
Northern Protected Areas: Current Status and Future Challenges

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Abstract

Canada's northern boreal, taiga, and tundra biomes represent largely intact landscapes. These regions contain vast natural systems, wide-ranging mammals, a diversity of migratory species, and relatively intact natural processes. Across the northern jurisdictions of the country, several strategies are underway to set aside representative portions of these ecosystems as protected areas. Concurrently, the science of reserve design is receiving increasing attention in the primary research literature. This paper presents an overview of the Canadian Council on Ecological Areas (CCEA) Northern Protected Areas (NPA) project. The NPA Project examines the scientific ecological principles underpinning the design of protected area networks and contrasts these findings with the current composition of protected areas in northern jurisdictions. As well, we present a brief overview of the results of a comprehensive survey of protected areas planners and managers across the country to assess the state of knowledge with respect to protected area design. The results of the survey suggest that some planners and managers are making progress towards the integration of ecological science knowledge within their planning frameworks. However, most jurisdictions face a range of barriers to the application of research findings. This paper discusses some of these successes and barriers and makes recommendations that may help to improve the state of planning

and management for representative protected areas networks in northern Canada.

Keywords: *northern protected areas, protected area planning and design, practice*

Introduction

The Canadian Council on Ecological Areas (CCEA) Working Group on Ecological Integrity recently commissioned a project on Northern Protected Areas (“the NPA project”). Part of the NPA project is the production of a background report (Phase 1), which was scheduled for publication in December 2005. The second component (Phase 2) of the NPA project is a series of case studies assessing minimum requirements for protected areas across the Canadian north. The first case study, for the western boreal, is scheduled for completion by early 2006. Here we present an overview of Phase 1 of the NPA project, providing research highlights and preliminary conclusions as well as directions for future research.

The purpose of the NPA Phase 1 report is to review current knowledge and practices for the design and selection of protected ecological areas, identify gaps in system planning needs, and provide preliminary guidelines for the design of protected ecological area networks in northern Canada and circumpolar regions. The goal of the CCEA NPA project is to offer protected areas practitioners science-based principles, guidelines and best practices for area/network design, planning and management (i.e., implementation) of northern protected areas. The specific objectives include a review of the literature and relevant conservation science, and an assessment and synthesis of ecological criteria and principles related to protected areas planning and management.

The focus of this project is on the north. This focus is appropriate, given the increasing development pressures that this region is facing. The impending Mackenzie Valley pipeline, increase in forestry activities, and minimum exploration all threaten the ecological integrity of fragile northern systems. The establishment of protected areas in advance of resource development activities provides a unique opportunity. Provided they are designed to have ecological integrity, based on sound scientific and ecological principles, they can serve as ecological benchmarks against which the effects of resource development activities can be compared (Arcese and Sinclair, 1997; Wiersma, 2005). As benchmarks, protected areas should have as high a degree of ecological integrity (EI) as possible (Parks Canada Agency, 2000) in order to distinguish natural changes from human-mediated ones.

The NPA Study Area

The “northern” study area is defined quite liberally and includes the “near” northern ecozones, which are already quite impacted by resource development activities, and the far north (Figure 1). For the purposes of this study, we adopt the IUCN definition of protected area, which states that a protected area is “*an area of land/water especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means*” (IUCN website). While we acknowledge the importance of marine protected areas, the NPA project is confined to an analysis of terrestrial protected areas.

An Overview of Phase 1

Phase 1 of the CCEA NPA project, the background report, has three major components. The first is a comprehensive literature review of the ecological science pertaining to the design of protected areas and networks. The second component is an assessment of the state of protected areas across Canada

Figure 1. Ecozones of Canada comprising the Northern Protected Areas (NPA) study area. Ecozones as delineated in Wiken *et al.* 1996.



relative to recommendations made in the literature. The third component of the Phase 1 report was a comprehensive survey of protected areas practitioners, aimed at soliciting information about research activities, knowledge base, and limitations to effective protected areas design and management. A brief overview of each of these sections is given here; details can be found in the CCEA NPA report (Wiersma *et al.*, in press).

Literature Review

The literature review investigated recent research on several design criteria for protected areas that will have ecological integrity. These criteria included recommendations from the literature on minimum reserve size (and concluded that protected areas should be on the order of several thousands of square kilometers to have a chance to be ecologically viable), minimum replication requirements for representative networks, and site selection procedures. The literature and tools related to the design of representative networks is quite dynamic and continually expanding. Many tools and techniques exist, some of which are more appropriate for certain regions and data sets than others. The literature review attempts to parse out the advantages and disadvantages of the tools and techniques available so that practitioners can make appropriate decisions for their specific jurisdictions.

In addition to an overview of the literature on protected areas design, the literature review touches on some of the issues that are unique to design of protected areas in northern regions. These issues include the high percentage of migratory species in the north, the dynamic nature of northern ecosystems, increased pressures from resource activities, and climate change. Suggestions for area and network design to address these uniquely northern challenges are presented.

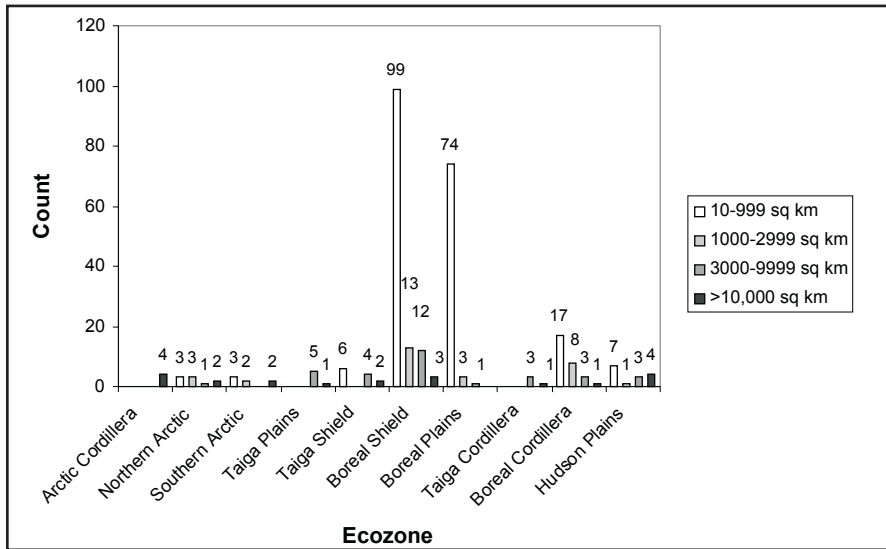
State of protected areas

Phase 1 of the CCEA NPA project inventoried existing protected areas across the study region. This inventory is a challenging undertaking because jurisdictions are at different stages of planning and implementing protected areas, and thus the number of sites is highly variable. Nonetheless, at the time of writing, there appeared to be a strong bias to having many protected areas in the Boreal Shield and Boreal Plains ecozones and a higher proportion of smaller protected areas than larger ones (Figure 2).

Practitioners Survey

A comprehensive survey on aspects of design, research, management of protected areas, and related issues was sent to 49 practitioners across the

Figure 2. Distribution of protected areas by size class (km²) across the ecozones within the study area. Protected areas less than 10 km² in size are not included in this chart. Values are indicated above each bar – where no value is listed, the count is zero.



study area. A total of twenty-six (53%) responses were received. Main findings are highlighted below; the numbers in parenthesis represent the number of respondents to each question.

The most common threats to protected areas were identified as population declines (16), climate change (15), habitat fragmentation (13), and incompatible land use outside of protected areas (13) (Figure 3). Of these, incompatible land use was ranked the highest on average, followed by habitat fragmentation, climate change, interruption of natural cycles, and population declines.

When asked to describe the areas in which their agency has expertise, most listed socio-economic planning (19), species reintroductions (17), and conservation genetics (13), although a range of areas of expertise was cited (Figure 4). In addition, agencies are involved in a range of projects related to these and other areas of expertise (Figure 5). When we asked respondents to identify candidly ways in which their agency is limited in implementing science-based principles to protected areas design, the majority (18) cited the lack of spatially explicit wildlife data. Other limitations include developing models (12), stress assessment and indicators (11), and inventory and monitoring (16) (Figure 6).

Figure 3. Threats to existing protected areas, as identified from a survey of 26 protected areas practitioners.

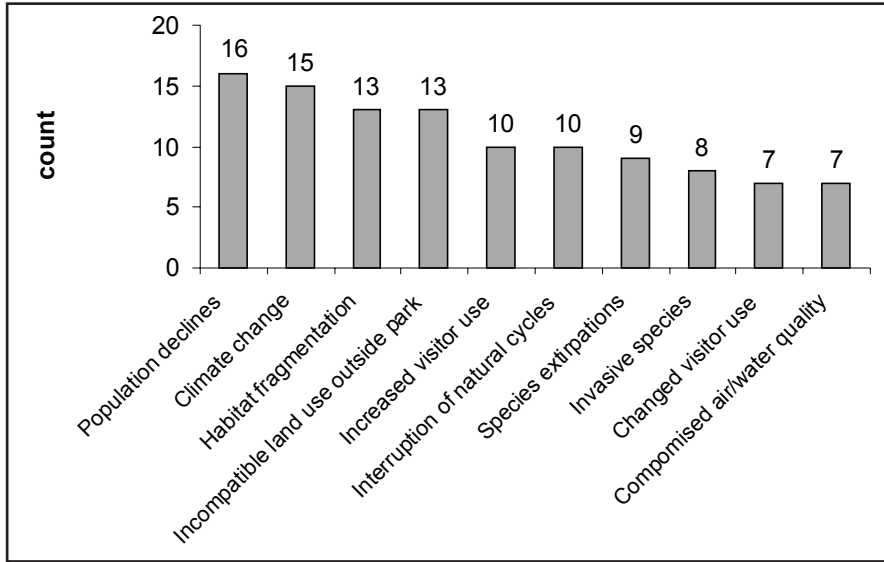


Figure 4. Areas in which practitioners self-identified that they had expertise.

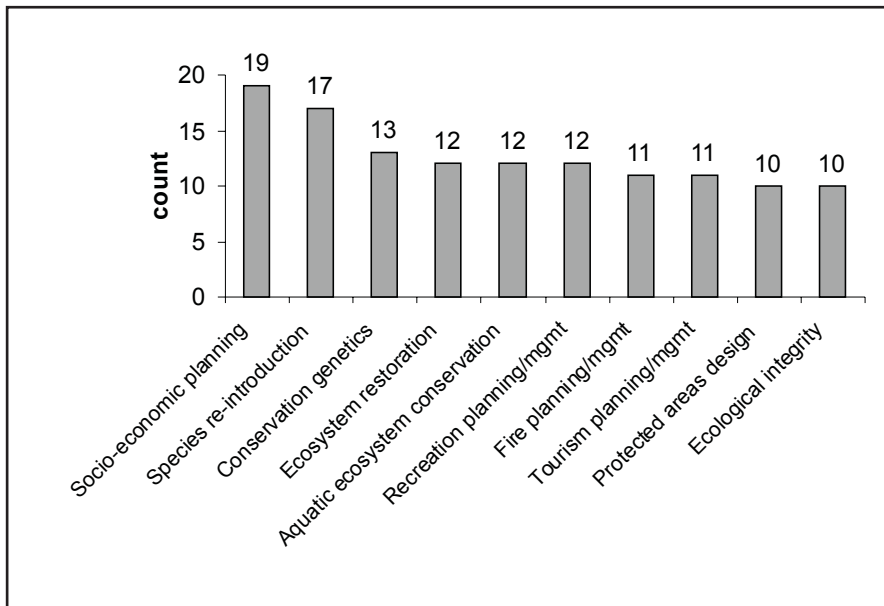


Figure 5. Current research activities in protected areas across Canada.

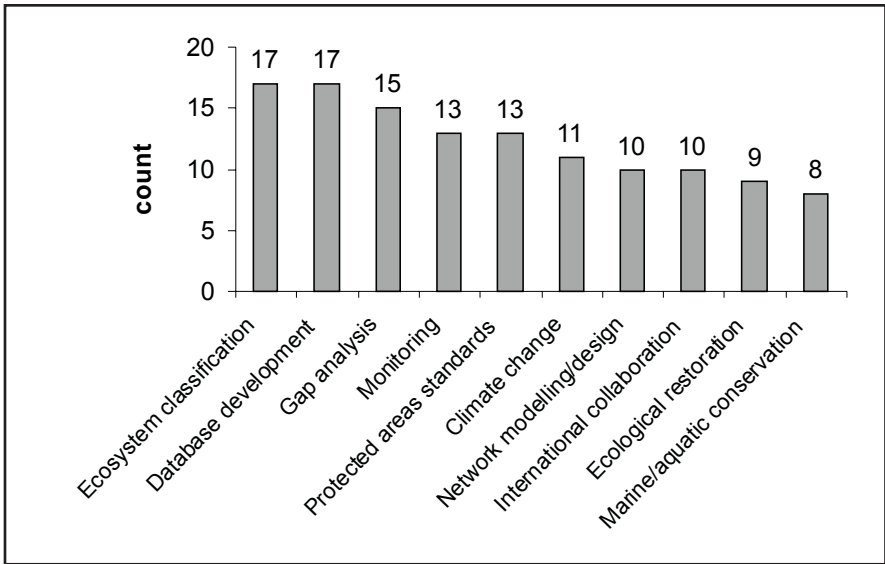
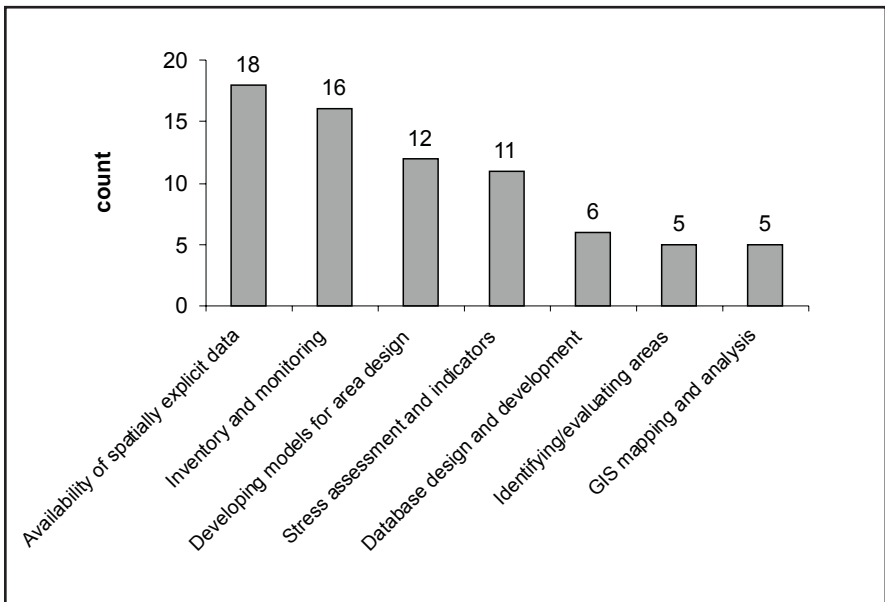


Figure 6. Limitations to effective protected areas planning and management, as identified from a survey of 26 practitioners.



Conclusions

The results of Phase 1 of the CCEA NPA report suggest that more domestic research is needed, as much of the literature reviewed was on studies on tropical and temperate regions. Serious data gaps exist for all taxonomic groups across Canada. An assessment of existing protected areas suggests that more large areas are needed, and the network principles and guidelines should be refined. It is hoped that the case study proposed in Phase 2 of the CCEA NPA project will assist with gaining scientific knowledge about ecologically efficient ways to design protected areas and networks in the northern biomes.

The survey of protected areas practitioners suggests that there is variability in agency expertise and the scientific research is not being widely applied. Data on protected areas is highly variable, and more top-down coordination is needed. We applaud initiatives such as CARTS (the *Conservation Areas Reporting and Tracking System*), which is a national initiative being developed by CCEA with federal, provincial and territorial jurisdictions and other partners to consolidate data on existing protected areas and to provide a mechanism for agencies to conduct periodic (annual or semi-annual) self-reporting and updating of the database. More specific conclusions from the practitioners' survey can be found in the CCEA NPA report (Wiersma *et al.*, in press).

Overall, Phase 1 of the CCEA NPA project concluded that agency mandates and policy are reasonably advanced, and there is a good foundation of existing protected areas. However, to ensure a viable network of northern protected areas that can effectively and efficiently serve as ecological benchmarks, more work is needed.

Acknowledgements

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