Research Links
A Forum for Natural, Cultural and Social Studies
VOLUME 3 - Number 1 *Parks Canada, Alberta and Pacific-Yukon Regions* SPRING 1995

CAVES OF THE ROCKY MOUNTAINS

Features of the landscape for half a billion years, caves give us a glimpse into times past

Jonathan Rollins

THE CAVES

A recent inventory for Alberta and the Southern Canadian Rocky Mountains (south of the northern border of Jasper National Park) documents 137 caves in the jurisdiction of Parks Canada and several provincial departments *(Table 1)*.

Defining what a cave is can be highly subjective. The inventory, with a few exceptions, used the cave explorers definition: a cave has some extent of bedrock passage, and its passages are formed by dissolution processes rather than frost shattering or bedrock collapse (thus obviating the all-too-common Rocky Mountains "frost-pocket").

Since caves are typically found in limestone or dolomite, it is hardly surprising the Canadian Rocky Mountains contain caves. What is surprising, considering the large areas of carbonate rocks involved, is that more caves have not been found. The majority of caves and karst areas have entrances at about 2000 metres above sea level, and have been extensively modified by sequential periods of glaciation. Cave passages can be seen heading out of mountain sides, and occasionally have been de-roofed. The entrances of many extensive cave systems consist of small openings in scree or moraine material, often enlarged by digging in order to gain access. Glaciation has undoubtedly removed and truncated many cave systems.

(Photo credit: Marek Vokáč)

Castleguard Cave: one of Canada's longest and deepest caves

The caves, when compared with caves in other parts of the world, are not notable for their length, averaging half a kilometre within the inventoried area. Most Rocky Mountains caves have a strong vertical component with sections of passage known as "drops" or "shafts," which can only be descended and ascended using rope climbing systems. Low temperatures (typically 2–3°C) and long approaches make cave exploration in the Canadian Rocky Mountains an extremely arduous activity.

The inventory area includes Canada's longest and deepest caves. Castleguard Cave, located beneath the Columbia Icefield, now consists of over 20 kilometres of explored passages. In Robson Provincial Park, Arctomys Cave, with a surveyed depth of 536 metres, is the deepest cave North of Mexico. Many other remarkable caves lie within the inventory confines, notably Yorkshire Pot at Crowsnest Pass, which, following connections with five other caves, now has a surveyed length of more than 12 kilometres.

Rocky Mountain caves sometimes occur in isolation, but more often are grouped together in karst areas. The four mountain parks contain some of the finest examples of alpine karst in the world. These areas of solutionally eroded limestone are easily recognized by surface features, including sinking streams, springs, limestone pavements, closed depressions, and shafts (steeply descending cave entrances). Micro-karst features, known collectively as karren, consist of distinctive grooves and fissures in exposed bedrock surfaces. Fine examples of surface karst together with underlying cave systems can be found in Castleguard Meadows (Banff National Park), Hawk Creek (Kootenay National Park), and the Snaring karst (Jasper National Park). The Burstall Pass area in Kananaskis Country has extensive surface karst, but no significant known caves.

GEOLOGY AND CAVE FORMATION

All caves in the Canadian Rockies are contained in carbonate rocks, *i.e.* limestone and dolomite of the Paleozoic Era (540–258 million years ago). The Livingstone and Palliser carbonates contain the Snaring, Crowsnest, and front range caves. The Cathedral

– continued on page 12 –

Research Links

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STATEMENT OF PURPOSE

The main goal of this publication is to foster communication between scientists, resource managers, and science and management. Views of authors do not necessarily represent the views of Parks Canada or its employees.

FEATURE ARTICLES

DEPARTMENTS

WRITE TO...

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FRANCOPHONES

Le texte de cette publication est offert en français. Vous pouvez l'obtenir en écrivant a l'adresse ci-dessus.

SUBMISSIONS WELCOME FOR FALL ISSUE. DEADLINE IS JULY 14, 1995.

EDITORIAL

With this issue, *Research Links* is entering its third year. The last two years have seen the publication define and redefine itself and its audience; this process will continue.

Billed a forum for natural, cultural, and social studies, *Research Links* attempts to inform, educate, and stimulate discussion. This substantial mandate molds most of the decisions of the *Research Links* editorial board, and makes each issue a new frontier. It has led to actions such as covering environmental initiatives, and last winter's Cultural Resource Management issue. However, all of this has taken place within a limited geographical area: Alberta, British Columbia, and Yukon—the Aberta and Pacific-Yukon regions of Parks Canada.

This spring, *Research Links* is expanding its borders and looking beyond Alberta and Pacific-Yukon Regions. The majority of the issue, as is *Research Links'* mandate, is divoted to Alberta and Pacific-Yukon research, but there is also an article on archaeological mitigations and engineering innovation at the Motherwell Homestead National Historic Site in Saskatchewan and a story on the chemical-free gardens of Wasagaming in Manitoba's Riding Mountain National Park. Is this more national focus a one time exception, or an indication of things to come?

"There is also an article on archaeological mitigations and engineering innovation at the Motherwell Homestead National Historic Site in Saskatchewan and a story on the chemical-free gardens of Wasagaming in Manitoba's Riding Mountain National Park. Is this more national focus a one time exception, or an indication of things to come?"

Perhaps. While (for the time being, at least) *Research Links* remains a regional publication, some of its future plans include, out of necessity, a more national (or at least more western) focus. The editorial board decided to follow a theme focus for several future issues—for instance, the Fall 1995 issue will highlight research into the ecological effects of fire management, and the Winter 1995 issue will look at social and historical studies, with focus on multiculturalism. Research and subsequent management initiatives in many of these areas are not limited to Alberta and Pacific-Yukon Regions; they are scattered across Canada's national parks and sites.

As a result, the board is wrestling with the question of whether *Research Links* should take on a national perspective, solicit articles on themes from across the parks system, and expand the "links"—a suggestion made by several Parks staff outside Alberta and Pacific-Yukon Regions. The consequences of such a move are large: while the cost of producing a larger *Research Links* would be incremental, the editorial workload and distribution costs would increase significantly.

If there is interest in expanding the publication, there needs to be commitment from other Parks Canada regions, headquarters, and individuals to share the workload and costs. Feedback form *Research Links'* existing audience will play a crucial role in the final decision. What do you think about *Research Links* moving towards a national perspective? What do you think of where *Research Links* is at now? We welcome your thoughts and suggestions.

AROUND THE PARKS

OUR SCIENCE, THEIR EDUCATION

Science Alberta Foundation (SAF) and Parks Canada have jointly developed Science-in-a-Crate programmes to educate young Canadians about links between science, research, and heritage protection. Aimed at a 9–12 year-old audience, the programmes are circulated in libraries. Two programmes, already receiving rave reviews, are on endangered species (peregrine falcon—*Falco peregrines*) and endangered spaces (habitat the swift fox—*Vulpes velox*). Parks Canada Alberta Regional Office faunal specialist Dave Poll helped connect Parks Canada science with SAF's education activities, enabling students to understand the specifics of the animal, how it became endangered, and what scientists are doing to help save it. Volunteer interpreters assist librarians in demonstrating the programme, which covers subjects such as telemetry, bird banding, and predator-prey dynamics. All the equipment and activity guides come in self-contained crates, which Greyhound ships at no cost to schools and public libraries.

Two more programmes are in the works: one on agriculture and ranching (related to research done for Motherwell Homestead and Bar U National Historic Sites) and one on carnivore conservation (based on wolf and bear studies).

Parks staff and scientists who can help connect science/research to these topics and any other topics for which they see educational programme potential are encouraged to contact ***Heather Oxman*** *at Alberta Regional Office at (403) 292-6891.*

AN OVERDUE CLEAN-UP AT SASKATCHEWAN GLACIER

The Saskatchewan Glacier forms the headwaters of the Saskatchewan River system, and is an access route to the Castleguard Meadows and Castleguard Caves in Banff National Park. The glacier was the site of oversnow vehicle testing and military exercises by Allied soldiers during World War II. The wood and metal debris from the exercises were cleaned up this summer—some 50 years after the end of the war.

The project was partially funded by Environment Canada's Environmental Citizenship Initiative, and featured Parks Canada and the Canadian Armed Forces working together to restore the glacier to its natural state.

For further information, please contact ***Kathy Rettie*** *at Banff National Park, at (403) 762-1560.*

THE BOOKREST MINE CLAIM CHALLENGE

The summer of 1994 found a group of Parks Canada cultural resource managers pondering how to protect a cultural resource, both for and from the public.

Bookrest Mine, the legacy of a claim staked near the turn of the century by Bill Peyto, one of Banff's most colourful characters, is in a secluded part of Banff National Park, near Simpson Pass. Over the years, enough visitors have passed by that a number of artifacts of Peyto's legacy have disappeared—probably into a private collection or two. The disappearance of these irreplaceable, non-renewable artifacts is a serious concern: not only has the integrity of an historic area been tampered with, the artifacts are also not there for subsequent visitors.

To save the remains of Peyto's legacy, Parks Canada surveyed the site, inventoried remaining artifacts, and made a video recording, featuring interviews with historians Ted Hart and Ian Clarke, and a re-enactment of Bill Peyto and his activities.

The question of protecting the Bookrest legacy while still offering it to the public remains unresolved, and cultural resource managers are exploring various solutions, including the possibility of partnering the site and restricting access to it to guided tours only.

For further information, please call ***Don Mickle*** *at Banff National Park at (403) 762-4506.*

FEEDBACK...

"A copy of *Research Links* was passed onto me recently—what an informative, attractive, stimulating publication. Congratulations!

"Over 125 000 people (both residents and visitors) come in to our library annually, seeking information and reading material. Having *Research Links* available would be welcome by our many library users....

"I hope the axe does not fall on this outstanding publication—we look forward to receiving issues and making them available.

Thank you!"

– Jeannette Fish, Librarian
Banff Public Library

CLARIFICATION

The cutline underneath the photograph accompanying Christine Feniak's piece, "Protecting National Collections," in *Research Links* 2[3], was inaccurate. The cutline should have read *Hours of exacting work: Michael Gair performs preventive conservation on an artifact* instead *of Hours of exacting work: Conservator Michael Gair restores an artifact. Research Links* apologizes for any confusion this may have caused.

CALL FOR SUBMISSIONS AND FEEDBACK

The next issue of *Research Links*, coming out in Fall 1995, will be devoted to Fire Management. Relevant submissions are welcome, both within and outside Parks Canada and the Alberta and Pacific-Yukon Regions. Submission deadline is Fri., July 14.

The Winter 1995 issue of *Research Links* will follow in the footsteps of last winter's Cultural Resource Management issue, focusing on Social and Historical Studies, highlighting aboriginal and multicultural issues and events in the national parks and sites. Submissions are welcomed and encouraged; the deadline for that issue is Mon., November 6.

WRITE TO

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In the footsteps of the caribou...

A study of Revelstoke's mountain caribou habitat highlights the importance of old-growth forest for the animals' survival. How does this bode for their future?

Michael Morris

Researchers conducting the Revelstoke Caribou Project are into their third winter studying mountain caribou *(Rangifer tarandus caribou)* of the Columbia Mountains near Revelstoke, BC. Early data show some valuable information about caribou habitat use.

The project, a joint effort between Parks Canada and the British Columbia Ministry of Forests, is by coordinated John Flaa, a Mount Revelstoke and Glacier National Park warden, and Dr. Bruce McLellan, wildlife habitat ecologist with the British Columbia Ministry of Forests. Also involved are the Columbia Basin Wildlife Compensation Fund (BC Hydro) and Friends of Mount Revelstoke and Glacier, who are providing the project with additional funding.

Parks Canada initiated the study to improve its ecosystem management decisions, and their impact on caribou in the North Columbia Mountains. Parks Canada and its provincial partners believe that, in light of the current debate on land use in British Columbia, the project is very important and timely. The information it is expected to provide about caribou habitat, population density, and overall ecology is of interest to many parties, including provincial foresters. Early winter range of the caribou corresponds with the most commercial part of the forest—old-growth stands—and forestry officials hope an understanding of caribou habitat usage will produce harvest plans that both permit the cutting of some old-growth timber and leave a sufficient habitat to sustain the caribou.

In the first two years of the study, researchers captured 37 caribou fitted them with radio collars, and subsequently tracked them. Following in these animals' footsteps, researchers record data that will help them determine how caribou use their habitat. Determining habitat use means asking, and finding answers to, many questions: what do caribou eat? how much food is available? where do they bed down? what sites do they prefer? what are the characteristics of these sites? what are the mortality rates and causes?

The radio collars have a "mortality sensor," which is activated if the collared animal has not moved for four hours. So far, eight of the 37 collared caribou have died, as a result of predation, tree-well accidents, and avalanches.

Three caribou appear to have triggered their own deaths during avalanches, leading researchers to speculate that the animals have no understanding of avalanche conditions. One starving animal died by falling into a tree well, and another when a tree fell on it. Another three animals are believed to have been lost to predation: evidence of a wolverine *(Gulo gulo)*, a black bear *(Ursus americanus*, and a wolf *(Canis lupus)* were found in separate incidents, but whether these animals made the kills or simply scavenged the carcasses is unknown.

Mountain caribou have a unique strategy to cope with the deep snow pack of the Columbia Mountains. When snow covers the sedges and forbs of caribou summer range high in the mountains, the mountain caribou descend in late fall to low elevations; other caribou populations move south. The Revelstoke herd spends a lot of time in low elevation old-growth forests, whose large trees intercept much of the early season snow, making it easy for caribou to forage on falsebox *(Pachistima myrsinites)*, an evergreen shrub. As the snowpack deepens, digging for food becomes more difficult and the caribou, unlike any other ungulate, move upslope in mid-winter, seeking arboreal lichens *(Alectoria* and *Bryoria)*.

By March, the caribou are in subalpine forest', such as the summit of Mount Revelstoke where a three metre snowpack is common and predators unlikely to follow. This is due to another unique caribou adaptation: caribou have very large feet and are able to spread their hooves and dewclaws to act as small snowshoes.

Lichens are the mainstay of caribou diet for the rest of the winter, until plants begin to grow at low elevations and the caribou head to the valley bottoms for something fresh to eat. In late May, pregnant females disperse to high, secluded locations to avoid predators during calving. Throughout summer, caribou are widely dispersed at high elevations and remain there until early winter.

Lichens, a crucial part of caribou diet, grow slowly and are most abundant on old trees, which makes old-growth forests so important to caribou survival. The Revelstoke caribou data indicate major caribou population concentrations where such forests are common.

The data also show the ani-

(Photo credit: Mat Matsushita)

Tracking caribou: Researchers attach a radio collar to a captured animal

– continued on page 6 –

Innovation at Motherwell Homestead

David Hems

An holistic approach during project planning that considers archaeological concerns resolves apparent mandate conflict, minimises land disturbance, and lowers costs

A LITTLE HISTORY...

Lanark Place, as the Motherwell Homestead was known, is located in eastern Saskatchewan approximately 115 kilometres northeast of Regina. Designed as a showplace for W. R. Motherwell's agricultural practice ideas, the homestead operated between 1905 and 1918. It was designated a national historic site in 1966, and officially opened in 1983.

Motherwell Homestead National Historic Site contains several heritage buildings, and has been replicated to represent the 1912 period. It is also a repository of buried artifacts from the historic, and possibly pre-contact, period.

In 1994, Parks Canada's mandate to protect the Federal Heritage Building Review Office (FHBRO) classified buildings, yet simultaneously ensure the preservation of buried artifacts, produced a dilemma. A new water utility line, necessary for protecting the site's buildings from fire, had to be installed, and the initial proposal called for the excavation of a trench, approximately one metre in width, through the historic zone, to instal the water pipe.

Protecting our heritage: Controlled excavation of the culturally significant layers at Motherwell

Each additional utility line or land disturbance project results in altered contexts and relationships of the sub-surface cultural remains; digging a trench through the historic area of Motherwell would essentially diminish the cultural integrity of a nationally significant, historic piece of property. However, because alternatives were investigated during the planning stages of the project, Dave Anderson, project manager of Prairie and Northwest Territories Region Architecture and Engineering Services, developed a resolution to this apparent conflict between protection of built and buried cultural heritage, which minimised impact, cost, and work delays.

AN INNOVATIVE SOLUTION

Site managers were aware of the potential damage to buried cultural artifacts from the start of the project, and the original plan was to conduct a series of shovel tests along the proposed water pipe route, with surveillance in the historic zone to salvage archaeological remains or identify previously unknown archaeological features.

Unfortunately, such an approach to archaeological mitigation was, at best, reactive. Not only did it presuppose a disturbance, it would require time to process, analyse, and store artifacts and records—activities that have the potential to greatly escalate the cost of any development project.

Moreover, such an action would be contrary to the Environmental Assessment and Review Process Guidelines Order, under which the environmental assessment at Motherwell was conducted. Simply reacting to a plan by conducting an impact assessment and then proposing that surveillance be undertaken in order to "mop up" is not in keeping with the strict sense of the EARP Guidelines Order or the Cultural Resource Management Policy. All involved recognized that every effort should be made to minimise ground impacts or to find alternative methods that maintained site integrity and did not involve land disturbance.

Anderson incorporated archaeological concerns into the project design, and investigated the possibility of using hydraulic boring equipment. This approach met the requirements for providing fire protection, but minimised impacts to buried artifacts. The idea was that holes would be excavated at either end of the proposed water-line and the pipe fed through the undisturbed clay levels well below the cultural deposits. This would allow for controlled archaeological excavations at either end of the water-line and also would greatly limit the quantity of soil that would be disturbed. Upon completion of the archaeological excavations, a back-hoe would continue the excavation to the desired depth of the 2.75 metres needed to protect the line from freezing during winter.

A total of four excavation units were required to facilitate turns in the water-utility line or to instal fire hydrants as outlined in the project design. The results of these excavations showed minimal evidence of archaeological features, however, evidence of previous utility lines and the location of a previous tree shelter was encountered. In addition, the edge of a previous archaeological excavation unit was found near where a previous, unrecorded, utility

– continued on page 6 –

Caribou

— continued from page 4 —

mals concentrate on edges of clear-cuts and old-growth stands, due to the abundance of lichen on blown-down or cut trees. This behaviour of caribou, while affording loggers an opportunity to see caribou, has left forest workers with the impression that there are plenty of caribou—unfortunately, a misconception.

The Revelstoke caribou study is taking place during the greatest land use debate in the history of British Columbia. How the province's resource-rich forests should be used, harvested, or protected will impact everyone—loggers, governments, backcountry visitors, commercial tourism operators, conservationists, and the caribou. Viable populations of caribou require large areas in which old-growth forests are common; these are the areas in which human industry is often most interested.

The most recent census of the Revelstoke caribou found 375 animals between Revelstoke and Mica Creek, with a ratio of 19 calves per 100 adults. These are relatively low population densities.

Until recently, little was known about the movement and habitat requirements of caribou; the Revelstoke study is filling an important gap in ecosystem management knowledge. Information from this project is already being used to modify the West Kootenay Commission on Resources and Environment (CORE) Report. This land use plan for the area, released on March 13, 1995, identifies special management zones for mountain caribou—a major conservation breakthrough, given the resulting drop in timber supply.

Where the caribou roam: Mount Revelstoke National Park and area are witnessing the struggle between a viable economy and a sustainable environment

Parks Canada considers the Revelstoke caribou project a high priority and intends to seek funding for its continuation. As this project—ecosystem management at work—continues, more information about caribou habitat and ecology, and the ungulates' place in the Revelstoke/Glacier ecosystem, will be available for management decisions.

***Michael Morris** is a park ecologist (communications), at Mount Revelstoke and Glacier National Parks. For further information, please call (604) 837-7556.*

Motherwell Homestead National Historic Site

— continued from page 5 —

line makes a 90° turn. This sudden change in direction of the utility line was not shown on site maps, and the identification of this alteration meant the line was easily avoided during instalation, further reducing site disturbance.

CONCLUSION

The Motherwell Homestead water utility project incorporated archaeological concerns into the planning process by using horizontal boring equipment, with numerous advantages. Most importantly, the amount of land disturbance was minimised, and this reduced the potential impact to both buried cultural resources and natural resources, and reduced the amount of backfilling, re-sodding, and reseeding required.

Because the location of the disturbance was clearly identified, controlled excavations could be undertaken prior to the arrival of heavy excavation equipment. This meant that archaeological features could be recorded and artifacts collected using standard archaeological procedures, and that locations of present and previous utility lines could be identified prior to project implementation, enabling the contractor to avoid impacts to present facilities.

Once the excavations were completed, the project could proceed without major concern with archaeological resources. Moreover, an individual was not required to remain on site for surveillance and there was little chance of project delays as a result of interference with buried cultural resources.

"The amount of land disturbance was minimised, and this reduced the potential impact to both buried cultural resources and natural resources, and reduced the amount of backfilling, re-sodding, and reseeding required."

Finally, the costs of implementing the project, including the costs of the archaeological mitigation, were significantly reduced. In fact, had this approach been used initially, it would have eliminated the need for the utility trench portion of the impact assessment conducted in 1992. The areas of impact would have been identified in the design and there would have been no need to test the entire length of the trench. In many ways, the initial impact assessment created almost as much disturbance to the site as the implementation of the project. This project shows that if heritage resource concerns are incorporated into the planning from the outset, our ability to manage these resources *in-situ* will be enhanced and, in most cases, overall costs will be reduced.

***David Hems** is an environmental assessment archaeologist at Prairie and Northwest Territories Region's Professional and Technical Service Centre. For further information, please call (204) 984-5823.*

In response to changing, more competitive markets, governments and managers are focusing on

Measuring Performance

Anne-Marie Pham

Management based on revenue growth and minimising costs may provide a short-term solution to an agency's performance goals, but many organizations have realized that to stay alive in today's competitive marketplace, the focus must be on clients.

Parks Canada, Alberta Region, recognizing the importance of meeting client needs, developed a client report card system for campgrounds in 1993 (since applied in several other client centres in Jasper National Park).

Client report cards are accurate tools used to measure how well an organization is serving its clients. They provide a valid means for linking internal organizational processes to external ratings of performance. A carefully developed performance measurement system consisting of a set of standard performance indicators applied over the years will provide managers with important information with which to make decisions. The method used to measure performance is called benchmarking, a process of consistently researching to find the best ideas for improving client service and products, and then adopting or adapting these ideas.

A performance measurement system was first developed in Alberta Region in 1993 in response to campground managers' need to be informed on a continual basis of how campers rated campground services and facilities. Combined with sound financial analysis, campers' ratings provide managers with information necessary to make decisions about the services and products campers need and are willing to pay for. This allows managers to optimize resources by redirecting them to areas where improvements are needed and by spending less time and money on areas considered less important to campers. With the recently conducted Campgrounds Operational Review, the system becomes increasingly crucial to allow managers to measure the impact new campground efficiencies are having on campers.

With the help of a specialist in performance measurement survey design and analysis, managers who seek continuous improvement in their operations and a high level of customer satisfaction can also set up their own performance measurement system. Performance measurement methodology, with customized modifications, may be applied to many areas and departments that are trying to streamline and improve their services and products.

The Performance Measurement System

1. Identify a service or product that needs to be benchmarked:
- Identify what product or output to benchmark: what are the reasons for the existence of this product or output?
- Understand your internal work processes used to arrive at each product/output.
- Identify who should be benchmarked (*e.g.* campers, visitors, internal clients).

2. Develop indicators of performance to rate internal processes:
- Choose indicators that are able to measure inputs (levels of resources used), throughputs (levels of services provided), and outputs (outcome achieved).
- Involve the service providers in identifying performance indicators.
- Remember that these indicators will be standardized and used over the years. Therefore, ensure that all identified work processes have corresponding performance indicators.

3. Determine current performance levels:
- Design a standardized questionnaire with performance indicators.
- Collect data *via* a scientific client survey.
- Measure the gap between how you rate and how others rate. Compare with other sections, functions, departments, and even industries whenever comparisons make sense.
- Report current levels of performance to all affected employees.

4. Project future performance levels:
- Ask yourself: are you satisfied with the ratings?
- Project what performance levels should look like; these become estimated standards.
- Consult with service providers when projecting future performance levels.

5. Establish functional goals and design and implement an action plan:
- Come up with an action plan, based on your estimated standards, that will improve future performance levels. Learn to adopt or adapt the best in industry practices.
- Set a time frame during which changes to work processes are made, and implement your action plan.
- Link performance measurement to financial reporting whenever possible.

6. Monitor your progress periodically:
- Decide if you have achieved your set standards.
- Evaluate what impacts the changes made have on your clients.
- Monitor progress by continuing to conduct the standard performance measurement survey.

7. Recalibrate your benchmarks and establish standards:
- Ask yourself, after every performance measurement survey: are you satisfied with the new ratings? If you are, establish a performance standard for each one of your products/outputs. If you are not, recalibrate your benchmarks and make the changes required to your work processes.
- Continue the performance measurement process toward continuous improvement.
- Continue to benchmark your product or output against other service providers and competitors.

***Anne-Marie Pham** is a performance measurement specialist at Alberta Regional Office's Strategic Research and Analysis Division. For further information, please call (403) 221-3212.*

NATURAL REGION

Research Priorities for 1995

PACIFIC COAST MOUNTAINS (I)

Pacific Rim National Park Reserve

On-going projects in both the terrestrial and marine environment will continue to provide Pacific Rim National Park with new information about the status and function of our coastal ecosystems in 1995. Two new steps we are taking this year, as are many other national parks, are the gradual implementation and refinement of a data management plan and the familiarization of management and staff with the capabilities of Geographic Information Systems (GIS) in the context of a data management framework.

Working with informatics officer Dan Williamson, park warden Bob Hansen has developed a GIS/Data Management Implementation Strategy that should put us in a position to take advantage of the heritage resource data, which is being accumulated in our area at an ever-increasing rate. Clayoquot Sound, Barkley Sound, and the large, intact watersheds of the West Coast Trail are attracting the attention of a wide variety of researchers and interest groups. We must approach the potential for extensive, inter-agency data exchange both systematically and cautiously.

Recognizing that it is not sufficient simply to accumulate data in an efficient and retrievable fashion, we are taking steps to make management and staff familiar not only with what GIS, as part of a managed database, can do for them, but also what the limitations of such a system are. To this end, we employed a Co-op student to digitize a variety of natural and cultural resource data as well as facilities information for a small part of the West Coat Trail Unit of Pacific Rim National Park Reserve on Cape Beale. That small database now serves as a training tool for staff and an example to management so that better decisions can be made about the purposes and processes of data acquisition elsewhere in the ecosystems of Pacific Rim National Park Reserve.

*For further information, please call **John McIntosh** at (604) 726-7721.*

COLUMBIA MOUNTAINS (IV)

Mount Revelstoke and Glacier National Parks

This coming year, Mount Revelstoke and Glacier National Parks will continue their ecosystem-level focus in research with provincial partners. More than half of our funding now comes from outside sources, and co-ventures have become our research standard.

In the summer, we will be testing a habitat-mortality model used to estimate grizzly bear *(Ursus arctos)* populations in British Columbia. A grid of 35–40 cameras will sample the bear population as part of our five-year West Slopes Bear Research Project. The cameras are equipped with motion detectors, and we can estimate the bear populations by comparing the number of marked (radio-collared) bears to unmarked bears in the photographs.

Our caribou *(Rangifer tarandus caribou)* research has proven to be very topical and valuable to the current land use planning process in the North Columbia Mountains (see story page 5). We hope to look more closely at certain parts of our caribou range and the effect of wolf predation this coming year.

Other priorities for 1995 include the second year of a wolverine radio-tracking project, the start of a detailed study of the ecology of the Northern long-eared bat *(Myotis septentrionalis)*, and the third year of operation for our neotropical bird monitoring station.

*For further information, please call **John Woods** at (604) 837-5155.*

ROCKY MOUNTAINS (V)

Banff National Park

In 1994, Banff National Park began an intensive study programme on key indicators of ecological health and cumulative effects in the Bow Valley (see *Research Links* 1[3]). The Bow-CEA project got off to a spectacular start. Working with copartners from the Universities of Calgary, British Columbia, and Guelph, we placed nearly 50 radio-telemetry collars on moose, grizzly bears, black bears, and wolves. Researchers spent nearly 300 hours in helicopters and fixed wing aircraft to obtain thousands of observations on habitat use and movement patterns. Further, we began enhancing our habitat mapping by importing a 1:50 000 Digital Terrain Model into our Geographic Information System databases.

This work will continue in 1995, despite financial constraints. Our objectives for the year will include helping individual researchers meet their research objectives, providing up-to-date ecological information to the Minister's independent commission on the status of the Bow Valley, and integrat-

Ursus arctos: The grizzly bear is the focus of a Mount Revelstoke and Glacier National Parks population study

ing individual projects to provide us with a comprehensive view of cumulative effects. The Bow-CEA project will continue for at least another three or four years. Interim results will be available next year.

For further information, please call ***Cliff White*** *at (403) 762-1422.*

Kootenay National Park

Kootenay National Park is long and narrow, with major north-south valleys connecting it to adjacent provincial lands in a region of extremely high ecological and resource value. Consequently, a major thrust of our research is to assess the ecological significance of various regional-scale activities and to develop co-management strategies in collaboration with federal and provincial agencies, universities, and other stakeholders.

To facilitate cross-jurisdictional research, we are currently developing a digital ecological database. This project will integrate data from various agencies so that researchers have a one-stop opportunity for acquiring baseline information on items such as forest cover, road networks, hydrology, elevation, and biogeoclimatic classification.

We will also be conducting several wildlife studies, including research on lynx and bobcat habitat in the East Kootenay Region; a wolf ecology study as part of the Central Rockies wolf recolonization programme; and a badger population study in the East Kootenay Trench.

For further information, please call ***Alan Dibb*** *at (604) 347-9361.*

Jasper National Park

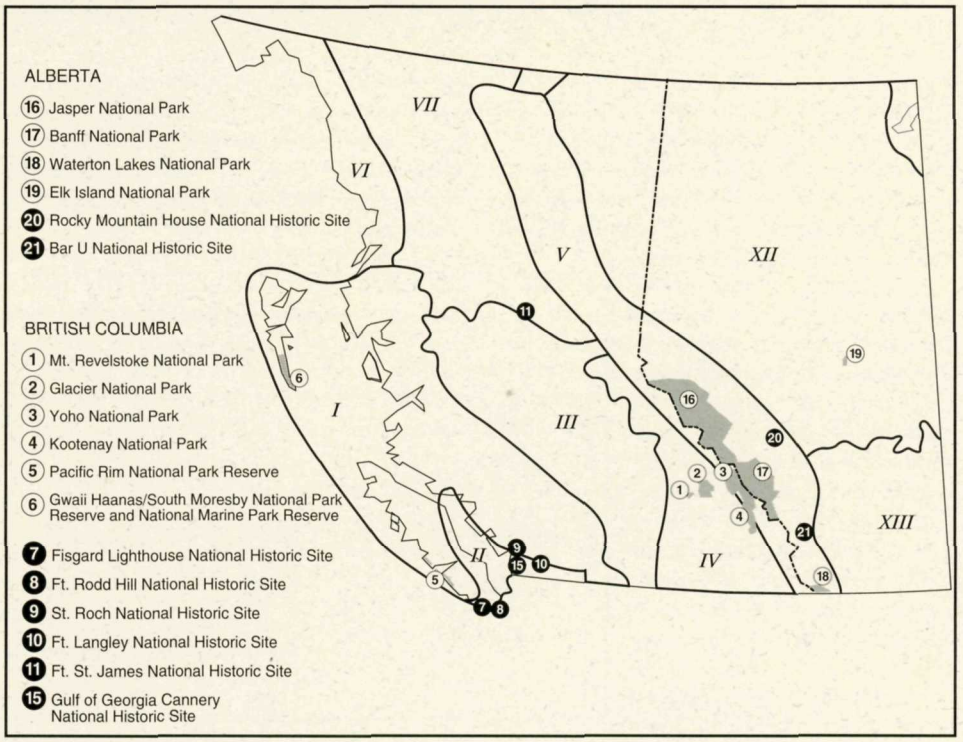
One of Jasper National Park's priorities is reducing wildlife mortality from motor vehicle accidents along Highway 16.

Presently, there are about 120 large mammal deaths every year on Highway 16. Wes Bradford, Jasper's wildlife/human conflicts specialist, in conjunction with other park wardens and Highways/Scenic Corridors staff, is trying to find a way to reduce wildlife/vehicle collisions. Current actions include sanding Highway 16 with calcium chloride instead of common road salt (which attracts wildlife and may contribute to wildlife mortality), and analysing traffic patterns.

Traffic counters along Highway 16 record number of vehicles, vehicle type, speed, date, and the exact time of day. The information will be analysed to see how vehicle speed patterns vary throughout the day, over the year, and by vehicle type (car, camper, semi, bus, *etc.*). Alberta Highways is contributing data from police accident reports originating inside the park, which may identify patterns in who is running over our wildlife, at what time of day, *etc.*

The information gathered in this project may be used to propose a joint research project with the insurance industry, which stands to gain financially from reduced wildlife-related accident claims.

For further information, please call ***Evan Manners*** *at (403) 852-6161.*



Yoho National Park

The 1995 research priorities for Yoho National Park run the gamut from wolverine *(Gulo gulo)* and wolf *(Canis lupus)* ecology to management, removal, and monitoring of non-native plants. We are continuing to support the University of British Columbia's edge effects research (see *Research Links* 2[2]); specifically, work on amphibians and a graduate study of mountain bluebirds.

We will also be continuing with a cooperative research initiative with the business interests in the Lake O'Hara Area. The focus of this socio-ecological model is the development of a decision support model to assist in the management of conflict by grizzly bear and human use conflict.

Other projects include the Fragmentation and Connectivity study, the Burgess Shales project, ecological monitoring of permanent sample plots, ecological land classification, and a tourism/recreation study.

For further information, please call ***Derek Petersen*** *at (604) 343-6324.*

Waterton Lakes National Park

In 1995, Waterton Lakes National Park plans to complete the vegetation/soils component of the park's Ecological Land Classification project, and begin the wildlife component. We will also be refining the park's monitoring programme with the assistance of instructors and students from Lethbridge Community College, and studying and monitoring key species such as wolf *(Canis lupus)*, bull trout *(Salvelinus confluentus)*, and whitebark pine *(Pinus albicaulis)*.

For further information, please call ***Kevin Van Tighem*** *at (403) 859-2224.*

A 1994 visitor survey looks at crowding levels in day - use areas

Crowded in Jasper ?

Paul Lauzon

During the summer of 1994, Jasper National Park conducted an exit survey of users to some of the heaviest use frontcountry non-commercial trails in the park. These trails were categorized into three components: trails in the Bench area, trails in the Maligne Canyon and Old Fort Point area, and miscellaneous high and moderate use trails. One purpose of the study was to assess whether visitors felt crowded while using the trails, and if so, if it affected their overall recreational experience.

On average, trail users encountered about 24 people on their trip. Roughly 77 per cent of all users were hikers and 22 per cent were cyclists. Analysis of variance (ANOVA) revealed that hikers encountered a mean difference of 24 more people than did cyclists. A possible explanation for this difference is that cyclists may select trails that are under-utilized. Furthermore, a large proportion of the hikers interviewed were hiking the heaviest day use trails in the park, such as Cavell Meadows and the Maligne Canyon trail, where cyclists are not allowed. On these two trails, it is possible to encounter up to 300 people in a single trip.

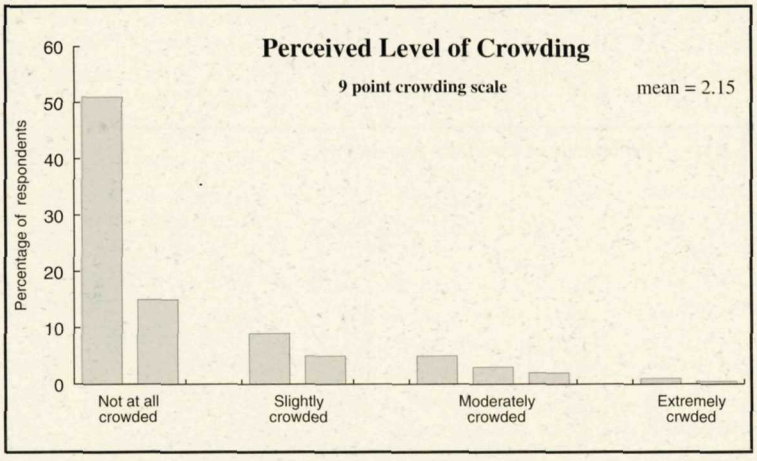


Figure 1: How crowded do Jasper visitors feel?

For about 33 per cent of users, the number of encounters was more or less as expected. Nonetheless, more than 40 per cent felt it was "little less" or "much less" than they expected. Both hikers and cyclists appeared to have similar expectations of encounters while on a trail.

The majority of visitors (about 64 per cent) had "pleasant" or "very pleasant" encounters and roughly 28 per cent had neither pleasant or unpleasant encounters. Cyclists felt significantly more pleased about their encounters than did hikers.

The majority of users felt "not at all crowded" by the number of encounters they had *(Figure 1)*. Hikers felt significantly more crowded than did cyclists. About 30 per cent of users expressed that they experienced some degree of crowding as a result of their encounters.

For the majority of trail users (53 per cent), the number of people encountered did not appear to have any effect on their overall experience. While 33 per cent expressed that the encounters "added a little" or "greatly added" to their

– continued on page 11 –

Chemical-free gardens flourish at Wasagaming townsite

Hugh Penwarden

The townsite of Wasagaming, MB, in Riding Mountain National Park, was designed in the 1930s to resemble a Victorian British resort in the wilderness, complete with gardens, tennis courts, bowling green, golf course, beach, playgrounds, and rustic log buildings with Tudor details. The gardens around the museum and park headquarters represented a romanticized version of the English countryside, the original of which was familiar to the park's Anglo-Saxon visitors.

The gardens have been maintained with organic, chemical-free methods since 1985. The decision to "go green" was a grass roots one: made by the gardeners themselves out of personal conviction. The gardeners believed using hazardous chemicals in a national park, especially in areas where people walk barefoot and lie on the grass, was inappropriate. Today, these practices are in keeping with Parks Canada's policy of stewardship, and organically maintained, chemical-free public gardens are becoming increasingly important examples of environmental stewardship in a world of rapidly proliferating chemicals.

The techniques used in Wasagaming are fairly standard. Lawns are maintained by cutting the grass long; aerating (exposing the grass to the chemical action of air—a natural process); top dressing with a combination of top soil and compost; and not worrying about the odd weed—they are ground covers, too. The flower bed maintenance consists of good hygiene practices; employing principles of companion planting; and enriching well-drained soil with compost.

Occasionally, problems do arise, and gardeners resort to numerous chemical-free remedies. Something as simple as placing paper matches along the stems just above and below soil level stops cutworms. Wood ashes repel slugs; beer traps let them die happy.

The Wasagaming gardeners hope the Riding Mountain National Park townsite will eventually be known not just for its Victorian look, but also for its the organically maintained gardens and commitment to environmental stewardship.

DID YOU KNOW...

Companion planting works on the premise that certain plants have an inhibiting effect on certain insects, diseases, and fungi. For example, mint and tansy deter cabbage moths; catnip discourages flea beetles; marigolds, asters, nasturtiums, calendula, and geraniums repel most insects; and parsley inhibits Black Spot disease.

***Hugh Penwarden** is head gardener at Riding Mountain National Park. For further information, please call (204) 848-7260, May 8–November 1.*

Happy in Banff?

Backcountry survey looks at impact of user fees on backcountry visitors in Banff National Park

Paul Lauzon

During the summer of 1994, Banff National Park conducted an exit survey of non-commercial users of several of the most used trails in the park to assess visitors' reactions to imposed user fees. The trails surveyed were the Bryant Creek trail, the Skoki trail, and three trails in the Sawback region (Cascade, Forty Mile Creek, and Johnston Canyon—about four kilometres from the trailhead). Visitors were asked a variety of questions, including how they enjoyed their time in the park in relation to the fee paid, how they felt backcountry services should be funded, and what changes they would support in order to maintain the current fee for backcountry trails.

The Four Mountain Park District recently implemented a backcountry user fee of $5 per person per night to a maximum of $25. When asked to rate the value of their experience in the backcountry for the fee paid, the majority of respondents felt their experience was "very good." On a 5-point scale from "very poor" to "very good," the mean score was 4.72.

The majority of users (about 60 per cent) felt this fee was "just right." Roughly 20 per cent of respondents felt it was "somewhat low" or "much too low." Analysis of Variance (ANOVA) was used to test if differences existed on this question in relation to the mode of transportation used, by country of origin, and whether respondents were overnight users and first time users. The test revealed no significant differences on any of these variables. However, a simple regression analysis determined that there is a linear relationship between the value of users' experience for the fee paid and how they reacted to the fee: the more satisfied visitors were with the value of their experience for the fee paid, the more they tended to feel the fee is just right or low.

Approximately 75 per cent of users felt backcountry services should be paid for partially by tax dollars. Only about 13 per cent preferred users pay all costs, and less than 10 per cent were in favour of strictly tax dollars as a source of paying for backcountry services. When asked to rate the person per night fee system on a 5-point scale from "very much opposed" (1) to "very much in favour" (5), the majority of users were in favour of the system with a mean score of 3.74. First-time users were significantly more in favour than repeat users. Visitors who were in favour of recovering all costs from the user were significantly more supportive of this system than respondents favouring partial or total tax support.

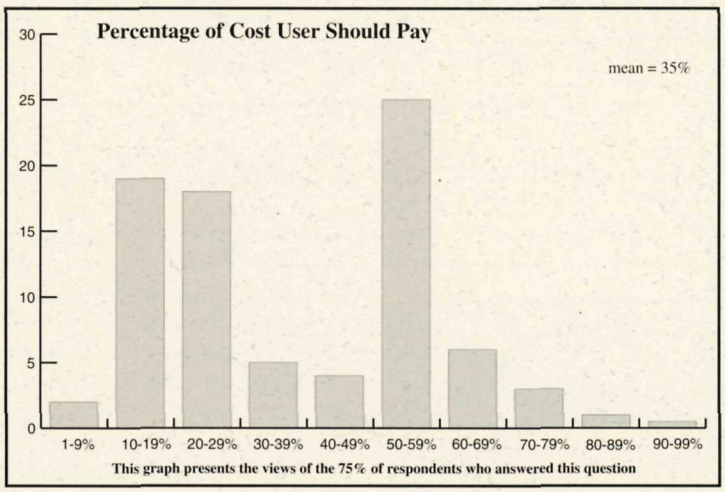


Figure 1: How much of the cost should the user pay?

On average, those who selected partial tax support as a means of paying for backcountry services indicated 35 per cent of the costs should be picked up by the user *(Figure 1).* More experienced users, who used backcountry services most frequently, did not want to pay less of the cost, despite the fact that the more they would use them, the more it would cost them. There were also no significant differences found in relation to either mode of transportation or country of origin in terms of the percentage of cost visitors felt the user should pay. Additionally, overnight users did not differ from day users, and first time users did not differ from repeat users on this variable.

Users were also asked which changes they would support in order to maintain the current fee for backcountry trails. The majority of users said yes to "no changes" and to "charge a higher fee." However, a large proportion stated they would prefer to maintain the current fee and implement changes.

Although results of the study indicate that attitudes of users to Banff's backcountry are quite favourable of the $5 fee and the fee per person per night system, it should be noted that this study represents only the attitudes of users who came to Banff. It does not represent the opinions of users who may have been displaced to other wilderness areas such as Kananaskis Country and other provincial land areas along both the eastern and the western slopes of the central Rocky Mountains as a result of the fee introduction.

Paul Lauzon *is a market analyst at Alberta Regional Office's Strategic Research and Analysis Division. For further information, please call (403) 292-5984.*

1994 Jasper Visitor Survey

— continued from page 10 —

experience, only 13 per cent said their encounters "detracted a little" or "greatly detracted" from their experience. Cyclists felt the number of encounters significantly added more to their experience than hikers. Taken as a measure of satisfaction, this may not be cause for concern at this time. Nonetheless, on-going monitoring of satisfaction in conjunction with perceived crowding is advised in order to maintain the current opportunities for high quality experiences.

Based on these results, crowding is currently not a problem on the day use trails of Jasper. Much of the reason for this may be that users have relatively accurate expectations about the number of people they will encounter while on a trail. Furthermore, as long as encounters between users remain pleasant to some degree, visitors will tend to feel less crowded and will likely remain highly satisfied with their experiences.

Paul Lauzon *is a market analyst at Alberta Regional Office's Strategic Research and Analysis Division. For further information, please call (403) 292-5984.*

Caves of the Canadian Rocky Mountains:

– *continued from page 1* –

formation contains Castleguard Cave and the buff-coloured Mural Limestone, Arctomys Cave, and the Small River karst.

These caves are extremely old features—the dating of calcite deposits (stalactites and stalagmites) indicates many passages had already formed over one million years ago (Yonge 1987). Existing bedrock passages are solid, and have survived many earthquakes and glacial periods.

Caves are often formed when meltwater streams from glaciers flow off moraines and sink underground when they come in contact with limestone. Such is the situation at Small River, adjacent to Robson Provincial Park, where 14 caves have been discovered, and in the Hawk Creek area in Kootenay National Park, where several caves, up to 100 metres deep, have been explored. The contact between permeable and impermeable beds can act as a focus for cave development, as with Arctomys and the Goat Valley caves in Robson Provincial Park, where the Mural limestone is interbedded with shales and sandstones.

Some caves are obviously abandoned springs (in some cases still active), as with Maligne Canyon Cave (Jasper National Park), Castleguard and Pinto Lake caves (Banff National Park), Helicopter Hole (Yoho National Park), and Silver Sands and Tin Can caves (Kootenay National Park). Although flooding is rarely a danger in alpine caves, most contain small streams and sections of water-filled passages known as sumps. All caves occur in concert with active springs, which drain the lower flooded sections of cave systems.

"Buried deep in the Earth and protected by layers of rock, caves have not been subjected to the sequential periods of glacial activity that have scoured the land surface of much of Canada."

STOREHOUSES OF THE PAST

The contents of caves include mineral formations, mud deposits, fauna and faunal remains. Mineral formations, composed of the mineral calcite (calcium carbonate), occur frequently in Canadian Rocky Mountain caves. Common are coatings and crusts of calcite, giving a light-coloured appearance to ceilings, walls, and floors of cave passages. Cave coral, a coralloid consisting of small knobby clusters 5–10 millimetres in diameter, is often found in cracks and fissures in drier sections of caves. Stalactites occur in most inventoried caves, soda-straws being especially numerous. Stalagmites range from small button-shaped protrusions to massive rounded bosses growing from the cave floor. Other more exotic mineral formations found include helictites, cave pearls, moonmilk, and spar.

Most Rocky Mountain caves contain large amounts of glacial sediments, ranging in size from large cobbles to coarse gravels, silts, and fine glacial flour. Records of paleomagnetic reversals found in rhythmites in Castleguard Cave indicate a minimum deposition age of 720 thousand years (Gascoyne *et al.* 1983).

Cave fauna is fairly limited, due to low temperatures. Trogloxenes—animals who use cave entrances as a temporary home—are the most numerous inhabitants. Pack rats *(Neotoma cinerea)*, little brown bats *(Myotis lucifugus)*, and harvestmen spiders (order *Opiliones*) are present in many caves as well. Little is known about aquatic invertebrates in local caves, however, amphipods (order *Amphipoda*) and isopods (order *Isopoda*) have been identified at several sites (Holsinger *et al.* 1983). Rich deposits of faunal remains have been found in several low altitude front

Jurisdiction	Number of Caves
Parks Canada	53
British Columbia Forest Service	34
Alberta Forestry, Lands and Wildlife	31
British Columbia Ministry of Lands, Parks & Housing	17
Government of Alberta	2

Table 1: Southern Canadian Rocky Mountain Caves

Occasional Papers

The Canadian National Parks Occasional Papers Series was initiated by Parks Canada in the late '70s to promote understanding and informed debate on issues relating to parks and protected areas. All submitted papers are subject to a blind peer review process, and presented at a level of comprehension and in the traditional format of a scientific journal article.

Graham, Robert. 1983.
Canadian national park and heritage area research needs and funding sources. Parks Canada Occasional Paper Series 1.

Hotzel, Charles N.C. 1979.
The source of native claims in Canada. Parks Canada Occasional Paper Series 2.

Nepstad, Elaine. 1993.
Towards a better understanding of human/environment relationships in Canadian national parks. Parks Canada Occasional Paper Series 5.

Rowe, J. Stan. 1989.
National parks and climatic change. Parks Canada Occasional Paper Series 4.

White, Cliff A. 1985.
Wildland fires in Banff National Park, 1880–1980. Parks Canada Occasional Paper Series 3.

Papers in the series are available for researchers and authors from any organization. Researchers and authors wishing to publish in this series should submit manuscripts to the editors listed below.

For further information, please call editors ***Stephen Woodley*** *of the Natural Resources Branch at (819) 994-2446 or* ***Per Nilsen*** *of Visitor Activities Branch at (819) 994-2745. Mailing address: 25 Eddy Street, Hull, PQ, K1A 0H3.*

An Overview

range caves. Stratified bone beds in the entrance of Rats Nest Cave, near Exshaw, contain bones of 34 mammalian species with a date range of 2 000 - 7 000 years ago. Two prehistoric Indian arrow heads at the same site were identified as 2 000–3 000 year old Pelican Lake style (Burns 1989).

RESEARCH

Buried deep in the Earth and protected by layers of rock, caves have not been subjected to the sequential periods of glacial activity that have scoured the land surface of much of Canada. Cave mineral deposits have the potential to provide detailed continental Quaternary climate records. Preliminary research using stable isotope analysis has yielded climatic signatures that parallel two proxy sources of Quaternary climate records: marine cores and polar ice cores.

As indicated by the bone beds in Rats Nest, some caves are storehouses for the study of paleobiology. As well, cave sediments can provide evidence for paleomagnetic dating and palynology. Fluctuations in the Earth's geomagnetic field are recorded in the alignment of mineral grains, and fossil spores of higher plant species have been found. Pack rat middens are located near the entrances of nearly all Rocky Mountains caves, and provide an as yet untapped source of vegetation records.

Some Rocky Mountains caves contain large volumes of permanent ice. Several different mechanisms have been established for how this ice forms (MacDonald 1994) and studies are ongoing to establish its age.

Cave research is in its infancy, and relies on the discovery of new cave sites. There is considerable overlap between the professional, scientific study of caves and those involved in cave exploration—for only through the efforts of cavers can the resource base be expanded. New caves continue to be discovered, and 35 cave systems have been surveyed in recent years, mainly in the northern British Columbia Rocky Mountains.

***Jonathan Rollins** is an environmental consultant specializing in alpine environments. For further information, please call (403) 282-6177.*

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Gascoyne, M. et al. 1983.
The Antiquity of Castleguard Cave, Columbia Icefields, Alberta, Canada. Arctic and Alpine Research, 15, 463–470.

Holsinger, J.R. et al. 1983.
The subterranean crustacean fauna of Castleguard Cave, Columbia Icefields, Alberta, Canada, and its zoogeographic significance. Arctic and Alpine Research, 15, 543–549.

MacDonald, W.D. 1994.
Mechanisms For Ice Development in Ice Caves of Western North America. Unpublished Masters Defence Project, EVDS, University of Calgary.

Yonge, C.J. 1991.
Studies at Rats Nest Cave: Potential for an Underground Laboratory in the Canadian Rocky Mountains. Cave Science 18 (3), 122–123.

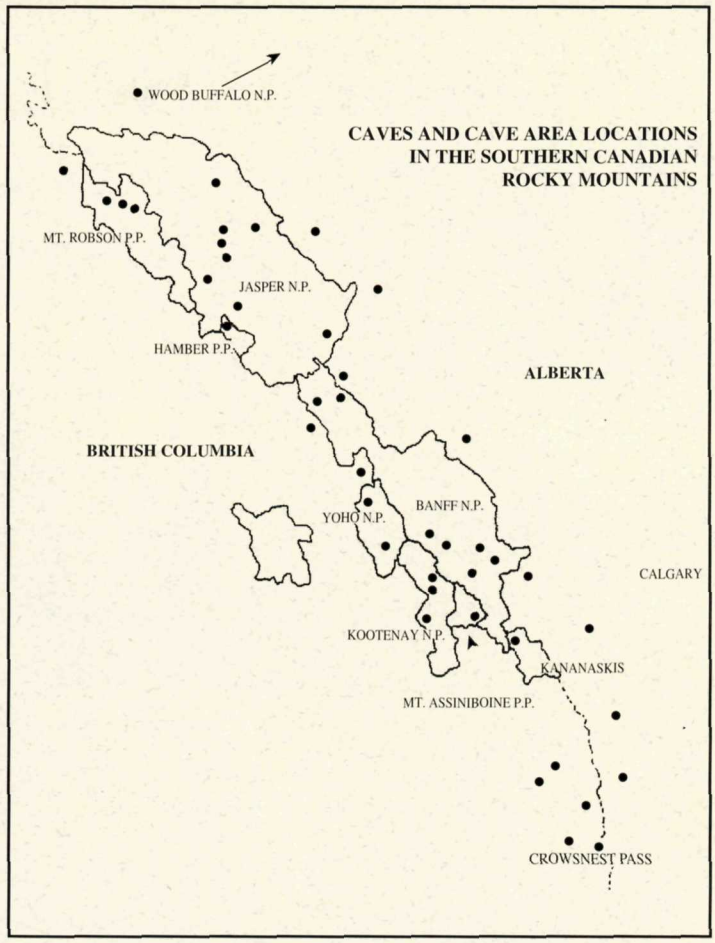

Figure 1: Distribution of Caves in Southern Rocky Mountains in Canada

GLOSSARY

cave – rock cavity that has some extent of bedrock passage, with passages formed by dissolution processes rather than frost shattering or bedrock collapse.

karst – region with underground drainage and many cavities caused by dissolution of rock.

moraine – area of debris carried down and deposited by a glacier.

paleomagnetism – magnetism remaining in rocks from past times.

palynology – study of pollen in connection with plant geography; dating of fossils, *etc.*

scree – mountain slope covered with small stones that slide down when trodden on.

shafts – steeply descending cave passages.

speleology – scientific study of caves.

stalactite – deposit of calcium carbonate, usually in the form of an icicle, formed by trickling of water.

stalagmite – deposit like stalactite standing on floor of a cave and often uniting with stalactite.

sump – sections of cave passage filled with water.

troglobites – fauna that live permanently and exclusively in caves.

troglophiles – fauna that spend lifecycle in caves, but species of which are also found outside of caves.

trogloxenes – fauna that use cave entrances as a temporary home.

Appetizer of a book doesn't fill you up

Parks and Protected Areas in Canada: Planning and Management
edited by Philip Dearden and Rick Rollins
reviewed by Douglas Clark

Dearden and Rollins deliver an overview of Canadian Parks' management practices newcomers to the field may find useful

Philip Dearden and Rick Rollins are familiar names and prolific authors in the field of protected areas management. Their book, *Parks and Protected Areas in Canada: Planning and Management*, has two purposes, as outlined in the first chapter: to summarize Canadian management practices, and to serve as a university or college text for this field—something that so far has not existed.

As a textbook, *Parks and Protected Areas* will serve admirably. The contents are clearly laid out, well-referenced, and organized. The book covers broad subject areas with plenty of current examples. The second appendix, of key words, concepts and study questions, will be especially useful for designing undergraduate or college courses. One overlooked use for this book would be to provide an overview of our organization and aims for new Parks Canada employees: it explains our jargon and acronyms quite painlessly!

Dearden and Rollins have assembled an impressive list of contributing authors, who cover a wide range of topics. Kevin McNamee's history of national parks sets the stage for a systematic examination of different aspects and specialities of park management. J.G. Nelson addresses the evolution of stewardship and the ecosystem perspective. Paul Eagles chronicles park legislation, its past effects, and future implications. Rollins' description of national park management is concise and complete. George Priddle and Guy Swinnerton discuss the park systems in Ontario and Alberta, respectively. John Theberge's chapter on the role of ecology and conservation is a broad introduction to conservation biology, a topic worthy of further coverage. Eagles' treatment of environmental management is unfortunately sometimes simplistic: almost misleadingly so in the assessments of bear/human interactions and information management. R.J. Payne and R. Graham address visitor management, an increasingly important concern. James R. Butler eloquently describes the history and many faces of interpretation in national parks. Lawrence Berg, Terry Fenge, and Dearden's analysis of the role of aboriginal peoples in park planning and management, and David Duffus and Dearden's chapter on marine parks are particularly well done, and very topical. Eidsvik presents a global perspective of Canada's considerable efforts and achievements. The final chapter, by Rollins and Dearden, is a direct call to action on what they feel to be the major challenges facing parks and protected areas in Canada.

The Canadian emphasis is consistent, and a welcome addition to the literature. However, it often seemed that authors were only able to describe issues, and did not have the scope to explore them further. I was disappointed by the lack of critical thought or real analysis of problems. This could certainly be exploited in seminars or class discussions, since there is plenty of other material with which to work.

Park managers should not expect to see anything new in this book. Many good ideas are presented, and these always bear repeating, but there is little synthesis of ideas. This does not detract from the solid presentation of the subject matter; *Parks and Protected Areas* clearly aims to present the basics, in a textbook format. It will be a much more widely readable and attractive package than something like J.K. Agee and D.R. Johnson's *Ecosystem Management for Parks and Wilderness* (1989). We should be thankful for this, since it should appeal to a much larger audience.

Overall, *Parks and Protected Areas* is a comprehensive treatment of contemporary Canadian thoughts and issues in protected areas management. For a student, new employee, or park manager, it is a worthwhile basic reference.

(Photo credit: Ole Heggen, in Parks and Protected Areas in Canada)

***Douglas Clark** is a senior park warden (wildlife/law enforcement) at Pacific Rim National Park Reserve. For further information, please call (604) 726-7721.*

***Philip Dearden** is a professor of geography at University of Victoria.*
***Rick Rollins** is a faculty member at Malaspina College's Department of Tourism and Recreation. Parks and Protected Areas in Canada: Planning and Management was published by Oxford University Press, Don Mills, Ontario, in association with the Canadian Parks and Wilderness Society (1993).*

PODIUM

Communicating research crucial

Ross MacDonald

Research too often is seen primarily as a tool for resource management, and only secondarily one for public presentation. The argument frequently runs along the preservation *vs.* recreation lines, with education relegated to, at best, entertainment. This myopic view fails to recognize that insightful and provocative public presentation, when based upon good research, is a powerful resource management tool. Without effective communication, all other conservation activities may be negated. A new mindset is needed among both researchers and professional communicators, one that views communication as an essential part of research, and a shared responsibility of researchers and communications staff.

Why communicate research to the public? It is the public, through user fees and taxes, who fund national parks and historic sites, and the research conducted therein. They are the residents in and around our parks, the visitors and the electorate who ultimately decide, through their direct and indirect actions, the integrity of the natural and cultural heritage we strive to protect. An on-going exchange of information and view points, building understanding and ultimately partnership with the public and specific stakeholders, is essential so the public and stakeholders are well-informed.

What has prevented the effective presentation of research to outside audiences? Dusty park and site libraries are filled with research reports that bury results amid scientific jargon inaccessible to lay persons. This research, if communicated at all, was presented only to the already informed. The need for presenting to the public and other park staff was not recognized or was only done if the research results were spectacular. Communication staff had almost exclusive right to distribute information to the public outside the site, but instead concentrated on visitors within. They also failed to market their services to other site sections. Cliques of presenters and resource protectors ruled their separate domains. The public and our heritage areas were the losers. The shift to ecosystem-based management requires that communication extend beyond site and park boundaries.

Credible research requires credible presentation. Communication is a complex and powerful tool. Using public presentation as a conservation tool requires preparation, otherwise it will be as ineffective as poorly planned research. Public presentation can-

"Cooperation between the two camps of experts will help expose and publicize research results and reduce the chance that they will gather dust in a library, unread and unused."

not remain the sole responsibility of communication staff. One section cannot meet all the communication needs of our heritage areas; teamwork is required. Researchers and resource conservationists are the resource experts; with training, they can also be key presenters. The education staff—the communication experts—should be advisors who help researchers create communication strategies to deal with issues, prepare presentation materials, arrange interviews with media, and provide communication skill training. Cooperation between the two camps of experts will help expose and publicize research results and reduce the chance that they will gather dust in a library, unread and unused.

Partnerships need to go beyond park staff and site boundaries. Other government agencies, nonprofit groups, educators, businesses, and the media are essential for our efforts to reach specific audiences (and, increasingly, to fund the research itself). Dialogue is the beginning of successful partnering to ensure shared risks and rewards.

Happily, barriers are falling and new alliances are growing between communication staff, researchers, heritage resource managers, and outside agencies. At Mount Revelstoke and Glacier National Parks, many education staff work directly for heritage resource conservation. A Banff National Park warden is coordinating a multi-agency interpretive project. At Rocky Mountain House National Historic Site, archaeologists, presenters, and Friends of the Park collaborated to produce a portable archaeological dig display. Kootenay National Park education staff work with a myriad of outside partners to reach audiences across North America and beyond. Elk Island National Park's public awareness and education campaigns generated public and private donations for trumpeter swan reintroductions and are increasing support for management practices.

There are numerous other successful examples of integrating conservation and public presentation, but this, unfortunately, is not yet the norm. There is fear of the risks involved with increased openness about our research and practices. We will make mistakes as we create new alliances. However, risk can be managed with preparation. Partners can be chosen carefully. Messages and delivery mechanism can be tailored to each audience. The effectiveness of communication can be monitored and modifications made if needed. We must not confuse risk management with risk elimination: the consequences of not communicating our research to the public are greater than those of sharing it and possibly losing tight control of research results. We then sacrifice opportunities for dialogues, partnerships, and building of constituencies needed for the continued survival of Canada's heritage.

***Ross MacDonald** is chief of Heritage Communications at Rocky Mountain House National Historic Site. For further information, please call (403) 845-2412.*

MEETINGS OF INTEREST

April 25–26, 1995 — Consensus or Confrontation: The Role of the Environmental Professional. Edmonton, AB. The conference will discuss the rapidly evolving roles and responsibilities of environmental professionals in helping to achieve consensus on issues involving the wise use of natural resource by society. Contact Teresa de Grosbois, Conference Chair, NOVA Gas Transmission Ltd. Tel: (403) 290-6028, fax: (403) 290-7227.

May 29–1 June, 1995 — Sustainable Forests: Global Challenges and Local Solutions. Saskatoon, SK. The conference will provide for the exchange of knowledge on sustainability aspects of the world's forests. Contact Dr. Thomas Bouman, Prince Albert Model Forest Association Inc., Box 2406, Prince Albert, SK, S6V 7G3. Tel: (306) 922-1944, fax: (306) 763-6456.

June 5–8, 1995 — Canada - U.S. National Parks Air Issue Workshop. Waterton Park, AB. This invitational workshop will address air quality and airshed management, with a focus on treaty, legislative and policy requirements. Contact David Welch, Parks Canada, tel: (819) 994-5532, fax: (819) 994-5140 or Erik Hauge US. NPS Air Quality Division, tel: (303) 969-2078, fax: (303) 969-2822.

June 15–19, 1995 — American Society of Ichthyologists and Herpetologists, American Elasmobranch Society, and Herpetologists League. Edmonton, AB. The conference will include symposia and presentations of papers. Contact Joseph S. Nelson or Mark V. H. Wilson, Department of Biological Sciences, the University of Alberta, Edmonton, AB. T6G 2E9, fax: (403) 492-9234.

July 16–20, 1995 — Tenth International Conference on Bear Research and Management. Fairbanks, AK. Contact Sverling Miller, 333 Raspberry Road, Anchorage, AK, 999518-1599, or Harry Reynolds, tel: (907) 456-5156.

August 14–16, 1995 — Second National Habitat Workshop. Sackville, NB. Themes will include habitat enhancement and restoration, sustainable habitat use, protective mechanisms, marine and coastal zone issues, habitat research and monitoring, and data and information management. Contact Dianne Amirault, Canadian Wildlife Service, Environment Canada, P.O. Box 1590, Sackville, NB, E0A 3C0.

September 12–17, 1995 — Annual Meeting of the Society for Ecological Restoration. Seattle, WA. The overall theme will address the role of restoration in ecosystem management. Contact Nikita Lopoukhine, tel: (613) 997-4900, or Society for Ecological Restoration, 1207 Seminole Highway, Madison, WI, 53711. Tel: (608) 262-9547.

September 24–27, 1995 — Greater Yellowstone Predators: Ecology and Conservation in a Changing Landscape. Yellowstone National Park. This is the third biennial scientific conference on the greater Yellowstone ecosystem. It will be taking a broad look at predators and predation. Contact Peyton Curlee, tel: (307) 733-6856, or Paul Schullery, tel: (307) 344-2205.

October 15–19, 1995 — North America Chapter of the WCN Commission on National Parks and Protected Areas Regional Meeting. Lake Louise, AB. The meeting will focus on issues of biodiversity and sustainable use. Contact Antoine Lecherc, CNPPA, 25 Eddy Street, 4th Floor, Hull, PQ, K1A 0M5. Tel: (819) 994-2657, fax: (819) 994-5140.

October 18–21, 1995 — Canadian Coastal Conference 1995. Dartmouth, NS. Hosted by the Canadian Coastal Science and Engineering Association, in cooperation with Atlantic Geoscience Centre, Dalhousie University, and the National Research Council, the conference's theme is "State of the Coasts: Monitoring and Prediction." Contact A. Bowen, Department of Oceanography, Dalhousie University, Halifax, NS, (B3H 4J2). Tel: (902) 494-7082, fax: (902) 292-2885, e-mail: tony.bowen@dal.ca.

November 6–11, 1995 — Aquatic Ecosystem Stewardship. Toronto, ON. This is the 15th International Symposium of the North American Lake Management Society. Contact Murray Charlton, National Water Research Institute, Aquatic Ecosystem Restoration Branch, P.O. Box 5050, 867 Lakeshore Road, Burlington, ON, L7R 4A6.

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