Science, Information and Research Needs for Ontario's Parks and Protected Areas in the Canadian Shield

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Abstract

Curiosity about the natural world, and concern for its preservation, helped to forge early scientific interest in parks and other protected areas in many jurisdictions. Contemporary understandings of ecological sustainability and biodiversity have reinforced these early motivations and interests among both scientific and agency personnel. Ontario's system of provincial parks and other protected areas currently reflects these inclinations through a well-established tradition of research. A central aim of the parks and protected areas system is to represent a cross-section of the ecological and geological diversity of Ontario and thereby secure baseline opportunities for research, monitoring and understanding of the province's natural diversity. Although the research record documents projects in a wide spectrum of disciplines, historical patterns of research demonstrate a very strong focus on biological research with more than 75% of all documented studies in this category. Notwithstanding the value of parks and other protected areas in furnishing opportunities for both pure and applied research, current efforts by Ontario Parks seek to attract more studies of direct relevance to planning, managing and monitoring park ecosystems and their associated values and benefits. Efforts are being made to engage scientists in the Ontario Ministry of Natural Resources (OMNR) through OMNR's Science Team and its corporate science, information and research strategy. Concurrently, Ontario Parks' involvement in the Parks Research Forum of Ontario (PRFO) and other collaborative ventures is seeking to attract wider scientific support and involvement in these efforts.

Introduction

The relationship between parks and protected areas and science and research has been a long-standing one motivated by mutual interests in conserving natural diversity and understanding Nature. For their part, natural scientists have been persistent advocates for parks and protected areas as one means to conserve natural diversity and to secure ecological areas for scientific study. Motivated more by recreational mandates than scientific reasons in the past, land management agencies are now increasingly supportive of such designations as cornerstones in efforts to achieve ecological sustainability and biodiversity conservation, both of which demand more scientific rigour.

This paper examines contemporary needs for science, information and research for planning and managing provincial parks and other protected areas in Ontario. Specifically, its aims are threefold: 1) to elaborate the context for identifying contemporary needs and priorities; 2) to relate briefly past research trends and activities; and, 3) to address implementation aspects to meet new challenges confronting park and protected area agencies today. Although dwelling on the mandate of Ontario Parks to plan, protect and manage Ontario's provincial park

system, many of the issues and ideas have relevance for parks and protected area agencies elsewhere in Canada and North America.

In many respects, this is a timely and topical review in Ontario. The Precambrian Shield houses the backbone of the provincial parks system, including many of its most significant foundation parks, such as Algonquin established in 1893, Quetico in 1904, and Lake Superior and Sleeping Giant in 1944 (Killan 1993). New administrative authorities for the provincial parks programme through the creation of Ontario Parks in 1994 (OMNR 1996a), coupled with its protection mandate and new outlook for ecosystem management, have strengthened the organization's view of science, research and information needs. These directions are further reinforced by *Nature's Best,* a provincial initiative committed to ecological sustainability including the completion of a system of parks and other protected areas (OMNR 1997b).

The Scientific Context

Science, information and research have long been regarded as pursuits associated with the establishment, management and use of parks and other protected areas. Indeed, the recent surge to expand park systems around the world is largely motivated by scientific interests and ideals to protect ecosystems and natural features for heritage conservation, research, education and appreciation (Green and Paine 1997). Much of that thrust derives from earlier inclinations, reflected in land-use philosophies such as that of Aldo Leopold (Leopold 1949). Another stimulus has been the movement to establish professional organizations such as the Natural Areas Association and the George Wright Society in the United States, and the Canadian Council on Ecological Areas and the Science and Protected Areas Association in Canada. So while parks and protected areas were largely regarded as "set asides", "withdrawals" or "reserves" by land management agencies in the past, scientific interests have influenced their broader acceptance today.

Over the past decade, new imperatives have emerged to strengthen the scientific support for parks and protected areas. Notable among these is the broadening recognition and support for parks and protected areas as exemplified in the *Canadian Forestry Accord* and the *National Forest Strategy* (CCFM 1992), the signing and ratification of the *United Nations Convention on Biological Diversity* (UNEP 1992), the development of the *Canadian Biodiversity Strategy* (BCO 1995), and efforts by organizations such as the Canadian Council on Ecological Areas (Gauthier et al 1995; Gauthier D. 1992) and World Wildlife Fund Canada (Hummel 1989; Kavanagh and Iacobelli no date; Noss 1995) which promote the completion of a Canadian system of parks and protected areas. At the same time, new perspectives on conservation biology and landscape ecology have highlighted serious concerns about the design and management of protected areas for the conservation of species and spaces (Riley and Mohr 1994; Poser, Crins and Beechey 1993; Noss 1995, 1992; Grumbine 1990).

Today, a fuller understanding of our relationship with Nature is manifest in new paradigms that we express as "biodiversity conservation", "ecosystem management" and "ecological sustainability". These templates relate to a more sophisticated land-use philosophy, more fully embraced by both land management agencies and scientific sectors, that places paramount importance

on the need to sustain ecological features, processes and systems as prerequisites for ecological sustainability. Parks and protected areas are a central component in these new paradigms, which more than ever rely on environmental benchmarks to assess our ability to manage ecosystems in a sustainable way. So, today, the importance of parks and protected areas to land-use management is greater than ever before, and their broad-based acceptance has been fortified by new ecological understanding.

These overall trends are manifest in Ontario. As early as the 1950s, the notion of "representation" emerged in connection with the efforts of the Department of Lands and Forests to identify sites for wilderness areas that were ultimately protected under the new *Wilderness Areas Act,* introduced in 1959. Subsequently, the activities of the International Biological Programme (IBP) in Ontario involved leading scientists and agency personnel in efforts to identify almost 600 representative and special natural areas for conservation purposes, including scientific research and education. The *Provincial Parks Policy*, first approved by the Ontario Government in 1978, reflects many of the scientific principles introduced through the IBP/CT (Beechey, 1980). Strategic land-use planning in the 1980s virtually doubled the provincial parks system (OMNR 1983), while efforts through the ongoing *Lands for Life* planning exercise provide another opportunity to add substantially to the system (OMNR 1997a).

Today, the relationship between parks and protected areas and science and research is largely a mutually supportive and beneficial one in regard to achieving ecological sustainability. In short, parks and protected areas provide the following functions: 1) they preserve unique and representative segments of natural and cultural diversity; 2) they serve as benchmarks to gauge and to assess the effects of environmental changes, such as global warming; 3) they provide secure locations for long-term, time-trend research and cumulative effects monitoring; and 4) they provide living laboratories for training, educational and interpretative programming. In turn, science and research activity confer the following benefits: 1) they strengthen the rationale for and improve our understanding of parks and protected areas; 2) they generate essential information and knowledge to inform management efforts in and beyond protected areas; 3) they provide the intellectual and educational dimension for interpretative programming; and, 4) they extend the sense of ownership for protected areas (Beechey 1996).

Provincial Parks in the Canadian Shield

The Canadian Shield is a vast area of ancient Precambrian bedrock comprising the central core of Canada's mid-north. In Ontario, the Shield includes approximately two thirds of the province—an area twice the size of the British Isles (Figure 1). Comprised of four distinct structural provinces in Ontario, it is highly diverse in its geological make-up and landscapes, which contain dramatic physiographies, thousands of lakes, river systems, watersheds and wetlands. The Shield is home to most of Ontario's vast Boreal and Great Lakes-St. Lawrence Forest regions. Not surprisingly, the Shield is rich in Aboriginal and European history and culture, and today, remains a primary source of natural resources—forest products, minerals, fisheries and wildlife. For parks and protected areas, the region is a storehouse of natural heritage, ecotourism and

recreational values providing most of Ontario's accessible wilderness areas, waterways and natural environments.

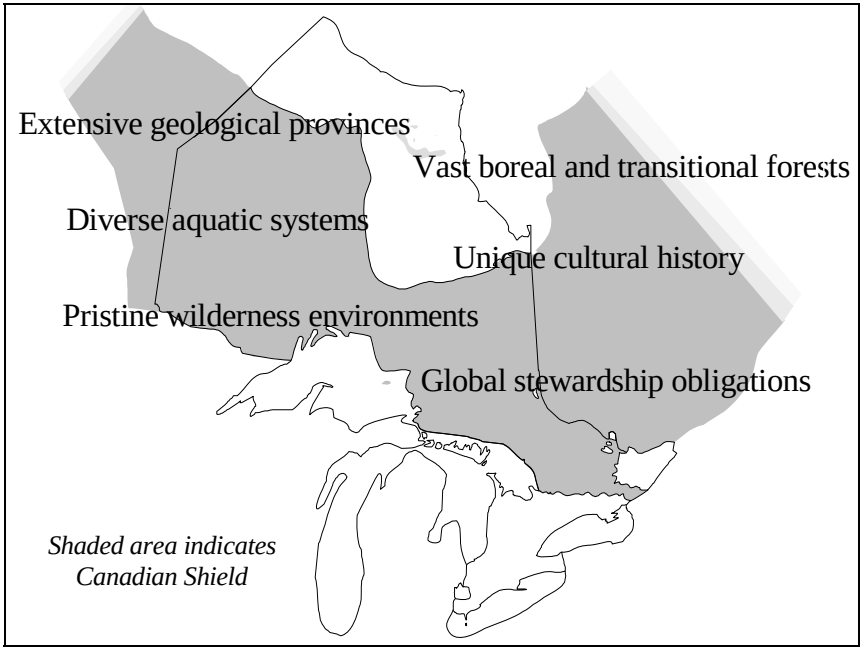

Figure 1: The Canadian Shield

As announced in February 1997, the provincial government has initiated a comprehensive land-use planning process called *Lands for Life*, which is seeking to allocate natural resource and heritage values for protection and appropriate utilization across the broad forested region of Ontario that generally corresponds with the Canadian Shield (OMNR 1997a). The efforts to establish new provincial parks and other protected areas, generically referred to as natural heritage areas, takes its direction from a parallel commitment set out in the document *Nature's Best: A Framework and Action Plan* (OMNR 1997b). *Nature's Best* is provincial in scope and specifies three broad regions–essentially southern, central and northern Ontario–where approaches to heritage protection will be specially tailored to the particular needs of these regions (Figure 2).

The selection, planning and management of provincial parks in the Canadian Shield are guided by *Ontario's Provincial Parks Policy* (OMNR 1978a) and the companion *Ontario Provincial Parks Planning and Management Policies* (OMNR 1978b). First adopted by the provincial government in 1978, these policies set out the goal, objectives, principles and park classification guiding the planning, protection and management of the provincial parks system. The goal is to provide a variety of outdoor recreation opportunities and to protect provincially significant natural, cultural and recreational environments. The protection and heritage appreciation objectives address the conservation of ecological, geological and cultural values, while the recreation and tourism objectives deal with day use, car camping and back country recreational activities. Guided by

systemic approaches, the policies are defined to include targets for wilderness, natural environment and waterway clases of parks (Davidson 1997a, McCleary *et al* 1992).

Figure 2: *Nature's Best* Planning Regions

Park targets are defined on the basis of frameworks that have been developed to organize the natural and cultural diversity to be represented in Ontario's provincial parks system. Geological targets have been derived through a classification that recognizes 44 themes and more than 1200 features including rock types, fossil assemblages, landforms and associated geological processes (Davidson 1981). Ecological targets include species, site types, vegetation communities and landscape patterns characteristic of the 14 site regions and 67 site districts in Ontario (Beechey 1980). Cultural targets are based on a topical organization of Ontario's human history that recognizes 13 themes containing 115 theme segments spanning recorded human occupation of the province (OMNR no date). Park classes, notably wilderness, natural environment and waterway, are vehicles to capture assemblages of these units, with nature reserves and historical parks being assigned specifically for representing natural and cultural diversity respectively (Davidson 1997a).

Wilderness parks are substantial areas where the forces of nature are permitted to function freely and where visitors travel by non-mechanized means and experience solitude and personal integration with nature. The target for wilderness class parks is to establish one park, 50,000 hectares or greater in size, or an equivalent size national park, and one complementary wilderness zone of 5000 hectares in size or greater, in each of Ontario's 14 site regions. By virtue of their size and natural condition, wilderness parks afford unique opportunities to study landscape scale ecosystems and the processes that sustain them, and associated back country use. Currently seven of nine site regions on the Canadian Shield include wilderness parks, and seven of nine regions contain wilderness zones (Figure 3)* (Davidson 1997a).

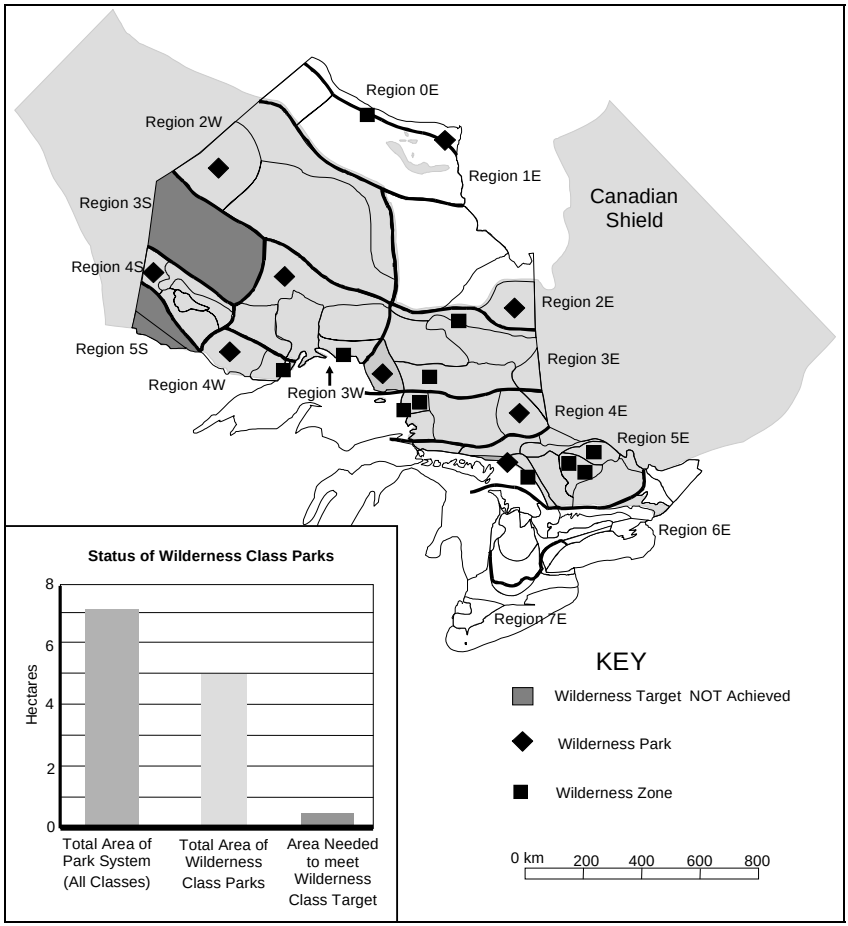

Figure 3: Wilderness Park Class Target Achievement

* The insert graphs in Figures 3 to 6 show the total areas within wilderness, natural environment, waterway, and nature reserve park classes as well as conservation reserves. These figures also show the area needed to meet the target for each.

Natural environment parks incorporate outstanding recreational landscapes with representative natural features and historical values to provide high quality recreational and educational experiences. The target for natural environment class parks is to establish one park, 2000 hectares or greater in size or an equivalent natural environment or wilderness zone, in each of Ontario's 67 site districts. Though generally much smaller than wilderness parks, natural environment parks still encompass substantial natural areas that provide important opportunities for scientific research and environmental monitoring. Currently, 59 of 67 site districts contain a natural environment park (although 17 of these are less than 2000 hectares in size) with absolute gaps in only three of the 42 site districts in the Canadian Shield (Figure 4) (Davidson 1997a).

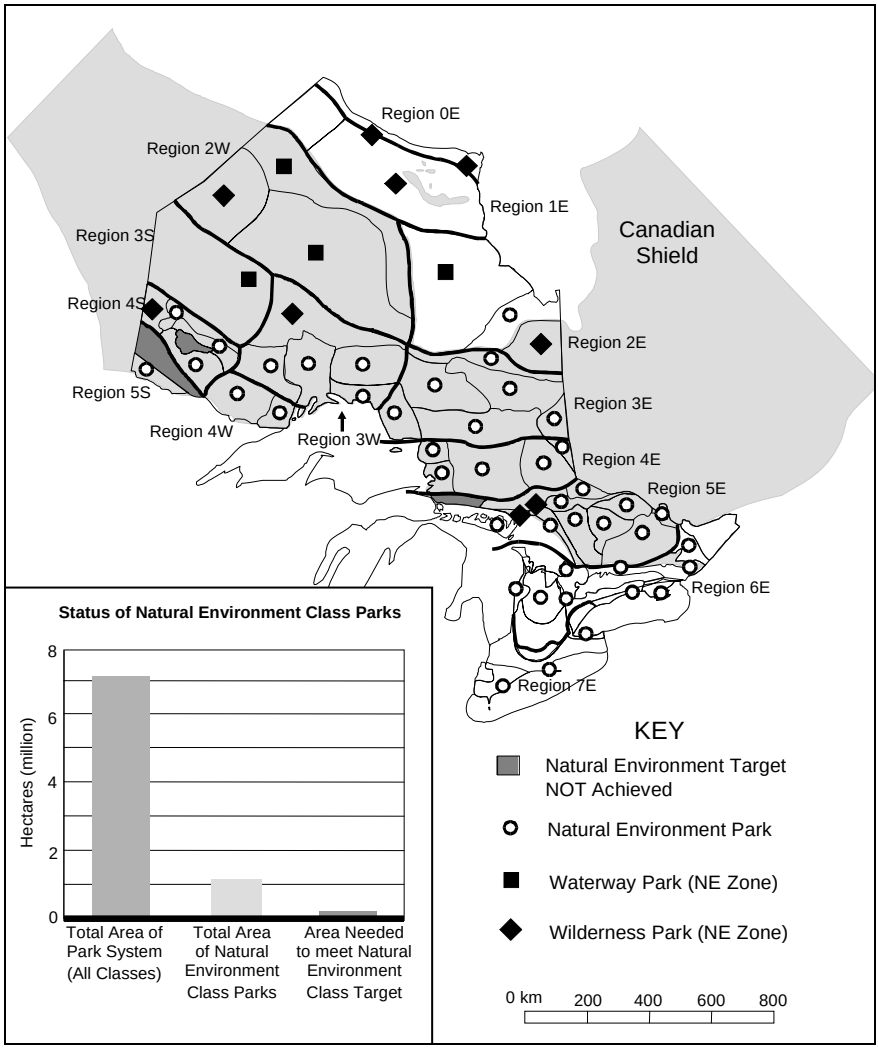

Figure 4. Natural Environment Park Class Target Achievement

Waterway parks incorporate outstanding water routes with representative natural features and historical values to provide high quality recreational and educational experiences. The target for waterway parks is to establish one park, having a minimum 200 metre setback from the river, or an equivalent waterway corridor in each of the 67 site districts. Waterway parks present diverse opportunities for research into human history and settlement patterns and the physical and biological sciences. At present 37 of the 67 targets have been achieved, mostly in northern Ontario, with only eight of the 42 site districts in the Canadian Shield having no waterway parks. Another 12 properly designed areas could complete representation in northern Ontario, while complementary approaches may need to be adopted in southern Ontario where no waterway parks currently exist (Figure 5) (Davidson 1997a).

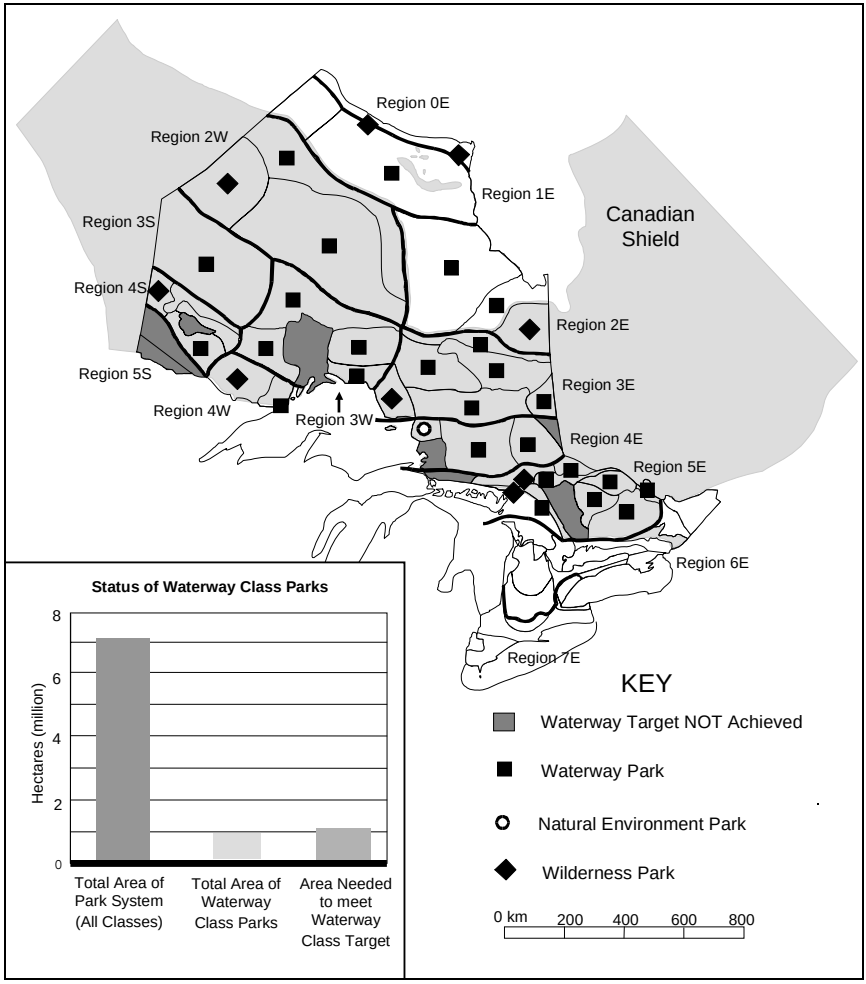

Figure 5: Waterway Park Class Target Achievement

Nature reserves are areas selected to represent the distinctive natural habitats and landforms of the province and are protected for educational purposes and as gene pools for research to benefit present and future generations. Protection targets for nature reserves are determined by geological and biological frameworks that define the natural features to be represented. Nature reserves are selected to represent and protect Ontario's most significant natural features, landscape segments, habitats and species. Owing to the diverse range of natural features that they contain, and the high degree of protection afforded to these areas, nature reserves are ideal sites for scientific research and monitoring. Although 63 of the 94 nature reserve parks in Ontario occur within the Canadian Shield, extensive gaps still exist in most regions (Figure 6) (Davidson 1997a).

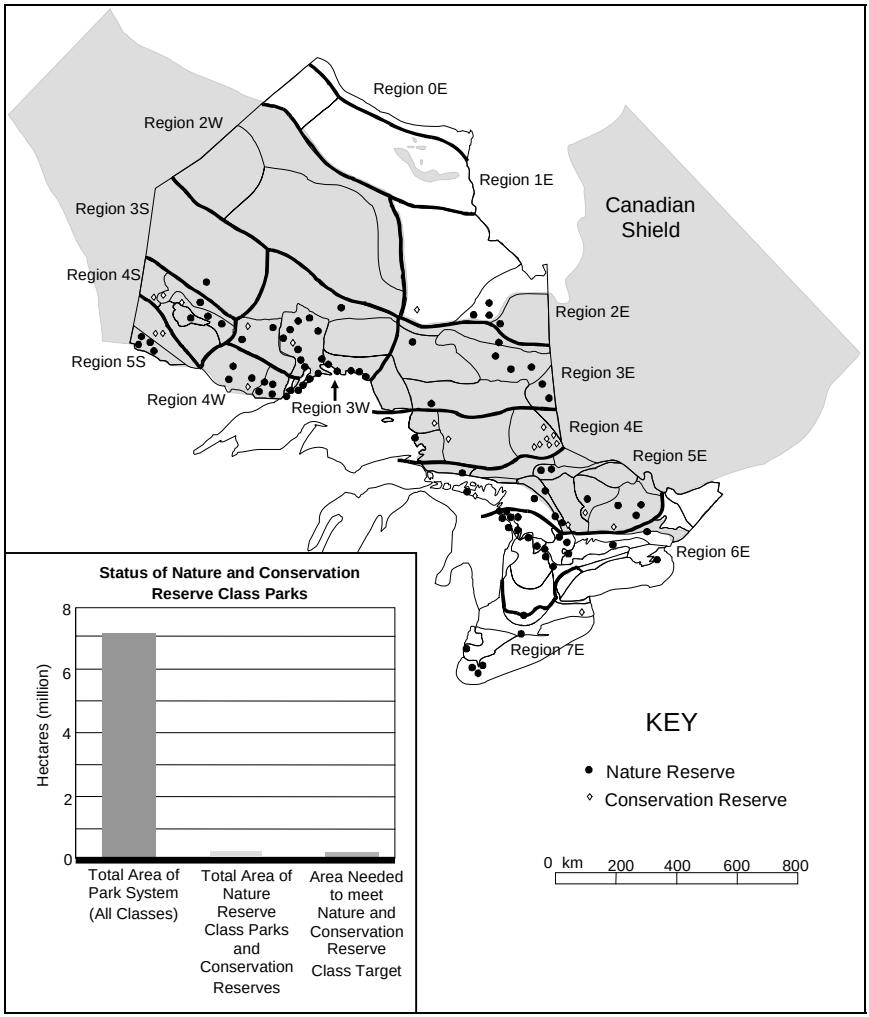

Figure 6. Distribution of Nature Reserve Class Parks and Conservation Reserves.

Two other park classes, historical parks and recreation parks, make up the remainder of the provincial parks system. Historical parks are areas selected to represent the distinctive archaeological and historical resources of the province protected for interpretation, education and research. Recreation parks provide a wide variety of outdoor recreation opportunities such as car camping and day use activities in attractive semi-natural outdoor settings.

In 1994, a new category of protected areas called conservation reserves was established to provide protection for significant geological and ecological areas. Conservation reserves prohibit logging, mining and hydro-electric development, while permitting other selected traditional uses such as hunting, trapping and fishing making them less suitable than nature reserves as baselines for research, environmental monitoring, education and heritage appreciation. Conservation reserves are established through regulation under the *Public Lands Act* and managed in accordance with provincial policies for this designation. Since their inception in 1994, 23 conservation reserves with a total of 68,734 hectares have been regulated (Davidson 1997a).

To summarize, the Canadian Shield houses an impressive network of provincial parks created through ongoing efforts dating back to the establishment of Algonquin Park in 1893. Notwithstanding this important achievement, additional well-designed wilderness, natural environment, waterway, and nature reserve parks are still required to meet current park system planning objectives. As well, the design of many existing provincial parks in all classes could be improved with boundary amendments to augment representation, incorporate special features and enhance ecological integrity. These steps have an important bearing on the adequacy of the provincial parks system to meet scientific, research and associated educational objectives.

To address these system planning needs, gap analysis (Crins and Kor, this volume) is being combined with the assessment of previously documented natural areas to identify candidate provincial parks and conservation reserves to be considered through the *Lands for Life* planning programme. In addition to these area identification methodologies, further consideration is being given to the evaluation of special features, including flora and fauna, and systemic design considerations that will enhance the ecological integrity of the overall system. Taken together, these measures address system planning requirements in a manner that will strengthen the value of the provincial parks system and other protected areas for scientific research and environmental monitoring.

Research Trends in Provincial Parks

Past trends demonstrate a diverse record of research in provincial parks driven by agency-based planning and management needs and external scientific interest. From a programme standpoint, basic survey and inventory work over the past three decades have provided considerable baseline documentation on the provincial parks system. Geological surveys have provided reporting and mapping of bedrock and surficial geology in many provincial parks. Ecological surveys have generated vegetation mapping with accounts of the flora and fauna in many parks. Archaeological and historical studies have documented pre-settlement and settlement artifacts and conditions. And socio-economic studies, including user surveys, have been conducted on a regular basis. This

information has been widely applied to develop park management plans and assist with heritage protection, management and visitor services programming.

Scientific research by the external scientific community has been more wide-ranging and less focused on its specific application to meet park planning and management needs. Here efforts have spanned projects from basic surveys and inventories through studies of ecosystem process and function. Classic long-term studies have been completed to demonstrate population dynamics, other ecological trends over time, and the influence of environmental perturbations on natural systems, features and processes. The extent and depth of such studies attest to the significant benchmark role of provincial parks, and their increasing importance in future efforts to manage surrounding landscapes and resources in a sustainable manner.

The foregoing trends have been fueled by a variety of circumstances. First and foremost, there has been a long-standing scientific interest in parks and protected areas, with research in many areas even pre-dating the formal designation of many sites. In some cases, such as Schreiber Channel, on the north shore of Lake Superior, and Ojibway Prairie, in the city of Windsor, extensive scientific interest is the primary motivation for establishing areas as provincial nature reserves. In the 1960s, an initial research policy for provincial parks attracted further scientific interest, which increased with subsequent promotion in the last three decades. More intensive marketing of research needs and opportunities in provincial parks in the 1970s drew peak interest coincident with the environmental movement and availability of funding (Figure 7).

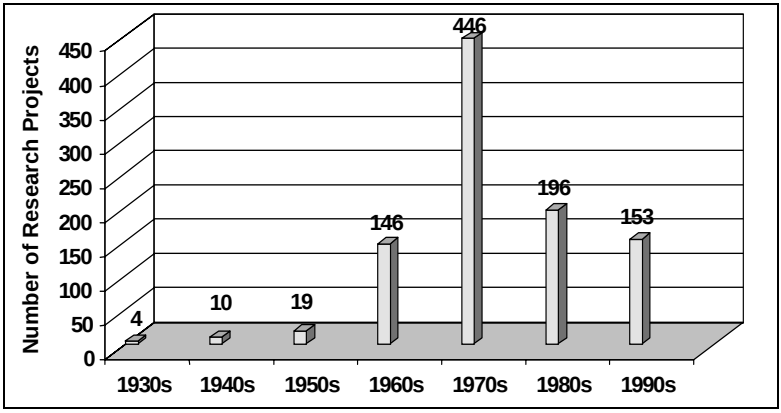

Figure 7. General Trend in Park Research Activity by Decade.

An assessment of some 1500 records of research in provincial parks by discipline indicates that activity in biological research far surpasses all other research activity. This reflects the pre-disposition of the biological fraternity to pursue research on natural ecosystems, features and processes which often coincide with parks and protected areas. Some of this skewed interest reflects the considerable research on forest ecosystems, fish and wildlife associated with the Ministry's research orientation to help serve its conservation mandate in these programme areas. Conversely, the comparatively low research activity by other disciplines reflects less interest in these sectors, motivated by more wide

ranging research pursuits less reliant on the unique opportunities associated with natural ecosystems found in provincial parks (Figure 8).

Research efforts in provincial parks are heavily skewed, with concentrated activity in a few parks and relatively little to none in others. For example, more than 400 research projects have been documented for Algonquin Park, since the introduction of an application and approvals process. The park bibliography includes more than 1800 citations, with references to a great deal of additional research pre-dating the formal research application procedure (Tozer and Checko 1996). By comparison, other provincial parks with far more modest, but still substantial research records, such as Killarney, Rondeau, Presqu'ile, Long Point and Lake Superior, together, have less than 100 approved projects on file. Figure 9 depicts the overall pattern of research for this suite of parks when broadly segregated into "Shield" (Algonquin, Killarney and Lake Superior) versus "Non-Shield" (Rondeau, Presqu'ile and Long Point) parks.

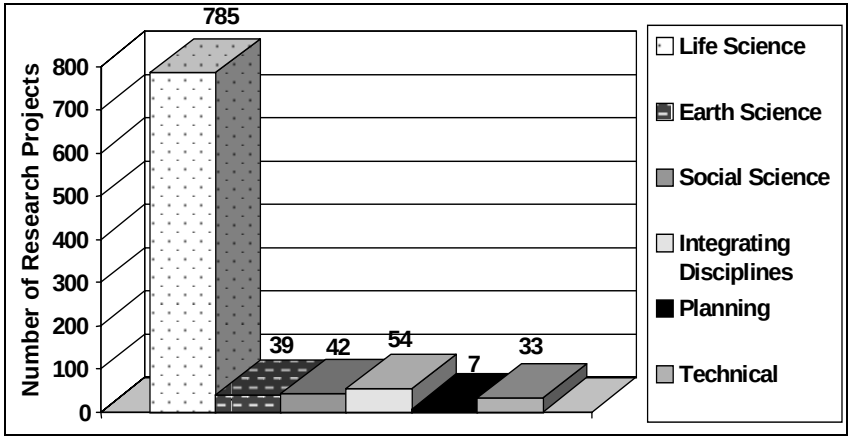

Figure 8. General Trend in Park Research Activity by Discipline.

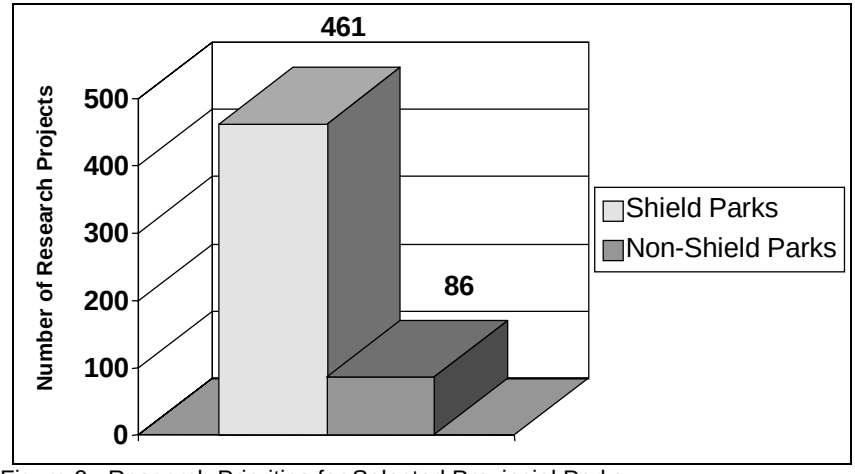

Figure 9. Research Priorities for Selected Provincial Parks.

A review of research records for provincial parks reveals other interesting facets about the nature of the clients and their activities. Not surprisingly, most researchers are from Ontario, either associated with universities or government agencies. While personnel from all Ontario universities are represented in the client profile, some, such as the University of Toronto, University of Waterloo and University of Guelph stand out for their extensive contribution. Among government agencies, noteworthy contributors include the Ministry of Natural Resources and Agriculture Canada. The records also document a number of long-term studies, such as the small mammal population work of J. B. Falls and his students beginning in 1952 in Algonquin Park, and wolf studies by the late D. Pimlott, J. Theberge and their students dating back to 1963 in Algonquin.

In summary, the research records for provincial parks, although far from complete, document some interesting patterns of use. Concentrated research occurs in relatively few parks across the system. Past and ongoing efforts are heavily focused on the natural sciences, mainly biology. The work tends to be focused on narrow topics, often based on one or a few species, rather than broad-based systemic studies with broad ecological application. And finally, overall activity peaked in the 1970s, showing subsequent declines probably associated with funding levels and interest which also peaked during this period of the environmental movement.

Current Research Needs and Priorities

The extensive record of research in provincial parks demonstrates the important role that these areas play in providing opportunities for both pure and applied research. Notwithstanding their importance for pure research, new challenges facing parks and protected areas highlight the need to generate more applied research directly oriented to protecting and managing these areas. Common needs and experiences worldwide have led to the formulation of guidelines for research on parks and protected areas (Thorsell 1992). In general terms, three closely related research streams can be identified around the broad themes of “building”, “managing” and "monitoring” the system (Figure 10).

In regard to building the system, there is need to adopt a more holistic outlook that embraces not only the natural sciences, but also the social and economic aspects of parks and protected areas, with emphasis on the many benefits that accrue from these areas (Whiting 1998 and this volume; Wells 1997; Stanley 1997; Mosquin, Whiting and McAllister 1995). While more research is required to better define and update approaches and targets for representation, complementary efforts also are required on the social and economic dimensions. These needs are predicated on better documentation and evaluation of heritage and recreational assets and the management of values to sustain appropriate visitation and use. The realization that park agencies must become more self-reliant necessitates careful evaluation and assessment of heritage assets to insure that these values are not compromised by traditional uses and new enterprises such as ecotourism.

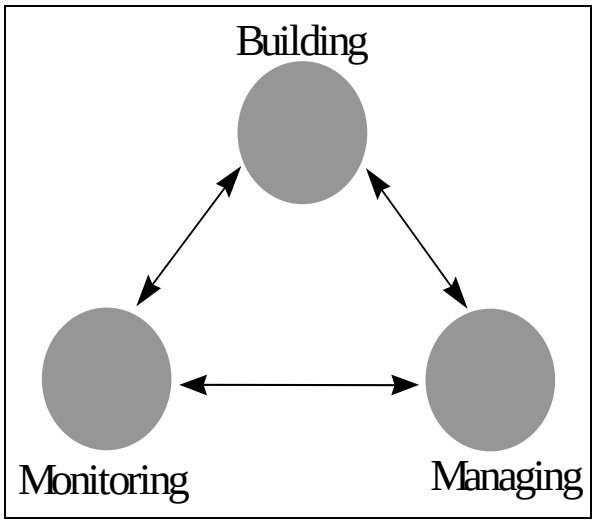

Figure 10: Research Priorities for Provincial Parks

In terms of managing the system, there is a pressing need for current information on the state of parks and protected areas. Cultural and natural heritage inventories must be current along with surveys of park use to gauge thresholds of activity which might impact park values. Management and operational plans need to be based on current information and ongoing assessment that informs managers of natural carrying capacity, natural changes, user impacts and socio-economic benefits. Such information is critical for protecting, managing and utilizing heritage and recreation assets, which otherwise can be compromised through inappropriate management or excessive use.

In comparison to the impacts induced by internal park use, more attention is required on trans-boundary processes and stresses associated with adjacent uses and activities beyond protected area boundaries. Such trans-boundary influences may be numerous and often complex, and have given rise to the adoption of ecosystem management perspectives on parks and protected areas (Grumbine 1994; Slocombe 1993; Woodley, Kay and Francis 1993). In many ways, the research and information challenges facing parks and protected areas are embraced by the greater area ecosystem perspective, which recognizes the close relationship of park environments to the surrounding ecological, social and economic realities, and the wide range of external activities, uses and impacts that stress park ecosystems (Keiter and Boyce 1991) (Figure 10).

The foregoing needs substantiate the importance of developing a monitoring programme to recognize and to assess changes in the system on a regular basis. Such a programme requires the definition of indicators for environmental, social and economic integrity, with emphasis on measuring and documenting the ecological integrity of the system and its component parts. This requires a standardized approach to monitoring cumulative effects, using reliable parameters to gauge appropriate levels of use and environmental stress. Parks

Canada continues to provide leadership and valuable guidance in this area (Skibicki, Stadel, Welch and Nelson 1994).

In addition to the foregoing scheme, efforts need to be accelerated on specific research to deal with the management of particular issues. This includes work on topics such as species re-introduction and recovery, control of alien species, fire management and restoration ecology. A number of excellent examples of such applied research are reported in this volume. And notwithstanding these very applied needs, there is an ongoing need to encourage, accommodate and support pure research that is not explicitly aligned to managing protected areas.

Advancing a Research Strategy

Taken together, the foregoing needs present a formidable agenda to be dealt with on several related fronts. At a corporate level, the Ministry of Natural Resources has developed a science plan that sets out the goal, objectives, and programme dimensions for corporate science, information and research efforts including parks and protected areas and heritage conservation. This plan has been developed by a multi-disciplinary, inter-divisional committee established by the Ministry's science team (OMNR 1996b).

Through the science plan, the science team sets priorities for the Ministry, and monitors and reports on research activities and progress on a regular basis. A key aspect of the plan is the transfer and application of results, focusing on the relevance of the products to park users. This approach will enable the development of a science business plan in line with the corporate business planning which is the foundation for decision-making in the Ministry.

Within the context of the Ministry's science plan, Ontario Parks is well on the way to developing a research and information strategy that addresses its specific needs for planning and managing provincial parks. This strategy sets out a framework for setting priorities and evaluating projects, and allocating resources to complete them. This approach ensures that science, research and information needs are dealt with in a rationale way consistent with the Ministry's corporate approach and business planning for Ontario Parks (Davidson 1997b).

Associated with these efforts, Ontario Parks is working with other partners to encourage, and to strengthen efforts on research most relevant to provincial parks and other protected areas. Examples of these endeavors are agreements with cooperating universities in a variety of areas, such as, the co-operative research station with the University of Waterloo at Presqu'ile Provincial Park (Suffling, Knight and Immerseel 1992), initiatives with Brock University at Short Hills Provincial Park; and a newly developing research collaborative with the University of Guelph.

In the interests of catalyzing and coordinating more research efforts for parks and protected areas, Ontario Parks has been an initial sponsor of the Parks Research Forum of Ontario (PRFO). Working with the other lead partners—Heritage Resources Centre, University of Waterloo; Frost Centre, Trent University; and Parks Canada, Ontario Region—the partners aspire to catalyze and report on research relevant for parks and protected areas.

Conclusion

Scientific interest in parks and protected areas in Ontario, as elsewhere, is a long-standing one motivated by professional and philosophical inclinations to preserve and understand the natural world. Although often driven more by curiosity than park goals, all of this research adds to our understanding of park ecosystems and strengthens the rationale to preserve these special places.

Ontario's system of provincial parks is a diverse one that offers a wide range of research opportunities in the natural and social sciences. Research needs range from wilderness management in the north to restoration ecology in the south. Increased visitation coupled with greater demands for resource extraction in surrounding areas are challenging park managers to better design, protect and manage these areas in line with a greater ecosystem perspective.

Applied research is central to improving decision-making for parks and protected areas. To that end, strategies are needed to define, carry-out and apply priority research to improve the planning and management of parks and protected areas. Business planning for science is essential to insure that limited resources are allocated most effectively on priority research needs.

At the same time, management agencies must recognize that pure, less applied research, remains a valid and desirable pursuit in parks and protected areas. Though perhaps less applicable for addressing immediate management issues, such research enriches the relevance, understanding, appreciation and programming for parks and protected areas as baselines for more comprehensive ecosystem management efforts.

Ontario Parks is far along in realizing the importance of science, information and research for planning and managing provincial parks. Internal strategies combined with outreaching partnerships are viewed as complementary ways to engage the scientific community in research pursuits of joint relevance to improve the provincial parks system.

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