Research Links
A Forum for Natural, Cultural and Social Studies
VOLUME 2 - Number 2 Parks Canada, Alberta & British Columbia FALL 1994

SOWING THE SEEDS OF THE PAST

As it was before: Elk Island National Park is working to restore native grassland species

Anne Dickinson

Good quality native grassland is a rare commodity in Elk Island National Park, though it is believed to have been once a prevalent component of the Aspen Parkland ecosystem. Due to past management practices, native grassland areas of the park have been lost to aspen encroachment (as a result of fire exclusion) and destroyed by cultivation of non-native species for hay production. Today, less than five per cent of the park area is grassland, and of that, very little is a good representation of native fescue grassland species.

Elk Island is taking some initial steps to reverse this trend. In addition to an intensive prescribed burning programme that has been underway since 1980, several new prairie restoration initiatives have been launched.

In an effort to reduce the amount of cultivated landscapes in the park, a pilot project began in the summer of 1993 to convert the lawn around Elk Island's administration building to a self-maintaining mix of native prairie grasses and wildflowers. The area, approximately one hectare in size, was seeded with 50 per cent western wheatgrass *(Agropyron smithii)*, 25 per cent slender wheatgrass *(A. trachycaulum)*, 15 per cent June grass *(Koeleria cristata)*, and 10 per cent green needle grass *(Stipa viridula)*.

This past spring, a small set of grow lights was purchased and some wildflower seedlings were propagated from seeds donated by the University of Alberta's Devonian Botanic Gardens. As of this writing (June 1994), the grasses form a thick, lush cover, and although weeds are a problem in some patches, it appears that the grasses will win in the long term. The wildflower seedlings (over 150 milk cartons full!) are now transplanted into the site, too.

Visitors to Oster Lake Group camp may notice the addition of a large fenced plot in the Oster Meadows. This is one of two plots within the park that are part of graduate student Dana Bush's MSc research project. The second plot is located at North Tawayik Lake Meadows.

Bush, who is studying under Dr. Anne Naeth at the University of Alberta, has designed 10 different combinations of native (grass and wildflower) seed mixes and is testing their ability to compete with invasive weed species. After the completion of her initial two-year study, the fencing will be removed. By that time, the seeded species should be established and able to withstand bison grazing and trampling.

The plots will continue to provide information on restoration. Future graduate students at the university will utilize the plots to test the sustainability of the various seed mixes and their ability to withstand changes in abiotic environmental factors, such as grazing and prescribed burning.

***Anne Dickinson** is a fire/vegetation specialist at Elk Island National Park. For further information, please call (403) 992-6390.*

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. The views of the 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 WINTER ISSUE. DEADLINE IS NOVEMBER 5, 1994.

AROUND THE PARKS AND BEYOND

THIRD INTERNATIONAL MINING HISTORY CONFERENCE

The Third International Mining History Conference, held June 6–10, 1994, in Denver, CO., provided an exciting and informative forum for presentations and discussions by 300 professionals from around the world. Speakers included academic and public historians, miners, engineers, geologists, curators, archaeologists, land managers, and mining heritage staff representing heritage sites and agencies, mining companies, libraries, and universities. In three days of presentations and two days of field trips, topics discussed included cultural resource management challenges, the development of shared management and interpretation of mining heritage sites, and historiographic issues.

Abridged from the Third International Mining History Conference Report. For further information, please call David Neufeld, Yukon Historian, at (403) 667-3913.

MOUNT EDITH CAVELL 1993 VISITOR SURVEY SUMMARY

A proposal to redevelop Jasper National Park's Mount Edith Cavell access road received valuable input from a visitor study conducted in August 1993. The 14 km road, built in 1924, is open to vehicle traffic May–October, and provides visitor access to the Mount Edith Cavell Hostel, a horse corral and enclosure, Tonquin Valley Trailhead, viewpoints, and the main day use area.

The study's objectives included examining options for upgrading the access road, determining visitor satisfaction and willingness to pay for an improved road, ascertaining the importance of various services and facilities, and obtaining visitor demographics.

The results of the study indicate visitors rate Mount Edith Cavell highly, often due to the ruggedness of the site and the unique, "entire glacier" experience it offers. Eighty-five of all respondents felt the road was fair or good, and appreciated having a paved (and rustic) road in such a remote area. In reaction to the overwhelming "the road is good enough as it is" response, Jasper decided not to rebuild the road, but sustain it with improved maintenance and a spot repair programme.

Abridged from the Mount Edith Cavell 1993 Visitor Survey Summary, by the Strategic Research and Analysis Division. For further information, please call (403) 292-4743.

ORGANOCHLORINE PESTICIDES IN OUR LAKES

Environment Canada's recently released report, *Polychlorinated Biphenyls and Organochlorine Pesticides in the Aquatic Environment Along the Continental Divide Region of Alberta and British Columbia,* deals with a little known aspect of our parks—pollution.

Polychlorinated biphenyls (PCBs) were detected in fillets of lake trout taken from 11 of the 14 lakes measured in Waterton, Banff, Yoho, and Jasper National Parks, and were occasionally detected in rain and lake water samples

Organochlorine pesticides—DDT, toxaphene, and hexachlorobenzene—were present in many of the lake trout fillets. Pesticide concentrations were below the Health and Welfare Canada regulatory limit, with the exception of toxaphene levels in lake trout from Banff's Bow Lake.

The source of this pollution, in most of the lakes, is atmospheric and may ultimately come from Asia. Local contaminant sources were identified in two cases: high levels of toxaphene in Lake Moab trout were attributed to a 1959 application of this toxicant to remove undesirable fish species; and high levels of PCB in Moose Lake may be attributed to spills from the highway, railway, or electric transmission line that are situated along the shoreline of this lake and its principal inlet river.

For further information or for a full copy of the report, please call David Donald at (306) 780-6723.

Multi-agency cooperation in the North Columbia mountains

Ecological research group formed

John Woods

In this age of hectic schedules, sending out 15 invitations to a day-long meeting in Revelstoke and having 30 people show up seems incredible—but this is what happened last spring at a workshop on ecological research in the North Columbia mountains. For a day, job titles and affiliations took second place to discussions about the North Columbias' research and plans to increase cooperation and communication. Participants heard the details of projects from the Ministry of Forests, the Ministry of Environment, B.C. Hydro, the University of British Columbia, and, of course, Parks Canada. By the end of the day, all had arrived at an easy consensus—most of the North Columbias work is inter-related and there are big advantages to finding better ways of working together.

A year later, the North Columbia Ecological Research Group (NCERG) is a reality. Its mailing list is a "who's who" of over 50 people connected with ecological research in the North Columbias and includes government employees, private contractors, and university professors, as well as members of crown corporations, forest companies, and park friends groups. These people have already received three newsletters and attended two informal meetings to swap information and ideas. Most importantly for the future, NCERG has adopted a terms of reference that clearly states the group's geographic scope, purpose, and intended activities.

The North Columbia area combines ecosystem thinking with practicality. Mostly within the interior wet belt of the Columbia Mountains Natural Region represented by Mount Revelstoke and Glacier National Parks, it also includes a portion of the Rocky Mountains Natural Region represented (in part) by Yoho and Kootenay National Parks. From a provincial point of view, the area includes all or part of five forest districts and numerous wildlife management units. And of course, the entire region is part of the north bend of the Columbia River, an area of extensive hydro-electric development and world-class wetlands. Roughly divided by the Trans-Canada highway and the mainline of the Canadian Pacific Railway, it includes protected areas, and areas of intensive forest harvesting, towns and cities, wilderness recreation areas and permanently flooded regions—in short, the complexity common to most of British Columbia.

NCERG has three major purposes: to facilitate and stimulate cooperative research to maximize efficiency, applicability, and cost-effectiveness across a broad spectrum of individuals and organizations; to provide a forum for professional information exchange, discussion, debate, and peer review; and to encourage the use of research results in decision making and public education.

A sampling of current research within the North Columbia area includes caribou use of managed and unmanaged forests, the impacts of forest fragmentation on bird and small mammal communities, monitoring the productivity and survival of neotropical migrants, cumulative environmental assessment of grizzly and black bears, distribution of bats in old-growth stands, ecology of wolverines, and the economic impact of forest harvesting guidelines. In the future, the group hopes to see the breadth of research expand to include aquatic resources, soils, terrestrial invertebrates, and plant ecology.

"NCERG is tackling the ambitious project of developing a research strategy that identifies information gaps, research priorities, opportunities, and actions."

The North Columbias may well be unique in terms of concentration of research and the number of interested parties, and this creates an opportunity to make major advances through cooperation, coordination, and joint funding. To this end, NCERG is tackling the ambitious project of developing a research strategy that identifies information gaps, research priorities, opportunities, and actions. By transcending agency boundaries, the strategy would provide an ecosystem-level view of ecological research that could be used as a planning and budgeting tool. Such a strategy, for example, could be used to suggest Parks Canada's role in ecosystem-level research.

***John Woods** is a faunal specialist at Mount Revelstoke and Glacier National Parks. For further information, please call (604) 837-7517.*

AROUND THE PARKS...

AQUATIC ECOSYSTEM HEALTH IN KOOTENAY NATIONAL PARK

Alan Dibb

In the summer of 1994, research began to establish baseline information on the benthic invertebrate communities of streams and rivers throughout and adjacent to Kootenay National Park. The approach relates benthic communities to key biotic and abiotic variables, including stream order and hydrology, soil and vegetation type, and stream slope and elevation. This research will provide the basis for long-term assessment of aquatic ecosystem health in Kootenay.

The project is supported by Kootenay National Park and the National Hydrology Research Institute in Saskatoon. Much of the field work will be conducted by a University of Calgary ecology graduate student. The project is expected to be completed by March 1996.

***Alan Dibb** is an ecosystem management specialist at Kootenay National Park. For further information, please call (604) 347-9361.*

JASPER NATIONAL PARK'S ECO LIBRARY

The Jasper community now has an official Eco Library, as a result of cooperation between Jasper National Park and the municipal library.

The Eco Library, which opened on March 3, 1994, is designed to be a user-friendly facility that will make residents aware of a variety of environmental issues.

Parks Canada teamed up with the Jasper Municipal Library to give the Eco Library a full-time home with easy access. The location will also help to enhance the service the municipal library already provides. The Eco Library, in addition to providing a valuable service to the community, will help to fulfill Jasper National Park's mission—"to promote understanding, appreciation, and respect for natural ecosystems and cultural heritage."

For further information, please call (604) 852-6142.

Do Parks Canada messages have effect ?

The Icefields Parkway 1993 Entrance/Exit Visitor Survey results are in and the verdict is...

Paul Lauzon

INTRODUCTION

The Icefields Parkway (Hwy 93) is a scenic route that spans 230 km between Lake Louise in Banff National Park and Jasper townsite in Jasper National Park. Eighty kilometres north west of Lake Louise, the Parkway is intersected by David Thompson (Hwy 11). The road climbs as high as 2000 m in two locations and provides numerous opportunities for sightseeing, learning, wildlife viewing, and other activities.

TABLE 1	Entrance	Exit
Wildlife	4.50	4.82
Climate	3.82	4.08
Landscape Features	3.66	4.18
Glaciers	3.51	3.86
Vegetation	3.43	3.76
Mtn. Build./Formation	3.43	3.73
Avalanches	3.28	3.54
Human History	2.92	3.25

Entrance and exit respondents

The Icefields Parkway Entrance and Exit Survey, conducted July 16–August 31, 1993, focused on five areas, one of which was the impact of Parks Canada messages on visitors. Parks Canada invests a considerable amount of resources in educational and interpretive services and facilities. One purpose for these services and facilities is to deliver various messages about Parks Canada's heritage, mandate, and role in the global environment. However, Parks Canada has not, to date, investigated whether these messages get across. Part of the Icefields Parkway Survey's purpose was to take an initial step in this direction.

METHODOLOGY

The target population was made up of all private vehicle visitors entering and exiting the Icefields Parkway from all three entrance and exit points (Jasper, Lake Louise, and Saskatchewan Crossing) during the time span of the study.

According to the laws of random sampling, each individual in the target population has an equal chance of being included in the sample. Therefore, by randomly selecting respondents in both the entrance and exit surveys, it is accepted that the samples are representative of the target population within a given margin of error. For this survey, that margin of error is plus/minus five per cent.

Sampling for this study was two-tiered. First, because the volume flow of traffic during any given day was not constant, use of a floating random sample to select respondents was the most efficient procedure. Specifically, a party (vehicle) was selected from the flow of traffic for the survey, and when the interview was completed, this party was redirected into the flow of traffic and the next party was selected. Meanwhile, other parties kept travelling by as interviews were conducted.

Second, only one individual was selected for the interview from each vehicle. That individual was the person, aged 18 or over, who would have the next birthday. If the party was not entering the Parkway for the first time or exiting it for the final time on this trip, the interview was immediately terminated. Additionally, during the exit survey, if the respondent had participated in the entrance survey on this trip, the interview was terminated immediately as well.

RESULTS

Using a scale of one to seven (1 = No Knowledge and 7 = Expert Knowledge), respondents were asked to indicate what they perceived to be their level of knowledge on each of the eight subjects presented on the Parkway. The study was not concerned with the amount of knowledge visitors felt they had, but whether a change in the perceived amount of knowledge existed between the entrance and exit visitors, the direction of the change, and the magnitude of the change.

A t-test was used to determine if a significant difference existed between the mean scores of all "entrance" and all "exit" visitors who had read/heard/learned about the specified subjects. The analysis revealed that significant differences existed in all the subjects except for "Glaciers" *(Table 1)*.

The data were further divided to include only the scores of the "exit" respondents who had specifically visited the Columbia Icefield Area, and then compared again with the scores of the "entrance" respondents *(Table 2)*. Statistical differences then emerged on the "Glaciers" subject between the scores of this specific "exit" segment as compared to the scores of the "entrance" respondents.

Another t-test was conducted on the scores of "exit" visitors. This included a comparison between the visitors who had specifically visited the Columbia Icefield Area and those who had not. There was no significant difference found between their knowledge scores.

The scores of travellers who specifically visited the Columbia Icefield Information/Exhibit Centre or who took part in a Snocoach Tour were also compared in their knowledge self-assessment to the scores of all "exit" visitors who read/heard/learned about the eight subjects. No difference was found in the mean knowledge scores between visitors who stopped at the Information/Exhibit Centre and those who did not.

In terms of comparison between those who took a Snocoach Tour and those who did not, the mean scores of four subjects appeared to show significant differences *(Table 3)*. However, the mean scores of the subject "Glaciers" were the only ones that differed significantly.

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TABLE 2	Entrance	Exit
Wildlife	4.50	4.88
Climate	3.82	4.12
Landscape Features	3.66	4.30
Glaciers	3.51	4.02
Vegetation	3.43	3.78
Mtn. Build./Formation	3.43	3.83
Avalanches	3.28	3.61
Human History	2.92	3.27

Exit Respondents who visited the Columbia Icefield

W.F. Whitcher

Victorian science in Canada's first national park

W.B. Yeo

In the busy summer of 1886, W.F. Whitcher journeyed to the Rocky Mountains to investigate the "kinds and conditions of game and fish in the Canadian National Park at Banff," which he did "pursuant to instructions received" from the Hon. Thomas White, Minister of the Interior. His report on his findings is dated December 31, 1886, and was published the following year in the parliamentary Sessional Papers.

The Whitcher report is significant as one of the earliest examples of how research influenced legislation, regulations, and park operations. Just how influential Whitcher may have been is subject to debate, largely because we know so little about early park management. Informal critiques of Whitcher's observations by present day specialists, noting his apparent inaccuracies and his anti-predator position, overlook his pioneering role. In his day, the authorities, both in Ottawa and in Banff, were working in a near-vacuum when it came to understanding natural resource issues in the area reserved for the new park.

Who was William Frederick Whitcher? From 1869 until his retirement in 1883, he had been Commissioner of Fisheries in the Department of Marine and Fisheries. He had joined the public service of the old Province of Canada as a clerk in 1847, and by 1865, had worked his way up to Chief Clerk in charge of the Fisheries Branch of the Crown Lands Office. He was present at the negotiations leading to the Treaty of Washington. He published a report on the fishery articles in the treaty; and in 1877, he assisted the commission that settled Canadian compensation under the treaty. He was secretary to the 1879 Royal Commission on the construction of the CPR. In 1887, following his return from Banff, he completed a work published by the CPR Passenger Department as *Nepigon Trout: An Ottawa Canoeist's Experience on the Northern Shore of Lake Superior.* He died in April 1888 (McCullough n.d.).

Whitcher may have been the most qualified available person to report on wildlife conditions at Banff, but it is not at all clear what the Department of the Interior was looking for.

Elimination of carnivores was an accepted part of Victorian science

Whitcher's retirement had taken place in controversial circumstances. He had been in poor health, and suffered from disagreements with colleagues and his Minister. A letter he had written to *Forest and Stream,* criticizing his department's fish-rearing programme, led to a suspension. He retired at 55 on pension, but he had been pushed out.

"'Wolves, coyotes, foxes, lynxes, skunks, weasels, wild cats, porcupines, and badgers should be destroyed,' along with predatory birds 'if too numerous.'"

His behaviour was questioned in the House of Commons, and documents on his case assembled for the Sessional Papers of 1885.

Perhaps this contract from the Minister of the Interior, and a trip to Banff, smoothed things over.

Whitcher's report consists of two main sections: his assessment of conditions at the Park Reserve, and his recommendations. He also makes reference to an advance report submitted in September 1886, which contained certain "urgent suggestions" for immediate action. These included restriction by the Superintendent of hunting and fishing, and measures to retain the receding waters of the Vermilion Lakes so as to permit the seeding of wild rice.

As others have observed, Whitcher's survey of conditions appears to have been limited in time and extent. In his report, he states his "personal examinations" were confined within a radius of 18 miles from Banff, supplemented by "other observations and inquiries." In addition, he lays out the philosophy behind his research:

> Paucity of fish and game will undoubtedly deprive the National Park of something of its many wild attractions; whilst plenteousness will be a source of profit and pleasure to Canadians interested in its development as a free popular resort for health and recreation, as also to strangers attracted thither by the natural features of scenic beauty and hygenic excellence which it assuredly embodies in an eminent degree (Whitcher 1887: 86).

In other words, Whitcher did not set out to study and understand an ecosystem, as a present day researcher might do, but, within the limits of time and space imposed on him, to inventory those things which contributed to his vision of a Victorian park, and to recommend measures to reinforce and protect them.

Where Whitcher is obviously most comfortable is in his discussion of fish and fish habitat. The report grows almost lyrical in its description of investigations at Lake Minnewanka (Whitcher's Devil's Head Lake) and its outlet, where Whitcher caught, with a fly, "a fine rainbow trout weighing six and a quarter pounds." It was, he says, "the handsomest fish I ever saw."

The proposal for artificially raising water levels in low-lying areas, and seeding them with wild rice, is based partly on Whitcher's ideas concerning fish habitat, as well as a desire to attract waterfowl. In addition, the report notes the existence of large tracts of fallen timber and old beaver meadows in the Bow Valley, making the new townsite and the railway vulnerable to fires. The

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W.F. Whitcher

– *continued from page 5* –

raising of water levels west of Banff is recommended as a means of protecting the environs of the town. More than half of the report's recommendations section is devoted to the details of manipulating the environment this way.

Whitcher's report fills only eight printed pages, but each time it is read, it reveals new insights into historic conditions in the park reserve, into the obscure ministerial instructions that guided the early activity there, and into the world of Victorian natural science. Perhaps the most useful way of discussing Whitcher's ideas is to identify any short and long term impact they may have had, starting with the legislation submitted to Parliament in 1887, together with his report, for the creation of Canada's first national park.

It is important to put the new national park initiative in its policy context. In *Working for Wildlife,* Janet Foster finds the federal government's handling of its first national park ambiguous, at least by modern standards. The government's overall policy, however, was clear:

> Far from "preservation," the Canadian government's emphasis was on development, exploitation and usefulness, the continuing program of the National Policy (Foster 1978: 26).

Despite this policy, the Rocky Mountains Park Act calls for the "preservation and protection of fish and game, [and] wild birds generally." Did Whitcher's report influence the wording of the act? It could be argued that the U.S. legislation for setting up Yellowstone Park played a model role. Whitcher mentions the U.S. law in his report, and other influences on the Canadian Act have been noted. However, Foster tells us the clause "wild birds generally" comes from an amendment in the Senate, which suggests that the bill brought in by the Minister of the Interior had been scrutinized by some members of Parliament– members who had read Whitcher's report.

Strangely enough, when Whitcher referred in his report to the "rules sanctioned by the U.S. Congress for the governance of the Yellowstone National Park," it was to comment unfavourably on their prohibition of sport hunting. He felt such activity, undertaken by "sportsmen" under appropriate supervision, should be permitted in the Canadian National Park. Despite this recommendation, the regulations issued in 1890 followed the American example.

"In other words, Whitcher did not set out to study and understand an ecosystem, as a present day researcher might do, but, within the limits of time and space imposed on him, to inventory those things which contributed to his vision of a Victorian park, and to recommend measures to reinforce and protect them."

Another, humbler, legacy of Whitcher's visit to Banff that appeared in the Park's early years is the Devil's Creek dam. This timber structure still exists beneath the waters of Lake Minnewanka, which drowned the original outlet of the lake in 1912 when the water level was raised by Calgary Power.

A longer term result of the Whitcher report was predator control: "wolves, coyotes, foxes, lynxes, skunks, weasels, wild cats, porcupines and badgers should be destroyed," along with predatory birds "if too numerous." Park authorities carried out this recommendation on a selective basis for decades.

Whitcher also supported the proposal for a museum of natural history at Banff, as "an instructive adjunct" and a place for the "animal species weeded out." The museum eventually opened to the public in 1895, and to this day it displays specimens of Edwardian taxidermy, which emphasize the ferocity of carnivores.

As if to balance the reduction of predators, the report suggests the introduction of ornamental pheasants and quail from Vancouver Island, to add to the attractions of the place, a measure that (fortunately) seems to have been overlooked. As one might expect, Whitcher also encourages the enhancement of fish numbers: "trout culture in all of these waters should be practised on a large scale."

Although the government did not respond in a systematic way until 1909, it is in the Whitcher report that we find the call for some form of organized guardianship in the new park:

> With efficient police at Banff to maintain order and enforce general laws and regulations, and to uphold special measures, and with forest rangers and active assistants qualified by mountain experience and familiarity with animal habits and haunts, of which force picked Indians would form a part, there should be no difficulty in securing the Park against injury and intrusion, and in enforcing the strictest protection for fish and game still inhabiting it (Whitcher 1887: 93).

By present day standards, Whitcher delivered a clearly deficient report on biophysical conditions in the park reserve. The only practical response to this observation is to compare the report with the standards of 1886, to weigh the product against the Minister's instructions, and to consider the qualifications of the investigator. In this way, we might determine whether or not the government got its money's worth. But there is a more significant point. The Whitcher report, deficiencies and all, was taken seriously enough to affect the framing of legislation, regulations, and operational priorities. We are still living with some of the results of these measures.

Bill Yeo *is an historian at the Alberta Regional Office. For further information, please call (403) 292-4475.*

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LITTLE GEM...

We're going to have PUPS! A Parks Use Permit System, designed by the Visitor Activity Management Section in Alberta,will be operational this fall. PUPS will generate a data base that will develop visitor profiles and help track revenue generation. For more information, please call (403) 221-3282.

Waste Stream Analysis helps Jasper recycle

Warden Kathy Calvert's research shows Jasper how to cut its waste in half

Evelyn Saurette

Spending close to 100 days sorting through more than 30 tonnes of garbage may seem, well, a little wasteful.

But Parks Canada employees had a good reason—if not an abundance of enthusiasm—for analyzing sample truckloads of garbage generated over the course of two years by Jasper's residents, visitors, and businesses.

Roughly 300 kilograms of garbage were sorted each day for eight consecutive days during each of the 12 months of the year.

Each year, the amount of waste trucked out of Jasper National Park has increased at a rate exceeded only by the environmental impact and costs associated with transferring garbage to a landfill site in Hinton.

Tonnes and tonnes of garbage

The results of the Waste Stream Analysis project proved that a 50 per cent reduction in waste is not an unrealistic goal. For example, the development of a community composting facility has become a high priority since the study identified food waste as comprising about 35 per cent of the garbage currently trucked to Hinton.

Composting two-thirds of that food product would redirect more than 900 tonnes of waste destined for the landfill site this year. And, recycling just half of this year's estimated 800 tonnes of cardboard would bring Jasper's 50 per cent waste reduction goal within reach.

The project formed the basis of park warden Kathy Calvert's MSc thesis, which she successfully defended last fall. Her research has given Jasper a baseline for future research and statistics.

"We are now able to focus our recycling efforts on the biggest pieces of the pie," said Calvert.

One of these pieces is the cardboard recycling programme, established in Jasper in May 1993. Calvert's Waste Stream Analysis research will assist project manager Heather Warrenchuk in tracking peak recycling opportunities and determining how much cardboard the programme has successfully redirected.

The completion of the Waste Stream Analysis project has laid the groundwork for an ambitious campaign aimed at halving the approximate 4 000 tonnes of waste currently landfilled each year. The analysis will also help to keep garbage levels down as visitor numbers rise in the future.

Park businesses, residents, and visitors generated as much as 34 tonnes of garbage per day in the summer. A 50 per cent waste reduction would relieve the Hinton landfill of an estimated 2 000 tonnes of waste in just one year.

Excerpted from Jasper National Park Green News, Issue 1, February 16, 1994. For further information, please call Heather Warrenchuk at (604) 852-6140.

JASPER GARBAGE MINI-FACTS

A total of 30 000 kg of garbage was analyzed in the Waste Stream Analysis.

Campground garbage accounts for 40 per cent of Jasper's summer garbage.

Organic and paper products are the largest components of the waste stream.

Icefields Parkway Visitor Survey

– continued from page 4 –

DISCUSSION

The survey results indicate that, for the most part, education and interpretive efforts on the Icefields Parkway are paying off. Survey results suggested visitors left the Parkway with more knowledge than when they entered. In some subjects (*i.e.* "Glaciers"), respondents appeared to learn more if they took a Snocoach Tour. In other cases (*i.e.* visiting the Columbia Icefield Information/Exhibit Centre), no added learning benefits were derived by visitors. Considering that the 1992 Columbia Icefield Area Carrying Capacity Study determined that crowding is definitely a problem in the facilities at the Centre, it becomes clear why visitors do not feel they are getting a quality learning experience there.

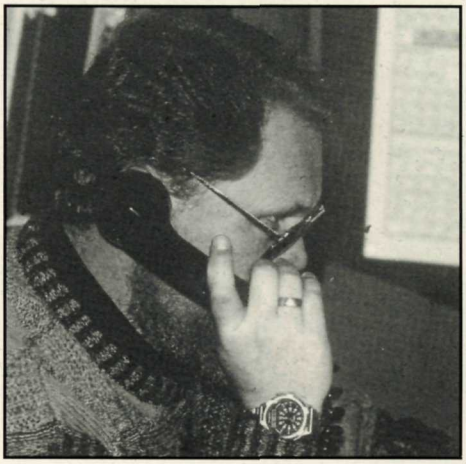
TABLE 3	Exit	Exit/Snocoach
Wildlife	4.88	5.01
Landscape Features	4.30	4.43
Glaciers	4.02	4.29
Human History	3.27	3.48

Exit Respondents who took a Snocoach Tour

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

NATURAL REGION

Meet the Western Parks' Wildlife Specialists



DAVID POLL
Wildlife (Faunal) Specialist
Alberta Regional Office

David Poll was born and raised in Alberta, and received a Diploma of Technology in Biological Sciences from NAIT in 1969 and a BSc in Zoology from the University of Alberta in 1974. From 1974–85, he worked for the Canadian Wildlife Service, Western and Northern Regions, and was involved in various Arctic ecology and national parks' research programmes. His varied research experience encompasses a wide range of species and habitats from waterfowl, passerines, and small mammals to barren-ground caribou, elk, and bighorn sheep.

Since joining Parks Canada in 1985, Dave has worked as a management planner, natural resource management advisor, research biologist and most recently (1989) as regional wildlife specialist. In this position, he is responsible for providing specialist advice to national parks, coordinating regional wildlife management programmes, liaising with Parks headquarters, and developing and coordinating inter-agency, cooperative wildlife management programmes.

JOHN G. WOODS
Faunal Specialist
Mt Revelstoke and Glacier National Parks

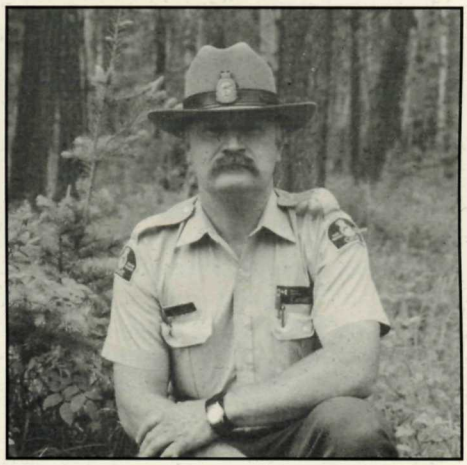
John Woods was born in Winnipeg, MB., and raised in Toronto, ON. In 1972, he received his BSc in Biology from the University of Guelph and started working for Parks Canada as chief naturalist in St. Lawrence Islands National Park, located in the Thousand Islands area of Ontario. He moved to Mount Revelstoke and Glacier National Parks in B.C. in 1975, and in 1991, he completed his PhD in Zoology at the University of British Columbia. His thesis title was "Ecology of a Partially Migratory Elk Population."

John is interested in seasonal movements of vertebrates in relation to their population ecology, and in parasites and diseases. As faunal specialist for Mount Revelstoke and Glacier, he is involved with studies on grizzly and black bears, wolverine, bats, and neotropical migrant birds.

WESLEY BRADFORD
Wildlife/Human Conflict Specialist
Jasper National Park

Wesley Bradford graduated with a Diploma in Wildlife and Fisheries Management from NAIT in 1975, and began his 19-year tenure with the Warden Service in Jasper National Park that year.

Wes has spent time in all aspects of the warden service. In 1986, he was assigned the role of wildlife warden, and in 1988–1992, he was the senior park warden of Wildlife and Fisheries. During this time, he coordinated the Bear Management Programme, the Greater Jasper Ecosystem Caribou Research Project, the Transportation Corridor Wildlife Mortality Management Plan, the Wildlife Monitoring Plan, and a strategy to reduce elk/human conflicts.



Wes believes wildlife/human conflict management will be an increasingly dynamic and demanding task, as a growing human population will place greater demands on development and tourism in the parks.

DOUGLAS CLARK
Wildlife/Law Enforcement Specialist
Pacific Rim National Park

Douglas Clark was born in Victoria, B.C. He obtained a BSc in Zoology from the University of Victoria in 1990, and gained his first exposure to fieldwork as a co-op student with the B.C. Forest Service. Doug got involved with Parks Canada in 1990, when he spent a season as an interpreter in Jasper National Park. He started with the Warden Service at Pacific Rim National Park in the spring of 1991. That year, Doug also started an MSc programme at the University of Alberta, studying polar bear habitats in Churchill, MB.

This spring, Doug became the wildlife/law enforcement specialist at Pacific Rim. He looks forward to increasing the park's emphasis on marine mammal research, improving co-management of large carnivores, and implementing new challenges—such as designing wildlife corridors to other protected areas on Vancouver Island and improving Pacific Rim's marine and backcountry law enforcement.

HIGHLIGHTS

BRIAN SHEEHAN

Senior Wildlife Warden
Kootenay National Park

As Kootenay National Park's wildlife specialist, Brian Sheehan is responsible for wildlife research, management of aquatic and cultural resources, and coordinating the park's environmental assessment programme.

Raised in Ontario, Brian received a diploma in Forest Technology from the Ontario Forest Technical School in 1965. After graduation, he worked as a forest technician for Ontario's White River Ranger District. He began his trek westward in 1969 and took on the job of park warden with Saskatchewan's Prince Albert National Park in 1971. He received a BSc (General) from the University of Calgary in 1972. Brian joined Kootenay in 1974 and has been there, happily, ever since.

Currently, Brian is involved in the bighorn sheep cooperative management plan and a wolf ecology study.

MICHAEL L. GIBEAU

Conservation Biologist
Banff National Park

Michael Gibeau has been with Banff National Park's Warden Service since 1976, specializing in wildlife research and management. He has extensive experience with wildlife research, and has studied coyotes, wolves, black and grizzly bears, elk, and sheep. His commitment to his career was recognized in 1991 by the Wildlife Society, which awarded him the Wynn G. Freeman Award "in recognition of his participation

in, and commitment to, the wildlife profession."

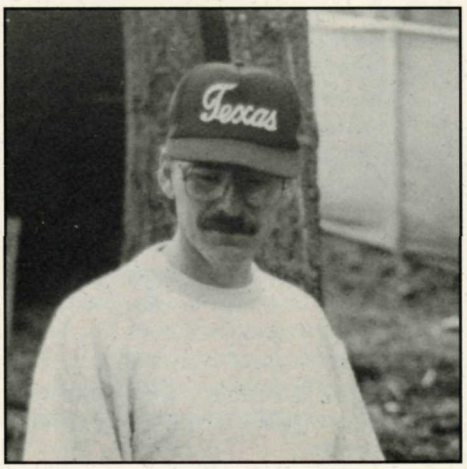
Currently, Mike is a PhD candidate at the University of Calgary, studying human impacts on grizzly bears. He holds an MSc in Wildlife Biology and a BSc in Resource Conservation from the University of Montana, as well as a diploma in Forest Technology from NAIT.

NORMAND COOL

Faunal/Limnological Specialist
Elk Island National Park

Before becoming Elk Island National Park's faunal/limnological specialist two years ago, Normand Cool spent 10 years with the park's Warden Service.

Norm received a Veterinary Technology diploma—and the Pitman Moore Surgical Award—from St. Lawrence College. He also holds a BSc in Zoology and Geology from the University of Alberta and has recently completed his MSc thesis—"Physiological indices of winter condition of wapiti and moose."



Norm believes Elk Island offers the richest experience in wildlife management in North America. Its proximity to large centres encourages academic and scientific interest in the park and offers many opportunities to develop environmental citizenship initiatives. He feels it is an ideal setting for those who truly wish to pursue a career in wildlife management. He counts himself as fortunate to be working there, especially because of his dedicated co-workers.

NORA MANNERS

Wildlife Specialist
Jasper National Park

Nora Manners (née Kopjar) has been with Parks Canada since 1984 and has spent time in Banff, Kootenay, Jasper, and Wood Buffalo National Parks. She has a BSc in Forestry and an MSc in Wildland Recreation and has been involved in research for a number of years, beginning with her MSc project, "Alternatives for Bison Management in Banff National Park." She has also participated in studies on forest fuels quantification in Jasper, highway wildlife mortality in Kootenay, and bison movement and distribution in Wood Buffalo.

By turning her attention to some of the smaller but important vertebrates—such as bats, amphibians, reptiles, and songbirds—Nora is working to provide a broader basis for wildlife management in Jasper.

Nora is enthusiastic about new initiatives supporting an ecosystem management approach and hopes the Warden Service successfully increases its science capability without losing the field skills that make it unique.

WILDLIFE RESEARCH NOTES

GRIZZLY BEAR HABITAT—ENDANGERED?

The results of a cumulative effects assessement study on grizzly bear habitats in Banff, Yoho, and Kootenay National Parks suggest grizzly bear habitat may be threatened.

Results indicated much of the three park block is only moderately productive at best in pristine conditions. Adding the impact of humans, the actual ability of the landscape to support bears may have been significantly reduced. The cumulative effects model used in the study suggests alienation in what is supposed to be core refugia for grizzly bears, and brings into question the ability of the landscape as a whole to support a viable population.

For further information, please call Michael L. Gibeau at (403) 762-1438.

DEER MOVEMENTS IN ELK ISLAND NATIONAL PARK

A study has been initiated on the white-tailed deer population in Elk Island National Park. The study, forming the MSc thesis of Dennis Madsen, a warden in Elk Island, will be focusing on the transboundary movements of the deer.

Large fluctuations in the white-tail population have been observed, and given absence of large carnivores and hunting pressure in the park, transboundary movement of the deer may be an important factor. Radio telemetry and boundary photo stations will be used to assess home range size and boundary movements.

For further information, please call Dennis Madsen at (403) 992-6391.

COYOTES IN URBAN HABITATS

A study on coyote use of urban habitats in the Banff townsite found coyotes are neither repelled nor attracted by urban environment. The results found no evidence that the coyotes are predisposed to aggression due to familiarity with humans.

For further information, please call Michael L. Gibeau at (403) 762-1438.

Use of newly reclaimed land by bighorn sheep

Emigrating Sheep

Wesley Bradford

The Nikanassin Range Bighorn Sheep Study was initiated by the need to know more about how the bighorn sheep that use the reclaimed landscapes at Cardinal River Coals Ltd. (CRC) and Gregg River Resources Ltd. (GRRL) interact with adjacent bighorn sheep populations, and how they use the reclaimed landscapes in the context of the surrounding mountain habitats and Jasper National Park.

Jasper shares the responsibility for managing this bighorn sheep population with Alberta Fish and Wildlife Services. Both agencies are concerned that the ideal sheep habitat created following open pit mining and reclamation of impacted landscapes of CRC and GRRL may have caused permanent abandonment of some traditional bighorn sheep ranges in Jasper and on the Red Cap Range.

Bighorn sheep in Jasper

The Nikanassin study, conducted by Beth MacCallum and Bighorn Environmental Ltd. staff, is sponsored by CRC, GRRL, Jasper National Park, Alberta Fish and Wildlife Services, and the Recreation Parks and Wildlife Foundation.

The main objectives of the Nikanassin study are:

- to identify spatial distribution of the bighorn sheep on CRC and GRRL mineral surface leases;
- to identify seasonal dispersion and migration routes of the sheep;
- to determine sex/age structure and population of the bighorn sheep;
- to document habitat use—vegetation type, per cent slope, aspect, elevation, and time of year—and to relate these variables to distribution of the sheep;
- to identify critical areas such as mineral licks, lambing sites, and rut and winter ranges within the home range of marked sheep; and,
- to provide information to the provincial and federal governments for use in future planning and management.

The field work on this three-year bighorn sheep study began on September 21, 1992, with the capture and radio-collaring of target animals. Nineteen bighorn sheep were radio-collared during the first year of the study.

FIRST YEAR HIGHLIGHTS:

- all 19 collared sheep are alive;
- two rut ranges, used by rams in addition to the rut range on CRC, were identified;
- lambing sites were discovered on Slide Mountain, in several basins of the Whitehorse Creek drainage, and in the headwaters of the Gregg River;
- a spring concentration of rams was noted on the GRRL mineral surface leases during June; and,
- distinct separation of ewe home range groups in the summer, which occupy the alpine drainage west of CRC and the alpine drainage east of CRC, was observed.

Preliminary data suggest the sheep have not abandoned their historical range, but have modified their traditional use of the Nikanassin Range to include the reclaimed landscapes of CRC and GRRL.

This project will allow monitoring and evaluation of the reclamation of open pit coal mines to wildlife habitat by direct observation of animal response. In terms of bighorn sheep ecology, the Nikanassin study has continued to document the colonization patterns exhibited by an expanding sheep population as it occupies newly available habitat.

Wesley Bradford *is a wildlife/human conflicts specialist at Jasper National Park. For further information, please call (604) 852-6204.*

Charging Elk

Problem elk management in Banff townsite

Carey Elverum

Over the past few years, a plethora of elk/human conflicts in Banff National Park has concerned park wardens, managers, residents, and tourists alike. Public complaints regarding aggressive elk in the townsite of Banff have increased dramatically, from three in 1987 to a high of 75 in 1991.

The most serious elk/human conflicts occur when elk charge at and make contact with people. Cow elk use their hooves to kick and stomp on a victim, while bulls sometimes lower their head and use their antlers as an offensive weapon. Elk/human conflicts may occur year round, but the likelihood of an elk charging and injuring someone is greatest during spring calving season and fall rut when elk are at the height of their aggressiveness. Camera-happy photographers or unsuspecting joggers and hikers are the most likely victims, especially when the personal space of an elk is invaded.

Rambunctious elk in town

The increase of elk/human conflicts in Banff townsite coincided with a greater use of the area by elk. Elk have become more abundant in the townsite for a number of reasons, including loss of valuable elk habitat to human development and the fencing of the Trans-Canada Highway; attraction to unnatural but highly attractive food sources, such as fertilized lawns, exotic flowers, and shrubs; and protection from wolf predation offered by the townsite (Elk Workshop, May 1992).

Additionally, the potential for elk/human conflicts may have increased as a result of higher tourist visitation during the spring calving season and the fall rut. Habituation to human presence by elk may be another contributing factor.

Presently, park wardens are addressing the elk/human public safety problem with hopes of reducing the number of incidents to below 1990 levels—less than 12 incidents and one injury per year.

The primary management strategy the Warden Service has relied on is educating the public and making it aware of the elk hazard. This has been accomplished by posting warning signs, distributing pamphlets, placing public notices in local papers, and blitzing the media with articles as the high danger season's approach.

Wardens are also closing problem areas to the public during the calving season and fall rut.

Additional management actions against aggressive elk include identifying the problem animal and marking the offender with paint. Repeat offenders are aversively conditioned and discouraged from using the townsite, removed from the park, or, as a last resort, destroyed.

The Warden Service is also looking at barring elk from particular areas of the park with fencing. Permanent or temporary structures would be placed at identified problem areas such as recreation grounds or school yards.

Finally, the Warden Service is encouraging the town's municipal leaders, business people, and residents to adopt landscape practices that are less attractive to elk. Additionally, habitat manipulation of park lands, such as the use of prescribed fire, will help enhance elk grazing habitat outside the town.

However, the increasing number of elk/human incidents may be symptomatic of a larger ecological problem. The provision of long-term solutions will require a greater understanding of the complex ecological issues involved.

Carey Elverum *is a park warden at Banff National Park. For further information, please call (403) 522-3866.*

WILDLIFE RESEARCH NOTES

INTERNATIONAL WOLF PROJECT

Kevin Van Tighem

A pack of at least six wolves has established a home range centered on the Belly River area and encompassing a portion of Waterton Lakes National Park and adjoining Alberta provincial, Blood Reserve, Blackfeet Reservation, and U.S. Glacier National Park lands.

This is the first known resident pack of wolves in southwestern Alberta since the 1950s, and is part of a natural recolonization process that has led to the establishment of several breeding packs in northern Montana since the late 1970s. The wolves likely emigrated from Montana, as one of them is a radio-collared female from the Flathead watershed in southeastern B.C. and Montana.

In Montana, wolves are actively managed and monitored as part of a Congress-mandated recovery plan. The province of Alberta has established a population target of 50 wolves for southwestern Alberta, but it also has an interest in managing populations of wolf prey species for recreational use and in minimizing predation of domestic stock by wild carnivores. Both Glacier and Waterton Lakes National Parks are mandated to protect and perpetuate all native wildlife.

In January 1994, representatives from the Alberta Fish and Wildlife Division, U.S. Fish and Wildlife Service, Blackfeet Indian Reservation, Glacier National Park (U.S.), and Waterton Lakes National Park met to plan a partnership to monitor the wolves' recolonization.

The project team has devoted considerable effort to community outreach. One of the results is a compensation programme for confirmed livestock losses to wolves or grizzlies, which relies on funds raised by conservation groups. This programme recognizes the importance of community support and mutual problem-solving strategies in large carnivore conservation.

Monitoring of the pack—which has produced seven pups this year—will continue in 1995 and 1996.

Kevin Van Tighem *is an ecosystem management specialist at Waterton Lakes National Park. For further information, please call (403) 859-5125.*

Transformed landscape patterns:

Carlos Galindo-Leal

THE CUTTING EDGE

The influence of humans on natural landscapes has reached unprecedented proportion. This impact is very apparent in the checkerboard pattern of managed forests prevalent throughout British Columbia, and the resulting edge effects.

The term "edge effect" was originally used to describe the increase in species diversity associated with the edge between adjacent habitats, like clearcut and old-growth forests. For years, "edge effect" was synonymous with good habitat and good habitat management. However, the concept has evolved rapidly (Reese and Ratti 1988). In the last two decades, studies on plants and non-game animals have documented some of the negative effects of edges (Angelstam 1992). A "cutting edge" research project now underway in the Beaverfoot Valley (Beaverfoot site) and Mount Revelstoke area (Revelstoke site) is investigating the temporal and spatial consequences of "edge"—habitat alteration through clearcut logging—on animal species.

"Forest management activities can initiate and promote a complex series of events that lead to dramatic changes in the community."

THE CUTTING EDGE RESEARCH TEAM

Project Manager
Carlos Galindo-Leal

Principal Investigators
Fred Bunnell
Carlos Galindo Leal

Landscape Level

Landscape structure and habitat context
Pierre Vernier

Modelling forest harvesting on guilds
Dave Daust

Community Level

Small mammals (live trappings)
Kindy Gosal
Fran Harrington
David Jones
Suzanne Mondoux
Miranda Terlingen
Leanna Warman

Medium Mammals (winter tracks)
Pierre Friele
David Jones

Song birds (point counts)
Steven Bennet
Wendy Easton
David Huggard
Pierre Johnstone
Jeffrey Joy
Chris Spytz

Riparian
Isabelle Houde
Saskia Wolsak

Population Level

Habitat selection by blue birds
Rachel Holt

Logistic Support

Susan Hall,
Ecosystem Management Specialist, Mount Revelstoke and Glacier National Parks
Alan Dibb,
Ecosystem Management Specialist, Kootenay National Park
Derek Petersen,
Ecosystem Management Specialist, Yoho National Park
John Woods,
Faunal Specialist, Mount Revelstoke and Glacier National Parks
Friends of Mount Revelstoke and Glacier National Parks
Francis and Clara Maltby,
Revelstoke City
Darcy Monchak,
Planning, Golden Forest District
Brian Amis,
Planning, Golden Forest District
Jim Blake,
Planning, Revelstoke Forest District
Bryan Nyberg,
Research Branch, Ministry of Forests, Victoria

BIOLOGICAL CHANGES

There are three orders of biological changes generated by edges.

First order changes affect the plant community through differences in microclimate, and include such events as changes in tree mortality, tree falls, or shrub cover.

Second order changes are marked by an increase in the numbers of edge species as a result of changes in the vegetation.

Third order changes, also known as "faunal edge effect," include positive and negative effects related to second order changes, such as increased predation and increased nest parasitism (Andren and Angelstam 1988, Yahner 1988).

Why are these effects important? If edge effects are prevalent in the checkerboard pattern, then ecological relations in the remaining forest patches will be very different from those in continuous forest. Depending on their size, the forest remnant may have higher predation and higher nest parasitism, and may lose interior forest species. In extreme cases, some species may consider the whole checkerboard uninhabitable. Isolation effects such as reduced population size, increased vulnerability to local extirpation, lower immigration rates, and lack of source populations may become increasingly important as fragmentation intensifies (Temple 1991).

To date, the Beaverfoot and Revelstoke projects have concentrated on first and second order changes, but future plans include third order studies of spruce grouse and pine marten.

BIOLOGICAL SCALE

The study is structured to tackle a tri-level biological scale, investigating edge effects at the landscape, community, and population levels.

At the landscape level, the focus is on assessing the effects of forest land use practices on the structure of the forest landscape and the availability of wildlife habitat in the Beaverfoot Valley. Structural attributes of the forest landscape (age, size, shape, diversity, connectivity, fragmentation, and edge habitat) and forest land use practices (cutting patterns, road networks, and plantations) are measured in both managed and unmanaged landscape units selected on the basis of their comparability.

At the community level, there are three objectives: to identify availability and use of critical structural stand attributes necessary to maintain biodiversity (*e.g.* large live trees, snags, woody debris, and vertical stratification); to characterize temporal changes of the habitat and the vertebrate community in relation to edge effects induced by clearcutting; and, to assess temporal changes in suitability of clearcuts for vertebrate species. These aspects are critical to understanding the consequences of forest practices on biodiversity both outside and inside protected areas. The study is currently examining birds and mammals at the community level, but work on amphibians is expected to begin in the spring.

At the third biological scale level, population, the study is investigating the effect of fragmentation on habitat use by moun-

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tain bluebirds. These birds potentially benefit from new seral stages created by clearcutting. However, as succession proceeds—edges are not permanent, but change dynamically as the areas become restocked and the age of the forest advances—the habitat may become unsuitable for them. Detailed study of changes in habitat selection in different seral stages will provide a better understanding of some of the ecological relations created by the new landscape patterns.

TEMPORAL SCALE

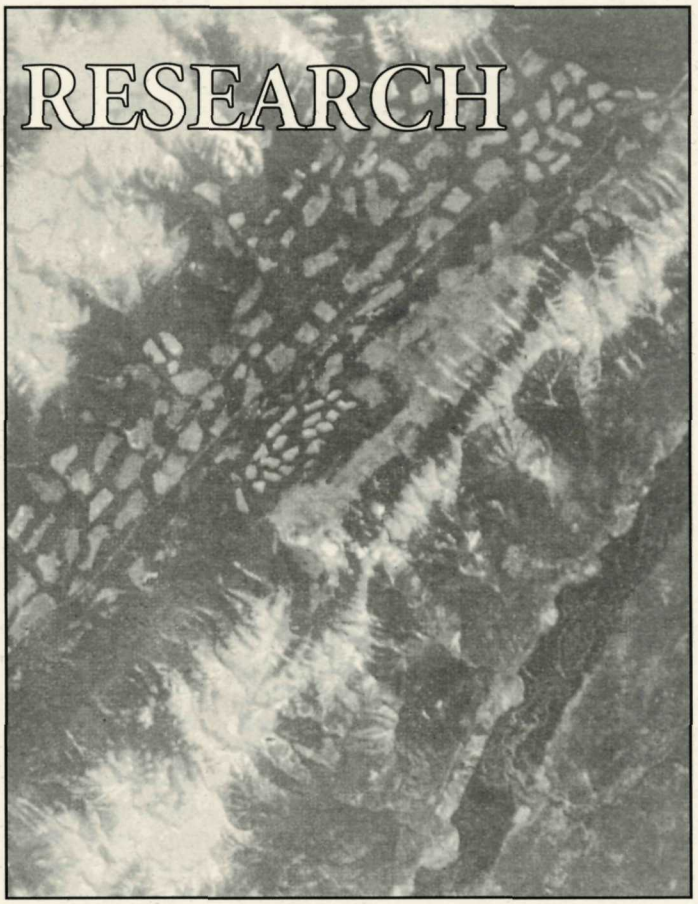
To study edges at different temporal stages within a relatively short time period, an approach known as "chronosequence" is used. Chronosequence uses space as a substitute for time—instead of waiting for time to go by, the study moves to places where edges were created at various times. Within the whole Beaverfoot Valley (an area of 300 km^2), the approximately 80 clearcuts range in age from one to 25 years.

SPATIAL SCALE

The results will be analyzed within different spatial scales. At the most detailed level, the distance of every individual habitat feature and bird and mammal record to the edge of the forest (less than 100 m) is recorded. At another level, plots on the edge are compared to those placed in the interior forest or in the clearcut (up to 400 m). Within the managed area, clusters of transects have been placed one to 30 km within the parks' borders. Inside the parks, transects are placed at varying distances from the managed area (up to 10 km). This last scale will allow insight into the effect of a managed landscape on species with large area requirements (medium-size carnivores and ungulates).

Finally, the two research sites are located in different forest types. The Beaverfoot site is in the Montane Spruce Biogeoclimatic Zone in the Rocky Mountains, whereas the Revelstoke site is in the Interior Cedar-Hemlock Zone in the North Columbia Mountains. The comparison of these two sites will indicate whether the study results can be generalized.

Carlos Galindo-Leal *is the project manager and principal investigator of the Beaverfoot and Revelstoke projects, and a forestry research associate at the University of British Columbia. For further information, please call (604) 822 -0503.*



Checkerboard landscape: a human-created environment

CONCLUSION

There are many concerns related to changes in the landscape. In addition to changing habitats and spatial patterns, forest management activities can initiate and promote a complex series of events that lead to dramatic changes in the wildlife community. For example, increased road access may lead to increased pressure from hunting and poaching, changes in the fire regime, deterioration of forage conditions resulting from excessive livestock grazing, and increased competition, predation, or parasitism on native species by introduced exotics.

Many important issues both in biological conservation and forest management occur at the landscape level. To address some of the relevant landscape questions, we need to investigate different temporal and spatial scales, as well as different biological levels. The Beaverfoot and Revelstoke projects provide an excellent opportunity to integrate different approaches to examining the consequences of human-induced landscape changes on the maintenance of biodiversity.

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Stewardship essays inspire and provoke

Sacred Trusts: Essays on Stewardship and Responsibility edited by Michael Katakis

reviewed by John McIntosh

I ordered *Sacred Trusts: Essays on Stewardship and Responsibility* sight-unseen, expecting to see a collection of scholarly essays on the definition and application of the concept of stewardship; a technically interesting and perhaps useful book from which I could quote new buzzwords. Instead, I found a compilation of essays—by everyone from Alston Chase *(Playing God in Yellowstone)* to Yvon Chouinard—that offers personal observations and reflections about wilderness and a strong challenge to the reader to take responsibility to care for, and about, nature and wilderness. This diversity makes the book all the more valuable in reminding us of the social element of ecosystem management.

It has been 44 years since Aldo Leopold compiled a number of his previously published essays into a new and expanded collection, *A Sand County Almanac and Sketches Here and There.* That book of reflections on American wilderness was widely read and adopted by the generation who study and manage wilderness in North America today. The success of Leopold's almanac lay in his ability to meld field observation with land ethic in an eloquent and readable fashion.

In *Sacred Trusts,* editor Michael Katakis has gathered a collection of essays by 30 contributors, including himself, in an attempt to inspire the reader with the importance of stewardship. His intent, as explained in the introduction, is not unlike Leopold's, but the method is somewhat different; not only because of the multiple authorship, but because of the variety of approaches amongst the essays. There are numerous personal reflections that harken back to Leopold's own style, but there are fictional stories as well, which muse about possible outcomes, some of them dire. A number of the essays are from the perspective of a fly fisher, reminiscent of Norman Maclean's *A River Runs Through It.*

Sacred Trusts is one of those books that you can pick up and open at random. There is no need to read the selections consecutively; each has its own, slightly different message, and the reader will probably end up selecting from the collection those authors and writing styles that hold the most personal appeal. Some pieces are a bit too stridently dogmatic to be credible, however heartfelt the motivation, but the majority of essays have the quiet, sincere appeal that has led me to read and re-read Leopold's work over the years. I recommend *Sacred Trusts* to you not as an ecosystem scientist, but as a person genuinely concerned about the well-being of the natural environment. It is largely both thought-provoking and inspirational.

***John McIntosh** is an ecosystem management specialist at Pacific Rim National Park Reserve. For further information, please call (604) 726-7721.*

***Michael Katakis,** editor of Sacred Trusts, is the author of The Vietnam Veterans' Memorial. Sacred Trusts: Essays on Stewardship and Responsibility is published by Mercury House, San Francisco (1993).*

Greening the Canada Games

Casey Morrow

February 19, 1995 marks the opening of the 1995 Canada Winter Games, which will be held in both Grande Prairie, AB., and Jasper National Park.

Parks Canada, a sister organization of the organizer of the games, Sport Canada, has developed a plan that is quickly becoming known as the "greening of the games" and earning the event the name Green Games.

The Green Games are not a special competition for highly skilled environmentalists, but a plan that outlines the objectives Jasper has set for the organizers and participants of the 1995 Canada Winter Games. The main goal of the programme is to ensure the games are the most environmentally friendly games held in Canada to date.

"The tone was set by the organizers of the Lillihammer Olympics, when they committed themselves to conducting a major cultural and sporting event while still respecting the fragility of the environment," said Cléone Todgham, the driving force behind Parks Canada's involvement in the games.

The staging of the games in Jasper has offered a window of opportunity for the staff and management of the park to show the rest of the country their commitment to environmental stewardship. Although the programme has just passed the "terms of reference" stage, it is already counted as one of the major contributors to the games' organization. Right now, organizers are researching various "green" methods and guides that will be used as reference materials by facility coordinators.

The ultimate goal is to develop a way of thinking that will be continued after the medals have been won.

***Casey Morrow** is a COSEP student at Jasper National Park. For further information, please call Cléone Todgham at (604) 852-6142.*

LITTLE GEM...

Jasper National Park's waste disposal system is among the cleanest in the country; perhaps even the world. It has been used as a model as far away as Hong Kong.

PODIUM

Carnivore conservation a crucial issue

David Poll

Space is air for the great beasts who roam the earth. Now is their final breath.
– John Weaver
Montana Wolf Researcher

It has been a history of conflict. From the earliest time, our relationship with other predatory species has been competitive, until today, we find ourselves contemplating the potential extinction of many large carnivore species. In Canada, many large carnivore species—*e.g.* grizzly bear, wolf, and cougar—occupy only a fraction of their historic ranges, while others — such as the black bear, polar bear and wolverine— continue to occupy much of their original range, but at reduced densities. All are under mounting pressure from human-caused mortality and habitat loss.

Why conserve large carnivores? There are a myriad of reasons, ecological and otherwise. At an aesthetic level, large carnivores have come to symbolize, for many people, the continued existence of wilderness. To many Canadians, the decline of large carnivores is an erosion of wilderness values that are part of our heritage and identity. Unfortunately, the opposing view—the image of any large carnivore as a hostile, ferocious predator that poses a threat to public safety and livelihood—is still prevalent. This persisting adverserial view will be the greatest hurdle to overcome if we are to be successful in conserving large carnivores.

At an ecological level, carnivores are an important indicator of the health of ecosystems. A widely held view in the conservation biology community is that a healthy top predator population is an indication of the overall integrity of the system. Predators tend to require large, relatively undisturbed home ranges; a rule of thumb is that if their requirements are met, everything else in the system will be accommodated (this, of course, is a simplistic view and will not apply in all cases). And, while conserving species is essential for maintenance of biodiversity, so is the perpetuation of natural processes—like the little-understood predator/prey system.

Notwithstanding their crucial role in maintaining natural systems or their importance as indicators of wilderness, carnivores have an intrinsic value and a right to survive for their own sake, independent of their importance or usefulness to humans. Aldo Leopold wrote in his essay "Thinking Like a Mountain" that "only the mountain has lived long enough to listen objectively to the howl of the wolf." He reminds us that certain meanings are hidden from us because we are human, including "the meaning in the howl of the wolf, long known among mountains, but seldom perceived among men." We cannot judge carnivores by human standards and values; we must respect them on their own terms.

How then do we assure the perpetuation of large carnivore populations in Canada, in view of ever-threatened habitat and continuing hostile public perception? World Wildlife Fund Canada (WWF) released "A Conservation Strategy for Large Carnivores in Canada" in 1990 that addresses a portion of this question. WWF proposes the establishment of Carnivore Conservation Areas (CCA)—areas that are sufficiently large and adequately managed to ensure long-term survival of free-ranging large carnivore populations. The CCAs are envisioned as inter-agency cooperative management zones where resource management and land use planning objectives include carnivore conservation. These zones would usually include existing protected core areas (national and provincial parks and wilderness areas) and areas of integrated resource management.

The Rocky Mountains of Canada and the northwestern U.S. are one of five CCAs proposed in the WWF strategy. The foothills and mountain valleys of the Rockies have become the easternmost ranges of many large carnivores that formerly ranged over most of North America. The proposed area stretches along the Rocky Mountain Cordillera from the Willmore Wilderness in the north to Yellowstone National Park in the south. Within this area, there is a large protected core composed of national and provincial parks, wilderness areas and special management zones; however, these areas still are not large enough to ensure the survival of these species. Pressures from human activity are increasing on both sides of the Continental Divide and effective conservation of large carnivores must be accomplished over a larger area.

We must act to protect these species and the natural systems they represent while the opportunity still exists. This means deliberate and considered cooperative action by all levels of government, conservation groups, academics, industry, and concerned citizens. It also means a shedding of the age-old view of the carnivore as a hostile, threatening enemy and a recognition of its crucial and intristic role in ecosystems.

David Poll *is a wildlife specialist at the Alberta Regional Office. For further information, please call (403) 292-4691.*

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For further information, full bibliographic citations, or copies of these reports, please contact ***Dave De Lange,*** *chief of the Strategic Research and Analysis Division, Alberta Regional Office, at (403) 292-4743.*

MEETINGS OF INTEREST

September 18–23, 1994 — Habitat 2000. Edmonton, AB. Contact Bruce Duncan, Planning and Development, City of Edmonton, 3rd Floor, 10310 – 102nd Avenue, Edmonton, AB. T5J 2V9. Tel: (403) 421-1944, fax: (403) 428-4742.

September 21–23, 1994 — Fourth Symposium on Groundwater and Soil Remediation. Calgary, AB. Contact Lise Gagne, Technical Seminar Coordinator, Technology Development Directorate, Environment Protection Service. Tel: (819) 953-5227, fax: (819) 953-7253.

September 22–23, 1994 — Getting to Know You. Waterton, AB. Hosted by Waterton Lakes National Park and Alberta Parks Services, this meeting's purpose is to seek opportunities for more effective and efficient sharing of information and pooling of efforts in the Alberta portion of Crown of the Continent. Contact Kevin Van Tighem at (403) 859-5125.

September 25–28, 1994 — Boreal Forests and Global Change. Saskatoon, SK. This conference is hosted by the International Boreal Forest Research Association. Contact Mary-Louise Wright, IBFRA Secretariat, 5320 – 122nd Street, Edmonton, AB. T6H 3S5. Tel: (403) 435-7312, fax: (403) 435-7221, e-mail: poplar@nofc.forestry.ca

October 2–5, 1994 — Fire Management in the Wildlife/Urban Interface. Kananaskis, AB. The theme of this symposium is "Partners in Protection: Sharing Solutions." Contact Partners in Protection, Box 7541, Edmonton, AB., T5E 6K1 regarding registration, and Kelvin Hirsch at tel: (403) 435-7319 or fax: (403) 435-7359 regarding submissions.

October 14, 1994 — Preserving Our Lifeline: A Report On the State of the Bow River. Calgary, AB. Presented by the Bow River Water Quality Council. Contact Chris Campbell, tel: (403) 297-6476, fax: (403) 297-5944.

October 31, 1994 — Update on Waste Energy and Management in Alpine Settings. Calgary, AB. Sponsored by the University of Calgary Faculty of Environment Design and the Alpine Club of Canada, this meeting will focus on new and exciting developments since the 1991 conference. Contact Dixon Thompson at (403) 220-3625.

November 10–13, 1994 — Chacmool Archaeology Conference. Calgary, AB. The theme of the conference is "Ancient Travellers." Contact Bill Perry at (403) 221-7989.

February 23–26 — Fourth Prairie Conservation and Endangered Species Workshop. Lethbridge, AB. The workshop's theme is "Sharing the Prairies: Sustainable Use of A Vulnerable Landscape." Contact the Institute for Renewable Resource Management, Lethbridge Community College, 3000 College Drive South, Lethbridge, AB. T1K 1L6.

April 17–21, 1995 — Eighth Conference on Research and Resource Management in Parks and on Public Lands. Portland, OR. This year's topic is "Sustainable Society and Public Areas: Challenges and Issues for the Perpetuation of Cultural and Natural Resources." The society is seeking papers and posters for presentation. Contact the George Wright Society, P.O. Box 65, Hannock, MI. 49930-0065, U.S.A. Tel: (906) 487-9722, fax: (906) 487-9405.

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.

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