

Determination of ecological boundaries for the establishment and management of Canadian national parks

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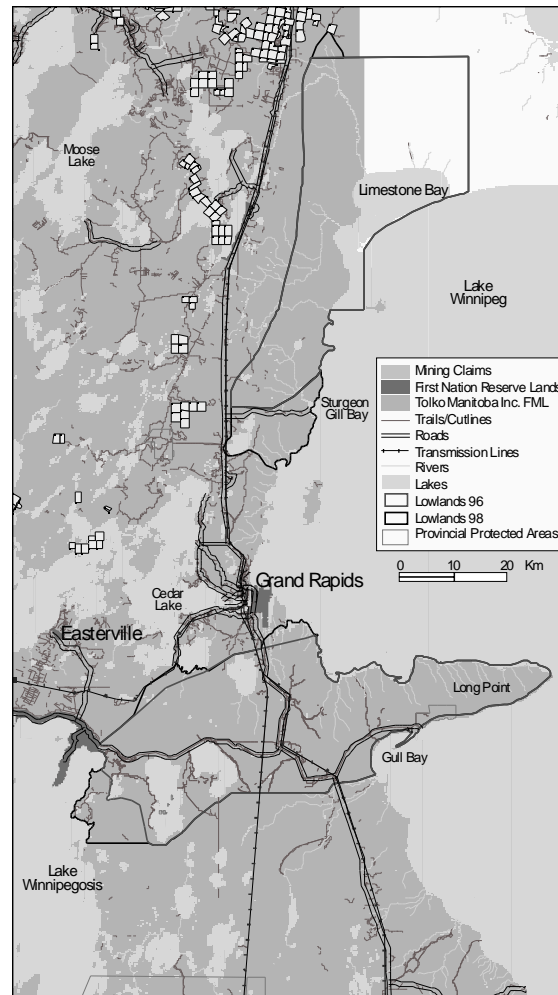
Guiding principles for the establishment of new national parks

When Parks Canada proposes boundaries for a potential national park, the agency's policy (dating from 1994) states that it will endeavor to establish a park with a size and configuration that takes into account a broad range of ecological and socioeconomic considerations. Six of the nine boundary factors listed in this provision focus on maximizing the park's ecological integrity, two address socioeconomic concerns, and the last one relates to Parks Canada's mandate to provide opportunities for public understanding and enjoyment. The first and third criteria tend to increase the size of the proposed park, whereas the second tends to make it smaller than it would be if it were based on ecological and educational values alone (Mondor 2000).

In most cases, the boundaries of Canadian national parks deviate from optimum ecological limits and present significant challenges to park managers. Whether the park boundaries cut across watersheds (e.g., Nahanni National Park, Fundy National Park), include only parts of an animal population's range (e.g., Prince Albert National Park, Riding Mountain National Park), or exhibit a high level of fragmentation (e.g., Prince Edward Island National Park, Point Pelee National Park), the intensity and costs of managing for ecological integrity significantly increase as the park boundaries deviate from ecological boundaries. In light of the revised Canada National Parks Act and the recommendations of the Panel on Ecological Integrity (Parks Canada 2000) to protect for ecological integrity, it becomes critical that newly established national parks aim for sound ecological boundaries or options therein.

Challenged by multiple land use types: the case of the proposed Manitoba Lowlands National Park

The creation of a new national park in the Manitoba lowlands natural region is a key step towards achieving the Government of Canada's commitment to protect representative examples of each of the nation's 39 national park natural regions. Following a feasibility process with the province and consultation with stakeholders, initial boundaries were proposed in 1996 and focused on large areas of relatively undeveloped lands in the northern part of the natural region (Figure 51.1). Concerns were expressed at the time, however, about the ability of the area to sustain ecological integrity. Minor additions were proposed in 1998 to improve representation of key features, but were not endorsed by the industry stakeholders and still did not fully address ecological concerns. This paper presents the approach used to re-examine the proposed boundaries of the Long Point component of the proposed Manitoba Lowlands National Park (Long Point 96), a summary of the results, and a discussion of the value of the analytical approach in light of ongoing negotiations over the status of the area.



J. Wood, 2001, WCSC

Data: Manitoba Conservation, NTDB

Figure 51.1. Proposed park boundaries for the Manitoba Lowlands National Park.

Delineation of ecological boundaries for the Long Point area

The analytical approach used to delineate ecological boundaries follows the process outlined in Figure 51.2 and is based on the parks' ecological goals and objectives of *representation* and *integrity*: representation, to ensure that the composition and abundance of native species and biological communities characteristic of the Manitoba lowlands natural region are reflected in the protected area; integrity, to

ensure that ecological processes and populations of native species are allowed to evolve.

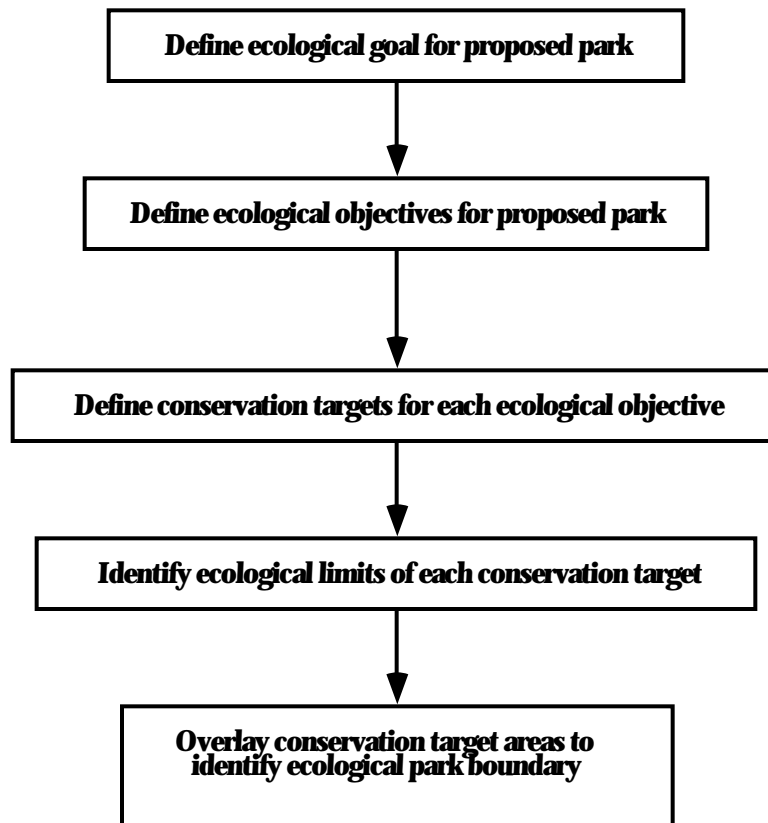


Figure 51.2. Process for defining ecologically sound park boundaries.

Based on the ecological objectives, conservation targets are developed at regional, coarse, and local scales and are used to assess the proposed park boundaries. If the proposed park boundaries fail to meet the conservation targets, new boundaries are identified based on the analysis of available information and best professional judgment (conservation target areas, or CTAs). These are then overlaid to depict the ecological boundaries of the proposed protected area.

Conservation targets and target area for each ecological objective

- **Ecological objective 1:** Represent the terrestrial and aquatic ecological systems that are characteristic of the Manitoba lowlands natural region, reflecting the composition and abundance of native species and biological communities.

“Representation,” as applied to conservation, is a measure of the degree to which a protected area or system of protected areas portrays the biological and physiographic diversity of a natural region. This is the number of characteristic features present in a protected area relative to what occurs in the region. It also has spatial

attributes in considering the proportion and occurrence pattern of these features (Mondor 1997). In order to ensure that special elements and phenomena such as hotspots of endemism, important migratory stopovers, critical breeding areas, as well as geological and soil landscape features are captured by the representational approach, multiple geographic scales are to be considered (Poiani and Richter 1999).

The conservation targets for ecological representation are based on a landscape analysis of the Manitoba lowlands natural region and consist of the following:

1. Objective: Protect regional and coarse-scale diversity of aquatic and terrestrial ecosystems and features. Elements: Diversity of aquatic communities (lakes, wetlands, shorelines); diversity of plant communities (boreal coniferous forest, mixedwood forest, grasslands, deciduous forest); diversity of physical features (ancient beaches and shorelines, limestone karst, calcareous shales). Conservation targets to be representative of the natural region for each element.
2. Objective: Protect important local-scale aquatic and terrestrial patches and site-specific features. Elements: Spawning and nursery areas; artesian springs and tufa mounds; eastern white cedar; endangered, rare, and threatened species and sites. Conservation targets to be included for each of the elements.

Results of the landscape analysis indicate that the proposed Long Point 96 boundaries do not adequately capture the regional representation of plant communities: mixedwood and deciduous forests are represented, but only account for 8% (10,560 ha) of the area (compared with 24% in the natural region as a whole) and occur in patch sizes of less than 400 ha (Figure 51.3). The original 17% prairie grass cover of the natural region is not represented, and it will be impossible to adequately do so in this proposed national park due to land-use changes (i.e., conversion to agriculture) and the proposed park's location, which lies northward of the mixed prairie zone. The boundaries also fail to capture the representation of lake sizes: the number of medium-sized lakes (100-1,000 ha) is under-represented, with only two such lakes included, covering 3% of the total area of the proposed park.

At the local scale, the Long Point 96 boundaries encompass two ecological reserves and sites of threatened and endangered plant species (COSEWIC 2000) but fail to include some areas of local importance, such as caves, artesian springs, and tufa mounds.

To increase representation of aquatic and terrestrial ecosystems, the CTA should include a large area to the southwest of the proposed boundaries (Figure 51.3). This will increase representation of the mixedwood and deciduous forests and the medium-sized lakes. Moreover, local features and rarer plant communities, such as willow shrub stands and marshes, would be better protected.

- **Ecological objective 2:** Maintain ecological processes and characteristic rates of change that support the continued viability of species intact.

The proposed national park's mandate is to ensure that ecological systems and their supporting ecological processes, such as disturbance regimes, are maintained within their natural range of variability over the long term. Fire is the most important factor shaping the boreal forest of the Manitoba lowlands. Unfragmented landscape, or "wilderness areas," have also been recognized as reservoirs of biodiversity and evolving ecosystems. Wilderness areas are parts of the landscape that are unfragmented and distant from human access; an area is considered to be fragmented when it is divided into smaller patches resulting in metrics that differ from those of the natural landscape (Wilcove et al. 1986; Kattan et al. 1994). Such changes in the landscape, linked to habitat loss and increased human access, are usually unfavorable to the reproduction and survival of animal species showing specialization to the

original habitat or landscape. Moreover, populations occupying the smaller patches or fragments are often confronted with a multitude of factors impinging on their survival (Andr n 1994; Meffe and Carroll 1994; Collinger 1996).

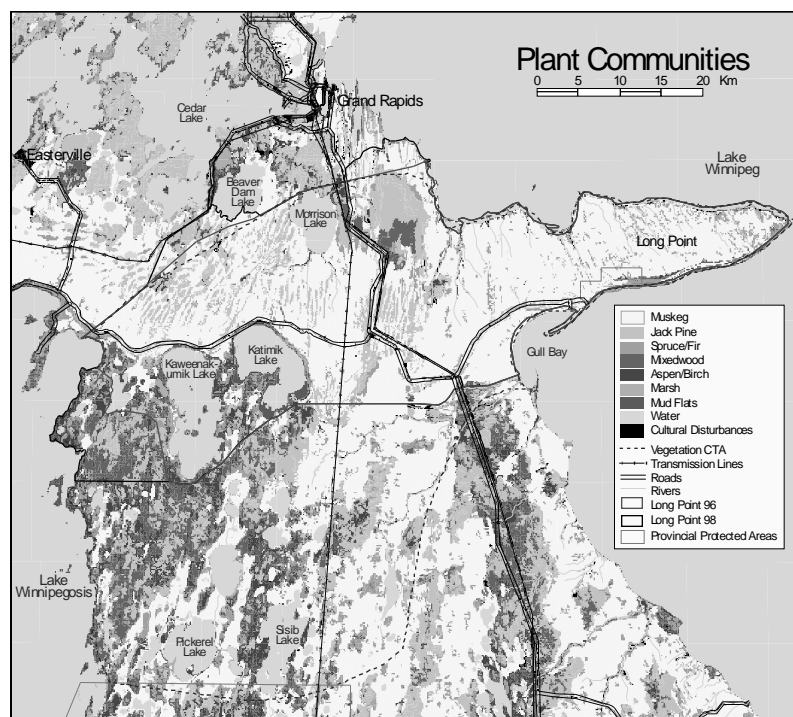


Figure 51.3. Plant communities of the Long Point component.

The conservation targets for ecological integrity, based on a landscape analysis of the natural region, consist of the following:

1. Objective: Protect the ecological integrity of the aquatic and terrestrial ecosystems. Elements: Connectivity between water bodies; include a wilderness area—a landscape that is unfragmented and distant from human access. Conservation targets to be included for each of the elements.
2. Objective: Ensure park size is sufficient to support the region's forest fire disturbance regime. Elements: Include a large wilderness area; natural topography, such as lake and river drainage systems; and a diversity of vegetation. Conservation targets to be included for each of the elements.

The proposed Long Point 96 boundaries do not capture entire watersheds; they also sever seven rivers and creeks and embrace the lake shorelines on just four occa-

sions (Figure 51.4). The proposed boundaries do not secure the protection of spawning and rearing grounds and, on the north, overlap with the Manitoba Hydro water power storage reserve, an area subjected to continual water-level fluctuations. Moreover, the Long Point 96 boundaries include a large number of linear disturbances, including Highways 6 and 16, two hydropower transmission corridors, and a number of winter roads and trails resulting in a road density of 0.24 km/sq km.

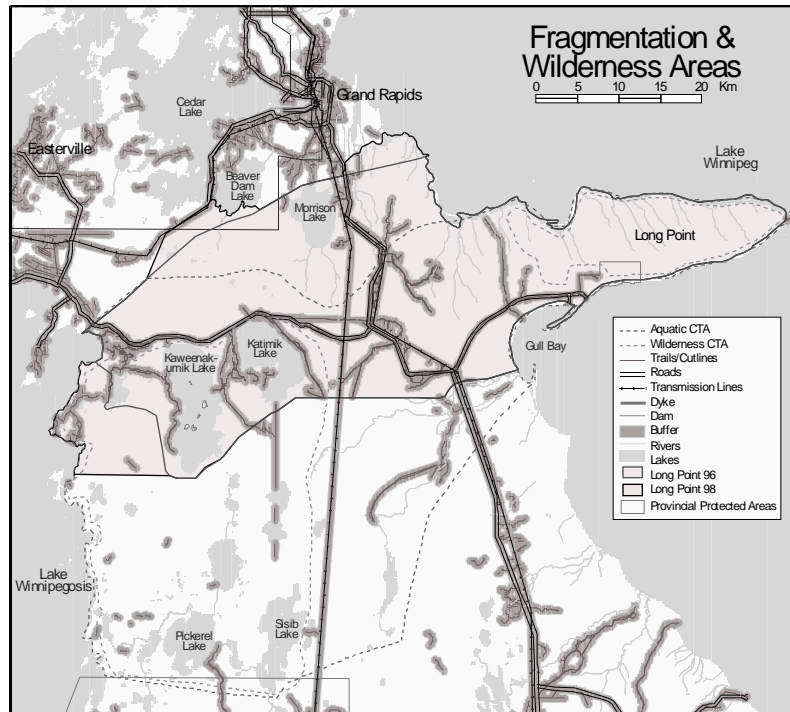


Figure 51.4. Fragmentation and core wilderness area of the Long Point component.

In order to maintain the ecological processes and characteristic rates of change that support the viability of plant and animal species, the proposed CTA includes an area to the south to ensure that waterways are not severed, that lake shorelines include a buffer area, and that a core unfragmented area is included (Figure 51.3). Moreover, this additional area captures a complex pattern of small- to medium-sized lakes with good connectivity, wetlands, and shorelines of great ecological value. The proposed CTA also excludes an area to the northeast to be more distant from the water power storage reserve and the core of Manitoba Hydro activity. The largest unfragmented patch would be twice as large in the CTA (106,930 ha) as that found in Long Point 96 (51,430 ha) and would provide connectivity with another protected area.

- **Ecological objective 3.** Encompass habitat requirements of viable populations of the region's native species, in natural patterns of composition and abundance to the extent possible.

An environment presenting different biotic and structural characteristics offers food and cover for a number of animal species. Some habitats are more productive than others, and are often referred to as "sources." In source habitat, individuals are produced in excess and are led to emigrate to less-productive habitats. These source habitats depend on the species' requirements and other life-history traits. A good representation of these habitats, along with adequate connectivity between suitable patches, is of great importance and is likely to have a significant effect on population numbers (Andrén 1994; Fahrig 1997; Bender et al. 1998).

The conservation targets for viable animal populations consist of the following:

1. Objective: Meet habitat requirements of regional- and coarse-scale aquatic and terrestrial species. Elements: Woodland caribou, wolves, elk, and moose; spawning and nursery areas. Conservation targets to be included for each of the elements.
2. Objective: Meet habitat requirements of local-scale aquatic and terrestrial species. Elements: Staging and breeding grounds for shorebirds, waterfowl, and raptors; habitat for endangered, rare, and threatened species. Conservation targets to be included for each of the elements.
3. Objective: Ensure connectivity between different part of a species' range, between populations and metapopulations. Elements: Corridors to allow species movement between different parts of their range. Conservation targets to be included for each of the elements.

The Long Point 96 component contains source habitat for woodland caribou: lichen-rich boreal habitat consisting of predominately jack pine uplands interspersed with black spruce and tamarack bogs. The 19,920 ha of jack pine uplands are, however, only a fraction of the average home range for woodland caribou (Figure 51.3) and is highly fragmented with more than 24% of the area in roads, trails, or hydropower transmission lines. To help with the protection of this threatened species, it is important to include large unfragmented areas, good winter habitat, and corridors to the north to provide some connectivity with other populations. However, the fragmentation to the north is noteworthy with a large hydropower reservoir, transmission corridor, forestry activities, roads, trails, and townsites.

As another example, the proposed boundaries also contain some high-quality habitat for elk—upland mixedwood forest mainly occurring southwest of the Long Point area (Figure 51.3). Again, the 8,116 ha of mixedwood and deciduous forests only account for a fraction of the species' range; to maintain a viable population of elk, additional range with some connectivity to the Chitek Lake reserve and the remaining part of the species' range is paramount.

The current boundaries of the Long Point 96 component protect important breeding-bird colonies and staging grounds for a large number of shorebirds and waterfowls.

An additional area to the south-southwest of the Long Point 96 area would allow for more unfragmented land, some connectivity with another protected area, and the protection of local sites of importance. The proposed park area remains highly fragmented, however, with more than 16% of the overall area, or 39,948 ha, under some form of linear disturbances. Regional management will be necessary for the long-term protection of the large mammal species.

Boundary or boundaries?

The outcome of the analysis identifies an area south of the proposed Long Point boundaries that is of ecological importance for its terrestrial and aquatic diversity, the integrity of the waterways, and its distance from human disturbance (Figure 51.5). The second significant result of the analysis underlines the necessity to think beyond park boundaries—already at that stage—to maintain some connectivity to the south and to the north for the viability of long-ranging animal species such as caribou, elk, and wolf. This can be achieved through the extension of the park boundaries and other shared-management options.

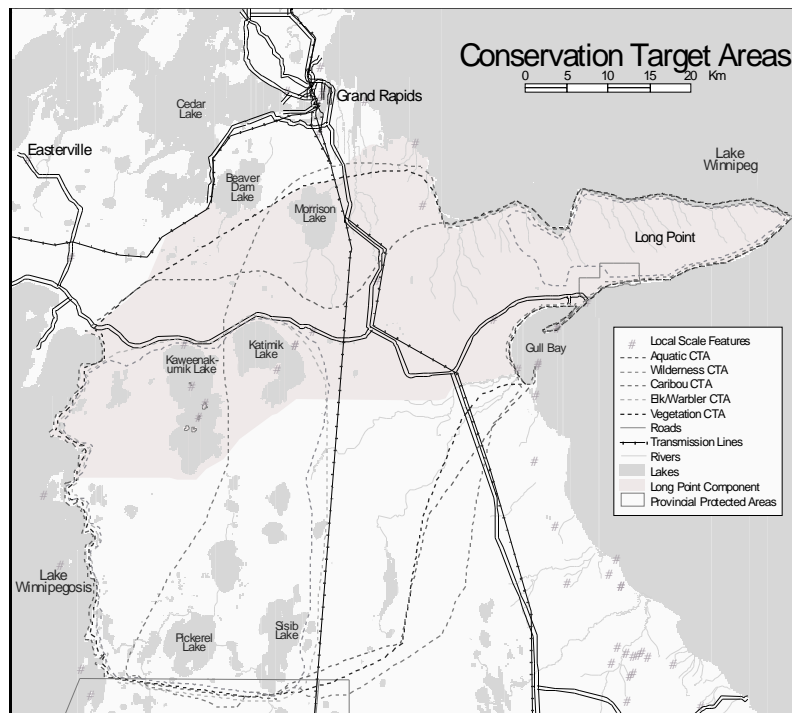


Figure 51.5. Conservation target areas for the Long Point component.

To support negotiations over the status of this land, we opted for a number of boundaries instead of one line on a map for the following reasons:

To ensure the openness of the process and better involve the different stakeholders in the reflection. A number of ecological indicators have been used to portray the Interlake ecosystems, and additional ecological and cultural features will be added as they are identified. People of the Interlake area have an intimate understanding of their homeland and, as the reflection continues, ideas will be shared and built upon, new lines will be drawn and re-drawn, until we have a common vision of the system.

To better contribute to the decision-making process. It is in the power of science to provide information to decision-makers. The multi-boundaries approach, in

providing an understanding of the different ecological processes occurring at different landscape scales, should encourage people to come together to examine and discuss conservation options. In the spirit of ultimately sustaining wildlands and wildlife as well as communities and regional economies, ecological information on these complex landscapes is being conveyed and shared.

Are we going to have ecological boundaries? Forestry and hydropower industries have significant interest in the area, particularly that portion lying to the south-southwest of Long Point. The area is licensed to a forest company and the province is challenged to find compensation (additional wood fiber) for the area. Moreover, Manitoba Hydro's northern generation planning foresees an additional high-voltage transmission corridor through the area. Faced with an already high level of fragmentation, additional access and activities in the area are possible only if carefully planned and mitigated. Conservation of our natural ecosystems can succeed only if there is a concerted effort among stakeholders to develop long-range, integrated conservation and regional plans.

Acknowledgments

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