Conservation of Species and Ecosystems at Risk: BC Parks and Protected Areas Challenges

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Abstract: There are six interrelated challenges to managing species and ecosystems at risk within British Columbia's protected areas system: (1) the history of goals for park acquisitions, (2) the 12% goal for the protected land base, (3) the fragmentation inherent in a system that represents all ecological zones, (4) the dual mandate of conservation and recreation, (5) the need for recognition that protected areas do not have inherent integrity and therefore require management, and (6) the need for management of protected areas as part of the landscape beyond protected area boundaries. Each of these challenges is discussed in this paper.

Key Words: challenges, management, protected areas, conservation, integration, British Columbia

Introduction

A variety of challenges face protected areas managers in British Columbia (B.C.). The six listed below are the primary challenges for those with the mandate to manage and protect conservation values including species and ecosystems at risk:

1. the history of goals for park acquisitions,
2. the 12% goal for the protected land base,
3. the fragmentation inherent in a system that represents all ecological zones,
4. the dual mandate of conservation and recreation,
5. the need for recognition that protected areas do not have inherent integrity and therefore require management, and
6. the need for management of protected areas as part of the landscape beyond protected area boundaries.

These are all challenges for species at risk management, but they also apply generally to the management of biodiversity. There is a close relationship between most of these challenges. By choosing to limit the size of the protected areas system within a framework that calls for representation both geographically and ecologically, we immediately have to deal with the issue of fragmentation. Depending on how isolated the reserve fragments become, the area outside the protected area boundaries (referred to as the matrix) is more or less hostile to movement by

species. At the most extreme, the islands that are the reserves are completely isolated. This is clearly not the intent, and so we look to management of areas outside the reserve system to help maintain the values within the protected areas system and to complement the protection of values inside with protection of values outside the reserves.

Challenge 1: A Short History Lesson

In 1911, Strathcona Provincial Park was established as British Columbia's first provincial park. Soon after, Mount Robson Provincial Park was established as the province's second park, and like Strathcona, was situated along railway lines. Early parks were clearly means to increase tourism, and park recreation included lodge development and alpine touring. During the 1920s and 1930s, large provincial parks such as Garibaldi, Kokanee Glacier, Tweedsmuir, and Golden Ears were created for reasons beyond tourism including multiple use and resource extraction. During this time, the amount of protected land base grew rapidly. Post-war British Columbia saw a boom in demand for car-based family recreation. Camping quickly became a popular activity as highways expanded and more of the province became accessible to the average resident. The 1950s and 1960s brought significant additions to the parks system in the form of small roadside parks with camping facilities; however, by the mid-1950s and early 1960s, large tracts of park lands had been removed from the system to facilitate hydroelectric and forestry development. Although the system was gaining in park numbers, overall lands protected were reduced by about one million hectares between 1950 and 1965.

Until the 1960s, parks were primarily thought of as places to showcase the natural splendor of the province. In the 1960s, a new movement began evolving. People began to view protected areas as places for conserving the natural diversity of the province. In 1965, the first *Park Act* was passed, which explicitly mandated the Parks Branch to manage these areas for future generations.

In the 1970s and 1980s, conservation interests continued to grow along with concerns about land use. At the global level, the World Commission on Sustainability urged the protection of biodiversity by encouraging the global community to triple the amount of protected areas. At the Earth Summit in 1992, Canada signed an accord vowing to meet the challenge of establishing 12% of its land base as protected areas. In 1993, British Columbia took up this challenge and released its Protected Areas Strategy (Province of British Columbia 1993). The Strategy committed the province to double the amount of protected area land base from 6% (1993) to 12% by 2000 following a framework based on ecological representation. New areas for protection were identified through community-based land use planning that involved industry, environmental groups, First Nations, communities, and government. Land use plans were developed for more than 70% of the province, resulting in the protection of an additional five million hectares of the land base. British Columbia was the first province in Canada to achieve the 12% goal.

The challenge demonstrated by this history lesson is that we are now managing for species at risk in a system that was not specifically designed to protect them.

Challenge 2: The 12% Target

When, at the 1987 United Nations World Commission on Environment and Development, Gro Brundtland declared 12% as an international target for protected areas, it represented a tripling of the global protected land base and was a lofty goal (Brundtland 1987). That goal has nearly been met globally through the creation of 100,000 protected areas representing 12% of the land base (Martin 2003); however, the goal was not based on science. Although British Columbia has reached the 12% target, we cannot pretend that either our species and ecosystems at risk or the rest of our considerable biological diversity can be maintained in that area alone. The debate over the proportion of protected lands is also about the management of the land area in which the protected areas are embedded (the matrix). If there is no consideration for conservation in the matrix, then much more than 12% (recent papers suggest 40–60% [Margules et al. 1988; Saetersdal et al. 1993; Soulé and Sanjayan 1998; Warman 2001; Rumsey et al. 2003]) would be needed to maintain current levels of biodiversity. If we expect all of the biological diversity in British Columbia to be maintained in 12% of the land base, we will fail because the 12% target represents an 88% reduction in habitat area. The species/area curve of island biogeographic theory predicts that we would loose 50% of our species by decreasing habitat by 88% (Soulé and Sanjayan 1998).

Awareness of the values within protected areas and the matrix, together with an objective to maintain these values, can inform careful management practices in the matrix and make a smaller reserve system effective. The successful management of species at risk and other components of biological diversity in the province depends on integration of management objectives and strategies across the landscape.

The challenges of the 12% target are (1) that it is an artificial target, and (2) once that target has been achieved, it cannot be used alone to manage for species and ecosystems at risk.

Challenge 3: Fragmentation

British Columbia has 817 protected areas of various sizes distributed across 14 broad ecological zones. Most of the protected areas are in the 100–1000 ha size class, but by far the largest land area is in the few protected areas in the 100,000–1,000,000 ha size class (Fig. 1). The protected areas are scattered over the landscape—some are extremely isolated while others are nearly contiguous. By limiting the protected areas system to 12% of the land base and aiming at ecosystem representation, the system, by definition, becomes scattered with varying degrees of connectivity between ecosystem types and habitat types.

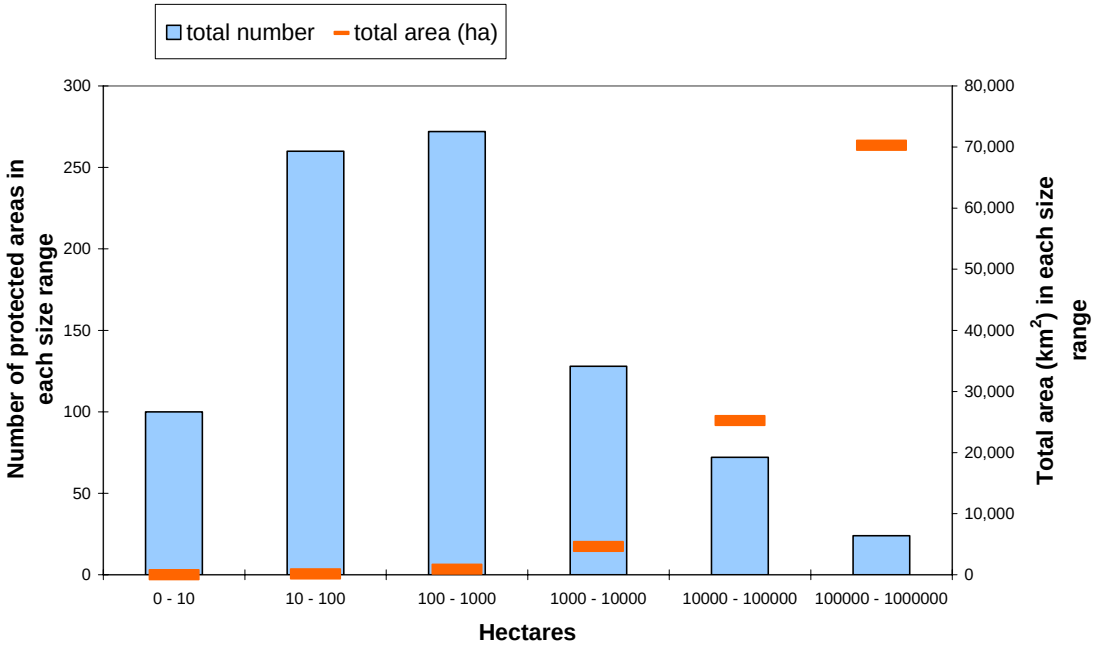

Figure 1. Size class distribution and total area by size class of protected areas in British Columbia.

The large reserves have many ecological benefits. They have greater potential for containing complete watersheds or undisturbed ecological functions such as predator-prey systems, and they may protect a greater variety of habitat types. These advantages are passed on to species (at risk or otherwise) by providing protected movement between habitat patches within the reserve, allowing for the needs of wide-ranging species, providing habitat for greater numbers of populations, metapopulations and species, and reducing edge effects from human developments outside the boundaries.

Small reserves also provide benefits. They are able to protect unique landforms or populations of small organisms. For example, Liard Hotsprings Provincial Park provides protection for the hot water physa (*Physella wrighti*), and phantom orchids (*Cephalanthera austiniae*) are protected in Katherine Tye (Vedder Crossing) Ecological Reserve. Small well-placed reserves may also act as connectors within the protected areas system.

Ecological reserves are generally small, protected areas that may be designated for the purpose of protecting a population of a species at risk. At least 50 of the 152 ecological reserves in British Columbia contain species or ecosystems at risk. In a fragmented protected areas system, it is essential to recognize the possibility of loss of these populations as a result of factors outside the system. For example, Haley Lake Ecological Reserve was set aside for a population of the endangered Vancouver Island Marmot, but the marmot no longer occurs in the reserve.

The challenge of fragmentation is to recognize the ecological needs of species that may require either elements or processes found outside the protected areas system or protected connecting fragments between larger reserves.

Challenge 4: Dual Mandate

Under the *Park Act*, the Minister of Water, Land and Air Protection has jurisdiction over, and must manage and administer, all matters concerning parks. In a single sentence, the *Park Act* specifies the importance of maintaining both conservation and recreation: parks are "dedicated to the preservation of their natural environments for the inspiration, use and enjoyment of the public" (*Park Act* Sec. 5[3]). The Ministry of Water, Land and Air Protection interprets the legislation and policies to indicate a dual mandate: conservation and recreation. Conservation and recreation are intertwined.

Recreation has always been an important part of the protected areas system. Historically, it played an even larger role in decisions around park designation, but recently it has been made clear by statements from the government and from Parks and Protected Areas policies that although the parks and protected areas system has a dual mandate of recreation and conservation, the primary goal of the protected areas system is the protection of conservation values. Three examples of this are provided:

1. In a 1991 document that described park policies (B.C. Ministry of Lands and Parks 1991, p. 13), it was stated unequivocally that "Protecting and enhancing the natural resources of a park is *foremost*" (authors' emphasis added).
2. In 2000, when Ecological Integrity training was delivered to all Parks staff, the strong message from the Parks Management Committee (PMC) (Assistant Deputy Minister, directors) was "PMC endorses the protection of ecological integrity as the first priority in planning, management and decision making at all levels of the protected area system" (B.C. Ministry of Environment, Lands and Parks, Ecological Integrity training for BC Parks staff, 2000).
3. A survey of approved Purpose Statements (abbreviated management plans, as of 28 February 2003) from five of nine Ministry of Water, Land and Air Protection regions showed that most protected areas are being managed explicitly for conservation first, and that collectively, the size of these protected areas is nearly an order of magnitude greater than those in which recreation is the primary management purpose (Table 1).

To achieve a balance in reaching both conservation and recreation goals, BC Parks is guided by legislation, regulations, and policies. Protected areas are designated under three different Acts: the *Park Act*, the *Ecological Reserve Act*, and the *Environment and Land Use Act*. The *Environment and Land Use Act* is used primarily to designate Protected Areas[1]. Lands designated under this Act generally rely on the *Park Act* for management legislation.

[1]Protected area (lower case) is the general term used for any reserve (i.e., park, ecological reserve, Protected Area, recreation area) in the protected areas system. Protected Area (upper case) is a specific category of protected area that is designated under the *Environment and Land Use Act*.

Table 1. Primary purpose (conservation or recreation) for 119 protected areas with Purpose Statements as of February 2003.

Region	*Total no. of protected areas*	*Total no. of protected areas with conservation as their primary purpose*	*Average size (ha)*	*Total no. of protected areas with recreation as their primary purpose*	*Average size (ha)*
Lower Mainland	19	12	5870	5	72
Kootenay	26	13	1422	12	71
Omineca	19	17	3790	2	312
Peace	6	3	38141	3	86
Vancouver Island	49	38	2050	11	944
Total	119	83	4148	33	421

Three conservation tools are provided by the *Ecological Reserve Act* and the *Park Act*:

1. **Designation**: The designation of an area of land as a protected area is a significant conservation achievement. Designation removes the land from the Crown land base. With a few exceptions, the designated area is not subject to any other act[2]. Further, as detailed in Section 3 of the *Park Act*, the minister has jurisdiction over and must manage and administer all matters concerning protected areas.
2. **Protection**: Through provisions in the *Park Act* and *Ecological Reserve Act*, every protected area has a common set of minimum protection standards. Commercial logging, mining, and hydroelectric development are not allowed in protected areas. It should be noted that Class B parks and 81 Protected Areas established under the *Environment and Land Use Act* have one or more nonconforming activities, but otherwise are managed as protected areas under the *Park Act*.
3. **Management**: Both the *Park Act* and the *Ecological Reserve Act* provide the ability to make regulations to limit impacts on natural values. Conservation management is enabled in the legislation by a system that manages interests and actions through permits. The most critical feature of the permit system is the 'test' that must be met in order to issue a permit. Section 9 of the *Park Act* works to protect natural resources by stating that a natural resource "… must not be granted, sold, removed, destroyed, damaged, disturbed or exploited except as authorized by a valid and subsisting park use permit." The Act goes on to state that the permit must not be issued unless the activity is necessary for the preservation or maintenance of the recreational values of the park involved. This is a strict test, but it requires interpretation of what the recreational values of a park could be.

[2]After this paper was written, the *Wildfire Act* came into effect (31 March 2005). This Act supersedes the *Park Act*; however, through a Memorandum of Understanding, the Ministry of Forests and BC Parks are cooperating in managing fires in an ecologically appropriate way, where possible.

> Looking back to the era in which the *Park Act* was written, it is undeniable that the term 'recreational value' has narrowed in meaning to what we call outdoor recreation and widened in scope to include the natural values that outdoor recreation depends on. This is known as experiential integrity; that is, an integrity of experience across generations that lies at the intersection of maintenance of ecological integrity and the range of human activities that connect with a natural place. The *Ecological Reserve Act* and regulations provide a different set of limitations on permits; permits can only be issued for scientific research or educational purposes related to the purpose of the particular ecological reserve.

The three conservation tools that are provided by the *Park Act* and *Ecological Reserve Act* are strong tools, but they do not work without active management. Stresses and threats in protected areas have to be continually monitored and evaluated against the desired state that is set out in the legislation and in park plans and public expectations.

To conserve the natural values of the province, we need public support, which is gained through an understanding of the breadth and importance of these values. Understanding comes from experience of the natural world. This is the main reason people come to protected areas.

Finding the balance between promoting tourism and maintaining the essential elements of biodiversity, such as species and ecosystems at risk, continues to be a major challenge.

Challenge 5: Lack of Inherent Integrity in Protected Areas

Once a line has been drawn around an area designating it a protected area, there is not an immediate cessation of concern. The perception of ecological integrity within protected area boundaries is not correct. There are several reasons for this misconception. First of all, the values within the boundaries are poorly known. There is rarely a complete inventory of species or even of ecosystems within protected areas. Without that knowledge, it is difficult to identify and manage appropriate activities in protected areas. Secondly, human use in the form of a multitude of recreational activities within protected areas requires planning and management. And finally, management practices outside of protected areas can have significant consequences for ecosystems within them.

The protected areas system in British Columbia has been specifically tasked with protecting a representative array of ecosystems, and in some instances, of species and ecosystems at risk. Protection in the sense of a 'protected' area can mean many things. In British Columbia, there can be hunting, fishing, livestock grazing, camping, mining, roads, cabins, resorts, and other activities and facilities within protected areas. These activities are not normally associated with the concept of protecting and maintaining natural systems; however, the overriding goal of protection is addressed through policies and ongoing active management programs.

The political designation of a boundary that indicates a different intent inside the boundary from outside does little to prevent the deleterious effects of broad-scale influences such as acid rain, climate change, loss of predators, or dammed rivers. It requires diligent monitoring of species and processes inside park boundaries to make sure that external pressures do not impact the values that are being protected.

The Recreation and Conservation Section of the Parks and Protected Areas Branch advocates an approach to conservation that looks at the entire land base and evaluates priorities for active management based on the level of threat to conservation values, the importance of the value, the cost of addressing the threat, the cost of ignoring the threat, and the probability of success. Protected area status will play a role in determining both the level of threat and the probability of success. It is appropriate to recognize the boundaries at this level of evaluation; however, it is not appropriate to put all conservation issues in protected areas at the bottom of the priority list because 'they are already protected'. Provincial conservation priorities should reflect both the important conservation values within protected areas and the long-term benefits accruing from protected status.

The challenge comes from convincing decision makers that scarce resources are well spent in areas that are 'already protected'.

Challenge 6: Integration of Management across Protected Area Boundaries

The more we know about what we have within the protected areas system the more we know about what has to happen on the outside in order to maintain the species and ecosystems in the province. To safeguard the province's biological diversity, conservation efforts require some ongoing efforts both inside and outside protected area boundaries. Ecological processes do not recognize these boundaries. Fires move across the landscape according to wind patterns, terrain features, and fuel loads without regard for lines on a map. Upstream influences will still affect downstream ecosystems whether the stream has crossed a park boundary or not. Wildlife moves across the landscape from one habitat patch to the next and can inadvertently move from the influences of one management philosophy to another. Where we once thought of salmon as an anadromous species confined to marine and freshwater ecosystems, it is now clear that their influence covers extensive portions of the terrestrial environment for hundreds of miles inland of marine environments (Gende et al. 2002). How we suppress, modify, or manage these ecosystem components outside of protected areas can have significant and often deleterious effects on those areas that we have labeled as 'protected'.

Three examples of how management outside of protected areas can affect the integrity of protected areas are presented:

Fire

Many of the larger protected areas have a 'monitor only' zone meaning that managers can request that a fire be monitored rather than immediately suppressed if it is in a remote area. The desire to let fires play their historic role tends to be tempered by our need to protect park facilities and values adjacent to protected areas. In addition, BC Parks has an understanding with the Ministry of Forests that fires from protected areas will not burn Crown forest (if possible). Fire frequency in parks in British Columbia may have been reduced by more than half due to suppression activities in the forested land base adjacent to protected areas. This unwillingness to let fires burn has led to high fuel loads, which heightens the reluctance of managers inside and outside of protected area boundaries to let fires play their historic role.

Large Woody Debris in Aquatic Systems

Aquatic systems are linear and dependent on upstream influences to keep them healthy and functioning. When a protected area does not contain a complete watershed, particularly if it is only in the lower part of a watershed, it may be subject to changes in natural processes due to developments outside of the protected area. For example, large woody debris (LWD) is an important component of some stream ecosystems. It comes from both streamside sources and upland sources and gradually decays or makes its way to the ocean. Streamside sources may be protected in riparian leave strips, but often the upland areas are modified to the point where debris torrents no longer provide the periodic large influxes of LWD to streams. Over time, this will seriously reduce the amount of LWD in streams without regard for the political designation of the land. Any protected areas downstream of highly modified uplands will suffer reduced LWD in streams regardless of the state of the immediate stream banks.

Hunting, Trapping, and Fishing Regulations

Reserves are rarely large enough to contain the entire range of a wide-ranging species; therefore, populations can be subjected to varied management objectives and practices when they move into and out of reserves. These objectives may have contradictory results. For example, marine reserves may be subject to degradation of conservation values by overfishing in the areas outside the reserves. Grizzly bear hunting outside of protected areas has been found to have a deleterious effect on the reproductive success of females within the protected areas (Wielgus and Bunnell 2000). In 40% of British Columbia, hunting is an allowable activity within protected areas; however, the harvest level is generally set below that found outside the protected areas.

The corollary to the idea that management outside of parks affects the species and ecosystems within the park boundaries is that parks are generally not large enough to support populations of species across all their seasonal ranges, including all important predators. This makes it difficult

to use 'ecological process management' (Boyce 1991). The basis of this type of management is to "allow the ecological processes of nutrient cycling, plant succession, fire, decomposition, competition, predation, symbiosis, birth and death, to operate unimpeded by human intervention" (Boyce 1991). Therefore, it is essential to the protected species and ecosystems that the area outside protected reserves be considered to have an important supporting role.

Ecosystems are not static. We cannot draw a line around an area (especially a purely political line with no relationship to an ecological unit) and expect what is inside to stay the same. Forest, shrub, or grassland ecosystems move through seral stages. Natural disturbances occur. On a longer time scale, species evolve and major climatic influences shift. The system must be managed in such a way that natural disturbance regimes are maintained, and managers must be flexible enough to give ecosystems the chance to change with larger global changes.

The challenge is to manage this fluid system with a design of static protected areas to maintain species and ecosystems at risk as part of the entire suite of species and ecosystems in British Columbia. Clearly, this cannot be done on 12% of the land base and will require cooperative management across protected area boundaries.

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