilderness areas with no development, and little management intervention (Eagles et al., 2002). These different zoning categories attempt to reflect the need for managing both the ecological integrity of an area and the resulting intensities of visitor use (Wright & Rollins, 2009)

The strategic level of zoning establishes the tools for park managers to create and manage zones at the site level for individual parks. Zoning is particularly useful to park managers when they face a number of values that require protection, especially where there is extensive public use occurring within the park (OMNR, 2009). A park-specific zoning plan refers to the differences in management direction for different sections of protected areas established through a planning process that addresses specific management objectives, standards, and actions for each area of the park (Haas et al., 1987). The number of zones within a given protected area will vary with the possible combinations influenced by natural and cultural resources, human uses, conflicts between use values, public issues, management concerns, success of the current

management program, use trends, and implementation feasibility. Usually, the greater the diversity of biophysical resources and human uses within a park, combined with the variety in the conditions of the resources, the more likely and effective a large number of zones will be (Haas et al., 1987).

Most commonly carried out as part of a broader management planning process for a park, site level zoning is a technique frequently used for organizing management activities and objectives of smaller sub-areas of the overall protected area (Wright & Rollins, 2009). Zoning at the park level is intended to direct management towards achieving particular objectives in specific areas of a protected area. It can also serve to separate incompatible uses and to exclude inappropriate uses from certain areas of the park, or to disperse use where impacts are threatening important values (Eagles et al., 2002).

The general procedures of zoning vary greatly between park management agencies, and even from park to park within an agency. Broadly speaking, the zoning component of a park management planning process requires two steps: a descriptive step, and an allocation or prescriptive step (Eagles et al., 2002). The descriptive stage identifies the ecological, cultural and social values of the park, in addition to the opportunities for protection and use. This stage requires the gathering of information, and inventory of resource characteristics and existing park uses. The amount of information available for a park will vary, depending on the size of the park, how long it has been established as a protected area, and the human and financial resources available to conduct inventories. Lockwood

(2006) gives the following list of spatial resource information from which zoning would ideally be developed:

- Land capability factors, such as sloped, soil type and hydrology;
- Vegetation communities;
- Areas of botanical and zoological significance;
- Sites of cultural and historical significance;
- Landscape values;
- Recreation activities and opportunities; and
- Current land uses.

Following the collection and synthesis of all available information, park planners and managers will then move to the prescriptive stage. The allocation of zones involves working with other experts, park staff, and various stakeholders to determine priorities for protection, use, and development. During this phase, decisions are made regarding management goals and objectives, and the kinds of visitor opportunities that will be provided in the park (Eagles et al., 2002). The resulting zoning plan thus guides resource management and visitor use activities, while balancing conservation priorities with human use (Parks Canada, 2008; Wright & Rollins, 2009; Eagles et al., 2002).

Lockwood (2006) argues that zoning must reflect significant differences in management emphasis between zones in order to be useful. He notes that some park plans contain very few specific management actions which distinguish between zones, indicating that planners and managers have either been unable to make some difficult management decisions, or that zoning has been implemented because it is standard practice, but without considering how it contributes to park planning and management goals (Lockwood. 2006). Although often challenging to achieve, the process of zoning should seek to be

“prospective, not reactive” (Walther, 1985). Most protected areas already have existing land uses, development or activities happening prior to the designation as a park or the development of a management plan making it difficult for park planners to zone in a prospective manner. To this end, zoning requires a “high degree of coordination and goal consensus among decision makers” (Walther, 1985) in order for a final plan to be arrived at, and implementation to be successful.

Further to the goal of implementing specific management objectives at the site level, zoning can be used to inform and structure monitoring in parks. According to Haas et al. (1987), zones that incorporate explicit standards or targets can form the basis for long term monitoring of park values. Used in this way, zoning is valuable for developing an efficient and effective resource monitoring and restoration program because it focuses attention on the critical issues in each part of the protected area (Haas et al., 1987). Managers can then use the zoning to evaluate potential pressures on the area’s values (OMNR, 2009).

2.5 Parks Canada Zoning

Zoning is one of the principal techniques used by Parks Canada for organizing management activities and setting objectives at the park level (Wright & Rollins, 2009). It has been a central part of the planning and management of Canadian national parks for decades (Sookocheff, 2003; Hodgins, 2005). Zoning was first applied in 1961 at Point Pelee National Park, Ontario, where a two zone

approach was applied. This early application of zoning led to the Parks Branch seeking a consistently applied policy, and a five zone system was adopted nationally in 1967 (Sookocheff, 2003). The zones were organized as follows:

- (1) Preservation Lands
 - Class I: Special Areas
 - Class II: Wilderness Recreation Areas
 - Class III: Natural Environment Areas
- (2) Development Lands
 - Class IV: General Outdoor Recreation Areas
 - Class V: Intensive Use Areas.

In the mid 1970s, the zoning categories were re-organized, and the five zones renamed:

- Zone I: Preservation
- Zone II: Primitive
- Zone III: Natural Environment/Outdoor Activity
- Zone IV: Recreation Facility
- Zone V: Visitor Services.

At that time the intent was to emphasize the preservation of resources and to make zoning the primary objective of national parks management, and the zoning system was intended as a guideline to achieve generalized objectives in each zone classification (Sookocheff, 2003).

In 1979, after several revisions, a national policy document afforded greater importance to zoning:

Zoning is one of the most important tools for the planning, development and management of national parks...It provides a guide for the activities of both visitors and managers within a national park. It assists in managing the tension between use and preservation (Parks Canada, 1979, as cited in Sookocheff, 2003).

The first National Parks Management Planning Process Manual published in 1985 included a substantial chapter on zoning, including detailed guidelines on the application of zoning in national parks (Hodgins, 2005). Currently, zoning is directed by the following key policy documents: Parks Canada Guiding Principles and Operational Policies (1994) and the Guide to Management Planning (2008). These documents are summarized in section 2.6.

At the strategic level, the Parks Canada zoning system “attempts to reflect both ecological integrity and visitor experience” (Haider & Payne, 2009). At the site, or park level, Parks Canada uses an integrated approach to zoning, in which terrestrial and marine areas are classified according to ecosystem and cultural characteristics, protection goals, and their capability and suitability to provide opportunities for visitor use (Parks Canada, 1994a). Within a park management plan, zoning is one tool used to assist the maintenance of ecological integrity by providing a framework for area-specific management direction for resource management, visitor activities, and research. Parks Canada policy states that the goal of park zoning is to “reflect principles of ecological integrity by protecting park lands and resources and ensuring a minimum of human-induced change” (Parks Canada, 1994a). The Parks Canada GPOP emphasizes that “the application of zoning requires sound information related to both ecosystem structure, function and sensitivity, as well as the opportunities and impacts of existing and potential visitor experiences” (Parks Canada, 1994a).

Currently, a management plan for a national park must contain a zoning plan based on the five zones described in the Parks Canada GPOP (Table 1; Parks Canada, 2008). Each zone has specific characteristics and different permitted uses, as summarized in table 1 and described below.

Zone I - The Special Preservation designation is applied to those lands which require the highest level of protection because they contain or support unique, threatened or endangered natural or cultural features, or are among the best examples of the features that represent a natural region. Preservation of the specified values is the primary management consideration. Motorized access is not permitted and other forms of access are carefully regulated (Parks Canada, 2008).

Zone II - Wilderness Areas, the most commonly applied zone within national parks, are areas that are good representations of their nature region. Wilderness zones are managed for the perpetuation of ecosystem processes and are maintained in a wilderness state (Parks Canada, 2008). Motorized recreational access is not permitted. Zone II facilities are restricted to trails, backcountry campgrounds, huts/shelters, and warden patrol facilities (Parks Canada, 2010).

In Zone III – Natural Environment areas, visitors experience the park’s natural and cultural heritage through outdoor recreational activities that require minimal services and facilities of a rustic nature (Parks Canada, 2010). Access is determined on a park-by-park basis and motorized access is usually limited and strictly controlled (Parks Canada, 2008).

The Zone IV – Outdoor Recreation designation is limited to small areas which are capable of providing a broad range of visitor opportunities and related essential services and facilities. Management intent is focused on minimizing the impact of activities and facilities on the landscape. Direct motorized access is permitted to these areas (Parks Canada, 2008).

Finally, Zone V – Parks Services is reserved for towns and visitor centres that exist within the boundaries of national parks. Major park operations and administrative functions as well as the most intense development are accommodated in this zone (Parks Canada, 2008).

Once included in an approved park management plan, zoning can only be altered after a management plan amendment and public consultation. A review of strategic level zoning usually occurs during the five-year review process of a management plan (see section 2.1.1). At the site level, zoning remains as policy, and therefore cannot be directly legally enforced. Zoning is meant to guide how various spatial areas in the park will be managed; however, it is up to park managers to make sure that use and development is restricted accordingly throughout the respective park. Additionally, zoning is considered during any environmental assessment process or in the issuance of a license or permits for uses in a park. Permits and licences are used to allow activities under certain circumstances for specific uses and in these cases, permits or licenses should be respectful of the prescribed zoning (W. Bourque, personal communication, August 15, 2011). Regulations issued under the *Canada National Parks Act* are one means through which zoning is implemented and enforced.

2.5.1 Wilderness Declaration

In addition to the zoning policies outlined above, Section 14 of the *Canada National Parks Act* provides for areas of a national park to be declared, by regulation, as wilderness areas. The purpose of the wilderness declaration by regulation is to enhance protection and maintain a high level of ecological integrity, in addition to providing the public with assurance that development and inconsistent use will be prohibited. In these declared wilderness areas, the legislation only permits development and activities required for essential services and resource protection (Parks Canada, 2008). The wilderness declaration provides strict legal protection to these areas by including legal descriptions in regulations under the *National Parks Act*, which can only be altered or reversed by an Order in Council after public consultation.

In general, the declared wilderness area boundaries in Canada's national parks follow Zone II - Wilderness boundaries (see Table 1). Additionally, in some cases Zone I - Special Preservation areas may also be included in declared wilderness areas. Further to the restrictions prescribed in the Parks Act, zoning and landscape management unit objectives will determine levels of use in declared wilderness areas (Parks Canada, 2008). It is important to note that declaration of wilderness areas is discretionary to park managers and there is no legal requirement that all parks must have declared wilderness areas (Hodgins, 2005).

Zone Name	Purpose	Management Framework	
		Resource Protection	Public Opportunities
Zone I – Special Preservation	<ul style="list-style-type: none"> Contain or support unique, threatened or endangered natural or cultural features or values, or are among the best examples of a natural region. 	<ul style="list-style-type: none"> Strict resource preservation 	<ul style="list-style-type: none"> Usually no internal access Strictly controlled No motorized access
Zone II – Wilderness	<ul style="list-style-type: none"> Good representations of a natural region and will be conserved in a wilderness state. 	<ul style="list-style-type: none"> Perpetuation of ecosystems with minimal management intervention is encouraged. 	<ul style="list-style-type: none"> Internal access by non-motorized means Dispersed activities providing experiences consistent with resource preservation Primitive camping
Zone III – Natural Environment	<ul style="list-style-type: none"> Managed as natural environments that provide opportunities for visitors to experience a park’s natural and cultural heritage values through outdoor recreation activities requiring minimal services and facilities of a rustic nature. 	<ul style="list-style-type: none"> Oriented to preservation of natural environment setting 	<ul style="list-style-type: none"> Motorized access, where allowed, is controlled. Semi-primitive camping Rustic fixed roof accommodations
Zone IV – Outdoor Recreation	<ul style="list-style-type: none"> Limited areas capable of accommodating a broad range of opportunities for understanding, appreciating and enjoying the park’s heritage values, and related essential services and facilities, in ways that impact the ecological integrity of the park to the smallest extent possible. 	<ul style="list-style-type: none"> Minimising impact of activities and facilities on the natural landscape 	<ul style="list-style-type: none"> Outdoor opportunities in natural landscapes or supported by facility development and landscape alteration. Serviced camping facilities Small accommodation facilities
Zone V – Park Services	<ul style="list-style-type: none"> Communities that contain a concentration of visitor services and support facilities. Major park operation and administrative functions 	<ul style="list-style-type: none"> Emphasising the national park setting and values in the location, design and operation of visitor support services and park administration functions. 	<ul style="list-style-type: none"> Facility based opportunities such as visitor centres, park administration

Table 1 Parks Canada Zoning System Summary (Adapted from Parks Canada, 1985 & 2008 & Eagles et al., 2002)

2.5.2 Zoning Implementation

Although zoning is part of a national policy, the characteristics, goals and challenges unique to each national park result in the zoning system being applied differently across the country, varying from park to park and planner to planner (Sookocheff, 2003). Given that the zoning system and the application of it in park management plans did not begin until the 1960s, many parks were already well-established before zoning was undertaken, and much of that early zoning simply reflected the existing use and characteristics of the park.

For example, although Banff National Park was established in 1885, a formal management plan for the park was not completed until 1988, which also contained the first zoning plan for the park (Parks Canada, 2007a). The plan was reviewed in 1993 and modifications were made as a result of the 1988 amendments to the *Canada National Parks Act* (Parks Canada, 2007a). In 1994, at the request of the Government of Canada, the Banff-Bow Valley Task Force was struck to study and provide recommendations for the long-term management of ecological integrity in Banff (Parks Canada, 2010a). The 1997 Banff National Park of Canada Management Plan was approved after four years of scientific studies, analyses and public consultation, and incorporated many of the task force's recommendations (Parks Canada, 2010a). The current 2010 management plan was created through a recent review and update of the 2007 management plan. Although the park's zones remains almost identical to the zoning in the 1988 management plan, some modifications have been made in each revised version of the management plan (Parks Canada, 2010a, KI #2). The most

recent change in zoning in Banff was made to align the existing zoning of a portion of a lake with an area that was to be regulated as Declared Wilderness (KI #2).

Banff National Park includes designations of all five Parks Canada zones in addition to Environmentally Sensitive Sites (Parks Canada, 2010). Figure 2 shows the zoning map from the Banff management plan. Approximately 4% of the park has been designated as Zone I - Special Preservation. This zone has been applied to the most unique areas of the park such as the woodland caribou habitat, and important and sensitive physiographic or biotic resources such as hoodoos, cave features, rare plant and animal species, prehistoric cultural sites, elk and bighorn sheep range and wolf and grizzly bear habitat. Motorized access is not permitted and other forms of access are carefully regulated in these areas. Most of the Zone II areas have been legislated as wilderness declaration areas. Zone III – Natural Environment areas cover approximately 1% of Banff, and include areas for backcountry lodge access and other visitor experience that require more facilities than permitted in a Zone II designation. The Zone IV – Outdoor Recreation zone covers about 1% of Banff National Park and accommodates a broader range of visitor access and activities. (Parks Canada, 2010). Areas around the highly developed Banff townsite and Lake Louise have been zoned as Outdoor Recreation (Zone IV) and Park Services (Zone V) to reflect their heavy use and human development.

In turn, zoning designations affect other park management decisions. In the case of Banff National Park, the management plan specifically refers to zoning in additional sections of the plan dealing with park operations. Two examples highlight how zoning is

used to implement specific park management actions at the site level. One example is business licensing for tourism activities, where the park plan states that existing licences may be continued in some areas, while no new licenses will be considered for the Clearwater Zone I area. Similarly, another management action states that trails and infrastructure will not be maintained in a particular area zoned Special Preservation in order to discourage use of this area to further protect the values in which it was zoned to protect.

2.6 Related Policies

Many policies have been developed to guide the management planning process, and zoning, over the years. The following is a summary of the crucial internal policies of Parks Canada that refer specifically to zoning at both the strategic and site levels.

2.6.1 1985 Guide to Management Planning

The National Parks Management Planning Process Manual was released in 1985, and contained details of the zoning system, which was revised from previous stand-alone versions. A thirty page chapter of the manual was dedicated to a detailed description of zoning, its philosophy, principles, and zone descriptions. This version of the system stressed the need for consistent application across the country (Sookocheff, 2003). The manual gave detailed information on the zoning system and its place in the park management planning process, stating that “good zoning will flow from sound analysis and synthesis of objectives, constraints and opportunities that can be identified for any national park” (Parks Canada, 1985).

Land-Use Zoning, Banff National Park

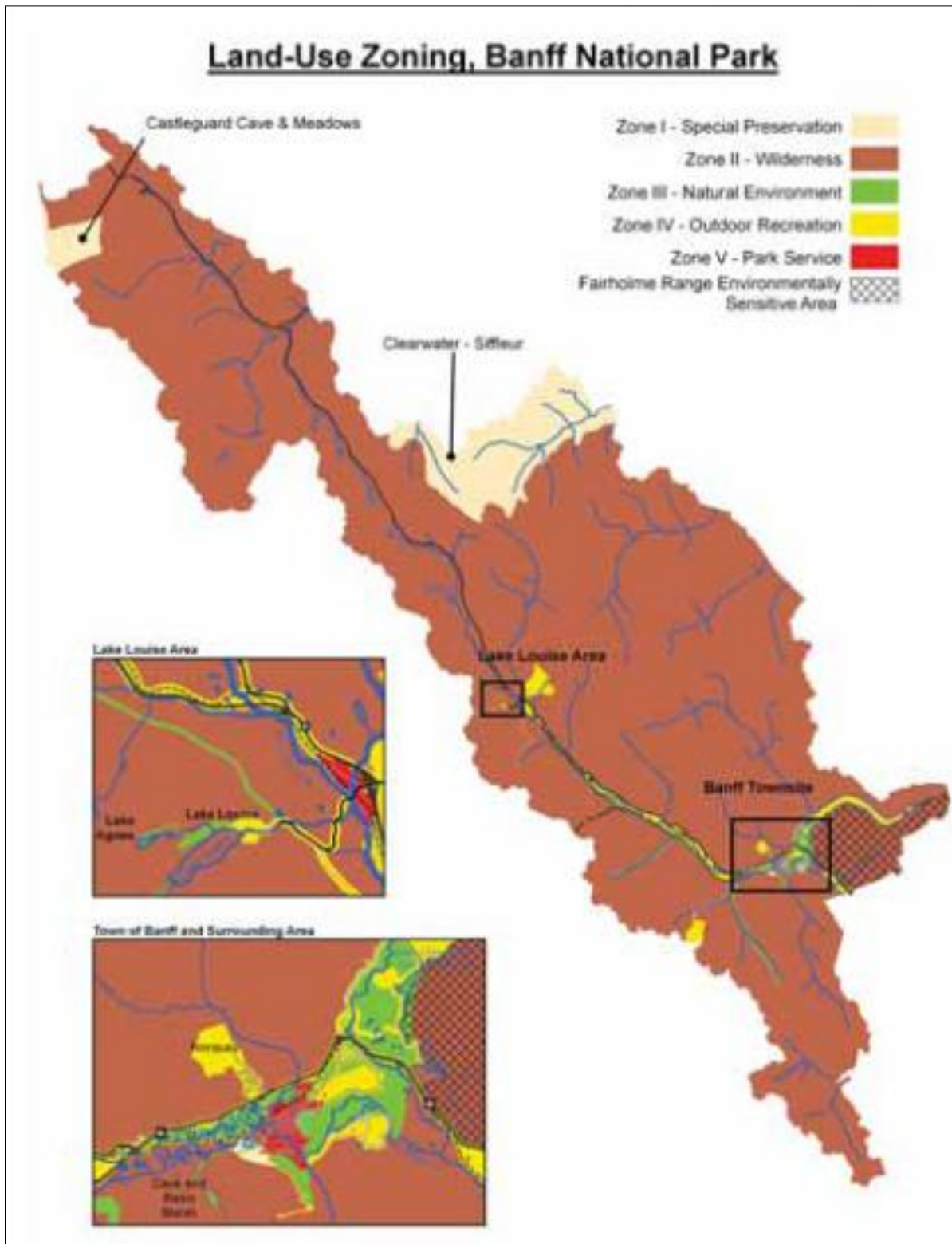


Figure 2 Current Banff National Park Zoning Map

The following eight principles were described in the process manual as the basis of the zoning system:

- (1) The National Park Zoning System will apply to all Parks Canada Natural Heritage Areas.
 - (2) Each zone must have clear objectives and be easily understandable in management intent.
 - (3) The zones of the system will reflect the relative emphasis of national park preservation and use roles.
 - (4) Zoning will assist in the application of Park's Canada's policies.
 - (5) A description of the zoning applied will be prepared and approved for a national park as part of the development of a park's management plan.
 - (6) Within each zone, the preservation objective may necessitate a full range of management techniques, from totally passive to intensively active.
 - (7) Change to a park's zones constitute an amendment to the park management plan and therefore will be made only after public notice and consultation.
 - (8) Cultural resources will be zoned according to their preservation requirements, significance in relation to other park values and capability to sustain use.
- (Parks Canada, 1985)

By examining the current policy documents that direct zoning, it appears that some of these general principles have remained in place over time, although not all of them have been articulated in subsequent management planning policy documents. These eight principles are general in nature and do not give detailed direction for implementing the zoning system in a park, but rather set a framework within which the details of zoning must occur. This is part of the flexibility of the zoning system, allowing it to be tailored to each individual park and its unique values.

The manual also contains detailed descriptions of each of the five zones, including management attitudes and objectives, resource preservation, public use, a discussion of management implications, and benchmark examples of each zone as it had been applied in a national park. Subsequently the manual outlines principles of application, intended to “assist in understanding the national park zoning system and how it is to be applied” (Parks Canada, 1985).

2.6.2 1994 Guiding Principles and Operational Policies

In 1994, Parks Canada updated several policies with the release of the GPOP document. The GPOP was intended to clarify the place of management planning within the new Parks Canada organizational structure. The GPOP contained an overview of the policy context, including mission, vision, and ten guiding principles. The second part of the policy contained activity policies for National Parks and other heritage areas managed by Parks Canada. Finally, the GPOP contained a new cultural resource management policy.

The GPOP stated that “park management plans are essential for the direction of park managers. They are also commitments to the public by the Minister responsible for Parks Canada regarding the use and protection of national parks” (Parks Canada, 1994a). The GPOP also outlined the general components of a management plan, indicating that it should contain:

statements of management objectives in sufficient detail to indicate how a park will protect and represent the natural and cultural aspects of its

region. In keeping with these objectives, plans will: specify the type and degree of resource protection and management needed to assure the ecological integrity of the park and the management of its cultural resources; define the type, character and locale of visitor facilities, activities and services; and identify target groups. (Parks Canada, 1994a).

2.6.3 2000 Panel on Ecological Integrity

In response to years of concerns regarding the health of Canada's National Parks, a panel was formed in 1998 to identify issues, examine Parks Canada's approach for maintaining ecological integrity, and provide recommendations for improvement. The Panel members travelled to national parks to speak with park staff and other interested Canadians from the public, and to examine the problems and issues surrounding the ecological health and management of the parks. The result of the two year study was a detailed two volume report with specific recommendations addressed to the Minister and to the Parks Canada Agency (Parks Canada, 2000).

Recommendations of the report spoke to park management planning, and more specifically to zoning. The Panel stated that the zoning system and methods for zoning needed to be reviewed. The panel found that "the current zoning system predates Parks Canada's development of an ecosystem-based management approach and is more reflective of historic land use than ecological sensitivity" (Parks Canada, 2000). The Panel also found that the zoning categories were "weakly defined in terms of the protection of ecological values" and that "ecological information is generally only used for determine the location of Zone I (Special Preservation) areas" (Parks Canada, 2000). The panel concluded that zoning is an important conservation tool that provides

analysis for decision making, but needed to focus more explicitly on maintaining or restoring ecological integrity (Parks Canada, 2000).

Additionally, the Panel report outlined some suggested guidelines for the development of a new zoning system, including: the use of advanced spatial analysis and reserve design algorithms that account for the rarity or uniqueness of habitat types; the application of zone designations regardless of existing or proposed facilities, developments or uses; and including a spatial and temporal means of identifying significance and sensitivity (Parks Canada, 2000).

2.6.4 2001 Parks Canada Guide to Management Planning

Following release of the Panel report in 2000, the management planning manual was updated and renamed in 2001 to reflect many of the recommendations of the Panel on the Ecological Integrity of Canada's National Parks. The revised Parks Canada Guide to Management Planning emphasized the importance of ecological integrity as the premier consideration in park planning and management (Sookocheff, 2003). Notably, this re-creation of the manual did not contain a section or chapter dedicated to zoning, nor was there any 'how-to' guidance on the subject. Zoning was referred to as an element in the outlined "contents of a park management plan", and was given passing reference as a planning tool to be included in the management planning process and final management plan document. A new action plan for the Declaration of Wilderness Areas was included in this document, but without the necessary tool of zoning for implementation (Sookocheff, 2003).

Like the 2000 Panel on Ecological Integrity report, the 2001 Guide to Management Planning also acknowledged the need for a review of the zoning system. In the section on zoning, it stated “the zoning system for national parks is to be reviewed to consider whether changes in approach are needed” (Parks Canada, 2001). It also noted that in the interim, policy guidance on zoning should be sought from the 1994 GPOP (Parks Canada, 2001).

Key informants interviewed as part of the present research stated that since 2001, there have been several attempts to review the zoning system. At least two internal reports (Sookocheff, 2003 & Hodgins, 2005) have been written that specifically examine issues and options around zoning. The intent of the discussion paper by Sookocheff (2003) was to facilitate discussion on adjustments to the zoning system, and it outlined suggested options for revising the zoning system, including: revisiting zone titles, zone descriptions and context, addressing the application of zoning in northern parks, clarifying the application of the Environmentally Sensitive Site designation, editing the content of the zoning system, and reintegrating the zoning system in the planning process (Sookocheff, 2003).

The 2005 internal report by Hodgins was written “to provide guidance on the application of the zoning system in light of the evolving legislation, policies and realities facing the creation and management of national parks”. The primary goal was “to ensure a clear understanding of the role of the zoning system, its application, and the constraints imposed on it” (Hodgins, 2005). This document was only mentioned by one

key informant in the present research. It was never officially adopted into policy or as part of the zoning system.

2.6.5 2008 Parks Canada Guide to Management Planning

The Parks Canada Guide to Management Planning (2001) was revised and re-issued in 2008. Designed to clarify accountabilities and establish a nationally consistent approach, the 2008 Guide provides direction for developing and reviewing planning documents, and sets out content requirements for park management plans (Parks Canada, 2008). This revision was designed to reflect “an integrated approach to management planning that promotes the interdependency and synergies among all three mandate elements” (Parks Canada, 2008). The 2008 Parks Canada Guide to Management Planning recognizes that the concepts of ecosystem based management are important and states that “[a]ctivities such as research, monitoring, adaptive management and incorporation of traditional knowledge help in gaining a better understanding of the state of the natural and cultural resources. These activities result in informed decision-making for prioritizing actions to improve on the ecological integrity of national parks” (Parks Canada, 2008).

This most recent version of the guide contains a short section on zoning outlining the zones using the same descriptions as the 2001 Guide to Management Planning and the 1994 GPOP documents. The 2008 Guide states that any change to zoning constitutes a major amendment to the park management plan and therefore requires a strategic environmental assessment (SEA), public notice and public participation (Parks

Canada, 2008). The SEA must be conducted in accordance with The Cabinet Directive on the Environmental Assessment of Policy, Plan and Program Proposals, 2004. The purpose of a SEA is to incorporate environmental considerations into the development of public policies, plans, and program proposals to support environmentally sound decision-making. The SEA of a management plan is carried out through the development or review of the plan as an integrated, iterative process and is meant to scrutinize the management plan in order to enhance positive effects of the plan and avoid or reduce potential negative effects the plan may create (Parks Canada, 2010).

2.6.6 State of the Parks Report

A relatively new addition to the Parks Canada planning framework is the State of the Parks Reporting. State of the Park Reports (SOPR) resulted from a recommendation from the Panel on Ecological Integrity (2000) and has been expanded to include the other components of Parks Canada's mandate (Parks Canada, 1998). The SOPR now fits within the legislated five year cycle of park management plans, and the key issues identified in the SOPR are used to inform the scoping document and subsequently, the management plan review process (Parks Canada, 1998). These reports are fact-based documents that describe the current conditions of a protected area using an indicator framework. The report assesses the park's performance in meeting established objectives for the indicators associated with the Parks Canada mandate, and the findings in these reports are important for evaluating the effectiveness of management actions. Often, they can point to deficiencies in current management approaches that may be addressed in the next planning cycle (Parks Canada, 2008).

Furthermore, the SOPRs are public documents that provide an objective evaluation, in concise format and non-technical language.

Park monitoring programs in each of the areas of the mandate (protection, education and visitor experience) provide scientific information for the evaluation of the state of the park, management actions, and ensuring that the actions are effective in achieving desired results (Parks Canada, 1998). Monitoring is completed on an ongoing basis through the national parks, and includes the process of collecting and analyzing data on a suite of indicators and comparing and reporting the results to management targets (Parks Canada 1998). These monitoring assessments are initiated prior to the production of the SOPR, and provide necessary information and context for both the internal analysis and the final report.

2.6.7 Policy Evolution Summary

Brown-John (2006) identified six major historic policy imperatives driving development and maintenance of Canada's national parks. These included: 1) the policy evolution from tourism and resources to habitat protection and ecological integrity; 2) the acknowledgement and engagement of Canada's Aboriginal peoples; 3) the (recent) assertion of national sovereignty especially in the Arctic; 4) the imperative of statutory requirements and, in particular, those which have emerged since 1999 when Parks Canada became an Agency; 5) the persistence of inter-governmental relations as a dimension of national park creation and operation; and 6) echoes from the "New Public Management" approach to public administration. Within this framework, not

all policy imperatives identified have been active simultaneously, and the architecture of the policy imperatives have changed over time. Among the policy imperatives which have driven national parks policy for the last 100 years, a dramatic shift has marked a changed focus from tourism and resources to biodiversity acknowledgement, habitat restoration and preservation and, ultimately, ecological integrity (Brown-John 2006).

The management paradigm of Parks Canada has seen significant shifts over the last century, and these changes are reflected in the policies summarized in this chapter with respect to management planning and zoning. Over the last three decades, management policies have evolved to include EBM and adaptive management principles, while still maintaining historically used policies such as zoning. This has resulted in the current mix of policies being used by Parks Canada. While Parks Canada has undergone major changes in organizational philosophy, bureaucratic structure, legislation and policy in recent years, the zoning framework has essentially remained the same since the 1970s.

2.7 Quantitative decision support tools for zoning

An additional research objective of this study is to explore the use of support tools in the zoning process. Specifically, there is a growing interest in the use of quantitative decision support tools in conservation planning (Ferrier & Wintle, 2009; Cowling et al., 2003). According to recent studies, quantitative decision support tools can be used to increase the transparency and objectivity in planning processes, such as zoning (Cowling et al., 2003; Geneletti & van Duren, 2008). Parks Canada has been exploring

the use of such tools for determination of proposed national parks sites, in addition to spatial analysis for the establishment of national marine conservation areas; however, this has not been used in the terrestrial context.

Zoning is a decision-making exercise that inherently requires the evaluation of multiple land attributes according to multiple objectives (Geneletti & van Duren, 2008). Park planners and managers analyze and assess data on all aspects of the protected area, from ecological data to cultural heritage information and visitor surveys in order to create a park-specific zoning plan. Modern spatial and non-spatial analysis methods and various software technologies are available , such as spatial conservation optimization, and can be used to assist decision makers and managers in undertaking such a complex task (Geneletti & van Duren, 2008).

2.7.1 Spatial Conservation Optimization

Recent advances in spatial analysis technology have resulted in several computational tools that can greatly inform planning processes in general, and park zoning in particular. Spatial conservation optimization is one such tool that has emerged and has been used in the siting and zoning of protected areas networks. Spatial conservation prioritization is a form of assessment to inform decision-making for environmental planning problems that involve choices about the spatial location of management actions that will be applied across a landscape (Ferrier & Wintle, 2009). This quantitative approach uses explicit mathematical or logical algorithms to generate

priorities from spatial data on values such as habitat types, species distributions, special features, etc. (Ferrier and Wintle, 2009).

2.7.2 MARXAN

Marxan is a decision support tool developed at the University of Queensland, Australia by Ball and Possingham. This program provides spatial decision support to conservation planners by identifying areas for protection that combine a number of ecological, social, and economic objectives (Ball & Possingham, 2000). It is currently applied as a conservation planning tool, supporting the design of reserve networks, in addition to a multitude of other spatial conservation planning problems (Ball et al., 2009). Using Marxan, planners can identify an efficient system of conservation zones that include a suite of biodiversity targets, and can also consider the cost associated with a specific configuration (University of Queensland, 2009).

Marxan with Zones is the most recent version of the software, incorporating the option for considering multiple zones and multiple costs (Ball et al., 2009). Initially developed for marine environments, Marxan was used to identify sites of high biodiversity values for protected area networks. It was a key tool in the rezoning of the Great Barrier Reef Marine Park. Marxan is now used to solve a range of spatial prioritization problems beyond network design (Ball, Possingham & Watts, 2009). More recently, it has been applied to terrestrial conservation planning problems (Ball, Possingham & Watts, 2009). For example, Parks Canada recently used Marxan in

exploring boundary configuration options for a proposed national park reserve in the South Okanagan-Similkameen region of British Columbia (Royle, 2010).

Previous studies have found that using a decision support tool such as Marxan can increase the transparency of the zoning process by identifying priority areas based on scientific data (Geneletti & Van Duren, 2008). This type of information, usually presented in cartographic and digital mapping formats, allows park managers and stakeholders to easily visualize and understand the process and information that leads to the final zoning plan configuration in a clear and transparent way (Geneletti & Van Duren, 2008). Using Marxan scenario outputs allows for the visualization and comparison of various policies or zoning options, and preferences of stakeholders can then be used to incorporate other values into the process. Such an approach could be useful in practice for providing flexible options upon which planners and stakeholders could base their negotiations and decisions for the zoning of national parks (Cowling et al. 2003).

While the benefits of quantitative conservation prioritization methods have been widely promoted, adoption of these methods in "real-world" planning and implementation is still in its infancy (Ferrier & Wintle, 2009). Spatial conservation prioritization brings together a wide variety of information to undertake planning in a quantitative manner, and informs decisions on the basis of scientific data. The overall goal of incorporating conservation optimization as part of the zoning process is to use an approach that, to the extent possible, is scientifically-based and practical for both park managers and stakeholders.

3: METHODOLOGY

This study employed primarily qualitative methods to address the research objectives, including an academic literature review, a review of relevant policies and legislation, and interviews with key informants. Qualitative methods of inquiry were chosen because of the exploratory nature of the research questions and the need for participatory knowledge to answer them (Creswell, 2003). Focusing on the zoning process specific to Parks Canada required expert knowledge from experienced staff as informants, in addition to critical analysis of Parks Canada policies and process outcomes.

3.1 Policy Review

The literature review focused on the relevant legislation and policy that currently guides the management planning and implementation process at Parks Canada. Relevant legislation, policies and reports, such as the *Canada National Parks Act*, the Parks Canada Guiding Principles and Operational Policies, the Parks Canada Guide to Management Planning, individual park management plans, and other internal documents were reviewed. This critical review was important for establishing the baseline of how management planning is conducted within Canada's national parks.

3.2 Key Informant Interviews

I conducted key informant interviews in order to gain first-hand, in depth knowledge of the zoning process currently used in Parks Canada. I selected qualitative research interviews as the primary method of data collection because personal interviews can generate high quality expert data, and add details or clarification to the answers given, as knowledge is produced socially between the interaction of the interviewer and the interviewee (Kvale & Brinkman, 2009). The interviews were designed to provide specific information on the zoning processes in Parks Canada based on the key informant's experiences, as detailed descriptions of zoning processes are not usually published.

I conducted a total of 13 key informant interviews with Parks Canada Agency staff during May and June of 2010. I selected participants based on their experience with management planning processes in general and specifically with zoning in Parks Canada, and from different parks across Canada to provide a national scope.. Most individuals had experience as planners, superintendents, ecologists, or with other technical or management positions within Parks Canada. Three interviews were conducted in person, and the remainder of interviews were conducted via telephone due to the remote and dispersed location of interviewees. Informants responded to all questions, and most interviews lasted 60 to 90 minutes. Interviews were recorded using a digital recording device with the consent of the participants, and later transcribed.

3.2.1 Snowball sampling

A snowball sampling technique was used to identify key informants for this study. Snowball sampling is a method for identifying and selecting key informants from a known network and is typically used when researchers are interested in a specific network of people or organizations (Neuman, 2000). In this study, the target network was Parks Canada staff with experience in zoning.

In general, snowball sampling is a multi-stage process where the researcher begins with a few key people within a network, and eventually increases the sample size based on recommendations by the initial interviewees (Neuman, 2000). For this research, individuals were sent an e-mail containing information about the proposed research and asked if they would be willing to participate in an interview. At the end of each interview, participants were asked for recommendations of potential additional informants for this study. This technique effectively allowed me to sample from key informants within a network of experienced national park planners and managers across Canada.

3.2.2 Semi structured interviews

Semi-structured interviews were considered most appropriate for this research in order to keep the format flexible and open while ensuring that key themes and ideas were addressed (Wengraf, 2001; Babbie & Benaquisto, 2002). Questions were prepared in advance and were designed to be sufficiently flexible, such that not all subsequent questions were planned in advance or asked in a particular order, but could

be improvised or expanded on to include more information where possible (Wengraf, 2001). In some instances, probing questions were added to draw out more complete information on certain subjects regarding zoning processes. For example, probing questions were used to ask interviewees to elaborate on what they had already answered in response to a previous given question (Berg, 2001).

The interviews were designed to focus on several themes central to the primary research questions regarding park zoning in Parks Canada. The use of semi-structure interviews was intended to elicit the views, experiences and opinions of the key informants in regards to zoning and key issues current in the zoning process (Wengraf, 2001). The experts were asked questions related to their planning experiences, or anticipated experiences when they were involved in a planning process that was not completed. Questions related to both the process and the outcome of zoning efforts, and the information used to inform the current Parks Canada zoning process.

3.2.3 Interview protocol

To collect primary data, I developed an extensive active interview protocol (see Appendix 1), which addressed the key research questions. The interview protocol was used as a flexible guide to facilitate open conversation between myself and key informants (Kvale & Brinkman, 2009). This protocol included addressing all key interview questions, probes to follow up on key questions where necessary, and space for recording comments or notes (Wengraf, 2001).

3.3 Analysis

All interviews were digitally recorded and then later transcribed verbatim by the researcher. Some notes were also taken during the interviews. To facilitate the transcription process, I used Express Scribe transcription playback software, which allowed me to playback the interview recordings at slow speeds without dramatic distortion. Each key informant (KI) was assigned a number (KI #1 – KI #13) to keep the participants anonymous.

I coded the interview transcripts using an open coding process (Babbie, 2001). Using my transcribed interview data, I examined and compared quotes obtained from my informants, and categorized these quotes according to the relevant themes and topics I generated. As I analyzed each theme, I generated more focused coding using further themes. This enabled me to categorize more data for analysis, until a point of “saturation” of the material by the coding process was reached and I was unable to find new insights or interpretations with further analysis (Kvale & Brinkman, 2009).

Multiple reviews of each interview were conducted, and themes were generated by the most common topics, issues and ideas raised by the participants’ responses to my questions. Once I generated this initial list of themes for open coding, I reviewed each interview iteratively and made notes in the margins of the transcript, assigning portions or quotes to a theme, or making general observations. I continued with this process until I felt each transcription had been thoroughly reviewed and coded for all possible key themes. Using this iterative, comparative method, I was able to derive a long list of key themes on zoning, which I used to further focus my analysis, and

systematically coded the transcripts. This process added clarity and validity to my analysis, while inductively generating further results for study (Babbie, 2001).

3.4 Ethical Considerations

To ensure the ethical treatment of the participants in this study, all communication material was submitted to and approved by the Office of Research Ethics at Simon Fraser University. Participants were not interviewed until approval was obtained. Involvement by all individuals was voluntary and participants were given the opportunity to withdraw from the interview at any time. Key informants also had the opportunity to review the transcriptions of their interviews and make corrections if they desired. The anonymity of key informants was maintained throughout the study, and each interviewee was identified only by a unique number in order to maintain anonymity.

3.5 Limitations of Research

Given the scope, time and resource constraints of this project, several limitations were evident:

- A total of 30 requests for informants were made via email and follow up emails., however, only 13 interviews were conducted due to time constraints, as well as response rates to requests for interviews. Although efforts were made to represent different regions of Canada, and a variety of Agency staff, this relatively small sample of the staff of Parks Canada may not be fully representative of parks management.

- I did not get representation from eastern Canada, as I did not receive responses to my requests sent to staff in Nova Scotia and Newfoundland. It is likely that Parks Canada staff from this region may have different, site-specific experiences, and therefore additional opinions and anecdotes that were not possible in this study might be relevant for these regions.
- Only three interviews were conducted in person, while the remaining were conducted on the phone due to geographic location. Interviewing via telephone can limit the personal interaction and make it more difficult to respond to interviewee reactions or other social cues. Social cues, such as voice, intonation, and body language of the interviewee can give the researcher a lot of extra information that can be added to the verbal answer of the interviewee on a question (Kvale & Brinkman, 2009). I do not feel that this would have significant implications for the findings of this project, as the key informants in this study were not the subject, but rather experts providing opinions and experiences on a subject. Under these conditions, social cues become less important (Kvale & Brinkman, 2009). Additionally, all key informants are professionals working in various locations nationally, and are familiar with relying on telecommunications regularly to conduct their work.
- Qualitative research based on interviews always is prone to the chance of misinterpretation of both questions and responses on the part of key informants and the researcher. Due to time limitations, I did not have a chance to conduct follow-up interviews for further clarifications or to ask additional questions. I attempted to minimize this limitation by allowing participants to review their transcripts if they so desired, and by asking clarifying probe questions during the interview to avoid misunderstandings.
- Key informants had various levels of experience with the zoning process. Many had completed management plan reviews, while some had participated in just one process, and a few had not completed a full management planning

process. In some cases, those with less experience may not have been able to fully answer some of the questions or provide insights on certain aspects of the zoning process. It is not possible to know if I covered a sufficient range of experience of Parks Canada staff.

- When interviewing key informants from a single government agency, it is impossible to know how much of the information collected is a restatement of official Parks Canada positions, and how much or which type of information amounts to unique individual insight. Parks Canada staff may have felt it necessary to give standard answers established by Parks Canada Agency rather than their opinion. I attempted to overcome this limitation by specifically asking for their personal opinion on some questions. In many cases, key informants specified whether they were referring to a specific policy or rather stating their personal insights on a given question.

4: FINDINGS

The results of this study are derived from the responses and discussions generated during the 13 semi-structured interviews. All key informants are current employees of the Parks Canada Agency in a planning or management position, and represented various levels of experience with the zoning process and its implementation. I specifically asked questions regarding the goals of zoning, how zoning relates to the Parks Canada mandate, the process and applications of zoning, the tools and information used during the zoning process, the potential for using spatial conservation optimization, the strengths and weaknesses of zoning, and how zoning could be improved. Given the semi-structured nature of the interviews, key informants often raised additional issues and ideas related to park zoning not directly addressed in the questions.

Quotations from interview transcripts within this section give insights to the types of responses that I received. I have selected the quotations that I feel best express the themes and discussions that occurred during the interviews

4.1 Goals of Park Zoning

All key informants articulated similar characteristics when asked the questions: *In your opinion what are the main goals of the zoning process? What does it attempt to achieve?*

One respondent succinctly stated: “Zoning is important for gathering, analyzing, information and developing ways of ensuring that you achieve different goals: protecting and ensuring that people can visit this place and love it and appreciate it and support it” (KI #1). Other common responses to this question referred to zoning as a tool for the management of the park, and most respondents discussed both the protection of natural and cultural resources and facilitating visitor management as important goals of zoning.

4.1.1 Zoning as a tool

Many key informants referred to zoning as a “tool” for park management, stating that it was used for both protection of natural and cultural resources, and for visitor management. Five of the 13 key informants explicitly referred to zoning as a tool for the management of parks. One respondent summarized the purpose of zoning as:

...a management tool for parks staff and Parks Canada. It's a tool we have for decision making and also managing the park. It's also a tool for protection the park and its habitats, resources, species at risk and so on. But it's also a tool for facilitating, providing access and also means for people to experience and visit and explore and discover the park. (KI #1)

Many of the key informants viewed zoning as a management tool used in decision making, strategic planning, and park operations, and mainly referred to examples of zoning at the site level. One respondent stated that zoning “gives managers a tool for better human use decisions, human use management in the park and ensuring protection of wilderness versus higher visitor use areas” (KI #5). “Human use management” is a term specifically defined by Parks Canada as “the direction and

guidance of people, their numbers, their behaviour, permissible activities and the necessary infrastructure”, with the main objective of allowing people to enjoy a national park without causing damage to its natural and cultural values (Parks Canada, 2006). According to KI #5, zoning was a tool primarily used for managing people in parks. The importance of facilitating and carefully managing human use in parks was strongly reflected in many of the discussions about the goals and purpose of zoning.

4.1.2 Protection of natural and cultural resources

The protection of natural and cultural resources was a predominant and recurring theme in the interviews. Eight of the 13 key informants specifically referred to protection as a primary goal of zoning. Five key informants also discussed the protection of ecological and cultural values, while still facilitating visitor use:

I think ultimately it's protection, so the ecological and cultural values and resources can continue to exist. While protection may be of primary importance, it's also important to facilitate visitor opportunities. If there's conflict, I guess one of the goals is to reduce or eliminate that conflict. To add to that too, I mean ultimately if you're looking for protection, but one of the other goals of the zoning process is to have a comprehensive discussion about how the park will be managed, and to build that support for the management of the park and why decisions are made. (KI #10)

Respondents made particular references to the protection of ecosystems, wilderness, sensitive areas, and species at risk. The protection of ecological integrity is already given priority in planning and management within the *Canada National Parks Act* (S. 8(2)), and this legal significance was reflected in many of the responses. Many informants also spoke to protection of cultural resources or cultural values in general, in addition to the importance of facilitating high quality visitor experiences within the parks.

4.1.3 Providing visitor experience

Most responses to the questions about zoning goals included references to both resource protection and the provision of visitor experiences and facilities, and zoning was regarded as a tool for both of these aspects of protected areas planning and management. One interviewee explicitly stated that the purpose of zoning “is to help manage the landscape to ensure visitor experiences are facilitated in certain areas, where other areas are protected for more ecological or culturally sensitive reasons, that’s the purpose of zoning” (KI #7). Almost all (10 of 13) key informants referred to “visitors” or “human use activities”, recognizing that facilitating visitor use is a primary goal of zoning.. “The intent of zoning is to ensure appropriate use and maybe even facilitate use to a certain extent, while at the same time protecting the resources”(KI #6). Thus, informants described zoning as playing an important part in visitor planning and management to ensure that high-quality visitor experiences can occur while minimizing negative impacts to the natural and cultural resources the parks are established to protect.

4.1.4 Does zoning achieve its goals?

Although the goals of park zoning were generally agreed upon by all 13 key informants, the question of whether or not zoning actually achieves these goals was not. When asked the question *Do you think that the current Parks Canada zoning systems achieves its goals?*, eight key informants responded with a clear yes, while three key informants stated no, and the remaining two respondents felt they could not adequately comment due to a lack of experience in completing a zoning process.

The eight key informants who agreed that current zoning practice achieved its goals meant the goals that interviewees themselves articulated. Several of these respondents also voiced concerns that there was “always room for improvement”, or that there were weaknesses in current zoning which could be addressed. For example:

...if [zoning] was not effective or useful, we would have dumped it. That system and process has survived while others have not survived in terms of processes, concepts and approaches at Parks Canada. Zoning is well, it's strong, and it's got its weaknesses. (KI #1)

Another respondent referred to past improvements that have helped zoning to better achieve park goals:

I think it's working better now than it was - if you had asked me this question like 5 years ago I would have said no, let's get rid of the whole system because people were so uptight about adding things like temporal zoning, or not zoning where appropriate. With some of those changes, I think the system is working far better. We don't seem to have the discussion about zoning like we used to, at one point we were discussing it constantly. (KI #6)

Given the different experiences and perspectives of each key informant, their perceptions of whether the goals of zoning were met varied widely. For example, a respondent from Banff National Park stated that zoning was working for management in that park: “I think so. Certainly based on our experience here in Banff, it's working for us and it seems to be acceptable to a wide range of visitors and the business community” (KI #9). The perceived success of zoning in management of Canada's oldest national park was significant as Banff is recognized as a unique situation within the national parks system due to its history, town site, and high visitation.,.

Conversely, three respondents strongly felt that the Parks Canada zoning system was not achieving the goals it was meant to serve within the management planning process. One key informant implied that zoning was done as a “lip service”, and that it did not always lead to effective management:

In the big picture, no, I don't think it does [achieve its goals]. I think it tries to draw the line around existing activities, and it's sort of what we did and it was more to appease people, it's got to be an effective tool, if it's used at all, effective management should be able to manage the park and take into consideration the purposes of the park. (KI #7)

Some respondents also suggested that zoning does not work toward goals, but rather reflects the current state, or 'status quo', of the park (see section 4.3 for further discussion). This was outlined by KI #3, who explained how zoning perpetuates the current state of the park and its historical use:

... you know what, I'm not so sure it does [meet the goals]. No, no I don't think it does. For a couple of reasons: because.... it seems to reflect status quo, and historical usage rather than looking at the potential possibilities and giving from a planning perspective, looking forward as to acceptable levels of use, acceptable levels of intervention, of management needs, even if it's things like active management processes like if you are doing fire restoration, or invasive species control, things of that nature, you don't get an idea, a sense of where there's more active management needs and whether its active management from the point of EI or active management from the viewpoint of visitor management. (KI #3)

Overall, respondent's perceptions and opinions of how well zoning worked were very specific to each individual's experience and the unique characteristics of each national park. The primary goals or purposes of zoning identified by Parks Canada staff were the protection of ecological and cultural values, and the provision of visitor

experience and facilities. Overall, respondents felt that zoning achieved its purpose in the broad sense; however, many suggested aspects which worked and aspects which did not. It is interesting to note that zoning was widely described as a “tool” within the management planning framework. The literature also describes zoning as a tool, a technique, an exercise, or a process. While these terms are often used interchangeably, they have differing connotations regarding the significance of zoning and how it is undertaken.

4.2 Zoning and the Parks Canada Mandate

One of the main goals of this research is to explore the relationship between zoning and the Parks Canada mandate. The three main components of the mandate (protection, visitor experience, and public education; see Figure 1) were often articulated by key informants as the goals of zoning, demonstrating that perceptually, zoning was closely tied to the mandate. I directly asked the question: *How does Zoning facilitate or enable the main components of the mandate: a) Ecological Integrity; b) Visitor Experience and Education; and c) Cultural resource protection?* The intention of this question was to ask respondents to demonstrate if, and/ or how zoning was perceived by them as directly linked to the overall mandate of the Parks Canada Agency.

Responses to this question varied, with most key informants (8 of 13) agreeing that zoning helped to facilitate the mandate to some extent. Some respondents felt that zoning leaned itself more to the protection of ecological integrity, while others focused on

its relevance to facilitating visitor experience. KI #1 deemed the relationship between zoning and the Parks Canada mandate as effective, especially regarding the protection of ecological integrity, while making links to visitor experience and education:

I think zoning is most effective, provides the greatest benefits for EI, and provides also a good sense of benefit to Visitor services management. Education is not as evident. Education, again, I was talking about one element of the mandate supporting the other, but protecting the resources that are really neat and sensitive and fragile, well this creates a way for telling the story of these resources, that's education. (KI #1)

Another planner discussed the emphasis that Zone 1 (Special Preservation), Zone 2 (Wilderness), and Zone 3 (Natural Environment) have on protection, while still allowing for opportunities to provide visitor activities:

[Zones 1, 2 and 3] have a strong aspect of protecting ecological integrity and cultural resources. All three [have] opportunities for visitor experience that are possible. I guess it's a tool to help us determine a focus some of the discussion around what activities are appropriate in the various parts of the park. But in the end there [are] opportunities for all aspects of the mandate in each zone, just in a different way. (KI #4)

One respondent explained how the designation (and often declaration under the *National Parks Act*) of Zone 2 (Wilderness) contributed to the protection of ecological integrity, while Zone 4 (Outdoor Recreation) and Zone 5 (Park Services) allowed for experiences tailored to different visitor market segments:

Zone 2 [Wilderness] is supposed to be quite large, large enough to maintain ecological processes, and so that's an important part of our mandate, Ecological Integrity. So I see Zone 2 equates quite well with ecological integrity part of our mandate, and then the Zone 5s and the Zone 4s are areas where you're getting the other kinds of experiences for certain market segments that aren't interested in experiencing wilderness, they're still getting exposure to the park and enjoyment, that's where you can have more of your education programs, school

buses can access areas, bring groups of kids in and that sort of thing. (KI #5)

Additionally, a couple of respondents pointed to the integrated nature of the Parks Canada mandate, stating that zoning was a component of the overall implementation of the mandate in a holistic manner: “I see zoning as just one of those things that we do that’s meant to be integrated and meant to be holistic. I don’t sort of see it facilitating the components individually; I see it sort of facilitating all of those components in an equal way” (KI #11). The GPOP outlines zoning as an integrated approach of classifying ecosystems according to ecological and cultural characteristics, goals for protection and suitability for visitor use (Parks Canada, 2004), and this idea was evident in many of the interview responses.

The protection of ecological integrity is legislated under the *Canada National Parks Act, 2000* as “the first priority when considering all aspects of the management of parks” (S. 8(2)); and this priority was reflected in the responses of many key informants. More recently, Parks Canada policy and operations have emphasized the importance of the visitor experience and education components of their mandate (see Parks Canada, 2008), and this emphasis was also strongly reflected in the semi-structured interviews. Although respondents were able to clearly articulate a theoretical link between zoning and the components of the Parks Canada mandate (ie. the strategic level), very few gave concrete examples to illustrate how this was manifested at the site level.

4.3 The Status Quo Problem

A recurring theme that arose from the interviews of key informants was the reflective or 'status quo' nature of zoning in Parks Canada. This refers to the idea that park zoning does not set objectives towards a desired future state or vision of a site or ecosystem, but rather aims to preserve the current state or status quo conditions. Although no questions were asked directly about this theme, the idea of maintain the status quo was raised or implied in 5 of the 13 interviews. One respondent explicitly stated that zoning did not work towards future goals, but rather embedded the conditions in the park that exist at the time of zoning: "I think that's what I am saying about [zoning]..... it's not a forward looking piece, it is more sort of entrenching with what has, with minor modifications, as things get put into place. But it's not thinking in terms of the longer park objectives" (KI #3). Similarly, another respondent expressed that zoning was more reflective of existing circumstances rather than prescribing how an area will be managed to reach a desired state:

I think it reflects it [the mandate] more than it prescribes it....it reflects the nature of the activities more than prescribes the information. It's designed as a prescription tool and the reality is it is a reflection tool for us. It's not prescribing where activities are going to occur but it's reflecting where activities do occur. (KI #7)

The problems raised by maintaining the status quo outcome in a zoning plan is that it can perpetuate the errors of the past, and can result in the entrenchment of non-conforming uses or activities that do not contribute to the mandate of Parks Canada. In order for zoning to contribute effectively to the management planning process, the

designation of zones should be a reflection of the way the park should be in the future, not how it is presently managed (McLean, 1994).

The reality of how park zoning is derived, decided, and implemented often leads to this reflective nature of the zoning map, which illustrates what already occurs in the park rather than what may occur in the future. One respondent pointed out that park zoning was not implemented in Canada's national parks until nearly a century after the first park was established:

Zoning is a tool that came into effect in the 1970s...but most parks are older than that so they'd developed their infrastructure through the heydays of the 1930s and 1950s and their consideration at that time was in the era of bringing people into the parks for recreational purposes. The infrastructure got all developed and then in the 1970s, 20 or 30 years after the development has occurred they decide they should zone national parks to say where the development should go, which has already taken place. It's a bit like shutting the barn door after the horses got out. So in an old park ... we know what our human use nodes are and we've had to manage the ecological integrity around the fact that [human uses are] not going anywhere. That's not the intent of zoning, to shut down things [human uses]. So that's why it becomes reflective. (KI #7)

Because zoning had to be applied in many well-established and developed parks, the resulting zoning represented the current uses of the park with little consideration for ecological integrity. Despite significant roles of current and historic usage of a park in the development and implementation of zoning, it is actually intended to prescribe *future* desired resource conditions, visitor activities and facilities (Hodgins, 2005). A 1994 discussion paper recommended that zoning should reflect the desired future state of the park, and should include a forward looking vision for each zone (McLean, 1994). As such, if a zoning plan focuses on the historical or current conditions

of the park, without consideration of future goals, it results in mistakes of the past being perpetuated and a lost opportunity to meet the mandate of Parks Canada fully: “it is a flaw in the zoning system, it’s reflective, it’s not prescriptive” (KI #7).

4.4 The Zoning Process and Application

Several aspects of the zoning process and how zoning is applied in various parks across the country were discussed with participants. The four main themes addressed were: differences in application between northern and southern parks; a lack of knowledge in how zoning for a park was originally established; the zoning criteria; and the lack of evaluation of zoning.

4.4.1 Northern Versus Southern Parks

A consistent theme throughout many interviews was the inherent differences and challenges between zoning in northern parks versus southern parks. For the sake of simplicity, it is assumed here that “northern parks” are those national parks located above 60 degrees latitude north. Eight of the 13 interviewees discussed the issue of applying zoning in the north versus how it was applied in the south. The concepts of zoning and wilderness, how zoning is applied, and the permitted activities prescribed by zoning, all were considered to pose challenges in the northern parks. **Concepts of zoning and wilderness**

A major challenge surrounding zoning in the north was the public’s concept of zoning. Aboriginal people, who represent the majority of residents in the communities within or surrounding northern parks, do not necessarily share the same understanding of the concepts of wilderness and boundaries which are the theoretical basis of Parks Canada’s zoning framework. One respondent stated that “If you talk to folks in the

north, I heard through them that the concept of zoning is an unknown concept for people in the north. We have this western approach of drawing lines on a map. For us down south, it's a normal thing" (KI #1). Another planner with working experience in northern parks and aboriginal communities shared these sentiments:

When we are working with our First Nation partners "Wilderness" is not a concept that they use and it's not a strong social construct in Aboriginal communities, and also they don't like the connotation that it gives people that it is a place with no other humans, because what they are trying to educate people in is the idea well in fact there's a bunch of wilderness and in fact people have lived here for thousands of years, and people still use these areas and you might be 3 days out on a trail but you might actually see somebody hunting there and maybe that doesn't compute with your current thinking of what wilderness means, but it's my traditional territory, part of the area that I use. So there are some issues around the words. (KI #2)

Similarly, another informant explained that often the terms used in zoning such as "Wilderness" and "Natural Environment" can appear to be awkward when presented to Aboriginal communities:

There is experience within Parks Canada using the current zoning system in two national parks in Nunavut, and it's useful. The only thing is that it's a little bit awkward in a way because in some ways we're trying to fit things into that system that don't really naturally easily fit. So Zone 1 areas, are areas that are very special, have very special features, ecologically or culturally, that's useful. Zone 2 is useful, but the names of those zones is a little bit awkward in Nunavut. (KI #4)

Motorized use and harvesting

Park access and permitted activities, especially the use of motorized vehicles such as snowmobiles, pose challenges for the implementation of zoning in northern parks. All of the northern parks are remote and most are inaccessible by road, therefore

necessitating the use of (non-car) motorized vehicles. Motorized access is a key difference in the application of the zoning policy in the north:

Another weakness I would say is in the north because motorized access in the north is different than in the south, it is more permissible, and because motorized access in many ways is really the only possible way of getting into some of these parks that there are many qualities of a zone 2 that you might want to have in a northern park but if the snow machines really is the most legitimate way to get there, or motorboating or whatever, the zoning policy, as policy, somewhere it states in policy that non-motorized means of access is preferred and that doesn't always quite fit in the north. (KI #2)

Zoning limiting motorized access can be a contentious issue for several reasons. For example, beneficiaries of park establishment agreements are often permitted to use motorized means of travel to access parks for traditional activities, while other members of the public are not. There are often proposals for economic development activities which cannot be permitted and are restricted by zoning (e.g. snowmobile touring), while beneficiaries of impact and benefit agreements are allowed to do the same thing as part of traditional activities. Tension and conflict between community members and towards park management may arise as a result of the different rules for different groups (Sookocheff, 2003). One respondent explained that this had been an ongoing issue with zoning in the north:

Certainly motor vehicle access is something we try to restrict through zoning, and that has actually been one of the problems in the north, we've had issues with skidoos... it starts to roll into the rights that people have under the Land Claim, and people have the right to hunt and trap and fish and they can use a ski-doo as they see fit and the zoning doesn't apply to them. But if you are running a commercial operation then it can have an impact, so if everything is Zone 2 Wilderness, it makes it difficult to then authorize some kind of commercial activity that requires motor vehicle access. We've been grappling with this for a long time in Parks Canada. (KI #6)

Additionally, there are significant differences in the permitted uses of northern parks, given the obligations to allow aboriginal traditional uses, such as harvesting: “Cultural harvesting is not technically a zoning issue because we are not managing that through zoning, but we need to listen to what the communities are telling us about harvesting and cultural activities and how zoning might affect that.” (KI #4)

These comments illustrated that the zoning concepts commonly applied to parks in the south of Canada must be applied with sensitivity to the aboriginal cultures which are more prominent in the north. National Parks in the north were often established as part of detailed land claim settlements, and thus planning for these parks is inherently different than the well-established parks in the south:

Where it doesn't work, like in a northern environment, things are a lot more dynamic. Communities, often little Inuit or Inuvialuit communities of a few hundred people, the park has just been established in the last 10 years perhaps. They don't know what's possible, they don't know what's possible within the park, they don't know what Parks Canada does, they don't know much about the tools and we shouldn't foreclose on opportunities down the road. So if we don't need zoning, if that helps build trust, well then don't zone. (KI #6)

Furthermore, applying the current zoning policies to northern parks does not often address 'northern realities' related to park establishment agreements, visitor access, and economic development opportunities. Specifically, the 'no motorized accessed' criterion of Zones I and II present a challenge for many of the northern parks

(Sookocheff, 2003). One informant suggested this discrepancy is a flaw in the system that must be addressed:

I think it needs to be updated in terms of..., I don't think it's well tailored for the new parks that we are establishing in the north. I think it was a very good tool for the southern park, it did what it had to do, I am not sure it would be as sufficient for northern parks. It's almost as if you would need two different zoning systems. One for the beneficiaries, the people, the locals that use the park, and one for the visitors. So if that's the reality then your system is not working. (KI #12)

4.4.2 Declaration of Wilderness Areas

The declaration of wilderness areas under the National Parks Act presented similar concerns in the north. The wilderness declaration is used by Parks Canada to designate areas by regulation to further protect them, and is usually consistent with Zone II areas. The Wilderness Area declaration has had limited use in the north so far, as many aboriginal peoples and surrounding park communities have been hesitant to support the regulation of areas because they perceive it as making it much more difficult to propose economic development activities or to possibly change the use of the area in the future:

Wilderness declaration and a lot of discussions around it especially in the north with First Nation co-operative managers does come down to potential economic opportunities for the Aboriginal peoples. So if you're wanting economic opportunities, some of them might involve snowmobile trips to the north, or boat tours might be run by a First Nation, and so you have to ensure that the ecology of the area is not damaged and you have to concern yourself with how you might impact existing visitors by introducing a new activity. But it does also mean that several of the Aboriginal peoples in the north are a bit leery of the wilderness declaration zoning or layering being put on Zone 2 because it is so long term. And they are nervous that it may then impact their potential economic development activities in the future (KI #2).

4.4.3 Institutional Memory

A major challenge in the application of zoning which planners often encounter has been a lack of records or information about how zoning was originally established in a particular park. The loss of “institutional memory” frequently becomes an issue when existing zoning is reviewed during a management plan review process. When the process, criteria, and information or values on which the original zoning plan was based were not recorded or were lost, it becomes very difficult for current park planners and managers to understand and justify the reasons for some zoning designations. Furthermore, this adds difficulty in determining if designations are meeting their purpose or not, or aligning with Parks Canada’s mandate. One informant who is currently working on zoning for a park plan explained how the lack of knowledge of the prior zoning process impacted their current management planning exercise:

We didn’t have the corporate history still in the park like we did with [another park] to really know who was all involved in developing these initial descriptions and maps, so we found that we couldn’t go back to learn more about how that came to be, which was a bit of a stumbling block. So at this point I can’t really tell you anything about how those values or processes were developed. (KI #11)

The loss of historical knowledge or institutional memory which was used to establish the initial zoning scheme in older parks can lead to a situation where the original zoning scheme is maintained with no apparent justification (ie. the status quo problem). For example: “In the 1970s they used to do the planning in the headquarters, and I don’t know who used to do that, and most of them are retired today, and I guess they’ve just went on with the same zoning from one plan to the other, and nobody ever really

questioned them” (KI #12). Having the background and rationale used for the past zoning schemes would allow planners and park managers to understand what natural and cultural values were used in the zoning decision making process, why decisions were made, and determine how zoning has been functioning:

[It’s something that another] planner and I have been dealing with National Historic Sites: having a clear record of how decisions were made in regards to zoning that reflects on the [park]. So having a record of why certain decisions were made, to put that in there is very useful and is not always existent. And we’re dealing with a Historic Site where the text was created but doesn’t seem to be based on facts, and now we’re doing a fact hunt. And that would be a useful product that when you change zoning or you create zoning clearly articulate how and why decisions were made. ...both our parks are from the 1970s, so that cohort of people is retired or retiring right now. (KI #10)

4.4.4 Zone Criteria

The question *do you think the criteria for designating zones are effective? Why or why not?* resulted in a wide variety of answers from key informants. Parks Canada staff were divided on how effective the zones presently are, given that these zones are currently defined by a small set of criteria which have remained unchanged since the 1970s. Some felt that the criteria were too vague and subjective, while others valued the flexibility afforded by the current system. One interviewee pointed out that zoning was initiated in part to enable visitor access into parks:

...frankly the zoning definitions haven’t changed much from the 1970s, and I think that essentially it came from the idea of enabling people to get into the parks particularly by motorized access, and I think that that kind of is my impression of why the classification hinged so much on accessibility and not much else. (KI #3)

Four of the 13 respondents felt that the zoning criteria were vague or unclear. One informant felt that the differences between the zones was fairly minimal and that applying the policy was subjective:

It's subjective. There's very little to differentiate the zone, even though there's a vast degree, the difference between Zone 2, 3 and 4 is almost inconsequential. One is supposed to be higher, you have shades of grey where you have Zone 1 is supposed to be more protected with less people and Zone 5 is supposed to be less protected with more people. (KI #7)

Specifically, the motorized access criterion was highlighted as the main difference between zones, and used for determining which zone to select:

Well that [the criterion] I think is the fuzziest, I think when it was done it was probably okay because it was very simple, it was probably not as many activities or different uses in the park, and people probably used the parks differently than we are using them today, for different activities, so they are not sufficient. Just to say motorized versus, well the way it's set up now, it's either motorized or not, so it's a Zone 2 or a Zone 3. So it's not sufficient, you cannot base your Zones just on one criteria like that. (KI #12)

Despite documents outlining the policies on zoning, practical and relevant guidance on zoning application is currently limited. The 1994 GPOP document covers the application of zoning in section 2.2, and outlines the criteria for each zone in only a few sentences. The most recent (2008) edition of the Guide to Management Planning does not further elaborate on zone criteria and refers back to the 1994 document. One respondent pointed to the similarity in wording between zones, indicating that clarification and objectivity is needed for decision making in applying zones:

I can't remember if it's Natural Environment and Outdoor Recreation, they say the exactly the same thing. So how useful is that? So the actual

criteria for what falls into what [zone] is the biggest issue in my mind. That's where we need improvement . and the criteria need to start with the sensitivity of the thing from an ecological perspective, or a resource perspective. And I do believe that it needs to also include a visitor opportunity aspect but right now this system doesn't do that well. (KI #8)

By comparison, other key informants felt that the zone criteria were clear, and that the flexibility was important in enabling planners and managers to make decisions for situations unique to their park. Two planners highlighted the importance of this flexibility within the zoning system:

For me personally it seemed really clear cut, it's also really flexible....there's no reason that you can't apply temporal zoning. And I love the fact that we have some guidelines but you can make it adapt to your park and I think that when we have that flexibility, it's great. To be able to make something work for your setting and there's nothing that restricts us from doing that. (KI #10)

[The criteria] could probably be more finely defined, but it's defined at a very strategic level, this is one of the challenges that any national policy, whether its Parks or DND faces, is that if you get down to a really micro level of what should be in Zone 1 special preservation, what should be in Zone 2 wilderness, there is always going to be a park somewhere that it doesn't quite fit and it doesn't quite work. So it's got to be a broad, strategic level. Based upon my professional experience so far I think it works. There is no one solution that is going to be perfect. There needs to be a little bit of flexibility, and a fairly broad strategic level in terms of defining it. (KI #13)

Interviews on zoning criteria essentially demonstrated that Parks Canada staff are divided on how effective the zones are, how detailed the criteria for each zone should be, and whether the notion of flexibility in zoning was important. Cases were made both in support of more detailed, ecological based criteria, and for keeping the broad, more flexible framework that currently guides the zoning process.

4.4.5 No Evaluation

When asked the question: *How do you evaluate if zoning is successful or effective?*, many key informants struggled to submit an answer. A few (4 of 13) respondents indicated they felt that no formal method existed to evaluate whether zoning was successful or effective. Most responses to this question implied that evaluation was a component of the zoning system that has been overlooked and should be considered: “Well maybe you have a point there that needs consideration. There is no method out there or criteria; that’s an interesting question, maybe you have a good point” (KI #1). Another respondent stated that other processes, such as State of the Park reports and visitor feedback, were the main mechanisms that could be used to assess zoning in the absence of a formal review process:

Well it’s interesting there’s nothing to evaluate the effectiveness of zoning, I am not sure I know of anyone or any process that’s ever been used to evaluate that, other than public opinion perhaps, like with the State of the Park Report, there’s these things called indicators which is basically things along the lines of area forest, area of grassland, area of wetland, and things of that nature. (KI #3)

Similarly, another key informant stated nearly the same opinion:

Well at this stage we don’t have very sophisticated or elegant tools for assessing things, a lot of it comes down to compiling information that we’ve got, it might be based on visitation, surveys of animals or monitoring data of a stream say, depends on what the situation is. (KI #5)

Thoughts on how to evaluate or assess zoning varied from using visitor surveys to park management opinions to ecological monitoring. One planner who conducted most of their work in a busy, high visitation park felt that zoning success was best

assessed by human compliance and the facilitation of visitor and management activities:

The simplest test for us is whether or not we are challenged on it, whether people agree with it and abide by it, or whether they keep asking us to change it or keep proposing activities or facilities which are incompatible. That is probably the best test of it. Is it working, are people accepting it or not. If people are not happy with things they certainly will challenge you. (KI #9)

By comparison, key informant thought an assessment should be based on ecological change within the zones:

Well I guess the only way that you can do that is to give, it would be, oh my goodness how would you? If your zoning is well planned then your system should maintain itself, it should keep all of its integrity...if you have a system that's very sensitive and you have the wrong zoning, well then you are going to degrade that area very fast because it's sensitive. So you're going to lose your features that you are protecting. So if your zoning is well planned, you should be able to maintain the features that you're protecting. (KI #12)

It was evident from informant responses that no prescribed evaluation processes or criteria are presently in place. It appears that a combination of the considerations raised during the interviews is currently used to evaluate zoning, that this occurs in an informal, subjective manner during a management plan review process, and that the considerations vary from park to park depending on management.

4.5 Tools and Information for Zoning

The process of reliable zoning at the site level is dependent on the collection and analysis a wide variety of information. The amount, quality, and timeliness of data varies

greatly between parks and among topics, and the availability of this information, specifically of updated scientific information for natural and cultural values, was an issue often raised by park staff during the interviews.

When queried about information sources that were used in the zoning process, key informants gave a wide variety of answers. Typically, they listed types of information combined with tools, such as: “GIS layers that are showing cultural sites, archaeological sites, visitation patterns, migratory animal patterns, all those kinds of things, all that kind of stuff is really valuable” (KI #6).

The following is a list of information sources that park planners and managers stated they used in the zoning process. (Number of asterisks indicates the number of interviewees who provided that answer).

- Scientific knowledge/ information/ studies/ reports *****
- Cultural resources*****
- GIS (Geographic Information Systems) ****
- Stakeholder input ****
- Previous Management Plans ***
- Parks Canada policies **
- Park staff expertise **
- Aboriginal traditional knowledge/oral history**
- Local knowledge**
- Public input **
- Visitor data**
- Species at Risk act**
- Natural resource information **
- Site visits to park*

- Land claim objectives*
- Aboriginal elders*
- Environmental Assessment*
- Biophysical data*
- Inventories*
- Park Planning Team and Joint Management Committee*
- Historical maps*
- Park Advisory board*
- Infrastructure*

To a follow up question specifically relating to zoning tools, some key informants reiterated the use of Geographic Information Systems (GIS) and existing Parks Canada policy. The following is a list of additional tools mentioned (or reiterated) by key informants when asked to think of any other tools or frameworks that were used in developing the zoning for the park:

- GIS***
- Guiding Principles and Operational Policies (Parks Canada, 1994) **
- Resource Description Analysis (RDA)*
- Workshops*
- Cumulative effects study*
- Monitoring*
- Carrying capacity*
- Google Earth*
- Parks Act, policy, regulations*

Both lists of tools and information demonstrate the wide assortment of approaches taken when conducting the zoning process. Despite this extensive listing, many key informants stated that often the challenge with gathering information and

conducting analyses for the zoning process was the availability and quality of data, or availability of resources for analysis. Seven of the 13 key informants suggested that GIS was important for conducting a zoning process, however, they raised concerns about available resources and the quality and availability of information needed to use GIS for analysis and mapping. For example: “[GIS data are] not always available. Increasingly it is, but in lots of cases it won’t be. Southern parks are pretty good, northern parks not so much. That’s more just a reflection of how long a park has been in existence and how long we’ve been compiling data” (KI #13). Another respondent highlighted the lack of specialized staff time and resources to dedicate to GIS as a decision analysis tool:

In a lot of cases I would say the staff resources and time to analyze whatever data you’ve got because we had in this park at this time, one GIS person who was doing everything that was needed for the park in GIS. So you know you can collect data and more data and more data and more data, well first of all is it useful, and is it really what you need. But more important do you have somebody that has got time to do the analysis and the ‘so what does it really mean’ stuff. That’s what I want.
(KI #8)

4.6 Spatial Conservation Optimization

Expanding on information collection, analysis and decision support tools, the use of spatial conservation optimization as a potential tool to be used in the zoning process was explored with respondents. Currently, the most prominent tool used for this type of analysis is Marxan, a software program used to support the design of marine and terrestrial reserves worldwide (Ball & Possingham, 2000). Using Marxan software,

conservation planners can identify an efficient system of conservation sites that include a suite of biodiversity targets at a minimal cost (University of Queensland, 2010).

Informants were asked two questions regarding the use of spatial conservation optimization as a tool to assist in the zoning process. The first question was: *Are you familiar with Spatial Conservation Optimization, such as Marxan?* If the respondent answered no or was unsure, I briefly described spatial conservation optimization, and the inputs and outputs of Marxan software. Following this, the second question was asked: *Can you identify any barriers that prevent adopting/ implementing such decision support tools for the zoning process in Parks Canada?*

Only about half (7 of 13) key informants stated that they were familiar with the Marxan program. Most had only heard of it briefly, and only two respondents were able to accurately describe spatial conservation optimization. A few informants were familiar with the output of Marxan but did not know how it actually worked. No respondent could refer to any examples of using Marxan in the management planning process of a terrestrial park (Canadian or otherwise). This lack of familiarity among many respondents may reflect the recent development of Marxan and an initial design as a tool for site evaluation and reserve design of marine protected areas.

4.6.1 Barriers to using Marxan

Many key informants felt that Marxan, or a similar tool, could be useful as a decision support tool in the zoning process, but several felt that the key barriers were the availability of data, human capacity, and expertise to use such tools. Concerns

regarding data availability and quality were cited by several key informants. For example:

The only barrier is the availability of data. Because we work in such large parks...the availability of data is probably the barrier. I was just thinking that if we were going to use some sort of decision support tool like Marxan or another, from what I understand of decision making support tools, they're only as good as the data that goes into them (KI #4)

Data availability and the costs (time and resources) to acquire data needed to use Marxan effectively was cited as the primary barrier to adopting this technology into the zoning process. Furthermore, one informant argued that even a tool like Marxan would still have a strong subjective component to spatial conservation optimization in the weighting or ranking of input data:

I know it [Marxan] needs a lot of information to be able to run Marxan properly, a lot of places won't have that kind of information, before you can run it you need to assign the scores or the values or the weights to things, and that process needs to be vetted somehow...like if you do it internally you'll be questioned on how you weighted, how you developed the process to do the weighting, it will add a layer of complication. I think it's very time-intensive and not applicable to most parks. We just don't have the information...it's only as good as the information you put into it and how you weight the information. (KI #10)

This informant (KI #10) also felt that a major barrier to using this type of analysis in many parks was due to a lack of appropriate data. One key informant hypothesized that many of the terrestrial based park staff would be unfamiliar with Marxan: "And the other institutional barrier I would say is probably that a vast majority of people don't have a clue what Marxan is" (KI #8). Similar obstacles were outlined by another

informant in response to the question about barriers to using spatial conservation optimization as part of the zoning process:

Money, people and time. For instance as I said, we are starting the Marxan stuff now essentially two years in advance of when we are going to need to do zoning. That's great if you've got two years worth of time and money and staff available to do it, I would say that the vast majority of parks that are on their standard A-base funding wouldn't have that. (KI #8)

Additionally, one informant touched on the issue of communicating a more complicated zoning process using a software tool like Marxan and its information to the public, stating: "the main thing is that you have to have the data. If it's a complicated process and a complicated thing to communicate to the public, then that will be an issue" (KI #4).

Overall, most respondents did not have substantial knowledge or familiarity with Marxan, but many were open to the utility of spatial conservation optimization and were willing to discuss how it may be used within the zoning process. One informant summarized their feelings about using Marxan in zoning as follows:

I think it could be [useful for zoning]. If there are enough resources, time and money and people. Because I gather from the information that I have, that it takes substantial amount of all of those. I think it would be useful particularly, I mean the process I am familiar with that have used Marxan where they come up with sort of a Conservation utility mapping based on all the data inputs, it pops out and says 'okay and here are the most important areas for from an ecological perspective' that's very useful. It would also be very useful it popped that information out on a visitor opportunity side and it would be really nice if it also could do a similar thing from a cultural side, because then we've got sort of the three legs of the stool, excluding the public outreach/education side. That you can then play with, work with, consult on, discuss, that sort of stuff. (KI #8)

4.7 Strengths and Weaknesses

All key informants were asked the two questions: *What are the strengths of the current zoning system and approach? What are the weaknesses of the current zoning system and approach?* Table 2 summarizes the responses given to these questions (the number of asterisks represents the number of interviewees that gave the same answer). The long and varied list of both strengths and weaknesses demonstrates that the current zoning framework contains both merits and drawbacks, and for many issues there is no clear agreement on what they are.

4.7.1 Strengths of the current zoning system

One of the main strengths described by interviewees was the longevity of the zoning system (see Table 2). Only two key informants felt that the fact that this was a long-standing, well tested, and well understood policy that “spoke for itself”. KI #9 simply stated “I think the zoning system itself is sound, it’s been well tested over the years”. Other Parks Canada staff felt that zoning was a good tool for managing park activities and development. One respondent mentioned that zoning was a good tool for the communication of park values to the public. It was also noted that in general, the current five zoning designations provided a good spectrum of protection and human use. Another key strength mentioned was the fact that once a management plan is approved by Parliament, it is difficult to change zoning, and therefore provides protection to park values.

4.7.2 Weaknesses

Many weaknesses articulated by Parks Canada staff included the ‘status quo’ problem, that the current approach to zoning does not address future park needs, and perpetuates the existing conditions rather than planning for change (see Table 2). One key informant responded by stating the following as a weakness: “I don’t think it lends itself to planning for change and the unique characteristics that each park brings to the planning so that I don’t know that this current zoning system is really set up to accommodate and enable land use planning unique to each and every park” (KI #3).

Another respondent mentioned

that the process to changing zoning is difficult, which they interpreted as a potential weakness in terms of operational aspects of park management. This observation was directly contradictory to another respondent who said the onerous amendment process was a strength because it affords protection to park values. Several interviewees emphasized the need for an updated process for various reasons, including the application of zoning in northern parks and in marine or aquatic areas of parks.

Strengths	Weaknesses
<ul style="list-style-type: none"> • It's a good policy • Wilderness Declaration • Simple and straight forward • Good communication tool * • National scope • Focus on Wilderness • Useful for managing the park and various activities within it • Valuable tool for controlling and managing development • Helps manage motor vehicle access • Tool to use for conversations with the public to explain issues • Provides guidance • Well tested over the years * • Zones are clearly defined * • Long-standing; well understood ** • Triggers an Environmental Assessment • Consultation requirements • Gives a spectrum, good number of zones • Difficult to change/alter zoning ones management plan is approved, therefore provides protection 	<ul style="list-style-type: none"> • Only as good as the data/information that you have • No formalized, step by step process or checklist • Application of motorized criteria in the north • Does not address future needs, planning for change, status quo piece ** • Outdated from the point of view of how parks are being established now • Connection to regulations is not clear • Issues of scale – more difficult to apply in small parks • Working with stakeholders - understanding of zoning and terminology, etc. • How to apply this zoning system to marine or aquatic areas * • No clear objectives for each zone to link to why you are selecting it • Needs to be updated to be applicable for new parks being established in the north • Needs updated in general * • Difficult to change once approved - can be difficult for operational things

Table 2 Perceived strengths and weaknesses of the current Parks Canada zoning system

(Number of asterisks indicates the number of interviewees who provided that answer).

4.8 Update and improvement

Only a few (3 of 13) of the key informants suggested that the zoning system does not align with the contemporary priorities of Parks Canada mandate. The Parks Canada zoning system has been in place since the early 1970s and has not experienced any major updates or overhauls (Sookocheff, 2003; Mclean, 1994). By contrast, the Parks Canada mandate and policy focus has seen several significant changes over the last four decades, including changes in the guiding principles, the legislated adoption of ecological integrity as the first priority, and most recently, a policy focus on the creation of visitor opportunities and attracting a wider audience to the parks. Two key informants felt very strongly that at the strategic level, zoning had not kept up with the changing priorities and mandate of the Parks Canada:

...it does not reflect, the last 25 years has been a lot of progress of ecosystem management approaches, concepts and principles, that my binder/manual does not necessarily reflect those. In recent years we've made progress in the areas of visitor experience, visitor activities, public education, that's not reflected... (KI #1)

It was suggested that zoning needs a more integrated approach which more closely reflects Parks Canada's integrated mandate, and supports all of the concepts and goals of the Agency, including natural and cultural resource management aspects and the visitor experience component:

...it's got to be modernized to reflect the concepts and approaches we have today like Ecological Integrity, Visitor Experience and also the integrated approach we have at Parks Canada whereby visitor experience and public education can support ecological integrity and protection. If people are aware and appreciate and understand the

significance of the natural and cultural resources, that should help protect those resources. This is the integration of those two goals. (KI #1)

One informant felt that the zoning system did not support the current approaches and techniques used in protected areas planning and management: "...it's a very dated set of criteria, and they don't necessarily align with these other things I just mentioned earlier [ecological characteristics, potential recreation use, traditional harvesting, active management]". (KI #3). Similarly, another informant stressed that the current system may not be meeting the needs of park managers or contributing to the effective management of parks at the site level:

I don't think it's utilized, the concepts are quite dated, although the need for it can be very much brought up to current needs, but unfortunately, we are using a fairly dated scheme, but by putting it in park plans and on top of it, the wilderness declaration area, we've entrenched it even further and I'm not sure it's helping us to necessarily better manage these places (KI #3)

One interviewee simply stated "I don't like the zoning system for Parks Canada. It's way overdue for an update. And I want to be involved in that update!" (KI #8).

4.8.1 Improvements

Key informants were asked: *If you think the zoning system and processes could be improved, how would you change it so it would be more effective/ successful?* Many respondents (8 of 13) felt that the current zoning system and policies could do with improvements, including general updating and specific ideas on policy changes (summarized in Table 3). Opinions on particular improvements varied from improvements in the application of zoning including more flexibility, to changing to a

more structured process with less flexibility. Several informants felt that the current flexibility was a key principle:

I think there are maybe ways to improve it but I think it also always has to be the principles that guide it should be flexibility, it's important that it be something that we can use with our partners, that it's not prescriptive, that there is a temporal component to it, that it can change, and that ultimately it's just a tool. It shouldn't be the goal in itself. The goal is the health of these parks, not to have a wonderful zoning system. (KI #6)

One informant (KI #10) also stated the importance of having a publically transparent process. This interviewee emphasized that the public consultation process should seek to shape the zoning decisions, rather than presenting final decisions: "To ensure that it's an inclusive process, so it's not an in-house thing that then goes out, but that it's an open, transparent process as you develop it, even if you start with a draft, that it's open for shaping" (KI #10).

Additionally, two key informants felt that deficiencies in zoning for marine/ aquatic areas of parks needed to be addressed. This is an issue in parks where a significant portion of the tenure is over marine or aquatic ecosystems, including the Gulf Island and Pacific Rim National Park Reserves. One informant summarized the issue, stating that the current criteria do not allow for the application of zoning in a marine/aquatic environment:

It could be improved...[in]the zoning system there are flaws, particularly around how do you apply a terrestrial zoning system in a marine environment, and it does not. Its criteria are just poorly set out. It's not I don't know, it was probably drafted back in the 1960s, and it's never been updated. (KI #8)

Other suggestions for improvement included simplifying the system by reducing the number of zones, creating an applied checklist or ‘how to’ guide for zoning, and increasing the use of flexible tools such as temporal or seasonal zoning.

Suggested improvements:
<ul style="list-style-type: none"> • Updating *** • Reduce the number of zones ** • Criteria based more on ecological sensitivities** • Ensure an inclusive, open, transparent process (public consultation)* • Keep better records of what is informing decisions* • Reduce the application of non-conforming use designation* • Training ** • Make it easier to establish more declared wilderness * • Create a ‘how to guide’ or checklist for zoning (list of considerations and sources of information to be used during zoning process)* • Make the process more standardized/formalized* • Define a clear connection between the zones and the values being protected* • Maintain flexibility* • Increase use of temporal zoning**

Table 3 Suggestions for Improving the Parks Canada Zoning system/policies

(The number of asterisks represents the number of interviewees that gave the same answer).

4.9 Summary

While the responses and findings of the 13 interviews were diverse, many responses to particular issues were echoed by a number of key informants. All of the respondents articulated a similar goal for strategic level zoning calling it a management tool, and referring to the protection of resources and the facilitation of visitor experiences. Many key informants felt that zoning contributed to Parks Canada’s mandate, or at least some component of it. Responses were mixed regarding how site level zoning achieved its goals, and experiences varied widely from park to park. An

important and interesting finding was that several key informants felt that zoning was more reflective, rather than prescriptive, of existing conditions in a park, and often perpetuates the status quo conditions rather than considering a future desired state. Key informants illustrated many differences in the application of zoning from park to park, particularly between northern and southern parks. It was generally felt that the criteria used to define the zones could be improved and clarified. The key informants also articulated many strengths and weaknesses of the current zoning system and policies, but did not necessarily agree on the direction for altering the zoning decision process. Additional questions were asked about the use of information, utility of spatial conservation optimization, and specifically about the potential use of Marxan software as a decision support tool for zoning. There was a lack of familiarity with Marxan, and many respondents cited barriers to its use such as data availability, capacity and expertise.

Overall, the study participants all responded that the current zoning policy and practices could be improved and updated in some form or other to be better aligned with Parks Canada's current goals and management approaches.

5: DISCUSSION

Given the more recent shifts in policy imperatives at Parks Canada (as outlined in chapter 2) it is worth examining the role of park zoning as one of the primary management tools and why it has remained an integral component of the management planning process for more than three decades. During that period, Parks Canada has adopted new management paradigms, which are now prevalent in the management planning process including ecosystem based managed (EBM), adaptive management, and ecosystem restoration (Slocombe & Dearden, 2009; Woodley, 2009). By contrast, zoning has remained essentially unchanged.

Zoning provides an explicitly spatial component to the management planning process on a coarse (large) scale, illustrating where different values located on the landscape, and how management will be applied to the various units (i.e. zones). Zoning was one of the early tools intended to balance the interests of protection and development, and serves as map of what is intended to happen on the landscape. Over the long period that zoning has been applied it has become apparent, however, that one of the key challenges for Parks Canada is implementing a forward looking vision to the zoning process and balancing national standards with the flexibility essential for the realization of zoning in each park.

In this context it is helpful to distinguish between two levels of policy when referring to Parks Canada's zoning system. Harold Lasswell, distinguishes between two broad types of public policy making processes: constitutive and ordinary (Lasswell, 1971; Ascher, 2006; Healy & Ascher, 1995). Parks Canada's zoning system includes both levels of policy making processes – the strategic level of policy making at the national scale (constitutive) which governs and guides local zoning processes, and the park-level zoning processes (ordinary) which result from the application of this policy through the development of each individual park management plan.

5.1 The Constitutive Policy Making Process

The constitutive policy making process refers to a high level of policy decisions that establish the rules and structure of institutions or frameworks. Constitutive policy includes the deliberations and choices regarding how policy should be made at lower levels (Lasswell, 1971). It goes beyond the everyday operation of the existing policy process and focuses on how the institutions, analytical techniques, and procedures should be designed or selected (Ascher, 2006).

At the constitutive or strategic level, the *Canada National Parks Act* requires that zoning be completed as part of each management plan. An associated set of national policies establishes the zoning criteria and a general framework for how zoning is to be carried out within the park management planning process. Additionally, the GPOP is a national strategic document that specifies broad principles which direct the management planning process, and defines the five zoning categories of Parks

Canada. The Guide to Management Planning is another strategic level document that briefly outlines the zoning process.

5.2 The Ordinary Policy Making Process

Ordinary policy making refers to the considerations and policy choices made and implemented on-site within the framework established by the constitutive process (Lasswell, 1971; Ascher, 2006). Within the overarching constitutive policy architecture of Parks Canada, zoning at the individual park or site level represents this ordinary policy making process.

At the implementation or site level, the national zoning policies are applied to each individual park during the park management planning process. The need for flexibility in the zoning process is highlighted at this level, in order to address specific needs for each park. The result of this application and the concurrent public consultation is a park-specific zoning map and associated policies within the management plan. These site-specific policies are intended to guide the management decisions and daily operations of the park.

5.3 Zoning at the Strategic Level

The current national zoning framework provides a spectrum of visitor use and resource protection that ranges from areas of high development and visitor services (Zone V – Park Services) to areas of wilderness with little human access (Zone I – Special Preservation). This broad spectrum is intended to provide guidance for the provision of a wide range of visitor experiences, while also allowing park managers the

flexibility to make appropriate zoning decisions for the protection of natural and cultural resources within individual parks. The three components of the Parks Canada mandate (protection, education, and visitor experience) were frequently articulated by key informants as the goals of zoning, indicating that zoning is closely tied to the mandate at both the strategic and site levels.

Based on review of the current policies and key informant interviews in this study, it is evident that zoning at the strategic level is intended to have a direct role in implementing the Parks Canada mandate. As a national policy, the zoning framework provides management direction so that zones can, in theory, be applied consistently across the parks system. In consulting park staff from across the country, however, it became evident that the actual application of the zoning policy at the individual park level varied widely based on the unique characteristics and issues of the park, the available information and tools, and the opinions and experience of the staff and stakeholders involved in the zoning process.

5.3.1 Zoning in the north

The different application of zoning in northern parks (north of 60 degrees latitude) compared to southern parks was repeatedly identified as a fundamental concern by several key informants. The challenges for applying the current strategic level zoning framework at the site level in northern parks stems from the fact that the zoning criteria were originally developed for southern parks that had a differing history of use and development, and cultural values. Additionally, northern parks have their own unique

issues, including commitments to local and/ or Aboriginal people, a necessity for motorized access in wilderness areas, and traditional resource harvesting.

During the last twenty years, Parks Canada has developed a much more collaborative approach to the designation and management of protected areas, especially in the north working with local Aboriginal peoples (Brown-John, 2006). At the national level, the *Canada National Parks Act* recognizes existing Aboriginal or treaty rights to traditional renewable resource harvesting activities within national park lands. The establishment of many of Canada's northern parks has been based on agreements between Parks Canada and local Aboriginal communities. These agreements allow continued use of the park and its renewable resources by Aboriginal people, and attempt to minimize potential detrimental impacts of the park on local Aboriginal communities (Brown-John, 2006).

Also, concepts such as zoning and wilderness are not always understood or accepted by Aboriginal communities in the north, and in some cases may strain the relationship between them and Parks Canada. Several key informants discussed the challenges of implementing zoning in northern parks and felt that similar exceptions had to be made repeatedly in order for zoning to be applied.

Given the geographic circumstances of parks in the north of Canada, the unique conditions for park establishment, commitments and agreements made with local communities, and cultural differences in interpretation of concepts used in park zoning, the strategic level zoning process may not be an appropriate or effective means as part of management planning in the north. To recognize this systematic challenge, Parks

Canada should consider addressing the suitability of implementing zoning in the north using a strategic level policy developed for southern parks. This is critical so that implementing zoning at the site level in the north does not always appear to be in contradiction with national policies. Modifying the zoning specifications for such northern parks or having specific criteria, alternative or additional zones specific to the northern parks could make zoning a more effective management tool in the north.

5.3.2 Zone Criteria

The current zoning framework sets out criteria at the strategic national level. This set of criteria has remained virtually unchanged since it was first established in the early 1970s. Zoning is intended to identify and protect the natural and cultural resource values of the park, yet the current framework does not systematically focus on ecological or cultural sensitivities.

Only a few of the key informants felt that the criteria in the zoning framework were clear and useful in guiding zoning decisions, while most felt the criteria were too vague or too similar to distinguish clearly between zones when making zoning decisions at the site level. Distinctions between the zones are currently based primarily on historical or traditional human use and visitor activities. One of the major distinctions between management zones is the level of motorized vehicle access permitted. Several key informants perceived the access criterion as the sole deciding factor for zoning designations.

A second issue raised by key informants was the flexibility of the current zoning framework. The flexibility afforded by the strategic level policy is a precarious issue for

the implementation of zoning at the site level. While the current zoning framework is designed to be general and flexible enough in order to allow for application across the national parks system, some key informants found that this generality and flexibility diminishes both the value of having different park zones and the clarity of distinctions between these zones. Conversely, many practitioners valued the flexibility of the national policy and felt that increasing the amount of flexibility would allow planners and managers to better adapt zoning to unique site-level considerations. Some key informants suggested to increase the flexibility or adaptability of strategic level zoning by introducing temporal or seasonal zoning, and felt that in some cases zoning may not be appropriate or may need to be deferred until a later time (see section 5.3.3).

Temporal (or seasonal) zoning would allow the park management to permit or prohibit certain activities based on the time of year. For example, in the management plan for Kluane National Park Reserve during the winter months, two portions of a Zone II - Wilderness area (the Cottonwood Trail and the Ä'ay Chùr Valley) were declared as a temporal Zone III to allow snowmobiling access on these designated trails (Parks Canada, 2010c). During winter conditions these areas are less sensitive and carefully monitored snowmobiling activity was deemed permissible (KI#2). Several key informants felt that this type of temporal zoning should be formalized within the zoning policy framework to clearly allow further options when zoning for unique circumstances, proposed uses, or activities.

5.3.3 Delaying zoning

In some cases, park zoning may not be appropriate under certain circumstances. Three recent examples from Parks Canada management plans underscore this need for flexibility in zoning decisions. For example, the 2007 management plan for Tuktut Nogait National Park did not present a formal zoning plan for the park, but rather deferred zoning until the next plan review. Zoning was deferred because ecotourism was in the initial stages of development in the region, and visitor use patterns and the interests of the emerging ecotourism industry needed to be better understood (Parks Canada, 2007b). In order to address these multiple issues, park planners and managers determined that delaying zoning was the best alternative for maintaining positive relationships with the Inuvialuit and other local stakeholders. Similarly, the management plan for Auyuittuq National Park did not identify zoning for the northern fiords of the park and adjacent lands, as Parks Canada management felt additional information was necessary in order to make a sound decision on the appropriate zoning for this portion of the park (Parks Canada, 2010d). The management plan for Canada's newest National Park, Torngat Mountains, has also taken the deferral approach in order to explore zoning under a cooperative management framework with two Inuit groups after an understanding of the natural and cultural sensitivities and visitor experience opportunities has been developed (Parks Canada, 2010e).

If limited data are available to fully describe the natural and cultural resources of the park, or to analyze current or potential opportunities for visitor experience or other development, delaying zoning may prevent inappropriate or incorrect zoning

designations, which in turn may prevent the “status quo situation” from occurring (see section 5.4.1). In the examples described above, park planners and managers felt that they could reasonably justify delaying zoning decisions until further information was available, and good relationships with local communities were established. This type of flexibility needs to be enabled at the strategic framework level, so that such decisions can be made and implemented at the site level legitimately.

5.3.4 Policy layering

Since the initial introduction of zoning in Canada’s national parks, the process of park management planning has changed substantially. Zoning was one of the original and central concepts used in park management planning, while more recent concepts such as EBM and adaptive management have been adopted as core principles. The process of zoning has been maintained as a step in the management planning process. The result of such policy transitions is referred to as “layering” where at several occasions – as explained in Chapter 2 - new packages of policy measures have simply been added to the previous policy regime, and may lead to “inconsistencies between the new measures and the policy legacies from the old regime” (Thielmann & Tollefson, 2009). Parks Canada’s policies have evolved in such a manner whereas new policies (i.e. EBM) have been layered on top of older policies (i.e. zoning) without terminating or adapting them. This layering of several policies on top of each other over time is also reflected in the drafting and reviewing of park management plans.

In its 2000 report, the Panel on Ecological Integrity called for fundamental changes throughout Parks Canada's policies. Many of the Panel's key recommendations have since been implemented, resulting in a major change to Parks Canada's policy architecture and management paradigm including the adoption of EBM and principles of adaptive management. The Panel also recommended that Parks Canada revise its zoning system and the methods for zoning (Parks Canada, 2000) and gave several specific recommendations on updating this policy (as outlined in section 2.6.3). None of the Panel's recommendations on zoning have been implemented to date, resulting in the layering of outdated policies with new ones, and leading to the potential for EBM or adaptive management practices to misalign with zoning.

The principles of EBM and adaptive management are inherent throughout the integrative nature of the management planning process, but the zoning framework has remained unchanged and zoning has become a less prominent component of park management plans. An examination of the strategic policies and several recent management plans demonstrated that the zoning process is perceived to be completed as a required procedure (except where it is deferred), rather than an integral part of the planning process. In most cases, zoning is presented as a short, discrete chapter at the end of the management plan with only one to two pages of dedicated text and the resulting zoning map. Currently the strategic policies contain very little clear practical guidance on zoning implementation, including the Guide to Management Planning. As long as zoning remains a component of the policy architecture, it should be revised and

updated to form an integral and practical component of the Guide in order to continue being an important part of the management planning process.

5.4 Zoning at the Site Level

Most comments by key informants focused on zoning from an implementation perspective, and provided specific examples from individual parks and the ecological and human use issues it addresses. Most informants felt that on the ground, zoning facilitated the three part Parks Canada mandate to some extent. Some respondents suggested that the existing zoning process was more suitable for the protection of ecological integrity than other components of the mandate, while others focused on the relevance of zoning to facilitate visitor experience. Historically, zoning in protected areas has been more directly linked to visitor management and access, and has focused on the concentration and dispersal of human impacts in parks (Eagles et al., 2002). Despite the incorporation of ecological integrity throughout the strategic level policies, key informants often stated that decisions and revisions in zoning at the site level were often made on the basis of human use and levels of access in the park.

At the site level, the designation of a zone provides a spatial delineation for many policies. It is this spatial component that makes zoning a unique part of the management plan, and provides a tool to define goals for specific areas. The goals for protection of natural and cultural values are articulated in the objectives of the management plan for the entire park, but zoning itself addresses a finer scale and should attempt to further articulate specific goals, and measurable targets for each

zone. The mapping element seemed to be highly valued by park staff, and is what makes zoning a unique park management activity.

Based on discussions with key informants and the examination of recent management plans, it is evident that zoning remains a useful tool in park management planning. It addresses management issues at a smaller scale and allows managers to apply particular targets to these smaller units, rather than applying broad targets to the whole park. Zoning maps are a useful tool which managers and planner like to use, and zones could have the ability to keep up with changing needs and park directions if they are continuously monitored.

5.4.1 Status Quo Problem

During my interviews with Parks Canada staff, it became evident that in most cases, zoning does not set specific objectives towards a desired future state or a vision of a site or ecosystem, but more often it preserves the current state or status quo conditions. Land use decisions in older parks pre-date the zoning system, and zoning was applied after human use and development occurred. Consequently, this zoning is more reflective of historic land use than ecological or cultural values. Several key informants referred to this situation, and felt strongly that the status quo problem continues to plague the application and review of zoning at the site level. The status quo problem is compounded through management plan reviews that fail to comprehensively evaluate and significantly change old zoning. This results in the perpetuation of errors of the past, and can often result in the ingraining of non-conforming or inappropriate uses or activities in conflict with Parks Canada's mandate. Examples of non-conforming uses

exist in most parks, and many have been permitted to continue due to their historic existence. In many cases such uses should be flagged as inappropriate and a detailed plan for phase-out (where possible) should be given.

Through speaking with park practitioners and examining park management plans, it is apparent that once a zoning plan is established for a national park in the initial management planning process, it becomes very difficult to revisit the allocation of zones. In older parks, the original process of zoning was fairly ad hoc in the absence of any truly objective or analytical tools and under a differing mandate. Thereafter these zoning plans have been perpetuated over time, with only minor adjustments to rectify specific, but occasionally also more general problems. For example, an examination of zoning in the four iterations of the management plan for Banff National Park (Parks Canada 1988, 1994b, 2007a, 2010a) demonstrates that no substantial changes to zoning have been made in Banff since its first management plan was approved in 1988, despite several plan reviews and amendments that have occurred since. Section 2.1 briefly outlines the process for plan review and amendment.

Ascher (2006) argues that meaningful strategic planning puts the focus of attention on the future, and he proposes that far-sightedness in decision making can be promoted by altering the decision making process to “introduce more opportunities for consideration of long-term consequences”. The strategic framework could require that specific objectives, targets and expected future conditions are defined for each zone, for example, at five, ten and twenty year intervals. These should be articulated at the site level in a way that clearly demonstrates how each zone will contribute to the Parks

Canada mandate, and the overall vision of the park, focusing on the desired future state.

5.4.2 Zoning Evaluation

Several key informants discussed the lack of formal evaluative methods for reviewing or assessing zoning that is in place at the site level. It is clear that a zoning plan will not be perfect in perpetuity; only time and experience will determine what was right and what needs to be fine-tuned (Day, 2002). Parks Canada has no formal method for evaluating the effectiveness or success of a zoning plan that has been implemented. Thus, while the national policy mandates that zoning must be reviewed during each five year park management planning process there is no means to formally assess zoning. As zoning is already prone to remaining unchanged (ie. status quo) by site level management, evaluative processes must be generated and implemented at the strategic level to ensure compliance and consistency across the country.

Management Effectiveness & State of the Park Reporting

Although Parks Canada does not currently utilize a formal method for evaluating the success of a zoning plan, management effectiveness evaluation is recognized as a key component to successful planning processes, and is a vital component of responsive, pro-active protected area management (Hockings et al., 2006). The goal of such evaluation is to assess how well a protected area is being managed by examining the extent to which management is protecting the values, and achieving the goals and objectives of the park (Hockings et al., 2006). This concept could be applied to an

existing zoning scheme during a management plan review in order to evaluate how it is contributing to the management of the park.

Parks Canada conducts management effectiveness evaluations in each park, called State of the Park Reports (SOPR). The SOPR fits within the five year management planning cycle; and the key issues it identifies inform the scoping document that in turn leads to a management plan review (Parks Canada, 1998). Not all parks have completed SOPRs at this time, but the intention is that each park will create SOPRs once they have enough available monitoring data to create a baseline report. The SOPR reports on a number of indicators giving ratings of good, fair, or poor to the general areas of visitor experience, cultural heritage, ecological integrity, public outreach education, and stakeholder engagement based on monitoring data and other available information. Currently, evaluating natural or cultural heritage values in direct relation to zoning is not a component of SOPRs.

Objectives/targets for each zone

For the numerous reasons previously outlined, zoning effectiveness should be evaluated at the site level during each management plan review process. Haas et al. (1987) stated that park managers preparing zoning should “establish clear and quantifiable objectives, develop operational standards consistent with objectives, select actions to achieve standards, and monitor conditions”. Currently, the Parks Canada zoning system does not have any requirements to include measureable or time-bound targets, thus making it difficult for managers to use zoning to evaluate management

goals in an objective or quantifiable manner. Given that zoning must be reviewed during the management plan review, having measureable standards, indicators, or targets for each zone and an evaluation process for the review of a zoning plan would help park managers to determine if zoning is contributing to resource management in the park, and determine what changes are necessary. In general, zoning that contains explicit standards or targets can be used for the monitoring and evaluation of the values that are intended to be protected in the area (Haas et, al., 1987; OMNR, 2009). Thus, indicators and monitoring strategies should be defined at the site level for each zone. This would more closely align zoning with the current management principles that underlie planning and management at Parks Canada.

Evaluation tool

The purpose of a comprehensive review of a park's zoning plan should be to assess whether the zoning plan remains appropriate for meeting the objectives of the park management plan (site level), and the *Canada National Parks Act* (strategic level). There are two ways in which a formal evaluation method of zoning could be incorporated into the overall policy framework for management plan review. The first option would be to directly incorporate an assessment of zoning into the SOPR process and report by tying zoning directly to appropriate, measurable targets and indicators. The second option would be to create or use a separate, potentially less complex evaluation tool specifically for zoning at the site level. An example of a zoning system

with evaluation is the approach by the New South Wales Marine Park Authority in Australia which conducts comprehensive reviews of marine park zoning plans.

NSW Marine Park Authority Example

The New South Wales *Marine Parks Act 1997* required that zoning plans be reviewed after the first five years of operation, and then every ten years thereafter. The purpose of the review is to determine whether the zoning plan for the marine park remains appropriate for meeting the objects of the Act (NSW Marine Park Authority, 2009). Table 4 outlines the general process taken by the NSW Marine Park Authority in reviewing a marine park zoning plan. This zoning plan review was required in addition to any review of the marine park management plan, and consisted of three main stages: identifying the key issues with the zoning plan, preparing a review report, and finalizing the review (NSW Marine Park Authority, 2009).

Stage 1: Identifying the key issues with the zoning plan
<ul style="list-style-type: none"> • Release of public information package advising on ways in which the community can get involved with the review. • Package contains the following documents: A guide to the review process; a form for making submissions; a copy of the zoning plan users guide; an updated habitat map; a summary of the natural values of the park; a summary of the social, economic and cultural uses of the park; a summary of research and monitoring in the park; a summary of the management of the park; frequently asked questions. • Hold meetings and information sessions so stakeholder groups and the community can comment on the current zoning plan • A formal consultation period of two months
Step 2: Preparing the review report
<ul style="list-style-type: none"> • The review report includes an analysis of the current zoning plan against assessment criteria and summary of stakeholder consultation and submissions • The review report will be provided to the park advisory committee for at least four weeks to enable comment • The review report and comments from the advisory committee will be provided by the park authority to the Ministers for their considerations
Step 3: Finalizing the review
<ul style="list-style-type: none"> • On the basis of the review report, the Ministers will direct the park authority either to prepare a draft zoning plan to amend the current park zoning plan, or to continue with the zoning plan • If the Ministers decide that a draft zoning plan is to be prepared, this will occur in consultation with the Park Advisory Committee. The new draft zoning plan will be subject to further public consultation, including a three-month exhibition period.

Table 4: Summary of process for reviewing NSW Marine Park Zoning plans

(modified from NWS Marine Park Authority, 2009)

The NSW Marine Park Authority used a set of 14 criteria to assess the zoning plans of their marine protected areas (Table 5). These criteria were consistent with the criteria used to develop the initial zoning plan, and the review process used this framework. It also considered new information and issues identified since the zoning plan

commenced, including those raised through public consultation (NSW Marine Park Authority, 2009).

No.	Criterion
Conservation of natural and cultural heritage	
1	Establish the current level of knowledge of marine biodiversity and ecosystems in the marine park
2	Comprehensiveness and representativeness: represent in sanctuary zones the full range of ecosystems and habitats that occur in the marine park
3	Adequacy: ensure that sanctuary zones have the capability to maintain biodiversity and ecological patterns and processes over time
4	Include protective zoning areas for international, national, regional or local significance, or that are otherwise of high conservation value for marine biota and habitat conservation
5	Include protective zoning for potentially threatened species that occur within the marine park
8	When determining zoning, ensure that ecological processes can continue to operate effectively
9	Provide for adequate buffering of key habitats that are included within protective zones (buffers should be included within sanctuary zones when practical)
10	Protect biologically productive areas
13	Include protective zoning for areas of cultural and historical significance
Management of Zones	
6	Limit complexity of zoning
7	Maintain consistency with management of areas adjacent to the marine park, particularly Commonwealth and state marine and terrestrial protected areas and historic sites
Sustainable resource use	
12	Establish the current level of knowledge of social and economic benefits and impacts to the zoning plan
13	Provide for ecologically sustainable use of fish and marine vegetation
14	Provide suitable access to alternative areas for activities that have been excluded from an area due to protective zoning

Table 5: Criteria for assessing zoning plans
(modified from NSW Marine Park Authority, 2009)

5.5 Quantitative Decision Support/Marxan

Methods of data collection and analyses for decision making have evolved dramatically over the past 30 years. While many of these techniques, such as GIS and associated analyses, are now routinely used by Parks Canada during the various planning stages, such tools were not available at the time of many of the early zoning decisions in older parks. Some Parks Canada staff expressed interest in exploring the potential advantages of using Marxan, a spatial conservation optimization software that provides “a systematic planning framework to evaluate the consequences and trade-offs of alternative zoning configurations” (Watts et al., 2009). Use of spatial conservation optimization could provide a potentially objective, science-based foundation for the zoning process to inform and enhance park zoning using quantitative, scientific data, objectives, and targets as a basis for zone delineations. The software is a decision support tool and is meant to support rather than replace decision making processes. The outputs can be useful in a decision making process by identifying priority areas based on economic, social, cultural or biological constraints and objectives. Marxan outputs can also be used for generating alternative options for zoning, and for the basis of a stakeholder-led planning process (Watts et al., 2009).

Many key informants discussed the need for zoning to be a transparent process that focuses on identifying ecological and/or cultural “hotspots” in an objective manner, identifying them for the highest level of protection. Geneletti and van Duren (2008) also argue that ideally, a zoning process should be transparent and the evaluation of a park’s resources should be scientifically based. Traditional approaches to zoning have

been unable to meet many goals of park planning such as transparency, repeatability, and adaptability; and therefore fall into the trap of maintaining the status quo. These processes have typically not been based on a comprehensive, systematic data analysis in parks, and were based on the opinions and perceptions of a few key experts and stakeholders.

In practice, planners and managers need to evaluate the spatial distribution of the resource values, and decide about where to restrict or stimulate certain visitor activities, and where to implement measures to protect natural and cultural resources (Geneletti & van Duren, 2008). Marxan is an example of a tool that can provide a systematic analysis of these values, which can be used as a starting point for zoning plans, both when they are drawn up for the first time, or when they are being re-evaluated. Once sufficient spatial information is compiled for one park, a system like Marxan can serve as the objective integrative analytical platform.

5.6 Recommendations

Examining the current approach to protected area zoning in the national parks of Canada has revealed a number of strengths, weaknesses and opportunities to be considered by park planners, managers and the Parks Canada Agency. Interviews with Parks Canada planning and management staff and a review of management planning policy revealed that zoning is considered an important part of the overall management planning process for national parks, but that zoning policy has not evolved with changes

to Parks Canada's overall direction and management principles. Table 6 summarizes the key issues and challenges identified in this project.

5.6.1 Strategic Level recommendations

At the strategic level, the Parks Canada zoning system is part of a suite of management strategies used by the Parks Canada Agency to achieve its mandate. Based on the results of key informant interviews and the review of zoning policies, the following changes to the national strategic framework for zoning in Parks Canada are recommended:

Recommendation 1: Update the zoning framework to reflect policy focus of Parks Canada

The zoning policy framework should be updated at the strategic level to be relevant for addressing the pressures facing current park management. The integration of key concepts from current management paradigms being used by Parks Canada including EBM and adaptive management would result in a zoning framework that more clearly addresses the integrated mandate of Parks Canada. Including options for temporal zoning, and zoning deferment may strengthen the zoning framework by adding the flexibility necessary in a system of such unique protected areas.

Addressing the application of zoning in the north is an important consideration in updating the zoning framework. Given the unique circumstances in northern parks such as co-management, traditional harvesting, and access issues, it is reasonable to consider having zones specifically for the northern parks. Such zones will ensure that

national level zoning policies do not have to be contradicted in the management planning process of northern parks.

Recommendation 2: Reintegrate zoning as a key part of the management planning process

Parks Canada should position zoning as a more integral part of the management planning process. Previous reports (e.g. Sookocheff, 2003) have identified zoning as a process that appears to be an afterthought in management planning, rather than being an integral part of the process. In the most recent park management plans, zoning is contained in a short, final chapter, and is not referenced extensively throughout the rest of the plan. Frequently, zoning is treated as an appendix to the management plan, rather than an integral part of it. Currently, at the strategic level, the zoning policy is not a substantial component of the Guide to Management Planning, and if it is to have relevance to managers as an important component of the planning process reflecting the needs and vision of national parks, a more detailed process guide to zoning should be incorporated into the guide.

Recommendation 3: Develop specific training on zoning

Following policy amendment, Parks Canada should develop a training workshop to ensure that all planning and management staff involved in the zoning process and implementation have an understanding of the updated principles and tools of park zoning. Training would develop and ensure consistency among Parks Canada staff in the decision making processes involved in zoning, and provide professional development.

5.6.2 Site Level recommendations

At the site, or individual park level, the Parks Canada zoning system should be applied based on the unique values, goals, and challenges of each park. Based on the results of key informant interviews, combined with a review of zoning policies and the discussion above, the following changes to the implementation of zoning at the site level are recommended:

Recommendation 4: Zones should strive for desired future conditions of the park

Both planning and zoning should clearly identify future desired conditions for each feature on which the zoning designation was based. In existing practice, zoning reflects current human use and development. Non-conforming activities and land uses that do not support or are incompatible with this desired future vision should be identified for management action. Application of the zoning designation should respond to the natural and cultural values, the sensitivity of the ecosystem, and the future goals of the area being zoned. Park planners and managers need to consider what should take place in the zone to achieve desired objectives over the course of each management plan life cycle. Appropriate zoning designations should be applied regardless of existing facilities or historic use, and zoning should be based on the importance of the area for the ecological and cultural values of the park. To ensure that zoning is a relevant and useful part of the management planning process, it must be more closely linked to the future vision of the park, and be used to contribute to achieving specific management goals for each zone.

Recommendation 5: A formal evaluation of zoning is needed as part of the management plan review process

Parks Canada should consider establishing a set of criteria for the evaluation of park zoning plans during the management plan review process, similar to what is done in Parks Canada's SOPRs and NSW Marine Park Authority's zoning plan review. More specifically, criteria for Parks Canada's terrestrial parks should address each component of the mandate and be based on principles rooted in the current management paradigm of EBM. This includes objectives and measurable targets for each zone as the basis for evaluating the success of a zoning plan, and subsequent adaptive management to ensure that zoning is contributing to the effective management of a park and avoidance of the status quo problem.

Management plans are reviewed on a regular basis, yet there is no formal mechanism or framework in place to systematically evaluate the effectiveness of zoning. Clear guidelines for reviewing zoning, zone objectives, and management actions are necessary. Formal evaluation method of zoning should be integrated into the management plan review. The first option would be to directly address zoning concerns using indicators and targets within the SOPR. Zoning could be more directly tied to these indicators, and a review of the zoning plan for a park could indicate the state of the values of the area relative to protection or visitor experience goals set out in the zoning.

Alternatively, a separate and less complex evaluation specifically for zoning at the site level could be developed. For instance, guidelines with a summary table or

matrix could be used by the management plan review team in assessing the strengths and weaknesses of the current zoning plan in relation to specific goals or targets set for each zone.

Recommendation 6: Include a more scientifically based, objective component in park zoning.

The incorporation of spatial conservation optimization analysis into the zoning process could provide a more objective, and quantifiable basis for zone allocations. Utilizing this, or similar, technology would better integrate natural and cultural resource management information into the zoning process to directly, address protection goals, and provide rationale for the basis of a zoning plan. Explicitly incorporating a scientific, spatially based decision support tool, such as Marxan, would also increase the transparency and justification of the zoning process. Marxan could be further used in a review process to identify areas of conservation significance, which could be compared against the existing zoning plan for the park to identify the gaps between the current zoning and priority values. Use of a quantitative tool, such as Marxan, could also form the basis to begin expert and stakeholder discussions of an initial zoning, or a review of existing zoning, to increase the transparency of zoning, and help ensure that the most significant values of the park are being zoned for protection.

ISSUE	RECOMMENDATION	LEVEL OF IMPLEMENTATION
<ul style="list-style-type: none"> Zoning does not incorporate current management concepts, and hasn't been updated since the 1970s. 	1) Update the zoning framework to reflect the new policy focus of Parks Canada.	Strategic
<ul style="list-style-type: none"> Zoning is no longer a key component of the management plan. 	2) Reintegrate zoning as a key part of the management planning process. 3) Develop and conduct training for staff specifically focused on zoning	Strategic
<ul style="list-style-type: none"> Status quo problem. 	4) Zones should strive for desired future conditions of the park.	Site
<ul style="list-style-type: none"> No method of formally or systematically evaluating zoning in a management plan review. 	5) Develop a tool for the evaluation of zoning; incorporate targets and objectives for each zone	Site
<ul style="list-style-type: none"> No transparency, subjective identification of ecological/cultural values and prioritization of sites for protection. 	6) Include a more scientifically based, objective component (e.g. Marxan) in the process of park zoning.	Site

Table 6: Summary of key issues and recommendations for Parks Canada's zoning policy and practices

6: CONCLUSION

Zoning is considered to play an important role in Canada's national parks as a useful tool for park planning and management; however, the current zoning system is outdated and presents inconsistencies with Parks Canada's current management paradigms. This zoning policy contributes to the implementation of the Parks Canada's goals and mandate, at both the strategic and site levels. The national framework gives direction to the zoning process undertaken during the management process for each park, but its application and implementation varies across the country. A meaningful, strategic review of the zoning framework within Parks Canada would be beneficial. Based on my interviews with 13 key informants and reviewing the current and historical policies related to zoning, it is evident that many modifications could be made to improve the existing framework and process. Developing stronger, more explicit connections between zoning and the modern management principles of Park's Canada would result in a forward-looking, flexible policy and process that would better align with Parks Canada's mandate and goals in the longer-term. Given the evolution of Parks Canada's management paradigms over the last three decades to include the core principles of ecological integrity, EBM, and adaptive management, zoning should likewise be updated and further integrated into the management planning process. Additionally, utilizing a quantitative decision support tool, such as

Marxan, may improve the zoning process with objective rationales for decision making, thereby providing transparency, and accountability.

Future research building on this study could incorporate a comparative analysis of the zoning policy and practices of Parks Canada with those of other jurisdictions, such as well-established park management agencies in the U.S.A. and Australia. It may also be useful to directly compare zoning with monitoring or other ecological research data to determine quantitatively how well zoning helps to protect ecological integrity. Additionally, the recommendations of this research might be beneficial in other planning contexts, including provincial parks and conservancies, conservation areas, crown land planning, regional parks, marine protected areas, or any other planning processes in Canada that uses zoning as a tool for land use planning and management.

REFERENCE LIST

- Ascher, W.. (2006). Long-term Strategy for Sustainable Development: strategies to Promote Far-sighted Action. *Sustainability Science* 1: 15-22.
- Babbie, E. (2001). *The Practice of Social Research* 9th Edition. Toronto: Nelson Thomson Learning.
- Babbie, E. and Benaquisto, L.. (2002). *Fundamentals of Social Research* (First Canadian Edition). Toronto: Nelson Thomson Learning.
- Ball, I. R. & Possingham, H.P. (2000). MARXAN (V1.8.2): Marine Reserve Design Using Spatially Explicit Annealing, a Manual.
- Ball, I.R., Possingham, H.P. & Watts, M.E. (2009). Marxan and Relatives: Software for Spatial Conservation Prioritization. In Moilanen, A., Wilson, K.E., & Possingham, H.P. (Eds). *Spatial Conservation Prioritization: Quantitative Methods & Computational Tools*. Oxford University Press: New York.
- Banff-Bow Valley Task Force. (1996). *Banff-Bow Valley Study Round Table Summary Report*.
- Brown-John, C. Lloyd. (2006). Canada's National Parks Policy: From Bureaucrats to Collaborative Managers. Paper presented at the Canadian Political Science Association Conference, York University, Toronto. Accessed online from: <http://www.cpsa-acsp.ca/papers-2006/Brown-John.pdf>
- Canada National Parks Act*. S.C., 2000, c. 32..
- Canada National Parks Act*, R.S.C. 1988.
- Cattell, Keith M.. (1977). An Evaluation of the Canadian National Parks Zoning Systems. For the Natural Resources Divisions Parks Canada Department of Indian and Northern Affairs. Carleton University, Ottawa.
- Cowling, R.M., Pressey, R.L., Sims-Castley, R., le Roux, A., Baard, E., Burgers, C.J., & Palmers, G. (2003). The expert of the algorithm? – comparison of priority conservation areas in the Cape Floristic Region identified by park managers and reserve selection software. *Biological Conservation* 112: 147–167.

- Day, J.C..(2002). Zoning – Lessons from the Great Barrier Reef Marine Park. *Ocean & Coastal Management* 45: 139–156.
- Downie, B.K.. (1984). Reflections on the National Park Zoning System. *The Operational Geographer* 3: 15-19.
- Eagles, P.F.J., McCool, S.F., and Haynes, C.D.. (2002). Sustainable Tourism in Protected Areas: Guidelines for Planning and Management. IUCN: Gland, Switzerland.
- Ferrier, S & Wintl, B.A.. (2009). Quantitative Approaches to Spatial Conservation Prioritization: Matching the Solution to the Need. In Moilanen, A., Wilson, K.E., & Possingham, H.P. (Eds). *Spatial Conservation Prioritization: Quantitative Methods & Computational Tools*. Oxford University Press: New York.
- Fluker, S. (2009). Ecological Integrity and the Law: The View from Canada's National Parks. Available online at SSRN: <http://ssrn.com/abstract=1329094>
- Geneletti, D., van Duren, I. (2008) Protected area zoning for conservation and use: a GIS-based integration of multicriteria and multiobjective analysis. *Landscape and Urban Planning* 85: 97-110.
- Goldberg, M. & Horwood, P. (1980). Zoning: Its Costs and Relevance for the 1980s. The Fraser Institute: Vancouver.
- Grumbine, R.E. (1994). What is ecosystem management? *Conservation Biology* 8 (1): 27-38.
- Haas, G.E, Driver, B.L., Brown, P.J., & Lucas, R.G.. (1987). Wilderness Management Zoning. *Journal of Forestry* 85(12): 17-21.
- Haider, W. & Payne, R.J.. (2009). Visitor Planning and Management. In Dearden, P. and Rollins, R. (Eds). *Parks and Protected Areas in Canada: Planning and Management, Third Edition*. Oxford University Press: Don Mills.
- Healy, R.G.. & Ascher, W.. (1995). Knowledge in the Policy Process: Incorporating New Environmental Information in Nature Resources Policy Making. *Policy Sciences* 28(1): 1-19.
- Hobbs, R.J., Cole, D.S., Yung, L., Zavaleta, E.S., Aplets,G.H., Chapin, S.F., Landres, P.B., Parsons, D.J., Stephenson, N.L., White,P.S., Grabers, D.M., Higgs,E.S., Millar, C.I., Randall,J.M., Tonnessen,K.A. & Woodley, S.. (2010). Guiding concepts for park and wilderness stewardship in an era of global environmental change. *Frontiers in Ecology and the Environment* 8(9): 483–490.

- Hockings, M., Stolton, S., Leverington, F., Dudley, N. and Courrau, J. (2006). *Evaluating Effectiveness: A framework for assessing management effectiveness of protected areas. 2nd edition.* IUCN, Gland, Switzerland and Cambridge, UK.
- Hodge, G..(1998). *Planning Canadian Communities: An Introduction to the Principles, Practice and Participants.* Third Edition. ITP Nelson: Toronto.
- Hodgins, D.. (2005). *Zoning System for Canada's National Parks.*
- IUCN. (2009). IUCN's Protected Area Programme. Accessed online from: http://cms.iucn.org/about/union/commissions/wcpa/wcpa_overview/wcpa_ppa/
- Jager, E., & Sanche,A.. (2010). Setting the Stage for Visitor Experiences in Canada's National Heritage Places. *The George Wright Forum* 27(2):180-190. Available online: <http://www.georgewright.org/node/3142>
- Kvale, S. & Brinkman, S.. (2009). *InterViews: Learning the Craft of Qualitative Research Interviewing, 2nd Edition.* Sage Publications Inc.: Los Angeles.
- Lasswell, H.D..(1971). *Pre-view of Policy Sciences.* Elsevier: New York.
- Lockwood, M. (2006). Chapter 11: Management Planning. In *Managing Protected Areas: A Global Guide.* Lockwood, M., Worboys, G.L. and Kothari, A.. (Eds.). Earthscan: London, UK.
- McNamee, K. (2009). From Wild Places to Endangered Spaces: A History of Canada's National Parks. In Dearden, P. and Rollins, R. (Eds). *Parks and Protected Areas in Canada: Planning and Management, Third Edition.* Oxford University Press: Don Mills.
- McLean, A. (1994). *The Parks Canada Zoning System: A Discussion Paper.* Visitor Activities Branch, Parks Canada: Ottawa.
- Neuman, W.L...(2000). *Social Research Methods Qualitative and Quantitative Approaches, 4th Edition.* Allyn & Bacon: Boston.
- NSW Marine Parks Authority. (2009). *Solitary Islands Marine Park: zoning plan review report.* Available online: <http://www.mpa.nsw.gov.au/simp-zoning-plan-review.html>

- Ontario Ministry of Natural Resources. (2009). Ontario Protected Areas Planning Manual. Queen's Printer for Ontario: Peterborough. Available online: http://www.ontarioparks.com/english/planning_manual.html
- Prato, T. and Fagre, D. (2005). National Parks and Protected Areas: Approaches for balancing social, economic and ecological values. Blackwell Publishing Professional: Ames, Iowa.
- Parks Canada (2011a). The History of Canada's National Parks: Their Evolution and Contribution Towards Canadian Identity. Accessed online from: http://www.pc.gc.ca/apprendre-learn/prof/itm2-crp-trc/crp-trc5_e.asp?ID=490
- Parks Canada. (2011b). Parks Canada Attendance 2006-07 to 2010-11. Accessed online from: <http://www.pc.gc.ca/docs/pc/attend/table3.aspx>
- Parks Canada (2010a). Banff National Park of Canada Management Plan. Accessed online from <http://www.pc.gc.ca/pn-np/ab/banff/plan.aspx>
- Parks Canada. (2010b). State of the Park Report 2003-2008: Gulf Islands National Park Reserve.
- Parks Canada. (2010c) . Kluane National Park Reserve Management Plan.
- Parks Canada. (2010d). Auyuittuq National Park of Canada Management Plan.
- Parks Canada.(2010e). Tongait KakKasuangita SilakKijapvinga Torngat Mountains National Park of Canada Management Plan.
- Parks Canada (2008). Guide to Management Planning. Accessed online from http://www.pc.gc.ca/eng/docs/bib-lib/~media/docs/bib-lib/pdfs/pc_gmp2008_e.ashx
- Parks Canada (2007a). Banff National Park Management Plan July 2007 Amendment. Accessed online from: <http://www.pc.gc.ca/pn-np/ab/banff/docs/plan1/chap1.aspx>
- Parks Canada. (2007b). Tuktut Nogait National Park Management Plan.
- Parks Canada (2006). Proposed Human Use Management Strategy for the Lands Adjacent to the Town of Banff. Accessed online from <http://www.pc.gc.ca/eng/pn-np/ab/banff/plan/plan5c2.aspx>
- Parks Canada (2001). Parks Canada Guide to Management Planning.
- Parks Canada. (2000). *"Unimpaired for Future Generations"? Conserving Ecological Integrity with Canada's National Parks*. 2 vols. Report of the Panel

on the Ecological Integrity of Canada's National Parks. Ottawa: Minister of Government Works and Public Services Canada.

- Parks Canada. (1998). State of the Park Report for Kluane National Park & Reserve of Canada.
- Parks Canada (1994a). Guiding Principles and Operational Policies. Accessed online from: http://www.pc.gc.ca/docs/pc/poli/princip/index_e.asp
- Parks Canada. (1994b). Banff National Park of Canada Management Plan.
- Parks Canada. (1988). Banff National Park Management Plan Summary.
- Parks Canada.(1985). National Parks Management Planning Process Manual.
- Royle, K. (2010). Exploring Marxan as a terrestrial conservation planning tool. In S. Bondrup-Nielsen, K. Beazley, G. Bissix, D. Colville, S. Flemming, T. Herman, M. McPherson, S. Mockford, and S. O'Grady (Eds). 2010. *Ecosystem Based Management: Beyond Boundaries. Proceedings of the Sixth International Conference of Science and the Management of Protected Areas, 21–26 May 2007, Acadia University, Wolfville, Nova Scotia.*
- Searle, R.. (2000). *Phantom Parks: The Struggle to Save Canada's National Parks*. Key Porter Books Limited: Toronto.
- Slocombe, D.S. & Dearden,R.. (2009). Protected Areas and Ecosystem-based Management. In Dearden, P. and Rollins, R. (Eds). *Parks and Protected Areas in Canada: Planning and Management, Third Edition*. Oxford University Press: Don Mills
- Sookocheff, T. (2003). Preliminary Discussion Paper: Review of Parks Canada's National Park Zoning System.
- Thielmann, T. & Tollesfon, C.. (2009). Tears from an onion: Layering, exhaustion and conversion in British Columbia land use planning policy. *Policy and Society* 28: 111–124.
- Thomas, L & Middleton, J. (2003). Phillips, A. ,(Ed.). *Guidelines for Management Planning of Protected Areas*. Best Practice Protected Area Guidelines Series No. 10. IUCN. Gland, Switzerland.
- University of Queensland. (2010). About Marxan.
<http://www.uq.edu.au/marxan/index.html?page=77645&p=1.1.3.1>
- Walther, P.. (1986). The Meaning of Zoning in the Management of Natural Resources Lands. *Journal of Environmental Management* 22: 331-343.

- Watts, M.E., Ball, I.R., Stewart, R.S., Klein, C.J., Wilson, K., Steinback, C., Lourival, R., Kircher, L. & Possingham, H.P.. (2009). Marxan with Zones: Software for optimal conservation based land- and sea-use zoning. *Environmental Modelling & Software* 24: 1513–1521.
- Wengraf, T.. (2001). *Qualitative Research Interviewing*. Sage Publications Inc.: London.
- Woodley, S. (2009). Planning and Managing for Ecological Integrity in Canada's National Parks. In Dearden, P. and Rollins, R. (Eds). *Parks and Protected Areas in Canada: Planning and Management, Third Edition*. Oxford University Press: Don Mills
- Wright, P. & Rollins, R. (2009). Managing the National Parks. In Dearden, P. and Rollins, R. (Eds). *Parks and Protected Areas in Canada: Planning and Management, Third Edition*. Oxford University Press: Don Mills.

APPENDIX

Appendix 1: Interview protocol

Intro:

The overarching goal of this research project is to outline the approach to the process of zoning in Canada's national parks and determine how zoning can contribute to achieving specific components of Parks Canada's mandate. This project will assess the current approach to zoning as part of the management planning process in national parks and national park reserves, and attempt to determine if incorporating more quantitative decision support tools would inform the process and resulting zoning scheme.

1. What is the most recent zoning process you have completed?
 - a. Was this the first time zoning was established for this park?
 - b. Or was this a review of existing zoning? (See question 4)
 - c. If it was a review, was the zoning changed? Why or why not?
2. What were the key issues (e.g. conflicts, resource issues) to be addressed through zoning in the Park Management Planning process?
3. What are the main goals of the zoning process? What does it attempt to achieve?
 - a. Do certain goals have priority over others? (Cultural, Species at Risk, Visitor Management/Experience, Development, etc.)
4. If the zoning process was a re-zoning or maintained the existing zoning, what did you know about the established zoning?
 - a. How was zoning originally established?
 - b. What values/processes was it based upon?
 - c. Were any values/processes given priority over others (cultural, vs, development [grades, drainage, access to transport routes....etc], vs, wilderness, vs. recreation)
 - d. Did you alter it during the review? Why or why not?
5. Describe the main steps taken to complete the zoning (or review) process.
6. What information sources were used in the zoning process? Where some more important than others? Why?

7. What tools or frameworks were used in developing the zoning for the park?
 - a. What data were used and why?
 - b. What analysis was used?
 - c. How helpful was it (for each)?

8. Were there any existing activities/uses that had to be accommodated within the park? If so, were they dealt with through zoning or other policies, or both?

9. Were any existing activities/uses removed from the park through management planning/zoning?
 - a. Which ones?
 - b. Why?
 - c. How was this done?

10. Can you describe the role of public/stakeholder consultation in the zoning process?
 - a. what consultation/engagement tools were used and how effective were they?

11. In your opinion, what constitutes successful zoning?
12. How do you evaluate is zoning is successful or effective?

13. Do you think that the current Parks Canada zoning systems achieves its goals?
 - a. Overall?
 - b. In your park?
 - c. In some zones more than others (historical, vs. wilderness, vs. development, and why?

14. What are the strengths of the current zoning system and approach?

15. What are the weaknesses of the current zoning system and approach?

16. Do you think the criteria for designating zones is effective? Why or why not?
17. How does Zoning facilitate:
- a. Ecological Integrity?
 - b. Visitor Management/Experience?
 - c. Cultural resource protection?
18. If you think the zoning system and processes could be improved, how would you change it so it would be more effective/successful?
19. What types of decision support tools or quantitative information could be used to improve/aid in the zoning process?
20. Are you familiar with Spatial Conservation Optimization? I.e. Marxan?
[describe Marxan if necessary]
- a. If so, Do you think Marxan would be useful/valuable as a decision support tool in the zoning process? Why or why not?
21. Can you identify any barriers that prevent adopting/implementing such decision support tools for the zoning process in Parks Canada?
22. How does the management planning or zoning process need to change so that decision support tools can be included as a decision support tools?
23. Any other comments?
24. Do you know any other planners or people that have been involved in park planning and zoning that would be valuable to my research?
- a. If yes, can I get their contact information from you?
 - b. Any documents that are used for zoning?