

Parks Division Science Strategy

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Government of Alberta ■



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EXECUTIVE SUMMARY

Alberta's growing population and shifting recreation trends create a need for innovative and effective management of our provincial parks. These parks enhance and sustain our quality of life, protect biodiversity, and promote health and wellness through outdoor recreation. In order to best manage Alberta's parks, we must have accurate information about them, the features they protect, the opportunities they provide, and the activities they support.

A considerable amount of scientific work is conducted in parks. Establishing a Science Strategy is a priority action under Alberta's *Plan for Parks*. It is intended to facilitate natural and social science research and inform decision-making. It affirms the valuable role that science plays in understanding and managing parks.

The strategy is also intended to provide direction to improve our capacity to undertake and manage science, simplify our management and communication of scientific information, and provide tools to facilitate the incorporation of new knowledge into our management and planning practices. The effective integration of science will benefit the ecological, social, and economic health of parks.

The long-term success of this strategy will be judged by how well we have achieved the following key outcomes:

1. An increase in the amount, quality and availability of scientific information about parks, the visitors who use them, and the recreation and visitor experiences that they support.
2. Increased capacity to make informed decisions that positively affect parks and their users, ultimately enhancing our ability to employ science-based management approaches.
3. A culture of respect for the value and importance of science in the management of parks.

Objectives

To achieve these outcomes this strategy outlines specific objectives that reinforce the way we do business. These objectives are:

- Improve communications with the research community
- Improve our management and dissemination of information
- Establish formal partnerships
- Establish regional research centres
- Involve staff in science
- Ensure ongoing support for science in parks

Implementation

Identifying objectives to reach the intended outcomes is an important step, but is incomplete without a direction forward. To provide direction, this strategy details a number of priority action items, including:

- Setting research priorities
- Developing web-based resources to communicate (both externally and internally)
- Defining staff roles and responsibilities in relation to this strategy
- Developing a consistent process for permitting, and for applying conditions to research and collection permits
- Identifying appropriate parks to serve as regional research nodes and, ultimately, to house research centres

The strategy also identifies a set of scientific needs that could be considered broad research priorities. These are not detailed questions designed to fill specific knowledge gaps, but are rather fields of interest within which the priority setting process will be used to identify specific priority topics. These broad scientific priorities are:

- Conducting inventories in parks
- Studying the roles of parks in the broader context
- Developing best practices and innovative technologies, and,
- Developing and monitoring key indicators

Progress Tracking

Timelines for progress towards the priority actions are provided, and progress towards objectives and key outcomes will be reported to Albertans on a regular basis.

1.0 RATIONALE

Alberta's provincial park system comprises approximately four percent of the province's total land mass. Provincial parks offer a rich diversity of landscapes, opportunities and uses. They also have an intricate relationship with the surrounding areas. Good decision-making will depend on science and our ability to identify linkages and understand the broader inter-relationships and impacts.

This strategy reflects the positive contributions that scientific understanding and knowledge-based decision-making can make in daily operations and long-term planning.

1.1 IMPORTANCE OF SCIENCE IN PARKS:

Knowledge gained through science is an integral part of our commitment to continuous improvement in managing our lands, infrastructure, and visitor experiences. This knowledge provides a foundation for innovative management strategies and helps to maintain and enhance the natural diversity and cultural heritage of parks.

Alberta's parks are natural laboratories. They are valued by scientists as local, regional, and provincial reservoirs of natural diversity, as representative examples of Alberta's diverse landscapes and experiences, as reference sites by which to gauge the effectiveness of management applications on the surrounding landscape, and as sites where people of all ages, backgrounds and experiences interact with nature to the benefit of their physical and mental wellbeing. With approximately 8.5 million visitors using the parks system annually, they also provide invaluable opportunities for scientists to study leisure trends, economic models, visitor motivation and public perception.

Parks-based research contributes positively to Albertans' quality of life, as well as to conservation of our unique landscapes, natural diversity and outdoor experiences. Recognizing these rewards, scientific research within Alberta's parks will be encouraged, particularly where the proposed research aligns with the intended outcomes and objectives of this strategy.

1.2 HOW THIS DOCUMENT WAS DEVELOPED

A series of workshops were held from January to April, 2006, with participation from staff and a wide spectrum of the scientific community involved in disciplines that directly relate to parks including: environmental and conservation sciences; social and cultural sciences; management sciences (innovation and best practices research); and, economic and market sciences.

The goal of these workshops was to increase collaboration with the scientific community and to facilitate a greater understanding of the role for science

Scientific understanding is an essential prerequisite for implementing informed, ecosystem-based, management strategies, and for protecting our natural heritage while providing outdoor recreation, education, stewardship, and tourism opportunities for visitors.

within parks. Obstacles to increased collaboration were identified, and plans of action were discussed.

This strategy was developed from the common themes and desired outcomes that emerged at these workshops, as well as from subsequent suggestions from participants and reviewers.

HOW DOES THIS DOCUMENT FIT WITH ALBERTA'S PLAN FOR PARKS?

Alberta's *Plan for Parks* ensures that the management of parks aligns with the Government of Alberta's strategic direction. It outlines key planning elements also found in the Land-use Framework, and shares the following desired outcomes:

- People-friendly communities and recreational opportunities
- Healthy ecosystems and environment
- Sustainable prosperity supported by our land and natural resources

The *Plan for Parks* provides a foundation for decision making through a series of guiding principles. Scientific knowledge underpins several of these guiding principles, including: Knowledge-based Decision-making; Continuous Improvement and Innovation; Environmental Leadership; Stewardship; Integrated Management; and Sustainability.

The development and implementation of a Science Strategy is identified in the *Plan for Parks* as a key action to fostering evidence-based decision making. This strategy supports knowledge-based decision making, and will contribute to achieving the guiding principles and strategies outlined in the *Plan for Parks*.

1.3 PURPOSE OF THIS DOCUMENT

This document strives to create a platform for a successful and sustainable incorporation of science into park planning, operations and management. It provides a direction forward and outlines a number of steps to facilitate the incorporation of science into all aspects of the management of parks.

A successful Science Strategy will improve our understanding of Alberta's parks and their users, in turn providing increased capacity for innovation in the management and daily operations of our parks system and improved visitor experiences.

Key Outcomes

Implementation of this Strategy will lead to the following key outcomes:

1. An increase in the amount, quality and availability of scientific information about parks, the visitors who use them, and the recreation and visitor experiences that provincial parks support.

2. Increased capacity to make evidence-based decisions that affect parks and their users
3. A culture of respect for the value and importance of science in the management of parks

2.0 Introduction

2.1 DEFINING SCIENCE IN A PARKS CONTEXT

For the purposes of this strategy science is defined as: *“The observation, identification, description, experimental investigation, and theoretical explanation of phenomena”*¹. As defined here, science could include a broad range of techniques under any number of disciplines. Four broad branches of science directly relate to the core businesses of parks. These are: the natural sciences; the social and cultural sciences; economics and market analysis; and technological and best practices research.

- Natural sciences focus on landscapes, biological systems and diversity, and ecological processes. Knowledge in these areas is critical for ensuring the long term ecological integrity of provincial parks, for protection of biodiversity, and for understanding past, present and future changes in our environment.
- Social and cultural sciences focus on past, present, and future human uses of parks. This knowledge is important for understanding the history, spiritual significance and contemporary public uses and perceptions of parks. It enables us to provide park visitors with rewarding and meaningful experiences.
- Economic and market analyses concentrate on the economic impact and value of Alberta’s provincial parks. These studies help with understanding the types of users parks attract, the impact on surrounding communities and the economy as a whole as well as the value of services provided by parks.
- Technological and best practices research focuses on management practices and infrastructure. Knowledge in these areas allows for the development of sustainable, cost-effective and environmentally sensitive infrastructure and management techniques.

¹ *The American Heritage Dictionary of the English Language, Fourth Edition*. Houghton Mifflin Company, 2004

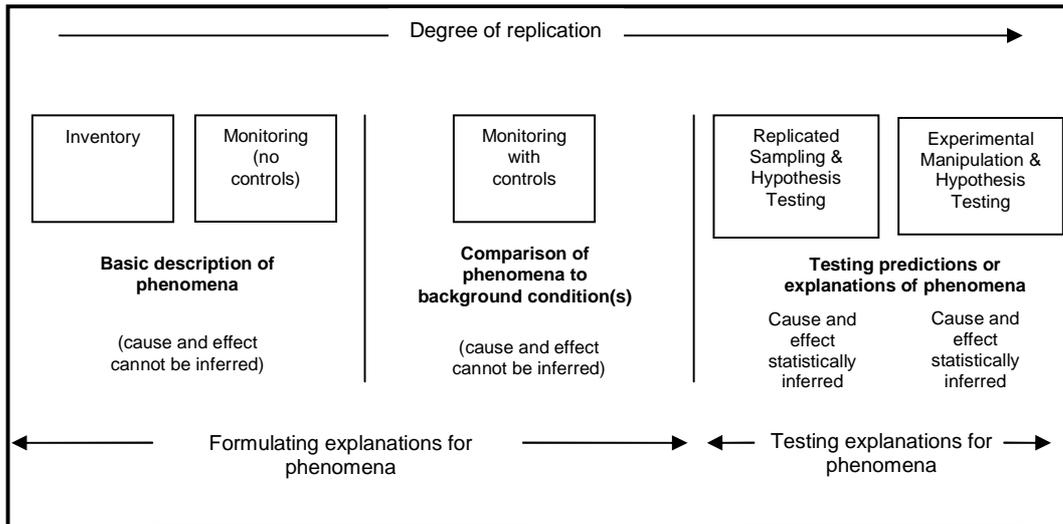


Figure 1. Continuum of scientific techniques that would be applicable to parks based research, showing conceptual characteristics of selected points along this continuum, from basic inventories (left) to replicated experimental manipulation (right). Points further right along this continuum provide greater confidence in attributing causality to an observed effect.

The deliberately broad definition of science used above encompasses an equally broad continuum of scientific procedures (Figure 1) that extends beyond the standard definition of ‘scientific method’ and recognizes the importance of other types of investigation to scientific understanding.

At one end of this continuum are basic inventories and monitoring studies. These exercises are among the most important contributors to our understanding of parks – they identify the species, ecosystems, cultural and natural landmarks and recreational activities that Alberta’s provincial parks support and protect.

At the opposite end of the continuum is experimental manipulation and hypothesis testing. These exercises allow for statistical inference and deduction of cause and effect – they identify the relationships and phenomena that underlie the many systems (both natural and human) that we observe.

It is important to note that there are other ways of understanding (such as traditional knowledge) that while not specifically covered under this strategy, are important contributors to knowledge-based decision-making. These are complementary lines of evidence that provide valuable insight into our understanding of Alberta’s provincial parks.

2.2 WHAT IS ACCEPTABLE SCIENCE?

It is important to define the types of scientific activities that are acceptable and desirable within parks, as well as those that are not. This determination should be made on a case-by-case assessment of potential benefits weighed against potential risks. For this purpose risks are considered to be any negative environmental, economic, or social consequence of conducting

scientific research. Following this method, research activities can be placed into one of four categories:

1. Activities that improve (or could conceivably improve) our understanding of parks and provide opportunities for improved management, at low risk;
2. Activities that improve (or could conceivably improve) our understanding of parks and provide opportunities for improved management, but at elevated risk;
3. Activities that fail to provide relevant knowledge, but that are of negligible risk; and,
4. Activities that fail to provide relevant knowledge, and are of high risk.

The level of acceptable risk will be determined differently for each site using the best professional judgment of science staff².

Scientific investigations that have high potential to enhance our understanding of parks, and that could ultimately lead to more effective management (categories one and two above) are both acceptable and desirable, and should be given priority consideration. The decision to permit scientific activities will then be based on site specific factors (e.g. ecological sensitivity, unique cultural values, presence/absence of other research projects) using the best professional judgment of scientific staff following the decision tree outlined in Figure 2.

Investigations that would likely not contribute relevant knowledge, but that can be conducted at very low risk (be it economic, environmental or social) could be permitted, but should not be directly funded or undertaken by the Parks Division. Projects such as these would be considered as a low priority.

Scientific investigations that lack potential to provide relevant knowledge, and that can only be conducted at high cost to the environmental, cultural, or social values of parks are unacceptable, and should not be permitted under any circumstance.

² Level of acceptable risk may vary between sites – e.g., an Ecological Reserve with unique and/or sensitive features should have a lower acceptable level of risk than a Provincial Recreation Area with features that are common of sites elsewhere.

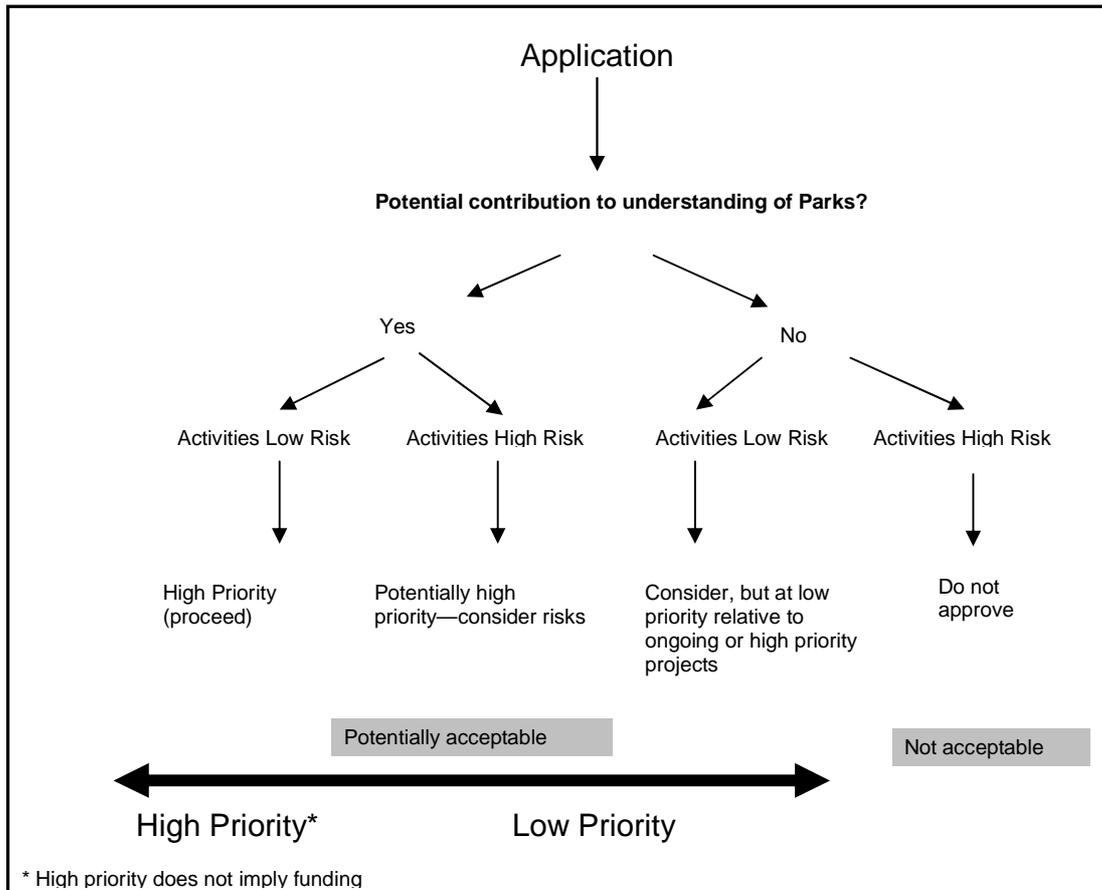


Figure 2. Basic decision tree used to determine acceptability (and priority) of proposed investigations. Determination of acceptable levels of risk will vary according to park designation (e.g. Ecological Reserve vs. Provincial Recreation Area).

Research Community

The ‘research community’ is the diverse group of individuals and organizations outside of the Parks Division with extensive experience planning, conducting, and publishing scientific research. This might include university and college faculty, and supervised students; non-governmental organizations; other Government of Alberta agencies and their staff; private consultants and contractors; and, volunteer collaborators.

3.0 Objectives

The following section of this document outlines the objectives that constitute the priorities of this strategy. These objectives are philosophical, procedural, or infrastructure related and are required to successfully and sustainably integrate science into park management, planning, and operations. Each of these objectives directly relates to the attainment of one or more of the intended key outcomes of this strategy.

3.1 Improve Communications with the Research Community

A significant amount of the scientific activities conducted within parks will, by necessity, be undertaken by researchers outside of the Parks Division. Therefore it is imperative to improve our communication with scientists outside of the Division, in order to continually improve our knowledge about parks and their users.

By improving *two-way* communication with the research community we will facilitate dissemination of knowledge both internally and externally, and be better able to foster the types of research that will be relevant to provincial parks. By communicating knowledge gaps and research priorities to the scientific community, we gain access to additional research capacity that can be utilized to improve park management. While many aspects of this strategy inherently recognize and address this issue, a structured medium for external communication is essential.

In addition to providing a medium for improved communication with other scientists, we must provide consistent and accurate information in our dealings with the research community. Consistency in messaging with regard to permit application procedures is important to ensure that researchers are aware of the opportunities in provincial parks. The goal is to increase access to knowledge, improve capacity to make informed decisions, and promote respect for science in parks.

3.2 *Improve Management and Dissemination of Information*

Ensuring that all staff have proper access to scientific information, including research results, interim findings, and ongoing project activities, is essential for application of that knowledge. Access to information is also vital to consistent communication with staff, scientists, visitors, and the public. Scientific knowledge gained through implementation of this strategy will be made available to support critical decisions. Providing access to this information allows for scientific knowledge to be incorporated into management planning, infrastructure development, and visitor services programming.

The objective is to ensure effective (and efficient) information management. Consistent communication of scientific findings, internally as well as to the greater research community and the public, has the added benefit of increasing the exposure and focus of our research program.

3.3 *Establish Formal Partnerships*

Developing and maintaining relationships with outside agencies is crucial for expanding our capacity to promote and conduct research within parks. Formal partnerships provide stable long-term relationships that outlast staff changes, enable close collaboration, improve transfer of knowledge, improve our ability to attract funding for research, and promote Alberta's provincial parks as places where cutting-edge research is conducted.

Academic Partnerships

Alberta's post-secondary institutions are the largest source of scientific expertise and research experience within the province. Partnerships with academic institutions are an important objective of this strategy.

Formal academic partnerships could assume a number of forms. Possibilities include:

- formal collaboration agreements with universities and colleges on research programmes;
- establishment of a research chair position at a major Alberta university;
- co-development of research centres in parks; and
- internal staff holding adjunct professorships at Alberta colleges and universities.

All of the above possibilities would engender closer collaboration and foster new, ongoing relationships with academic institutions. By working with undergraduate and graduate students, we also increase the potential to increase our internal expertise, as some students who work closely with Parks' staff are likely to seek careers in Parks as opportunities arise.

Establishing or promoting a research chair position at a major university could engender a full-fledged research program dedicated to park issues. Encouraging internal staff to seek out adjunct professorships would enable these staff to oversee and co-supervise graduate students working on parks-related research. Supervision of graduate students provides the opportunity to guide critical aspects of student research, ensuring maximum benefit for the division, and fostering closer relationships with the academic community.

Partnerships with other Government Agencies

Other provincial Ministries, such as Sustainable Resource Development (Fish and Wildlife; Forest Protection), Infrastructure, and Culture and Community Spirit, possess scientific expertise in matters that are applicable to provincial parks. Closer partnerships and collaboration with these agencies would provide mutual access to information and prevent unnecessary duplication of scientific effort. Such partnerships could assume a number of forms, ranging from Letters of Agreement on major scientific programs (e.g. Mountain Pine Beetle monitoring) to secondments for scientific staff (e.g. for staff involved in collaborative research projects to be housed under a single roof). Closer collaboration of staff at a working level should be considered a mutually beneficial goal.

Partnerships should also be sought with government agencies at the federal and municipal level. Some agencies, such as the Canadian Forest Service, Canadian Wildlife Service, and Parks Canada, have a great deal of scientific expertise that is directly transferable to Alberta's parks. Improving collaboration with scientists in these and other agencies should result in wide-ranging benefits for all parties.

Partnerships with Non-governmental Organizations

Many non-governmental organizations (NGOs) are active participants in Alberta's scientific community, and several of these (e.g., Alberta Conservation Association; Ducks Unlimited; Nature Conservancy Canada) have expertise relevant to provincial parks. Enhanced collaboration and mutually beneficial partnerships with these agencies should be sought.

Volunteer Partnerships and Citizen Science

The Parks Division recognizes that the public is one of its most valuable partners. By actively engaging volunteers from the public to collect and contribute scientific data, we can tap into this enormous potential and gain valuable information about our parks. In order to do so, however, we must provide the tools and resources necessary to support citizen science initiatives. Parks must support and encourage these initiatives by helping citizen scientists network with each other and by demonstrating the direct link between the contributions of volunteers and important management initiatives. We must be able and willing to facilitate truthful and meaningful engagement of our volunteers if we are to avoid wasting this important potential. Targeting volunteers to be involved in research specific to their expertise, skill sets, and interests is one avenue for increasing our capacity, while simultaneously providing meaningful engagement.

The unique settings and dramatic landscapes that characterize many of the parks where research would be conducted are often of great public interest. In these parks learning enrichment travel experiences – in which participants pay for the adventure of participating in a research trip into remote or special places – should be explored. These partnerships would not only improve our internal capacity, but would also facilitate new lines of communication with the public, and, hopefully, engender public understanding and support for research in Alberta's parks. Closer collaboration and planning between scientists and Parks staff will be necessary to coordinate and execute such efforts.

3.4 Establish Regional Research Centres

Our park system includes nearly 500 sites, many of which have similar attributes and, therefore, comparable value as places to conduct scientific research. Parks that are situated in similar settings may also share similar knowledge gaps and research needs.

While valuable research should be encouraged, regardless of the location, efficiency can be gained by concentrating scientific effort and science-related infrastructure at key sites. These sites could serve as regional research nodes – focal points where research in nearby parks can be undertaken, housed and supported. If properly distributed throughout the parks system³, these research nodes would provide a substantial breadth of research opportunity. Ultimately, these nodes would be the locations where research centres would be developed. Ideal locations for regional research nodes (and future research centres) would be parks with one or more of the following traits:

- Conditions that are representative of the larger landscape or Natural Subregion
- Exceptional features that are of substantial interest to the scientific community
- Focal points for recreation and/or tourism activities

³ A long-term goal of establishing one to two research nodes per region would provide this breadth of scope.

- Sufficient size to support multiple research activities without adversely affecting the park or its visitors
- Important or pressing knowledge gaps
- Infrastructure suitable for hosting research (i.e. housing facilities, suitable access, laboratory space, etc.)

In many cases existing infrastructure could be used, or upgraded if needed, to fulfil this objective. In other cases construction of new facilities will be required. The facilities in place and under construction at Dinosaur Provincial Park, as well as the Kananaskis Field Station at Barrier Lake, are excellent examples of facilities with the potential to attract world class researchers. Full-service research centres that attract top tier researchers from around the world would bolster the economic, social, and scientific standing of Alberta's parks, while simultaneously fostering long-term relationships with the broader scientific community. This objective directly relates to the achievement of all three of this strategy's intended key outcomes.

3.5 *Involve Staff in Science*

One of the critical components of implementing this strategy is the involvement of staff at all levels with ongoing scientific activities, and the provision of opportunities for staff to improve their education and scientific training.

Opportunities for Parks' staff to undertake professional development are important for the long-term success of this strategy. Most areas of science are in a constant state of advancement, requiring practitioners to be continuously aware of new findings and techniques. Staff should be provided with opportunities to stay current with new knowledge and with skill development.

Professional development initiatives could include:

- increased opportunity to attend and participate in scientific conferences, seminars, and workshops;
- opportunities for formal training in science (e.g. educational leave for pursuit of graduate degrees or technical diplomas);
- recognition or reward for staff who publish primary scientific results in a recognized peer-reviewed journal or text;
- consideration, in work plans and schedules, of time requirements to read and publish scientific literature; and,
- job-shadowing opportunities for non-scientific staff to participate in the science and research process.

By providing opportunities such as these we not only improve our ability to conduct science, but also foster understanding of the importance of scientific knowledge and its application in park management, planning and operation.

3.6 Ensure Ongoing Support for Science

This strategy emphasizes the importance of science in evidence-based decision-making for management of Alberta's provincial parks. Consistent promotion and support of science within parks will be needed to demonstrate our commitment to this approach.

Innovative partnerships and new sources of funding and support will be required to offset some of the costs of conducting research programs in remote locations.

4.0 Implementation

The following section of this document outlines the steps that must be taken in order to achieve this strategy's objectives and intended outcomes. Although by no means a comprehensive list, priority actions are noted below:

4.1 Priority Actions

Set Research Priorities

To conduct or facilitate the types of research that are important in managing Alberta's provincial parks, we must carefully define and effectively communicate our priorities. At present, no formal system for identifying knowledge gaps exists. Developing and regularly reviewing a scientific prioritization matrix is an important enhancement.

This priority setting exercise should include consideration of threats to specific sites or regions, availability of staff and financial resources, connections with larger research or regional planning priorities and pressing management concerns (e.g. mountain pine beetle, chronic wasting disease). As well, data that can be useful in a management context should take priority over more theoretical information.

It is critical that the priority setting process be repeated at regular intervals. Changes such as population growth, shifting demographic patterns, climate change and changing land use (to name but a few) present both ongoing challenges and emerging opportunities. Routine assessment of our knowledge gaps and management priorities will ensure that research remains current and relevant.

A preliminary assessment of high priority research realms is presented in Appendix 1. The broad categories listed could be considered provincial priorities, within which many provincial, regional or local knowledge gaps will need to be filled. Ideally, a complete list of scientific priorities for the entire parks system will be developed, along with priority lists for individual regions, and for key parks. These comprehensive lists will subsequently serve as the basis for defining and communicating our short-term scientific needs.

Develop Web-based Resources

In order to improve science-related communication with the research community and the general public a series of “Science & Research” webpages are being developed. These resources will be accessed through a single prominent link on the www.AlbertaParks.ca page and will display important information related to scientific activities in parks.

These online resources will be updated with current information, and will amass many of the components of this strategy into a single window, including:

- research priorities, listed provincially, by region and by individual parks (where applicable);
- information on facilities and infrastructure available for researchers;
- information, news and results from ongoing and completed research programs;
- examples of scientific research that have influenced management decisions with positive outcomes;
- information about grants and scholarships available to researchers;
- information about ongoing research and upcoming events (e.g. research seminars, presentations, etc.); and,
- contact information for key staff.

In addition to web-based resources dedicated to external communication, over time, resources will be developed to better enable our staff to manage and disseminate scientific information internally:

- a ‘sharepoint’ site where scientific staff can share important resources and provide opportunities for input and feedback on ongoing projects, Research and Collection Permit applications, etc.;
- an electronic library where all research publications and progress reports are stored and made available; and,
- a system for long-term storage of raw data.

Some of these resources, such as the science and research webpages, can be developed in a short period of time with relatively low expenditure. Others, such as electronic libraries and long-term data storage solutions will require an investment of both financial capital and staff resources.

Define Staff Roles and Responsibilities

In order to maintain a consistent and coordinated approach to implementing this strategy it is important to define the roles and responsibilities of staff at all levels.

One of the components of this strategy is the staffing of a full-time Science Coordinator position. The Science Coordinator champions science within the Parks Division, and works closely with staff throughout the province to provide overall direction for the implementation of this strategy and the incorporation of science throughout the provincial parks system.

Regional and Edmonton Park Ecologists are the primary point of contact with respect to science and will play a crucial role in expanding the capacity to

conduct and facilitate science. These staff will identify research priorities, communicate with managers and the research community and liaise with scientists to facilitate scientific research that contributes to identified priorities.

While the above roles are already well established, additional roles and responsibilities related to this strategy are likely to evolve in tandem with increased integration of science into decision-making. As well, present gaps in our scientific capacity should be identified and filled so that we are better able to attract and manage a broad spectrum of research. Some of these gaps are already known (e.g. social sciences, fire ecology, restoration ecology), while others are likely to emerge as through the implementation of this strategy.

Develop a Consistent Process for Permitting

Many of the workshop participants who contributed to the concept of this strategy viewed the implementation of a centralized and coordinated approach to the research permitting and approvals process as one of the most important steps in this strategy.

The Online Permitting and Clearance (OPAC) system provides the platform for consistent research permitting. The website provides clear information on the application process and on other permits that may be required to conduct some types of research within parks. Scientists who wish to carry out research or collection activities in parks now have immediate and around-the-clock access to information about application procedures, contact information, and review requirements.

All Research and Collection permits are issued subject to a core set of conditions. Specific conditions may also be imposed if the types of anticipated activities call for further precautions. These conditions would be applied on a case-by-case basis, taking into consideration the risks associated with the proposed activities and the nature of the proposed study area (park classification, sensitive features or users, etc.). Each permit reviewer is responsible for determining the special conditions (if any) relevant to a particular application. Regular discussion among staff is important for maintaining a consistent approach to the application of such conditions.

Identify Appropriate Regional Research Nodes

In tandem with identifying priority research questions, we should identify the sites that will serve as regional research nodes. By identifying these sites early we can avoid a later disruption or realignment of scientific effort.

Within each region, candidate parks should be identified. These could be sites that are representative of their natural region, or that have unique features or recreational and tourism activities that are of specific interest to the scientific community. Ideally, sites will be identified that are large enough to function as benchmarks to which the surrounding landscape or uses can be compared. Research node parks should also have existing infrastructure, or be sites where infrastructure can be developed with reasonable expenditure and effort.

4.2 Required Tasks

The following table outlines specific tasks associated with our objectives and priority actions. These are intended to be early milestones, covering the initial stages of implementation of this strategy.

| Task | Objectives or Actions Addressed |
|--|--|
| Develop Science & Research web pages. | <ul style="list-style-type: none"> • Improve communication with research community • Improve management and dissemination of information |
| Review research fund and scientific resources to determine level of resources needed to deliver on this strategy | <ul style="list-style-type: none"> • Ensure ongoing support for science |
| Formalize roles and responsibilities of staff, and update job descriptions | <ul style="list-style-type: none"> • Involve staff with science • Ensure ongoing support for science |
| Develop matrix for determining research priorities | <ul style="list-style-type: none"> • Set research priorities |
| Identify and prioritize knowledge gaps provincially, by region, or by park | <ul style="list-style-type: none"> • Set research priorities |
| Communicate research priorities through Science & Research webpages | <ul style="list-style-type: none"> • Improve communication with research community |
| Identify individual sites that are appropriate benchmarks at landscape scale | <ul style="list-style-type: none"> • Establish regional research centres |
| Identify representative sites in each natural region | <ul style="list-style-type: none"> • Establish regional research centres |
| Select 'research node' sites | <ul style="list-style-type: none"> • Establish regional research centres |
| Identify infrastructure needs related to research | <ul style="list-style-type: none"> • Establish regional research centres • Ensure ongoing support for science |
| Pursue Memorandum(s) of Understanding with other Agencies | <ul style="list-style-type: none"> • Establish formal partnerships |
| Investigate options for a research chair at a major Alberta university | <ul style="list-style-type: none"> • Establish formal partnerships |
| Seek support for staff to continue scientific education | <ul style="list-style-type: none"> • Involve staff |
| Investigate opportunities for learning enrichment travel related to scientific research | <ul style="list-style-type: none"> • Establish formal partnerships |
| Identify gaps in staff capacity to be filled (e.g. social sciences) | <ul style="list-style-type: none"> • Involve staff |
| Identify citizen science opportunities | <ul style="list-style-type: none"> • Establish formal partnerships |
| Identify technological solutions for development of internal communications tools (sharepoint, electronic library, etc.) | <ul style="list-style-type: none"> • Improve management and dissemination of information |

5.0 Tracking our Progress

Defining success in relation to a strategy as broad as this is challenging. As an ongoing policy there is no definitive endpoint to this strategy. The outcomes identified in this document are long-term and difficult to quantify, making progress toward their achievement hard to track. It is important, therefore, to set realistic and measurable goals so that we can periodically review our progress towards the desired outcomes of this strategy. Change cannot, and does not, occur immediately. Realistic increments should be used to chart our progress.

The Science Coordinator, along with other staff, will regularly report on progress towards this strategy through existing reporting and communications processes, in concert with other *Plan for Parks* Priority Actions. This reporting will provide:

- details on the number (and nature) of scientific studies that are either ongoing, or were completed in, the previous reporting period (based on research permits granted);
- the number of publications (journal articles, graduate thesis, book chapters, etc.) stemming from research in Alberta's parks that arose during the reporting period; and
- progress towards key objectives, as measured by completion of tasks outlined in the required tasks section of this document.

It will also be important to continually set new targets, pushing the incorporation of scientific understanding into all of our practices and policies. Only through continued support and re-invigoration can we achieve the key outcomes in the science strategy.

Appendix 1: Scientific Priorities (Provincial)

The following priorities are broad realms of science that are directly linked to what parks are, and how to best manage them for public benefit. These are scientific objectives; within each category there could exist any number of more detailed scientific topics, which will require a more fine-filtered approach to prioritization (see Section 4.1 – Set Research Priorities).

A1 Conduct Inventories in Parks

A crucial prerequisite for an evidence-based approach to management is a basic understanding of the range of natural, social, and economic features and uses that exist in our parks. This knowledge is important, since we cannot effectively manage or protect features or uses of which we are not aware. This priority is directed toward two of the intended key outcomes of this strategy – improved knowledge of parks (Key Outcome 1), and increased capacity to make informed decisions (Key Outcome 2).

Basic inventories are required to improve our understanding of many parks. Examples of inventory topics that could be priorities for investigation under this category include (but are not limited to):

- documenting biodiversity and species' distribution patterns;
- identification and description of ecosystem processes (e.g. fire history);
- identification of cultural and heritage resources;
- identification of significant geological features;
- collection of visitor use statistics;
- surveys of public perception of parks; and,
- descriptions of the climate and physical environment.

Because some individual parks have experienced a greater amount of research than others, some inventory needs are likely to be specific to the information requirements of an individual park or region, while others may be needed to address knowledge gaps common to the entire system.

In most instances the effort that would be required to complete a *comprehensive* inventory of a park would be enormous, and the timelines unrealistic. Prioritization of both sites and topics will be required in order to demonstrate an adequate return on investment in the short-term, and to align scientific effort with divisional priorities.

Inventories are one of the important building blocks for this strategy. Knowledge gained through inventory effort supports the determination of what features may need to be protected or enhanced, and can be used to develop the more detailed research and monitoring questions that provide direct insight into the management and operation of parks. Without an understanding of the physical, biotic and cultural elements that are relevant to a given park, it would be difficult to develop indicators that allow us to accurately monitor site conditions, or progress related to new management strategies. Without this information a knowledge-based approach to management is not possible.

A2 Study the Roles of Parks in the Broader Context

Alberta's Land-use Framework recognizes the role of parks as a key contributor to conserving the diversity of Alberta's ecological regions, and as an important component of integrated management of Alberta's landscape. Although such park functions are generally accepted, in many cases we have limited understanding of the details, relative importance, or context of these contributions. Increasing our understanding of the role of parks in the broader setting is therefore a priority under this strategy. Science conducted in support of this objective reflects the very concept of parks as places that not only protect the values within their borders, but also have connections to the broader landscape and perform services with wide ranging benefits.

Parks provide a unique opportunity to address research questions that tackle issues on such scales. These topics generally fall into two categories:

- (1) role of parks in the broader natural system (e.g. biodiversity conservation, watershed protection, ecosystem services), and
- (2) role of parks in the broader social and economic systems.

Improving our understanding of these roles is important for long-term sustainable management of parks, as well as the broader provincial land base and economy.

The study of parks as a component of the broader natural ecosystem can provide answers to critical issues for conservation and stewardship in our changing province. The ecological integrity and environmental diversity of parks help support the health of the entire province. Improving the understanding of how parks both support and depend upon the greater ecosystem is crucial information for future planning. What role do parks play in providing connectivity in a fragmented landscape? How can we use parks to inform and evaluate landscape management practices that are applied in the surrounding environment? The underlying principle behind these concepts is the role of parks as 'benchmarks' – standard frames of reference by which the integrity, functioning, and management of broader landscapes can be compared.

The study of parks as a contributor to broader social and economic systems in the province provides similar opportunities. The vast majority of Albertans agree that parks are important to their overall quality of life. Parks provide benefits for users and non-users alike, yet the nature and impact of these social and economic contributions are not fully understood. Parks attract visitors from around the world and contribute tourism dollars and jobs to our economy. For these reasons, improving our understanding of the social and economic roles of parks is a priority under this strategy. Examples of topics that may be of interest include:

- costs and benefits of parks versus alternative uses;
- non-market values of parks (natural capital);
- economic impact of parks on surrounding communities;
- socio-economic benefits of working landscapes;
- cultural and spiritual significance of parks; and
- health and wellness benefits (both physical and mental) of parks.

Studies on these topics not only contribute to our knowledge and understanding of parks, but also contribute to cultural and organizational awareness of the importance of science in our management, planning and operation of parks.

A3 Develop Best Practices and Innovative Technologies

Improving the quantity and quality of science conducted within, and with regard to, parks would be an incomplete endeavour without an introspective investigation of the facilities and management practices that are imposed upon them. Conducting or promoting research that addresses management practices, facilities and infrastructure in order to refine and develop best practices, is one of the scientific priorities of this strategy. This directly relates to our capacity to make decisions that positively affect parks and their users, one of the intended key outcomes of this strategy.

These types of investigation share the common trait of being applied, experimental and adaptive. New techniques and technologies are developed or deployed and then carefully and scientifically evaluated. Adjustments are then made based on the results of each evaluation. Examples of topics that might be explored under this objective include:

- green technologies (e.g. composting toilets, on-site alternative energy sources);
- management tools and techniques (e.g. invasive plant control);
- management planning (e.g. backcountry trail development); and
- image and branding exercises (e.g. best practices concerning messaging).

The results of these investigations will lead to new standard practices and improved management of parks and their facilities.

This category encompasses an exhaustive list of potential topics, which should be carefully developed and prioritized according to the needs and opportunities that are presented at any given time. It will be important, therefore, to synchronize this scientific work with the infrastructure and capital planning process as much as possible.

A4 Develop and Monitor Key Indicators

In order to effectively manage parks, we need a basis upon which to evaluate their present condition, or trends in the many ecological, economic, and human dimensions of our parks. Key indicators will be developed to evaluate these conditions. Key indicators are the 'vital signs' to monitor so that we may detect changes in environmental, social, or economic conditions in a timely fashion, and are also the metrics by which we will evaluate our progress in applying park management tools. In many cases the development and monitoring of key indicators is closely related to baseline information captured in inventories. While inventory data represents only a single 'snapshot' in time, monitoring programs provide the ability to evaluate conditions over a period of time. This information is essential for adaptive management strategies employing evidence-based decisions.

The selection of indicators to monitor should be a direct reflection of the values that are most important for parks, such as ecological integrity and sustainability of visitor experiences. In many instances the choice of key indicators will likely differ between regions or individual parks. These

differences reflect the diversity of the parks network, as well as the differences in the values for which a given park is managed. For example, natural disturbance regimes (such as the fire cycle) might be monitored as an indicator of ecological integrity in a large boreal park, but may not be relevant for a small recreation park in the mixed grass region. Conversely, return visitation statistics might be an important indicator of change in visitor satisfaction in a park near to an urban centre, but would likely not be a monitoring priority for a remote and largely inaccessible park.

Suggested indicators could include:

- Natural ecological processes, at a variety of spatial and temporal scales
 - (e.g. patterns and/or periodicity of large-scale natural disturbance)
- Distribution and abundance of select flora and fauna
 - (e.g. changes in population size or distribution of introduced weeds)
- Visitor use patterns or perceptions
 - (e.g. types of recreation, percentage of return users, effectiveness of interpretation programs, visitor satisfaction)
- Visitor impacts
 - (e.g. social, economic, and cultural impacts of visitors; conflicts between different users)
- Public attitudes, perceptions and values
 - (e.g. awareness of parks; knowledge of roles of parks)
- Market information and trends
 - (e.g. recreation trends; market profiles; social marketing; monitoring park visitation)
- Investment analysis
 - (e.g. return on investment)

Because of the long-term nature of much of this type of science, it is critical that steps are taken to ensure that we select and study appropriate indicators. Once selected, adequate support is required to sustain the flow of information, and support new management initiatives. Attainment of this objective is critical for improving our knowledge of parks, as well as our capacity to make informed and relevant management decisions. A commitment to a continued, consistent and scientifically defensible approach to the measurement of Key Indicators is one of the highest priorities under this strategy.

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