Ontario's Protected Area System: How can we turn it into a Network (if it isn't one yet), and then what?

William J. Crins
Senior Ecologist
Planning and Research Section, Ontario Parks
Robinson Place, 6th Floor South
300 Water St.
PO Box 7000, Peterborough, Ontario, K9J 8M5
Phone: (705) 755-1946
E-Mail: bill.crins@mnr.gov.on.ca

Abstract

The protected area system in Ontario is composed of the classical regulated protection mechanisms such as national parks, provincial parks, and conservation reserves, but it extends well beyond these mechanisms to include over forty different mechanisms, some of the them public, and some of them private. In order to determine whether or not the system actually comprises a functional network, the full array of mechanisms that provide both full and partial protection must be considered, especially in southern Ontario, where very little land is in public hands. This paper briefly reviews some of the conceptual requirements of a functional network, and proposes a few possible ways in which the present system of protected areas can be assessed, and from there, how a network can continue to be built. Enhanced cooperation and communication among conservation practitioners will be essential.

Introduction

From a biodiversity conservation perspective, the traditional view of protected areas requires that several conditions be met. Generally, these include:

- Strong protection mechanism (legislation or regulation);
- Permanence;
- Exclusion of industrial activities; and,
- Primary focus on biodiversity conservation.

However, there are many other types of areas in a landscape that may contribute to protection objectives in one way or another. Especially within settled and developed landscapes, areas with partial levels of protection play an essential role in contributing to connectivity across the landscape, and in conserving portions of the biodiversity of that landscape.

Thus, the answer to the question, *"what constitutes Ontario's system of protected areas?"*, is not necessarily straightforward. An international conservation organization, the IUCN (International Union for the Conservation of Nature and Natural Resources, now called the World Conservation Union), has developed a classification scheme to account for varying forms and degrees of protection (Phillips and Harrison, 1997). A major advantage of using a classification system such as this is that it enables conservation and protected area practitioners around the world to communicate with a common language. Furthermore, it provides a standard against which to measure the individual components of a protected area system, and to evaluate the contribution of each component.

The IUCN classification system contains six categories, with the first category having two subcategories, as follows:

- Ia: Strict Nature Reserve;
- Ib: Wilderness Area;
- II: National Park;
- III: Natural Monument;
- IV: Habitat/Species Management Areas;
- V: Protected Landscape/Seascape; and,
- VI: Managed Resource Protected Area.

If we expand our thinking beyond the traditional view of protection, the answer to the question of what constitutes Ontario's system or network of protected areas becomes very different. Recent work by the Ontario Ministry of Natural Resources (OMNR) has focussed on categorizing over forty different mechanisms and forms of protection within the IUCN classification system (Gray *et al.,* 2005). Not all of these mechanisms fall within an IUCN category. Thus, they recognize the fact that there are degrees of protection, and they have designed a decision tree for differentiating between full and partial protection. Table 1 outlines the mechanisms of protection (full and partial) that exist in Ontario at the present time. Their work acknowledges the contribution of numerous forms of protection to the protected area network in the province.

The question of what constitutes full versus partial protection is subject to interpretation and debate. Nevertheless, the following definitions may be helpful:

Fully protected: managed on a long-term basis primarily for natural heritage/biodiversity conservation purposes through legal or other effective means; and,

Partially protected: unregulated but having as an objective some level of natural heritage/biodiversity conservation, or regulated but with natural heritage/biodiversity conservation as a subsidiary objective.

Functionality of the Network

If we admit all of the types of protected areas noted in Table 1 into our concept of a protected area network, a more realistic assessment of functionality and connectivity within the network may be possible. First of all, we must determine what constitutes functionality in a network.

A network may be defined as a complex arrangement of intersections and interstices, with interconnections among its segments or parts. If one assesses these elements of a network, it can be argued that the current system is complex, in that it has many parts, of varying sizes and configurations, meeting varying objectives, and represents components of many ecological systems across the province. With regard to intersections and interstices, the system can be considered to be a partial network. In some areas, particularly along water courses, there are intersections with larger terrestrial blocks of natural cover. There are numerous interstices, which are those portions of the land base that are not part of the protected area system. In terms of interconnections, again, waterways provide the major linkages between the non-water-based parts of the system. However, additional connections are provided where the protected area system encompasses lateral features that may run perpendicular or oblique to the water courses, such as end moraines, old shoreline features, and green spaces paralleling transportation corridors.

Functionality, in the context of natural heritage networks, may be understood to mean the maintenance of *"… focal abiotic and biotic patterns and processes within their natural ranges of variability over time frames relevant*

to conservation planning and management (e.g., 100-500 years)" (Jalava *et al.,* 2001: 27). Nudds *et al.* (1998b) provided a discussion of the important attributes of connections, in a protected area network context. They point out that functionality and connectedness are inter-related concepts. Thus, *"...in order to be functional, connections between reserves must provide avenues for dispersal, daily movements, seasonal migration, genetic interchange, range shifts necessitated by changing climatic or environmental conditions, escape to refugia in the case of catastrophic disturbance within reserves, and recolonization following disturbance."* (367) This is a species-centric view of connectivity, and the design parameters for connections would be species-dependent, but it provides a good, tangible basis for thinking about the kinds of attributes that must be considered in the design and assessment of the functionality of connections between protected areas in a network.

Table 1. Types of Protected Areas in Ontario (from Gray et al.*, 2005).*

International	National	Provincial	Municipal	Private
Ramsar Convention Sites	National Parks	Provincial Wilderness Parks	Municipal Parks and Open Space	Eastern Habitat Joint Venture Projects
Biosphere Reserves	National Marine Conservation Areas	Provincial Nature Reserve Parks	Natural Heritage Features in Urban and Rural Areas	Nature Conservancy of Canada Nature Preserves
Important Bird Areas	National Historic Canals	Provincial Waterway Parks	Rouge Park	Federation of Ontario Naturalists Nature Reserves
	National Historic Parks and Sites	Provincial Natural Environment Parks		Bruce Trail Association Properties
	Canadian Heritage Rivers	Provincial Historic Parks		Carolinian Canada Sites
	Migratory Bird Sanctuaries	Provincial Recreation Parks		Conservation Land Tax Incentive Program Sites
	National Wildlife Areas	Conservation Reserves		Managed Forest Tax Incentive Program Sites
	Marine Wildlife Areas (Canadian Wildlife Service)	Wilderness Areas		Ontario Heritage Foundation Properties
	National Capital Commission (NCC) Lands	OLL Forest Reserves*		Conservation Easements
		OLL Enhanced Management Areas*		Land Trust Properties
		Provincially Significant Wetlands		
		Areas of Natural and Scientific Interest		
		Wildlife Management Areas		
		Crown Game Preserves		
		Fish Sanctuaries		
		Niagara Escarpment Commission		
		Niagara Parks Commission		
		St. Clair Parkway Commission		
		St. Lawrence Parks Commission		
		Conservation Authority Protected Areas		
		Remote Tourism Management Area		
		Forest Management Reserves		
		Restricted Access Areas		

**OLL = Ontario's Living Legacy*

Further to the species-based attributes, cycles and fluxes need to be considered as part of the functionality of the network. Thus, sources of energy, water, and nutrients, directionality and variability of flows, and destinations of ecosystem outputs need to be integrated into the design and assessment of protected area networks, as well. In his consideration of ecological integrity in relation to individual parks, Merriam (2001: 7) made similar points regarding *"… a functional set of processes …"*, but stressed the need to examine ecological processes at multiple scales.

There are several possible approaches to assessing the level of functionality and/or connectivity in networks. The simplest approach may be to overlay the existing protected area system with some existing or derived, hypothetical, connected network, and using various metrics to determine the degree to which the existing hypothetical systems coincide. In the case of southern and central Ontario, such a hypothetical network exists in the form of *The Big Picture* [Nature Conservancy of Canada (NCC) and Natural Heritage Information Centre (NHIC), 2003]. Although numerous assumptions were required to derive this network, given those assumptions, *The Big Picture* attempts to derive a parsimonious solution for connecting existing core areas, existing corridors, and potential ecological restoration areas.

Another approach would be to model a functional network by identifying the most parsimonious linkages among the existing protected areas, constraining the model with a set of ecological functionality requirements. Various metrics could then be used, as above, to assess the current system against this newly derived, most parsimonious, functional network.

Both of these approaches would provide estimates of how close we are to having a functional or viable network of protected areas, the first assessed against a target of 30% natural cover (at least south of the Precambrian Shield, as in the first iteration of *The Big Picture*), and the second assessed against a most parsimonious ecological solution, given the present landscape.

It also may be legitimate, in such a large jurisdiction as Ontario, to consider portions of the protected area system, perhaps on an ecozonal or ecoregional basis, in order to assess functionality of parts of the overall system. In a sense, this is the approach that has been adopted by Nudds and his students to assess the protected area system in parts of Ontario (by faunal provinces), using the concept of minimum reserve area (MRA) as it relates to interior forest bird and mammal faunas (Nudds *et al.,* 1998a). Although their approach does not address explicitly the connectivity and flows among components of the system, it assumes that, if enough suitable area of appropriate configuration is available in protected areas, the species that are dependent on that area, and the ecological processes that ensure the perpetuation of functioning ecosystems, will be sustained in those protected areas.

Aside from the work of Nudds and his associates, most of the types of analyses mentioned above have not yet been conducted. However, it is safe to say that, at present, the protected area system, in the broad sense, must be considered to be only a partial network. It contains some of the components of a network, and on a local scale, it may meet the tests of functionality and connectivity. However, on a regional or provincial scale, it is not yet a fully functional network.

Building the Network

As noted above, an examination of the functionality of a protected area network requires some type of ecologically based goal against which to measure. This may be an area goal, a connectivity goal, a biotic goal, or combinations of these. At the provincial level, the goal for the natural heritage areas system is focussed on representation, *"...to establish a system of protected natural heritage areas, representing the full spectrum of the province's natural features and ecosystems."* (OMNR, 1997: 3). Most conservation planning projects concentrate on ecologically defined areas that are considerably smaller than the province. Generally, these

projects identify goals and objectives, and sometimes, also higher level visions, to provide a philosophical context, as well as tangible, shorter term, measurable targets against which to assess progress. Ecoregional conservation planning projects are being conducted by non-governmental and government agencies worldwide (Anderson *et al.,* 1999). In Ontario, some notable examples include the *Great Lakes Conservation Blueprint* (Henson and Brodribb, 2005; Wichert *et al.,* 2005), bird conservation planning under the auspices of the *North American Bird Conservation Initiative* (NABCI), and a protected area network project mandated through the *Canada – Ontario Agreement Respecting the Great Lakes Ecosystem* (COA). All of these projects have the potential to identify areas that would supplement the current system of protected areas, and thus, contribute to the building of a functional network.

The first iteration of *The Big Picture* took a forward-looking approach by developing a vision that 30% of the Carolinian region of Ontario should be in natural cover in 300 years [Nature Conservancy Canada (NCC) and Natural Heritage Information Centre (NHIC), 2003]. This vision provided a framework for developing a hypothetical, efficient, connected network that was built from the existing cores and corridors. Jalava *et al.* (2001: 25) provided a discussion of the approach used in developing this vision, pointing out that the goal was *"… to generate replicable, rule-based mapping of a landscape-scale natural heritage system for southern Ontario … that would increase landscape functionality, ensure ecological integrity, and help to focus biodiversity conservation activity within the region."* Such a vision would help to focus conservation, securement, restoration, and other stewardship activities where they would have the most benefit in building a functional, connected network.

Also focusing on southern Ontario, Wiken (1999) discussed the importance of conveying the vision underlying protected areas, specifically noting that the vision should be credible, authoritative, and understandable, outlining the roles, functions, and purposes of protected areas, including biodiversity conservation, sustainable resource use, health, environment, and the economy. The vision should identify the link between protected areas and research, education, preservation, recreation, leisure, tourism, representation, and wildlife habitat.

Taking advantage of some of the concepts already applied in conservation planning initiatives, then, some of the elements of a vision for the protected area network for the Great Lakes Basin, or for the province as a whole, should include the network being:

- Protected;
- Representative at multiple scales (ecosystems, species, populations);
- Connected;
- Functional;
- With soft edges, where possible;
- With ecological integrity; and,
- Monitored, with adaptive feedback loops for ecosystem-based management.

The last element, monitoring in an adaptive management context, will be necessary to determine if the vision and its subsidiary goals and targets are being met. A monitoring program should be designed in such a way that reporting of progress can be made at regular intervals, and also so that there is a feedback mechanism to adjust goals or targets, if necessary, or to identify problems of design and functionality within the network.

Some of the elements of a vision for the protected area network are already in place. Broad policy direction exists in the forms of *Nature's Best* (OMNR, 1997) and *Our Sustainable Future* (OMNR, 2005a), where the desired components of a protected area system are identified, and where ecological sustainability is identified as the mission of the Ontario Ministry of Natural Resources (under whose mandate substantial portions of the protected area system fall). Parks Canada has a mandate to ensure ecological integrity in its holdings,

and has been applying the *"greater park ecosystem"* concept in an attempt to provide a broader landscape context for its parks (Parks Canada, 2002). At the local level, various mechanisms, tools, and programs are in place to assist with the building of the protected area network. These include planning designations that may result in open space and environmentally sensitive area designations, the *Provincial Policy Statement* that indicates that municipal plans must be consistent with several categories of provincially significant natural heritage features [Areas of Natural and Scientific Interest (ANSI), wetlands, endangered and threatened species, woodlands, valleylands, and wildlife habitat], and tax incentive programs for private land owners and environmental non-governmental organizations, to name a few. All of these contribute to the development of a connected, functional protected area network.

Current and Future Needs with Regard to the Network

Clearly, the development of a functional network of protected areas in the province will require continuing efforts to retain the existing cores and corridors, and to build up cores and corridors where these are too small to be functional, or where they do not exist at all at present. Conservation practitioners (government departments at all levels, environmental non-governmental organizations, stewardship councils, etc.) must keep an open mind with regard to the mechanisms that can be used to conserve or build these cores and corridors. As noted in Table 1, there is a plethora of types of protected areas, and there are numerous conservation and stewardship tools available to assist with the development of such a functional network. Conservation practitioners also must remember that this will be an ongoing, long-term process, as acknowledged in *The Big Picture*.

To assist with the task, a broad and long-term vision for the protected area network must be adopted. This vision must be adaptable to take advantage of future conservation achievements, but it must contain the necessary requisites of functionality, representation, and connectivity. As noted above, there are many conservation planning initiatives underway or recently completed in Ontario. Some of these include T*he Big Picture*, the *Great Lakes Conservation Blueprint* (OMNR, 2005b), the *North American Bird Conservation Initiative* (BSC, 2005), the *Oak Ridges Moraine Conservation Plan* (MAH, 2002), *Natural Spaces* (OMNR, 2005c), the *Northern Boreal Initiative* (OMNR, 2001), the *Superior Mixed Forest Conservation Plan* (NCC, 2002), watershed planning, and the Forest Stewardship Council's forest certification program. In the context of the vision that will be adopted, there will be a need for more effective cooperation and communication among the host of conservation agencies and practitioners in all aspects of network design, establishment, and maintenance, including monitoring.

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