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Waithaka, John

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## Policy on Management of Hyperabundant Wildlife Populations in Canada's National Parks

John Waithaka, Conservation Biologist, Parks Canada, Gatineau, Quebec

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### **Abstract**

Management of hyperabundant wildlife populations has become a growing challenge in many national parks in Canada, particularly in the south where competing land-use activities have resulted in the disruption of some of the processes that have historically regulated wildlife populations. The presence of hyperabundant wildlife populations has been shown to have adverse impacts on the state of the ecological integrity of the affected parks, requiring intervention by Parks Canada to comply with the Agency's conservation mandate. At least seven species with hyperabundant wildlife populations have already been identified in 10 of Canada's national parks.

Parks Canada has developed a new policy framework to address the management of hyperabundant wildlife populations to ensure the maintenance and improvement of the state of ecological integrity in these heritage places (Parks Canada 2007). The policy provides a nationally consistent approach to the management of hyperabundant wildlife populations while offering sufficient flexibility for innovation and adaptation. It spells out the criteria and conditions under which a wildlife population may be declared hyperabundant, outlines broad ecosystem-based management principles that must form the basis for active management, and provides implementation guidelines for different management actions.

The policy requires management decisions and actions to be based on the best available scientific information and priority to be given to methods that best contribute to the maintenance or restoration of ecological integrity. Hyperabundant wildlife populations must be managed under an adaptive management framework, where a combination of management, research, monitoring and evaluation provide more opportunities for improvement. Participation of Aboriginal peoples and other interest groups in the management of hyperabundant populations is encouraged, and public education and consultation are integral components of the entire planning and implementation processes.

### **Hyperabundant Wildlife Populations**

A wildlife population in a national park is considered hyperabundant when its size clearly exceeds the upper range of natural variability that is characteristic of the ecosystem (McShea *et al.* 1997). Hyperabundance should be judged in context, as the determination of what constitutes a hyperabundant population is a difficult and on-going challenge to park managers. To warrant management intervention, such a population must meet any one of the following conditions:

- The size of the hyperabundant wildlife population must have exceeded the upper range of natural variability that is characteristic of the ecosystem, and there must be demonstrated impact on ecological integrity.
- Hyperabundance must be as a result of alteration of the natural population regulation mechanisms.
- The survival or condition of one or more native species in the park, in particular species listed under the *Species at Risk Act* (SARA), are threatened or likely to be threatened by the hyperabundant wildlife population unless mitigation is undertaken.

- The ecosystem has experienced impacts outside the historical or modeled range of variation as a result of the presence of the hyperabundant wildlife population.

The policy targets populations of native species in a park, but also applies to those of naturalized species, defined as non-native species that have become so well established in national park ecosystems that it would be impossible (or undesirable) to eliminate them.

### **Legal and policy requirements to manage parks for ecological integrity**

On behalf of the people of Canada, Parks Canada has the mandate to 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. The *Canadian National Parks Act*, first established in 1930, states that parks are dedicated to the people of Canada for their benefit, education and enjoyment and shall be maintained and made use of so as to leave them unimpaired for the enjoyment of future generations. The *Act* was amended in 1988 to require maintenance of ecological integrity through the protection of natural resources be Parks Canada's first priority when considering park zoning and visitor use in a management plan. This significant legislative landmark introduced the concept of ecological integrity as a basic and comprehensive objective for managing, protecting and presenting national parks. By making ecological integrity the goal for park management, the government made it mandatory for action to be taken to define and eliminate the range of internal and external threats to park resources. Over the years, Parks Canada has made significant advances in the use of ecosystem science in combination with societal values to define ecosystem goals and to develop the greater national park ecosystem concept as a way of coordinating the management of parks with and adjacent areas.

Since 1990, the system for assessing the ecological integrity for a park has been significantly refined. In 1997 Parks Canada designed a comprehensive national ecological integrity reporting framework to provide an objective standardized structure for reporting on the overall health of park ecosystems, and the degree they might be impaired by the effects of the stresses they face. The framework took into account the interrelated nature of biodiversity, ecosystem functions, and stressors. In 2000, the *Canadian National Parks Act* was further revised to make maintenance or restoration of ecological integrity through the protection of natural resources and natural processes, the first priority of Parks Canada when considering all aspects of the management of national parks. The amendment made it a legal requirement for Parks Canada to both maintain ecological integrity and restore it in parks with degraded ecosystems. For the first time, ecological integrity was legally defined in the *Canadian National Parks Act* as "...a condition that is determined to be characteristic of its natural region and likely to persist, including abiotic components and the composition and abundance of native species and biological communities, rates of change and supporting processes". The *Act* was further revised to make it mandatory for every park to provide clear and scientifically-defensible assessments of the state of park biodiversity components, natural disturbance processes and rates of change, and to report on the effectiveness of park management activities according to objectives and targets in the park management plan. As a result, every park management plan includes a statement on the desirable state of each park's ecosystem, a strategy for achieving it and a monitoring program to measure performance. Each park's specific objectives are defined based on the best available knowledge, supported by a wide range of research, including a commitment to integrated ecological monitoring to help identify threats and the required remedial actions.

Within the Agency, priority active management and restoration activities for the maintenance and improvement of ecological integrity are identified through Park Management Plans. In many

parks in southern Canada, active management to restore a degraded park ecosystem often requires the management of a hyperabundant wildlife population. Consequently, Parks Canada has developed a new policy on the management of hyperabundant wildlife populations as one of the many steps it is taking to address impairment of a park's ecological integrity. The policy provides a consistent national approach to management of hyperabundant wildlife populations in national parks and promotes the involvement and participation of local communities, Aboriginal partners and other Canadians in the entire planning and management process as a way of enhancing an ecosystem-based approach to biodiversity conservation.

### **Hyperabundance a threat to ecological integrity of national parks**

Canada is divided into 39 natural regions and each park is established to protect representative examples of the ecological processes, habitats, wildlife and ecosystem diversity representative of, and sometimes unique to the natural regions it represents. As a representative of a natural region, each park has an individual character and a unique history, and represents a distinctive feature of Canadian natural heritage.

The ecological impact of hyperabundant wildlife populations threatens the uniqueness and individuality of the parks, and is becoming a growing concern across the country, particularly in parks in Southern Canada. The majority of parks with hyperabundant wildlife populations rarely consist of self-sustaining ecosystems, a factor that impedes their ability to respond to a range of environmental threats. These parks are also threatened by numerous other stresses, many of which originate beyond their boundaries (Parks Canada Agency 2000), and include habitat loss, habitat fragmentation, pollution, changing climate, invasive species and other ecosystem disturbances (Woodley, 2002). In addition, parks are affected by impacts of previous land management practices such as forest harvest, insect control, dams, fire, and carnivore management, among others.

Active management is necessary to compensate for past actions that created unnatural conditions that favored reproduction and survival of some wildlife populations. Loss of large carnivores for example presents a persistent challenge to maintaining healthy populations of large herbivores. The historical losses of wolves from twelve national parks - Cape Breton Highlands, Fundy, Grasslands, Gros Morne, Kejimikujik, Kouchibouguac, Point Pelee, St. Lawrence Islands, Georgian Bay Islands, Bruce Peninsula, Elk Island and Terra Nova, and eminent extirpation from two others -La Mauricie and Riding Mountain national parks (Parks Canada 1998), have created dysfunctional predator-prey systems that necessitate management interventions to prevent deterioration of ecological integrity. Other causes of hyperabundance include food subsidy, reduced competition, redefined ecological niche, and changing climate.

Many studies on the impact of hyperabundant wildlife populations on national park ecosystems have been published. In Gwaii Haanas National Park Reserve in British Columbia for example, research has established that the Sitka black-tailed deer which was introduced in the late 1800s has thrived in the absence of predators or browsing competitors and spread throughout the archipelago, attaining densities in excess of 30/km<sup>2</sup> in some areas (Gaston, Stockton et al. in press). They have drastically depleted the shrub and herb layers of forests, prevented the regeneration of some plant species, and changed the structure, composition and function of native ecosystems, putting several native species and ecological communities at risk of extinction (Buck and Henigman 2000, Golumbia 2004, Reimchen *et al.* in press).

The impact of hyperabundance on ecological integrity is not confined to large mammals. In Point Pelee National Park, Ontario, a high population of nesting double-crested cormorant is posing a serious threat to the Middle Island's rare and fragile ecology where 33 species are already listed

as threatened or endangered. The nests increased drastically from three to over 5,000 in the past 20 years (Waseloh *et al.* 2006, Wires and Cuthbert 2006). The large number of nests, combined with the nesting practices of the double-crested cormorants, have significantly affected the integrity of the island's ecosystem (Duffe 2006, Herbert *et al.* 2005)). Broken branches, trees stripped of their foliage, and the deposition of highly acidic guano on leaves and the soil is altering soil chemistry, causing changes to the soil, and destroying native ground vegetation (Duffe 2006, Herbert *et al.* 2006). A 41% loss in healthy forest canopy vegetation and a decline in species associated with the forest have been reported within the last decade (Koh *et al.* in press, North-South Environmental Inc. 2004,).

Other hyperabundant wildlife populations in national parks include the moose in Gros Morne, Terra Nova and Cape Breton Highlands; elk in Elk Island and Banff; bison in Elk Island; raccoon in Gwaii Haanas and Kejimikujik and whitetail deer in St. Lawrence Island and Point Pelee. Some parks such as Point Pelee, St. Lawrence Islands, Georgian Bay Islands and Elk Islands exist in locations where management options are especially constrained due to inappropriate boundaries or park agreements established many decades ago. Where a park provides the last stronghold for a species or a rare ecosystem, an unmanaged hyperabundant population may be the threat that may drive it to extirpation or extinction.

### **The use of knowledge systems to support good management**

The best available, peer reviewed science must be used to ensure that only populations that meet the criteria for hyperabundance are considered for active management under this policy. Scientific evidence that the population is outside its historical or modeled range of variation must be provided, reasons for hyperabundance must be adequately explained and adverse impact on ecological integrity demonstrated. The biology and ecology of the species must be understood and the regional evolutionary and historic context that has shaped the ecosystem considered. In addition, the impact of the management action must be assessed and understood at the ecosystem level. Up to date information, derived mainly from the park monitoring program must be used to set population management objectives, numerical targets and critical thresholds necessary to achieve the ecological integrity objectives of the park. Management decisions must be made in a manner that allows for the demonstration that actions are based on credible science undertaken in an open, defensible, transparent and inclusive way.

The policy also recognizes the significant role the knowledge of Aboriginal partners can play in understanding the past and providing a long-term perspective on ecosystem dynamics. Their knowledge can help construct a more complete and accurate picture of local environments, and since many Aboriginal communities have historically depended on a resource catchment of only a few hundred square kilometres, a size equivalent to many parks, their knowledge can help uncover ecosystem relationships that may remain undetected by modern science.

In planning for management of hyperabundant populations, the policy recognizes that both modern science and Aboriginal traditional knowledge systems are more likely to help develop goals that reflect the natural condition of the park ecosystem without managing for static ecosystem conditions, or trying to reconstruct the scenes of the last century.

### **Working with the Aboriginal peoples and interest groups**

Significant elements of national parks' ecosystems extend beyond park boundaries and working within a greater park ecosystem context is a great assurance for sustainable conservation of national park resources. As part of Parks Canada's commitment to building strong, effective and mutually beneficial working relationships with conservation partners and interest groups, the new policy requires national park managers to work closely with the Aboriginal peoples, local groups

and interest groups in the planning and management of hyperabundant wildlife populations. The aim is to ensure that Aboriginal peoples and partners have good understanding and appreciation of ecosystem dynamics, the complexity of natural processes and the challenges related to management of hyperabundant populations. Consultations with these groups must be conducted in an inclusive and respectful manner to help explore and clarify personal and cultural values attached to biodiversity, define issues more effectively, access information that may be outside the scientific realm, identify contentious issues, discuss the range of available management options and define and clarify roles and responsibilities of Aboriginal people and partners in the overall planning and management strategy.

While this approach may seem to delay action time, it helps create a sense of ownership of the program, and eliminates or minimizes conflicts during implementation. However, the policy calls for the understanding that park ecosystems have a limited capacity for resilience and emphasizes the need for decisions to be made expeditiously and action taken as early as possible in order to produce the desired results.

### **Choice of methods of managing hyperabundant populations**

Though Parks Canada has a long history of carrying out successful active management programs, some methods for controlling hyperabundant wildlife populations in national parks traditionally draw criticism from some sections of the public and specific interest groups. To ensure no population would be declared hyperabundant without meriting the status, the policy imposes stringent technical and procedural requirements for declaring a population hyperabundant and for developing management plans. While making decisions on control measures for example, the policy requires priority to be given to methods that best contribute to the maintenance or restoration of ecological integrity and, where possible, mimic a natural population mortality process for the species. The methods must have been previously used and found effective in controlling populations of the same or similar species. Both the positive and negative impacts of the proposed management initiatives on the overall ecological integrity objectives of the park must be predicted, and any negative impact must be fully evaluated and strategies for mitigation determined.

In addition, they must be assessed for impact on non-target species, Aboriginal partners, visitors, other park users and staff. Technical feasibility and cost-effectiveness must also be considered. Management involving handling of animals must ensure humane treatment and must be reviewed and approved by the Parks Canada Animal Care Committee. Lethal methods such as culling must only be considered when other methods of population control are not deemed effective or feasible.

### **The hyperabundant wildlife population management plan**

Once consultations have been concluded and the need for active management identified, a hyperabundant wildlife population management plan is developed with clear goals for meeting the ecological integrity objectives of the park, including addressing those conditions responsible for causing hyperabundance. The plan must provide a strong justification for active management, stipulate the potential benefits of the proposed measures, and set population targets and critical thresholds necessary to achieve the stated ecological integrity objectives. It should incorporate a detailed implementation plan, methods to be used, roles and responsibilities of participating parties, costs, timetables, safety requirements and partner-engagement strategy.

The plan must be subjected to peer and public review processes to ensure technical suitability and social acceptance. In addition, it must undergo an environmental assessment as outlined in the *Canadian Environmental Assessment Act*, another process that requires public consultation. As a

result, the final plan is a product of a thorough consultation process that, to the extent possible, reflects the interests and concerns of the consulted parties.

### **Implementation of the hyperabundant population**

The policy recognizes that even well designed management programs can easily lead to totally unanticipated outcomes as future conditions may deviate from predicted patterns due to climatic shifts and random events that cannot be anticipated. As a result, the management plan must be implemented under an adaptive management framework to allow decisions to be made and actions taken as part of an ongoing science-based program of research, monitoring and evaluation, and to incorporate new knowledge into management.

The new management directive is one of many strategies the Agency has designed for addressing issues that affect the ecological integrity of Canada's national parks. The new management directive addresses the issue of hyperabundant wildlife populations while simultaneously dealing with the underlying causes. Use of science and traditional knowledge with public involvement and participation promotes a big-picture ecosystem-based management approach and emphasizes that park management is a shared responsibility.

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