Columbia Mountains Institute of Applied Ecology

Compiled Abstracts

Learning From the Past

April 22-23, 1999

Revelstoke BC

Note

In 1999, the conference summary for this event was prepared as a print document only. In 2008 the Word Perfect files for the print document were converted to Word 2007 and then to PDF format. CMI apologizes for errors in formatting that occurred during this transcription, and notes that this document has not received a copy edit.

Columbia Mountains Institute of Applied Ecology

LEARNING FROM THE PAST

A Historical Look at Mountain Ecosystems

April 22-23, 1999
Anglican Church Hall, Revelstoke BC

Agenda

Thursday April 22, 1999

08:00 - 8:30	Registration
08:30 - 9:00	Welcome, Opening Remarks, Introduction of CMI

Perspectives on Historical and Traditional Knowledge in Ecological Management

09:00 - 09:30	**Aboriginal Burning and Fire Management** Leo Williams, Elder - Ktunaxa/Kinbasket Tribal Council
09:30 - 10:00	**Research Technologies in Land Claims, Treaties, Impact Assessments and Co-Management Strategies.** Peter D. Elias, Faculty of Management, University of Lethbridge
10:00 - 10:15	Coffee

Defining Climate Change in Historical Perspective

10:15 - 10:45	**Changes in Glacier Behaviour and Melt Patterns as Evidence of Climate Warming.** Dr. Mindy Brugman, Columbia Mountains Institute
10:45 - 11:15	**Fire in the Cool, Wet Forests of the Mountain Hemlock Zone** Douglas Hallett, Dept of Biological Sciences and the Institute for Quaternary Research Simon Fraser University
11:15 - 11:45	**Post-Glacial Palaeoecology of the Upper Columbia Drainage: an Archaeological Perspective.** Wayne Choquette, Archaeologist, Ktunaxa/Kinbasket Tribal Council
11:45 - 12:00	Discussion
12:00 - 13:00	Lunch

Traditional Plant Use, Aboriginal Burning and Forest Management

13:00 - 13:30 **Traditional Plant Use by First Nations Peoples**
Peter McCoy, Ethnobotanist, Ktunaxa/Kinbasket Tribal Council

13:30 - 14:00 **Aboriginal Burning and Prescribed Burning in Kootenai National Forest, Northwestern Montana,** Rebecca Timmons, Archaeologist, US Forest Service

14:00 - 14:30 **Lighting Fire in the Central Cordillera, Canada**
Mark Heathcott -Western Fire Centre, Parks Canada

14:30 - 14:45 Coffee

Understanding Human Impacts on an Ecosystem Scale

14:45 - 15:15 **Kootenay National Park Ecohistory Project**
Rod Heitzmann, Archaeologist, Parks Canada

15:15 - 15:45 **A GIS Analysis of the Human History of Jasper National Park / Upper Athabasca Valley**, Eric Higgs, Associate Professor, Department of Anthropology, University of Alberta

15:45 - 16:15 **Situating the Human Agent Within a Dynamic Ecosystem - An introduction to the Brazeau Cultural Habitat Study,** Kurtis Lesick, Executive Director, HUMANUS Cultural Research

18:00 - 19:30 Banquet

19:30 - 21:30 Guest Speaker, open to the public **Indians and National Parks: The Waterton-Glacier International Park Experience**
Dr. Brian Reeves, Professor Emeritus, Department of Archaeology, University of Calgary

<u>Friday April 23, 1999</u>

Fish and Wildlife Populations in Historical Perspective

08:30 - 9:00 **Is Wildlife History Bunk? Reflections on I.J.M. Robertson.**
Graham MacDonald, Historian, Parks Canada

09:00 - 09:30 **Recent Zooarchaeological Research in Banff and Waterton Lakes National Parks, Alberta,** Gwyn Langemann, Archaeologist, Parks Canada

09:30 - 10:00 **Use of Historical Information for Conservation and Restoration of Aquatic Habitats,** Karen Bray, Aquatic Biologist , Columbia Basin Fish and Wildlife Compensation Program

10:00 - 10:15 Coffee

Ecological Change in the Time of Written Records

10:15 - 10:45	**The Athabasca Portage to Boat Encampment during the Fur Trade Period 1811-1855: What do we know of it today?** Ian S. MacLaren, Canadian Studies Program, Department of Political Science - University of Alberta
10:45 - 11:15	**Repeating the Bridgland Survey: Tracing the Changing Landscapes of Jasper National Park Through Photographs.** Jeanine Rhemtulla, Graduate Student, Department of Renewable Resources, University of Alberta
11:15 - 12:00	Closing Remarks, Discussion

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Presentation Summaries

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1. Recent Zooarchaeological Research in Banff and Waterton Lakes National Parks, Alberta

Gwyn Langemann Cultural Resource Services
Parks Canada, Western Canada Service Centre, Calgary

At this workshop we are considering ways in which we can better understand the dynamics of environmental change, and better understand human behaviour as a component of the ecosystem. The use of archaeological data is one approach to studying changes in the human use of the environment over time. In this paper, I would like to give you an idea of the kinds of information that you can get from zooarchaeological studies, which are the studies of animal bones that are found in archaeological contexts. I shall discuss two projects that are currently underway. The first is the excavation of a stratified elk kill site in Banff National Park, which uses the more established methods of archaeological excavation and analysis. This project addresses the important question of samples: when can we say that rare fauna are truly absent from a region? The second project is a stable carbon isotopic analysis of bison bones from Waterton Lakes and Banff National Parks, which is being done in order to better understand the diet of the bison themselves. This is an example of how we can go back to an already existing collection of bone from a number of archaeological sites, and apply newly developed techniques of analysis in order to address questions of broader ecological interest that have arisen since the faunal material was originally recovered.

To archaeologists, Banff and Waterton Lakes are two of the best known areas in the Rocky Mountains. Extensive archaeological surveys and excavation projects have been carried out over the last 35 years, and some of these have been in sites with good faunal preservation. Most of the faunal analysis, however, was carried out some time ago, at the level of basic element and species identification. Many of the zooarchaeological collections should be re-examined in the light of new advances in taphonomy and bone chemistry.

Other papers in this conference have addressed the question of the ideal archaeological site; the Vermilion Lakes site just west of Banff townsite would embody this ideal for many of us. It is a deeply stratified site, with securely dated components that stretch from nearly 11,000 years ago to the musket ball on the surface. It was excavated in the early 1980s, in conjunction with a palaeoenvironmentalist, and has contributed largely to our

understanding of human use of the Bow Valley (Fedje et al. 1995). Part of the work involved understanding the faunal remains. A bone bed in the earliest layer contained many sheep remains, which proved to be larger than modern sheep, and probably represent a now extinct subspecies. This is a good example of the potential of zooarchaeology to help our understanding of the post-glacial dwarfing trend seen in many species. In addition, the site provided an example of human sheep hunting behaviour in the Early Prehistoric period.

Such sites, wonderful as they are, are not the norm for most of the Rocky Mountains. Many sites are shallow, single component sites, and it is up to us to put the information from a number of sites together to understand human use of an area over time. We have done enough work in the mountains now that we can make a good start at this kind of regional integration.

Zooarchaeological research has the potential to inform our understanding of past environments in many ways. When animal bones are found in a site, it is usually direct evidence that the species was present in the area, or brought there by the inhabitants of the site. The trouble is that conversely, the absence of animal bones does not necessarily mean that the species were not present, or not used by humans. There are many problems of sampling and preservation that can affect whether or not a species is found. Bone preservation in acidic and shallow mountain soils is often particularly bad. When bones are found, though, they are a source of information about many aspects of the ecosystem. We know the habits and environmental preferences of many modern animals, we know what their diet is likely to be, and this allows us to make inferences about the past environmental conditions. The bones themselves can be radiocarbon dated, which allows us to consider changes over time. Some kinds of archaeological sites involve mass animal kills, for example a buffalo jump or a large cache of salmon. These situations allow us to study an animal population at an instant in time: we can often identify the ages and sexes of the individual animals, do measures on the elements and see if the individuals are larger than contemporary animals, or belong to a different subspecies. Studies of tooth eruption or annular rings in teeth or fish scales and otoliths allow us to determine the season of the kill, and the age of the individuals.

When animal bones are found in a site, they often provide direct evidence of how the species was used by humans. We are coming to understand that people had an intimate knowledge of the animals and the environment; people were selecting particular ages and sexes of animals at different times of the year, for particular purposes. This is evident in studies of traditional ecological knowledge, and supported by the sort of detailed analysis of bones that allows us to age and sex the individual animals that were killed. Mammals, birds, shellfish and fish were hunted for food, butchered, brought back to a campsite and consumed, tools made from the bones and antlers, the remains disposed of in some way, and subsequently buried by natural or cultural actions. At each stage of the process, humans made decisions about how to treat the bones. Therefore the patterns left in bone distribution over different parts of the site, or breakage patterns that show up in the treatment of particular skeletal elements can tell us about the human use of the carcass for meat and tool making. Zooarchaeologists have made great progress over the last few

years in taphonomic work, which identifies the biases that can by introduced into an archaeological assemblage by the natural processes of decay and dispersal (Lyman 1994). In this way, natural patterns are not mistakenly interpreted as the result of cultural actions.

Microfauna are less frequently used as direct evidence of human diet, but such things as snails, insects and small mammals are extremely good indicators of local environmental conditions. In a stratified site, a site with a number of successive human occupations from different time periods stacked on top of each other, the changes in relative frequency of different microfauna can be used to track changing climatic conditions over time. Dry caves or rock shelters are often particularly good for such studies. Even with single occupation sites, changes over time can be tracked by studying a number of sites within a region.

In the last decade there has been a huge increase in the kinds of chemical analysis that can be done on the bone itself (Katzenberg and Harrison 1997). DNA analysis is used in contemporary wildlife studies to distinguish between different individual animals, or at least to speciate otherwise unidentifiable bone or hair. The technique is still experimental for ancient bone. Isotopic analysis, however, works well on ancient and modern bone. The proportion of different isotopes present for various chemical elements tells us about the long-term diet of the individual, or the temperatures in the environment, through the chemical signatures left in the very fabric of the bones. The second part of this paper will return to this topic.

I referred before to the problem of identifying rarely occurring species in the archaeological record (Lyman 1995, Woodward 1991). One example is the presence of elk, found in such abundance today in many national parks. Contemporary wildlife managers have turned to archaeological data to help identify the presence or absence of particular species in a particular area in the past, as well as questions of the relative abundance of various species. Recent environmental management studies have addressed the question of the health of the Montane environment in Banff and Yellowstone National Parks by studying the interrelationship between elk, aspen stands, wolves, fire and humans (Kay et al. 1994). As one part of the much larger research project, Kay examined the historic accounts and archaeological reports from much of western Canada and the United States, in order to approach the question of how many elk there were in the past. He found that elk were seldom identified in the archaeological record, although they were present in small numbers. There are of course a number of possible reasons why elk are scarce in the archaeological record, which include the poor preservation of bone in acidic mountain soils, the difficulty of identifying small fragments of large skeletal elements to species, the fact that most of our excavations have been in large valley bottom campsites, which may not be the kind of place where elk were hunted and butchered, the fact that elk fat tastes awful and other species were preferred (Hurlburt 1977), or because elk were hunted as individuals rather than in a trap or pound like sheep. Another possible reason is the one favoured by Kay, who argues that humans overhunted elk very early on in their history, and that since the early post-glacial period there never were many elk around to be hunted. The conclusion drawn has large implications for

current wildlife and range management practices, and it is important that it is based on research that is as sound as we can make it. It is true that we have a lot of archaeological sites recorded in Banff, but if they are not sites with good faunal preservation, and if our excavated sites are all the same kind of large valley bottom campsite, then I do not think we can safely say that elk were not present in any number in the past.

Because of this interest in the presence or absence of elk in the archaeological record, I have been looking hard for sites in Banff with good faunal preservation of any species. Last summer, I returned to a site near Banff townsite that was known to have bison bone in a stratified context. Daryl Fedje discovered site 1210R in 1986, on the edge of what is now the 18th fairway of the Banff Springs Golf Course. He excavated a single test unit at the site, and found a component containing a small number of flakes, and butchered bison bone (Fedje and Landals 1986). The site was near the junction of the Bow River and a former channel of the Spray River. A series of overbank deposits are visible between two tephras: Mazama at the base (6850 BP), and Bridge River near the top (2500 BP). After deposition of the Bridge River tephra, the Spray River appears to have moved into its present channel, a kilometre west of this site, and there is very little soil deposition at 1210R. The bison bones were found between the two tephras and were radiocarbon dated to 5500 years BP, which fits well between the dates of the tephras.

In 1998, further test excavations at Site 1210R uncovered a second and younger component that had not previously been noted at the site. There was a well defined living floor, which contained fire-broken rock from hearths and stone boiling, a number of small chert flakes left from resharpening stone tools, a point base, butchered large ungulate bones, and a freshwater mussel shell fragment. So far, all of the ungulate bones I have identified have been elk. The bones are concentrated on the west side of the site, and the flakes on the east, with fire-broken rock scattered throughout. There is a dense concentration of split long bones, articulated phalanges, and mandibles in the bone bed. Very few elements were complete, except for the articulated phalanges. The larger elements, such as tibiae, displayed spiral green bone fractures. The metapodials were split longitudinally, and often the two halves were found together, as if the bones had been split open, but were still linked by some tissue at the time of disposal. From the count of mandibles, there were at least three individual elk represented in the sample. The two most complete toothrows were a left and right, but were not a pair; they displayed clearly different wear patterns. One was likely from a four-year-old, and the other from a five-year-old. A single third mandibular molar had not yet erupted, or at least was not yet displaying any wear; this is likely from a two-year-old elk. A detailed analysis of the faunal remains is currently underway.

The radiocarbon date for the site is not yet available, but the elk component is clearly above the upper tephra, and so should be younger than 2500 years. Both tephras show up quite clearly in this portion of the site too. In the part of the site I tested, there were no other precontact components, although there was a thin scatter of historic artifacts in the sod layer, such as wire and horse bone. Below the Mazama tephra there was a long series of overbank silts and alluvial coarse sands and fine gravels.

Site 1210R is important and unusual for two reasons. First, it is rare to find stratified sites in the mountains. At this site, there are two volcanic tephras clearly visible in the soil profile, which help to define the stratigraphy. One occupation is found between them, and the elk component is above the youngest tephra, so the cultural components are well separated. The information from this site can be added to what we know about nearby sites from other time periods, and will help us understand changes over time in the human use of the lower Bow River valley. Second, there are few archaeological sites in the Rocky Mountains that have well-preserved bone, and very few where elk bones have been identified. In many archaeological sites the bone is too fragmented to identify the species, and the identification of elk has often been based on antler pieces. Shed antlers could have been picked up at any time, and the presence of antler in a site does not necessarily mean that elk were hunted and butchered. At Site 1210R, however, there are a number of large bone pieces that can be identified as elk; they have clearly been butchered, and are found in a living floor containing stone tools and fire-broken rock. The question of how many elk were present in the Bow Valley at various times in the past is of interest to Banff ecologists and managers; here is a clear example of a site containing a historically and archaeologically rare fauna.

Now I am going to shift to Waterton Lakes National Park, where there are many more sites with good faunal preservation than in Banff, and where most of the faunal remains are bison. In June 1995, a single night of heavy rain led to terrifically damaging floods. In the Blakiston Creek valley, the raging creek carved away a twenty metre wide strip of site 657R. This site is on an alluvial fan, near the Crandell campground. However, the flood damage also provided an opportunity to examine parts of the fan that had previously been so deeply buried that conventional archaeological testing could not reach them. When I monitored the site after the flood, there were newly exposed bones in the stream channel, including an articulated segment of bison thoracic vertebrae and ribs. The flood allowed us to examine a completely new cutbank profile that was 200 metres long, cut through the alluvial fan from one end to the other. Conventional testing would never be able to expose such a profile. Organic strata were visible in the profile, as well as a sequence of fan and alluvial deposits. Isolated bones were present in the fan deposits, which allowed us to get a series of radiocarbon dates, and age the various depositional events (Langemann 1996, 1998). The flood had an impact on a number of other archaeological sites in the park. At Site 665R, about one kilometre downstream from 657R, bison bones were exposed by the flood. The bones were held together in a dense root mat, while the soft sands and silts below were undercut by the flood; as a result the bones and root mat were draped vertically over the bank below. I excavated some tests and recovered these bones, but there were no artifacts associated, and no signs that the bones had in fact been butchered, or were there because of cultural processes. This was also the case for Site 657R.

What sort of analysis can be done on bone finds such as those from the two sites described above, where there is no evidence that the bones are cultural? One thing we did was take a number of bison bones from these sites, and give them to archaeologists at The University of Calgary for stable carbon isotope testing (Varney et al. 1997). Bones

from Sites 665R and 657R were tested, as well as bones exposed in the Belly River bank, and a bison skull from high elevation at Bauerman Creek.

Bone chemistry studies were a new thing in the early 1980s, when their usefulness for addressing questions of human palaeodiet through analysis of human bone was immediately appreciated. In the last few years, the techniques have been applied to palaeoecological research as well, analysing the diet of the animals themselves. Bison were the dominant large animal of the Canadian plains, and there has been some debate over the years about the degree to which they undertook seasonal migrations. One approach to resolving this has been to use the traces left in bone chemistry by the diet of the bison (Chisholm et al. 1986). Quite literally, "you are what you eat" (Kohn 1999). Bison eat plants, and plants in different environmental conditions have different stable isotopic compositions. The isotopic composition of an animal's tissue reflects what it has consumed over its lifetime.

To understand stable carbon isotopic analysis, the first thing to know is that plants can be divided into two main photosynthetic pathways: the C3 pathway (which includes most temperate grasses, and the leafy and woody plants), and the C4 pathway (which includes the more arid grasses, including blue gramma grass). The second thing to know is that carbon appears naturally as two stable isotopes, ^{13}C and ^{12}C. These isotopes behave slightly differently in chemical reactions, because the ^{13}C isotope is slightly heavier. The C3 photosynthetic process tends to discriminate against the heavier ^{13}C isotope, so there is less of it in animal tissues if they feed on C3 grasses. If a bone sample is analysed through mass spectrometry, the relative proportions of the two stable carbon isotopes can be measured, and therefore the proportion of C3 to C4 grasses that the animal was eating over its lifespan can be inferred.

How does this help us decide if bison were migrating from the plains to the parkland and foothills, or if they were staying in the parkland? Because the geographic distribution of C3 and C4 grasses is distinct. Fescue prairie, which is found on the eastern slopes of Waterton Lakes, contains an extremely small C4 component: less than 1% of the grass community is blue gramma grass. The proportion of C4 grasses increases to the south and east, in the more xeric mixed prairie communities. A bison spending all of its time in Waterton Lakes would be consuming almost exclusively C3 grasses. Any bison bone sample taken from a site in Waterton Lakes that shows a significant proportion of C4 grasses in the diet would therefore be from an animal that has spent time in the arid grasslands well away from the park.

This in fact is what the result of the stable carbon isotope analysis showed. All the individual bison tested were consuming C4 grasses, enough to account for between 9% and 24% of the diet of the individuals sampled. These bison must have been feeding well to the east of Waterton Lakes in the xeric mixed prairie grasses. This is evidence for considerable migration, given that the bone samples were collected in Waterton Lakes, including one sample found at high elevation in the park backcountry. However, none of the samples had the high values that would be expected if the animals had been spending all of their time in the xeric grasslands.

To follow up on this initial study, we have taken samples from the Entrance Site in Waterton Lakes (Site 572R) which is a major campsite where there have been substantial excavations over the years. Enough bison bone has been collected to allow a series of samples to be taken from the same skeletal elements, so as to ensure that each sample is from a different individual. As a control, samples of bison bone from two sites in Banff are being analysed: Scotch Camp on the upper Red Deer River (Site 401R), and Site 1912R, which is from the lower Pipestone River near Lake Louise. Both areas are currently very far from any C4 grasses.

Forestry management questions have dominated this workshop, but Waterton Lakes National Park also has grassland to manage. Bison have been a dominant species in the grasslands for millennia, and grassland communities have evolved in response to both fire and grazing. What is the effect on the fescue prairie when both fire and grazing have been removed from the ecosystem? One way to approach this question is to discover if there have been resident bison populations in the foothills and mountain valleys, or if the bison herds have been more migratory, and seasonally using the foothills as a wintering area. I suspect the answer will prove to be a more flexible model, where some bison stay put and some migrate in a dual dispersion strategy (Epp 1988). Stable carbon isotope analysis is one way to address this question.

Stable carbon isotopic analysis may be an arcane science, but it is one productive way of approaching an understanding of animals, the environment, and the human use of the environment and its resources in the past. It has the further advantage of requiring only very small bone fragments, and so it is possible to work with collections that we already have without disfiguring the specimens. Zooarchaeological sites are a finite resource too. If we are interested in bone chemistry studies, or studies of rare fauna, it is possible to revisit sites and collections that we already know about, rather than continuing to search for the perfect site that will answer all our needs.

Earlier, I discussed the recent extensive flood damage in Waterton Lakes National Park. This shook my confidence in our understanding of the archaeological record in that park. There are quite a few sites that have been recorded as bison kills on the basis of the presence of bone alone, when no other cultural artifacts were found. The flood has shown me that bones are easily moved downstream, and quite possibly moved from place to place over the decades by successive floods. I saw new gravel bars created by the flood, covered with a sizable scatter of bones that had not been there a week before the flood. The strata in the new large cutbank exposures through alluvial fans were dotted with isolated bones that had been swept downstream from higher up the tributary creeks, and that were in no way cultural. I would like to go back to the collection of bones that has been made from the Waterton Lakes sites, and re-examine them in the light of what we now know about taphonomic processes. It might well be possible to determine which are truly cultural sites, and which are places where natural animal deaths have contributed bones to the deposits.

One objective of this workshop was to inspire future research, to fill in the gaps of our knowledge of mountain ecosystems. Although it is always exciting to find new sites full of well preserved faunal remains, I would like to impress upon you that it is possible to do a lot of important research with existing zooarchaeological or zoological collections. Techniques change, our understanding of cultural and ecological history changes, our understanding of site formation processes grows, but our budgets shrink; re-examining existing collections from a regional perspective is often a fruitful way to approach archaeological research.

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2. Is Wildlife History Bunk? Reflections on I.J.M. Robertson

Graham MacDonald
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Those who like to read into history on occasion, may recall that the American automobile magnate, Henry Ford, considered himself something of a philosopher of history. He is remembered today for at least two remarkable contributions to that arcane sideline of historical enquiry. The first I think would be his contention, perhaps apocryphal, that history ‘is the succession of one damn thing after another’ - an observation difficult to disagree with, but a Ford statement I have not been able to document. The second, is more reliable, that ‘history is bunk.’ This remark appeared in the *Chicago Tribune* on May, 25, 1916 in the course of what eventually became a libel suite brought by Ford against the *Tribune*.

History is more or less bunk. It's tradition. We don't want tradition. We want to live in the present and the only history that is worth a tinker's damn is the history we make today.

Now a philosopher or the man running the local mechanic operation down the street would probably despair of trying to make much logical sense of that statement. Ford was undoubtedly a better car maker than philosopher. The term "bunk" has nevertheless tended to stick in the popular mind. A few years ago, when I became engaged with staff at Mount Revelstoke and Glacier in undertaking research on the shifting historical fortunes of the Mountain Caribou of the Columbia Mountains, I was intrigued to come across a paper by I.J.M. Robertson, a former Regional Manager of B.C.'s *Okanagan Fish and Wildlife Branch*, entitled: Is Wildlife History Bunk? This was too good to pass up I thought. Mr. Robertson had published his piece in the *Papers of the Okanagan Historical Society.* The piece had been written in response to a much earlier short paper which appeared in 1945 by Major Allen Brooks, the well known naturalist and artist, long resident at Okanagan Landing. Those who have picked up A.W.F. Banfield's *Mammals of Canada* or Percy Taverner's volume on the *Birds of Western Canada will* be familiar with Brook's excellent artwork.

A few of Mr. Robertson's observations will set the stage. About the title of his paper, Robertson stated: "The doubt...arises from questions about accuracy and sampling." This was the focus of his paper. Since the 1930s, wildlife biologists and technicians have been developing ever more sophisticated techniques for tracking and estimating on-the-ground populations of wildlife, but Robertson was interested in what we might make of the more impressionistic data which had come down to us from exploration, fur trade and pioneer literature. Such infrequent and casual observations left much to be desired owing to a lack of context. The writer held up the interesting parallel case of two hypothetical aliens landing in a human settlement in the modern Okanagan twelve hours apart from each other and who both departed after a making a short reconnaissance. Suppose one of these aliens had fixed upon a disco at midnight on a Saturday evening? And suppose the other on a solitary backyard gardener at mid-day on a Sunday? Their respective reports to their alien superiors would be very different. More important, such one time counts would not suggest anything about 'trends' which, in Mr Robertson's view, is the really relevant aspect of wildlife history. Robertson suggests that there are four elements to wildlife history which must me contended with: (1) documentation, (2) recognition, (3) abundance, and (4) trend. Up until about 1860, in the Canadian West generally, he suggests that there exist just scattered elements of documentation along with similar elements of species 'recognition' (although he states that even today, many people are not always sure what they actually see. Was that a white-tail deer or a mule deer?) There were also just scattered observations on 'abundance' and few meaningful statements about 'trend.'

"Sampling of wildlife abundance" he stated, "requires method and statistical analysis which is even now out of reach of wildlife managers on a broad scale." He made this statement with reference to the relative ease of taking a census of a human population, or of doing a forest resource inventory (a living commodity which is fixed in space), or of

certain types of birds, such as geese, which flock and gather at certain fixed points during the year.

'Trend' is the other aspect of population sampling, and one of great interest to wildlife managers. In order to establish trend, one needs to sample the same population at regular intervals so that one may produce a trend line on a graph.
Robertson concluded with a reference to the scarcity of documentation that has been available for pre-1905 years. "We do not know for certain what the population trend was when any historical comment or documentation was made...."

I don't believe there is much to object to in these contentions. He quite correctly identified a shift in the rate of wildlife observation with the 1860s when miners and other settlers started to report a little more systematically on wildlife by virtue of their increased fixity in one locale, and by 1890 we start to enter the period of systematic data maintenance by new government agencies. We shall see later however, how one group of researchers found a way around this gap in documentation via the records of *The Hudson's Bay Company*.

We must leave to one side the more dramatic historical chestnuts of wildlife history which have interested Pleistocene geologists, palaeontologists and anthropologists since well back into Buffon's time in the eighteenth century when it started to dawn that fossils were not just 'the sport of nature'. The most dramatic of the late Pleistocene extinctions is probably that of the woolly Mammoth, a species which appears to have survived in a dwarfed state on Wrangel Island as recently as 3,700 years before the present. Evidence of human predation of mammoths by Clovis point hunters has been found at Nacro, Arizona, thus placing that species in proximity to New World hominids.

The Wrangel Island discovery in 1993 merely points to the long and drawn out nature of the large mammal extinctions which seems to have occurred in both the Old and New World from roughly the time of the rise of Cro-Magnon around 40,000 years ago to about 10,000 years ago when it is conventional to end the last ice age. The subsequent climatic trend was one of warming and habitat change in the higher latitudes where large animals such as the mammoth had prospered. Another trend was the increase in human population and arguments have raged ever since about the particular role of that predator in the mammalian extinctions. The question of Pleistocene extinctions is a fascinating one and foreshadows perhaps some of the uncertainties which some contemporary wildlife populations are up against.

The question has recently been extended into more recent times by such as Charles Kay of Utah, who has argued for a theory of 'aboriginal overkill' as an important factor in the restructuring pre-Columbian environments in North America. This argument for earlier populations of Native peoples being effective hunters may be combined with the implications of Dobyn's work which suggests that pre-Columbian Native populations were of a much greater magnitude than suggested by pre-1920 commentators . These last mentioned studies deal with very broad-brush considerations about the continent as a whole, or large parts of it.

At the far end of the temporal spectrum in our part of the world, the archaeologist and anthropologist have often contributed to wildlife history through the faunal remains found in early sites. Jonathan Driver for instance has commented on big horn sheep remains found at kill sites of the early Holocene period in the Crowsnest Pass area. Much closer to our own times, focused regional studies have been attempted based on what can be inferred from first hand documentary reports. One might mention a recent paper by Shaw and Lee, dealing with the 'relative abundance' of Bison, Elk and Pronghorn on the southern plains, between 1806 and 1857. The cautionary words of Robertson apply to studies such as these. In our own time, wildlife history has frequently been the concern of wildlife biologists and managers who have turned their hand to it for their own purposes. One thinks of John Stelfox's work on Rocky Mountain Big Horn Sheep or the work of D.E. Phelps and his associates on Mountain Goats in the Kootenay region. Interestingly, the definitive history of the Bison, is that written by a man of the soil, a pioneer of the Blackfalds area of Alberta, who became an extraordinary observer and historian. He published his remarkable *The North American Buffalo* in 1951.

To go back for a moment to Mr Robertson's alien analogy: Many people who have read some of the classics in exploration literature - such as the *Journals* of David Thompson or the Palliser Expedition *Reports* - will be familiar with their references to scarcity of game in many of the mountain areas. Sir James Hector's observations on the Kicking Horse Pass area is one good example. Robertson stated, "The reports of deer scarcity, recorded by explorers and early traders may simply be instances of being in the wrong place to see deer at the time of the reports."

Ecology and Wildlife Cycles

I want to turn now to another group of observers who entered the scene in the later nineteenth century in the shadow of Darwin. They offered a somewhat different view of what was involved in the contemplation of animal numbers. These were practitioners of the new science of ecology. The earliest self-conscious definition of *ecology* is generally attributed to Ernest Haekel in 1866, who at that time was the main German advocate of Darwinian theory. In that year he set the new enquiry on its feet by defining it as "the comprehensive science of the relationship of the organism to the environment." As Donald Worster observed, this establishment of a new study reflected an awareness which had been in the air for some time, perhaps as early as the work of Linnaeus in the eighteenth century. The term was recognized at the 1893 meeting of the *International Botanical Congress* and in 1907 the *British Ecological Society* was founded, the first such society on record. I want to distinguish the viewpoint of ecology from what might be called traditional biology and zoology as it was being practiced from Darwin's time up to about 1910. The post-1859 Darwinian agenda seemed to have sent many people scurrying to the laboratory in an effort to sort out the physiology of species with a view to saying something significant about 'origins'. Were we really related to apes? The microscope should be able to tell us. Now the ecologists, as I understand the words of the young Charles Elton, wanted to get out of the lab and study relationships in the field.

They wanted to see how animals actually behaved and why. In chasing such questions, Elton went on to become one of the seminal influences in the field of animal ecology.

Chicago also became an important centre of study as well. Charles Adams published an influential study in 1913 called *Guide to the Study of Animal Ecology*. Adams had a warning for the early students of ecology: he said that ecology was still "a science with its facts out of all proportion to their organization or integration." In the same year, Victor E. Shelford published his *Animal Communities in Temperate America as Illustrated in the Chicago Region*. Shelford's book got the attention of Julian Huxley who had already left England for the Rice Institute in Texas. He later gave it to Elton. In 1921, Huxley asked Elton to join him on an expedition to Spitzbergen to do field work, the start of an important aspect of the latter's work which led him to formulate such now familiar concepts as the 'food chain' and the 'Eltonian Pyramid', both of which, in their own way, describe the distribution and abundance of animals within a community. During his time on Spitzbergen, he had given a close reading to a book on Norwegian mammals by Robert Collet, which taught him that lemmings aggregate roughly every three to four years, in preparation to migrate.

Following his Spitzberegen Work, Elton entered into a very creative relationship with *The Hudson's Bay Company*, headquartered in London, as a consultant. The managers were of the correct opinion that a better understanding of wildlife cycles might be advantageous to their yearly business planning. The archives of the 'Great Company' represented the great mother lode of data which observers such as Brooks might have yearned for. Elton sensed the potentials of the massive HBC records for wildlife research, although he was not the first to make use of them. Ernest Thompson Seaton had worked on the records and much of his research ended up not only in the charts he published in *The Arctic Prairies* (1911) but also in those included by Canada's Dominion Entomologist, Gordon Hewitt, in his *The Conservation of Wildlife In Canada* (1921), a work published just after Hewitt's untimely death. It was a work that greatly influenced Elton. These researches were able to draw on sequential documentation of wildlife returns from 1821 to as late as 1920.

In addition to the records in London, there was another important source of HBC documents located in Victoria B.C. reflecting the activities of the company's old Columbia Department. James Douglas, the venerable HBC Governor at Victoria, had kept for his own purposes, an impressive log of fur returns for the years 1825 to 1857, and this body of information eventually came to the attention of the biologist Ian McTaggart Cowan in the 1930s. In 1938, he published 'The Fur Trade and the Fur Cycle, 1825-1857'. As did Hewitt, Cowan constructed a number of graphs based on the yearly returns of furs from the posts in British Columbia Washington and Oregon which demonstrated how certain fur bearers demonstrated cyclical relationships. Based on the returns he saw parallels with what other researchers had established about the four and ten year cycle but noticed also that with respect to beaver there was a story of extinction rather than cycles from sustained overtrapping between 1832 and 1840. In this case, the relevant factor was human impact rather than relationship with other species.

The following charts illustrate how, from the fur returns of *The Hudson's Bay Company*, scholars were able to plot out trend lines on graphs, demonstrating that some fur bearers stood in apparent cyclical relationships with others. The correspondence of the Varying hare and Lynx was particularly notable. These first works helped set a portion of the wildlife research agenda for many years to come.

I raise this particular aspect of scientific work because of its appropriateness to National Parks and other special land reserves where there is both a mandate for land management and conservation and a stock of researchers and staff well-versed in Wildlife management techniques. The ecologist brings to his work an interest in correlating diverse natural phenomena in a terrain setting. I also raise this viewpoint in order to contrast it with other types of population studies which have been conducted since the early part of the century more with a view to the pragmatic requirements of fish and game departments in North America. It is well known that much of wildlife management on this continent has been conducted not so much with pure science in mind as with a view to the sustaining of certain specific game populations of interest to the hunter and angler. The state of this particular line of enquiry came together significantly in Aldo S. Leopold's classic 1933 text, *Wildlife Management* . It only needs to be added that Leopold went on in his later years to take a much greater interest in what we are here calling the ecological point of view.

There is nothing much I can say about the large technical literature on how to go about taking a census of a given species in a given area, of the importance of reviewing all relevant bias factors brought on by such criteria as sex ratios, rate of recruitment, age of the population, and so on. These are all considerations which wildlife biologists and technicians appropriately take cognizance of in their studies. Today such work has become more varied as practitioners seek to utilize the rapidly developing advances now available through DNA testing. Consider the title of a recent report: *Estimating Population Size of Grizzly Bears Using Hair Capture and DNA Fingerprinting in Southwest Alberta.* This is a sophisticated piece of work which seeks to assess the health of populations along the entire eastern slope of the Rockies of southern Alberta. For those of us not well versed in the methodologies employed, it nevertheless inspires confidence, for the authors demonstrate in their conclusions a great deal of caution with respect to what they have achieved. This is the way science proceeds.

Population Cycles and Environmental History

I wish to move away from the nitty-gritty of such field inspections, which successfully give us a slice-of-time view of a given local or regional population, and look more in the direction of what those who purport to do something called *environmental history* might achieve with the aid of such studies. The case of the Mountain Caribou of the North Columbia Mountains might be a useful example.

Clearly obtaining an extended series of field observations over time for a given species will be of interest to the historical study of any species. Robertson was appropriately concerned that such fragmentary observations as were to be gained from early traveller,

hunter or settler accounts, while often precise, may not have anything to say about trends. Trend data, in the right hands, produced an interesting body of ecological literature on population cycles for certain species. Within the larger mammals, and particularly the ungulates, the existence of cycles appear to be less obvious and habitat a much more critical factor. Predator/prey relationships may be important at certain critical times, but ecologists have been at least as interested in what induces a given species to suddenly move out of its customary terrain. The evidence would seem to suggest that carrying-capacity in relation to food supply is often the crucial factor. Some have noticed with respect to certain types of deer, that even under pressure, they may remain in familiar terrain even if they starve. Amongst opportunistic feeders such as Caribou and many other ungulates, it may perhaps be assumed that migration of a seasonal or regional nature may be a response to various environmental pressures. Butler takes the view that amongst those animals which are well known for cyclic rises and falls in population, immigration out from the centre of initial build-up is an important element in triggering the initiation of population build-ups in other areas. This was the key to why, across Canada, he noted that the peaks of cyclical populations occurred at different times. Now, if we consider the relatively coherent habitat range for the Mountain caribou defined by the ranges of the North Columbia, (Northern Idaho to about Prince George, B.C.) and if we assume that inter-species related cycles are not a significant phenomenon within the various herds, then we may probably assume that various other components in the environment provide the main controls on numbers. These clearly include food supply, predators, recruitment rates, and quite possible catastrophes, given the frequency of avalanche activity in these mountain ranges.

One of the factors which Butler suggested was important in the sequential triggering of population cycles in smaller mammals, was that in the process, a thorough juggling of the gene pool took place as one burgeoning population migrated into other areas not yet bursting at the seams. In the case of the ungulates, which are much more stable in number over time, the pressure to pick up and move may be much less frequent. There is no radical shake up of the gene pool with this crowd fostered by admixture of herds. What happens in a range which supports herds, in some cases already low in number, (such as in northern Idaho), if habitat and land use modification act to lessen even further such normal migration and admixing with other herds as may have occurred in more pristine times? Habitat fragmentation has become a watchword among wildlife biologists for good reason. 'Dwarfism' or outright extinction is the probable result if herds become radically boxed in and isolated. This appears to have been the fate of the Queen Charlotte Islands Caribou.

In the Caribou history study carried out for Mount Revelstoke-Glacier National Parks, there was a fairly clear trend of low herd numbers in the south end of the range and moving to greater concentrations and herd size in the north. In the south end of the study area, particularly in the east Kootenays, a greater variety of land use change can be noted in this century; and yet roads, mining, drainage effects from the Kootenay-Columbia water impoundments, and of course, a great increase since 1945 in the extent and nature of forest resource exploitation, has gone far to break up all the mountain ranges into units in which there are now many more barriers to a free flow of wildlife. The work of public,

academic and contract wildlife biologists since the 1970s has provided good and timely information on the waxing and waning of specific herds. My main question would be to what extent are these healthy populations in the sense of recruitment and a sufficient mixing of the gene pool? It is perhaps the task of the environmental historian to document the extent and nature of land use impacts and what these may portend for a given species or mix of species within the acknowledged relevant range or series of ranges.

In setting up work on the Mountain Caribou of the Columbia Mountain ranges, it occurred to the project managers that there was little point in focusing only one protected area, such as Glacier National Park. Our knowledge of the number of Mountain caribou present in the park and of their seasonal movements was fairly good based on post-1970 research and monitoring. What was of greater concern was what was going on in the overall habitat range of the herds, a concern shared by other public reserve managers of the Columbia Mountains. The search would be for as many constants in the ecosystem as might be relevant to the health of the species in question. In the case of the caribou, the correlation of their range with the availability of arboreal lichens, abundant in the old growth forests of the Cedar-Hemlock and Englemann Spruce/Sub-Alpine Fir Bioclimatic zones, was well known. Warden John Flaa cautioned on how far to push this as a year-round requirement, for the caribou are opportunistic feeders. But few doubt the crucial seasonal role of arboreal lichen on the winter range, and the use of this resource is presumably one important adaptation made in the distant past by the Mountain caribou. It is one more instance pointing to the importance of old growth forest. By reviewing other types of information such as fire history, water course changes, the results of climate studies, and combining these with what is known about the overall pattern of human impacts, there is a reasonable chance of pushing the environmental historical approach back in time before the appearance of any kind of regular statistics.

Conclusions

There are a number of reasons why people interested in conservation work should be interested in wildlife history as a concept. First, it provides some insight into the presumed long-term viability of a given species within a given known terrain. Second, it may help indicate trends over time and the general range of a given species. Third, it may help document the details of the fluctuations in population of a given species, and help clarify if the species is subject to significant cyclic description and behaviour. Fourth, it can provide a way into a consideration of the relationship of a given species with other species, including predators, recent intruders or introductions. We should include the relationship with the human species in that category. Fifth, it provides a way for us to assess recent or proposed large-scale changes in land use which may be relevant to habitat requirements.

In addition to keeping abreast of how wildlife biologists go about sampling and accumulating periodic data on wildlife numbers, it seems to me that the main concern for the environmental historian should be on the practical appraisal of land use changes and substantial changes in vegetation cover related to the essential needs of species.

'Fragmentation Theory' might be a useful heading for such people to try and master and put in context.

So finally, is wildlife history bunk? I can do no better than to quote Mr. Robertson in his own conclusion when he said. "I have tried to show that wildlife population dynamics is a complicated subject and that wildlife history has its pitfalls in sampling, documentation, and interpretation." I think our overall range of sources and techniques is increasing however, and historians interested in this topic will have to be sure to access the fruits of these new approaches along with what formal ecologists have to say about animal behaviour over time.

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3. Retrospective on Revelstoke: The Learning From the Past Conference

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In 1998, archaeologist Rod Heitzmann and his crew searched for evidence of early human activity along the shores of Columbia Lake, in the Rocky Mountain Trench. They not only found that activity, they also found bones of the bison, a grassland animal completely absent from post-settlement record of the Trench. Rod delivered this piece of information in the intimate and electric ambiance of Revelstoke's Anglican Church Hall, to a very diverse audience of field biologists, archaeologists, First Nations people, historians, glaciologists and just plain folks.

As a gentleman ecologist and sometimes writer, I was fortunate enough to be in that audience, and when Rod got to the bison part, I felt the definite crackle of electricity, of new synaptic connections, short circuits, and crossovers. Here was a piece of information from the distant field of archaeology that suddenly informed and modified one of my own areas of interest--the ecology and vegetation history of the Trench. Bison, even wood bison, depend on significant amounts of open grassland over their range of travel, an

ecological element largely missing from the modern Trench landscape. Rod doesn't know how old the bones are yet, but they are being radiocarbon dated.

Crossovers; this could be the real theme of Parks Canada and CMI's Learning from the Past Conference. Archaeology to ecology. Philosophy to re-photography. Glaciology to water politics. Sediment cores to traditional use. Science to field practice, and back again. Past to present; present to past. As a jaded veteran of decades of scientific and natural resource management conferences, I must tip my hat to the organizers, the presenters, the registrants and the cooks of Learning From the Past. This was one of the best conferences I have ever attended.

I have a colleague, Eileen Pearkes, a Nelson writer and artist. Scientific conferences are not part of her life, but she was intrigued by the interdisciplinary agenda for this one, and decided to attend. Eileen's insights are fascinating, and I would like to quote them (the similarity of electrical analogies is totally coincidental):

Any gathering of minds does its job if the result is not precise answers, but better, broader questions. The Learning From the Past workshop pulled together disparate disciplines and perspectives to offer ideas about how the region should approach land management issues: through the lens of culture, not just science. The most general question posed as a frame for this two day banquet of ideas was: can the past inform our present and future land-use? Eric Higgs asked us to push the present to the edge, then allow the past to fill in. We all did our best, hearing past perspectives on glaciers, aboriginal burning, archaeology, geology and fish habitats, to name a few.

To me, the richness of the workshop lay in its interdisciplinary structure. As such, the distinct intellectual frameworks (languages, hypotheses, assumptions) of each discipline were shared out, traded like playing cards, borrowed or mined for their richness. When this kind of cross-referencing takes place, true creative thinking results, and an exciting energy of possibility charges the air. I felt that current at Learning From the Past, and was (sigh! ever so briefly) reassured by the power of the human mind, by our wonderful capacity for self-criticism and by the perhaps endless options for improving our relationship with the place where we live.

To apply our rapacious minds to the landscape is a dangerous game, as the past 100 years of this region have evinced, but to put our <u>thinking</u> and <u>feeling</u> minds to the history of the landscape might bring better results. Looking back as well as forward provides a counterweight to the greed that inevitably informs present actions, makes us question the very values which we currently live by, causes us to take pause.

When the scope of time widens, so too does our perspective. For me, one of the workshop's most amazing moments came when Douglas Hallett projected a slide of a cone-shaped core sample of soil from a high alpine meadow marked by striations of soil, ash and charcoal deposits compacted by snow and ice over thousands of years, then crowned in the present with a lush green crop of meadow grass. Parks Canada and CMI in a sense took a similar core sample of the region's landscape history. We spent the

time in Revelstoke beginning to analyze the layers. But there are many more core samples available, and there are many observations of these layers left unexamined after two short days.

As with any successful event, I drove away wishing I was only just arriving, wanting to register for the second annual before I left. It's easy to sit in a room and trade ideas. The job now is much tougher: how to integrate that intellectual and philosophical sparkle into the granite everyday work that each of us does.

Eileen and I compared notebooks after the Conference, and here are a few presenter statements that both of us noted down:

Glaciers must be 70% snow covered to be "in balance." Currently, the glaciers of the North Columbia Mountains are only 30% snow covered. Glacier melt provides 90% of the August inflows to the major rivers of Western Canada. Do the math….When the big glacial lady gets out of bed, the bed rebounds. The big lady also leaks. (M. Brugman).

The Mazama ash layer at 6730BP is absolutely clear, like a bell. (D. Hallett).

Wild sheep should be managed as tiny remnants of a much more extensive population from 500BP, when alpine areas were much more productive. (W. Choquette)

Don't hide behind lightning fires. (M. Heathcott)

There are three views of our ecological future: cornucopian, incarcerated, and restorative. While we use GIS liberally, we possess no tool for measuring the cultural impact of land use. (E. Higgs)

History is just a series of one damn thing after another. (H. Ford)

The timescale for fish recovery after a major perturbation is roughly 100 years, longer than one human lifespan. (K. Bray)

I found Brian Reeves' evening presentation on the use of First Nations culture to promote tourism both hilarious and frightening at the same time. The colonial image-makers were able to distort and re-create another culture's reality virtually at will. We all laughed uproariously when Brian showed the 1930's Waterton Park promotional film, as the well-dressed a menage a trois stepped from their open roadster, pitched a gigantic tent, and then hauled several large trunks inside. We laughed, but there was a querulous edge to our laughter; which of *our* daily routines will cause similar uproarious laughter fifty years hence? One of the great lessons of the past is the profound silliness of much of what we humans do in the present. Perspective shifts our understanding.

I did come to the workshop as a scientist, but the writer side of me, who was not invited, came along anyway. I can never quite shut that writer side down, even when I want to--he attends as a kind of doppelganger, an obnoxious Charlie McCarthy I can't get rid of.

So it was the uninvited writer that made me collect this raft of delicious, resonant and mysterious workshop phrases, like a magpie collects bright and shiny objects: Melankovich forcing. Orbital wobble. Time-transgressive hypsithermal interval. Little climatic optimum. Lee-wave cyclogenesis. Adits. Pulse stability. Transitional matrix. Littoral. Committee Punchbowl. Narrative dilatation. Anthropogenic activity. Stochastic event. Taphonomy. Lithic workshop. There is no question that science is the undiscovered country for the creative writer.

I do worry about Eileen; we may have forever spoiled her for future scientific conferences, by accidentally making her first one such an outstanding experience. She told me that the information-based euphoria--what she termed "the CMI high"--lasted for a week afterwards.

As all of us reluctantly turn back to the daily granite, the memory of Revelstoke lingers on, reminding us of the real possibility of new levels of holistic integration, of crossovers, of better ways of living with nature, and with ourselves. So where do we go from here, or to borrow a phrase from Leon Trotsky, What Is To Be Done? I think we're already doing it; we're headed where we want to go. In between get-togethers like Revelstoke, however, the road can get lonely. Self-doubt can creep in. So the key perhaps, lies in personal encouragement and mutual support. Find ways to honor each other's work, continue the crossovers, and help move them to an ever-widening audience.

In the meantime, I can't wait to find out the age of Rod's old bison bones.

4. Using the historical record for aquatic habitat rehabilitation and restoration

Karen Bray
Fish Biologist, Columbia Basin Fish and Wildlife Compensation Program, Revelstoke

Rehabilitation and restoration of aquatic habitat imply some return to a previous state. Knowledge of past conditions provides direction or assists in setting goals to guide rehabilitative efforts and the historical record provides a perspective on the time scale for recovery of ecological processes. Historical information has been widely used in fisheries management, more frequently for stock assessments, but more recently for habitat rehabilitation. Several techniques and information sources are available and examples are presented along with an explanation of limitations and biases. The provision for future information and data sets is accentuated by historical analysis and is an important issue for present day practitioners.

5. Changes in glacier behaviour and melt patterns as evidence of climate warming

Mindy Brugman
C*olumbia Mountain Institute, Revelstoke, B.C.*
Abstract not available.

6. Post-glacial palaeoecology of the Upper Columbia Drainage: An archeological perspective

Wayne Choquette, Yahk, BC

Abstract not available.

7. Research technologies in land claims, treaties, impact assessment, and co-management strategies.

Peter Douglas Elias,
Professor, Faculty of Management, University of Lethbridge, Alberta, and Proprietor, Perisor Research Services, Calgary, Alberta

In the past thirty years, descriptions and analysis of aboriginal peoples' relationships to lands and resources has evolved from crude approximations to remarkable precision. In part, evolution may be attributed to the cumulative effects of theoretical and methodological experience, and in part to the development of strategies and technologies. This paper will track the evolution of land and resource research from the 1970's to early 1999. Finally, the paper will show how high quality land and resources research is applied to practical issues in community development, forestry, mining, parks, and wildlife management.

8. Landscape archeology and ecosystem management: Heresy or science?

Don Gayton
Extension Specialist, Southern Interior Forest Extension and Research Partnership, Nelson, B.C.

Definitions of ecosystem management abound, and the phrase is more often used as a 'buzzword' rather than a precisely defined term. Ecologists, historians and researchers should be aware that many definitions of ecosystem management do not include the use of historical or pre-European contact ecosystem conditions as benchmarks. Can ecosystem management be legitimately practiced in the absence of such benchmarks? Does the use of benchmarks commit natural resource managers to hypothetical and potentially useless comparisons? Does the 'backward looking' exercise of comparing contemporary conditions to historical benchmarks limit creative and forward-looking resource management solutions? How can the 'back to the Stone Age' stigma be removed from historical benchmark comparisons? What about climate change, and 'reversible' changes brought on by human development? I believe that scholars and

proponents of historical ecosystem conditions must confront these kinds of questions before they are taken seriously by contemporary natural resource management practitioners.

A personal study of historical ecosystem conditions in the East Kootenay Trench of southeastern British Columbia is presented, as an ongoing case in point, one that embodies many of these contradictions.

9. Fire in the cool, wet forests of the Mountain Hemlock Zone

Douglas Hallett
Dept. of Biological Sciences and the Institute for Quaternary Research, Simon Fraser University, Burnaby BC

We know very little about the role of fire in the cool, wet high-elevation forests of the Mountain Hemlock Zone that are found in the Coast Mountains, and to a lesser extent, the Columbia Mountains of British Columbia. I used two high-resolution charcoal methods to create independent fire history records for the Frozen Lakes area near Yale, British Columbia. The first method involves extensive AMS radiocarbon dating of soil charcoal collected from finely sampled soil profiles. Multiple charcoal lenses dated using AMS techniques andconspicuous deposits of Bridge River (2435 14C years BP) and Mazama (6730 14C years BP) volcanic ashes provide the basis for a local fire history that spans the last 10,000 years. Fifty AMS charcoal dates from Frozen Lakes soils show long fire return intervals and occasional periods of more frequent fire. Charcoal peaks in the Frozen Lake sediment record are the second method of determining fire history and represent a master fire chronology for the area. I examined magnetic susceptibility in the lake sediments to provide a proxy measure for erosion events in the watershed. The sediment charcoal record suggests a continuously varying fire frequency throughout the Holocene as climate and vegetation changes. An increase in fire frequency between 2200 and 1200 14C years BP is apparent in both the soil charcoal and lake sediment records, and may be linked to drier summer climate or potentially, human-lit fire. These unique fire history records give us a glimpse at the role of fire in Mountain Hemlock forests, and help us to understand the natural variability of these forest ecosystems across long time periods.

10.Kootenay National Park pre-history project

Rod Heitzmann
Archaeologist, Western Canada Service Centre, Parks Canada, Calgary

Canada's National Parks have recently increased their emphasis on managing parks areas on an ecosystem basis. In Kootenay National Park ecosystem managers recognized that understanding long term human influences could have a significant effect on how plants and animals are managed in this park. For the last three years archaeological studies have been undertaken to investigate the nature of past human use of the park and surrounding areas. These studies have consisted of literature reviews of ethnographic utilizational and palaeoenvironments, identification of human ignited burn patterns, recording of avocational collections, traditional archaeological excavations, carbon 14 dating and blood protein analysis of remains on stone tools. The results are a significantly improved understanding of the cultural dynamics in the upper Kootenay and Columbia River basins.

11.Lightning and lightning fire in the Central Cordillera, Canada

Mark Heathcott
Fire Management Officer, Western Fire Centre, Parks Canada

This paper examines the influences of fuel, weather and topography on lightning-caused forest fires in portions of southern British Columbia and Alberta, Canada (50-54N, 114-120W, 180,000 sq. km). The results show a significant difference in lightning and lightning-caused fires east and west of the Continental Divide. Nearly 90% of documented lightning fires occurred in British Columbia, and yet lightning activity in Alberta is 3 times greater. Despite spatial differences in lightning and lightning fire occurrence described in this paper, long-term fire frequencies are similar on both sides of the Divide. It appears fire of aboriginal origin must have been an important ecosystem feature prior to the current fire protection era, especially east of the Divide. Ignition implications for land managers are discussed.

12. Culture, Ecology and Restoration: A New Approach to Integrating Cultural and Ecological Information in Jasper National Park

Eric Higgs
Associate Professor, Department of Anthropology, University of Alberta

Ecological restoration - the process of assisting the recovery of ecological integrity - depends on historical knowledge to set clear goals and make prudent decisions. Restoration activities in so-called wilderness areas are especially challenging. Not only is the restorationist faced with demanding technical problems, but also with overcoming cultural beliefs that suppress or ignore important relationships between historical cultural practices and ecological patterns and processes. Over the last three years in Jasper National Park, a team of researchers based at the University of Alberta has investigated ways of bringing ecological restoration into prominence as a management paradigm, and also how to integrate historical ecological and cultural information. In this presentation, I will describe a spatial model of human activity - a GIS-based Human Activity Map - that uses the *lingua franca* of geographic information systems to connect historical cultural and ecological data. This approach has several advantages:

- Cultural data can be incorporated directly into ecological GIS models to improve resolution and create opportunities for new kinds of analysis;
- It links cultural resource management activities directly to much higher profile ecological management programs;
- It provides a flexible and adaptable model for incorporating any kind of historical human activity regardless of spatial or temporal characteristics;
- The database that supports the maps offers a way of effectively recording invaluable historical information provided by local historians and oral histories; hence it becomes a living archive for recording local history.

13. Recent Zooarchaeological research in Banff and Waterton Lakes National Parks, Alberta

Gwyn Langemann
Archaeologist, Western Canada Service Centre, Parks Canada, Calgary

To archaeologists, Banff and Waterton Lakes National Parks are two of the best known areas in the Rocky Mountains. Extensive archaeological survey and excavation projects have been carried out over the last 35 years, and some of these have been in sites with good faunal preservation. Few sites have contained elk bone, however. In 1998, Parks Canada archaeologists excavated a stratified pre-contact campsite near the Banff Springs Golf Course that contained the butchered bones from at least three individual elk. Site 1210R will contribute important evidence for the presence of elk in the past, and for their

use by humans. In Waterton Lakes NP the vast majority of zooarchaeological remains have been bison. University of Calgary archaeologists have been undertaking carbon isotopic studies on bison bone from a number of different sites in the park, in order to determine the proportion of the bison diet contributed by fescue grasses. Isotopic study of bone is a well established technique used to estimate the diet of past human populations, but has seldom been used to determine animal diet. In this case, the question of fescue grass content in bison diet may have implications for range management and management of animal populations in the park.

14.Is wildlife history bunk? Reflections on I.J.M Robertson

Graham MacDoanld
Historian, Western Canada Service Centre, Parks Canada, Calgary

Spinning off a question first put in 1984 by I..J.M. Robertson, the presenter reflects upon just what is involved in the attempt to 'do' wildlife history both in historic and deep time. Seeing it as a branch of Environmental History, he reviews some of the achievements in this area by wildlife specialists and ecologists, such as Gordon Hewitt, Charles Elton and Ralph MacTaggart-Cowan. The notion of 'population cycles' is reviewed in the context fur trade history and sources along with the manner in which environmental reconstructions of various kinds can help in the perusal of wildlife populations in pre-documentary times.

15.The Athabaska Portage to Boat Encampment during the fur trade period 1811-1855: What do we know of it today?

Ian S. Maclaren
Canadian Studies Program, Department of English - University of Alberta

Six to ten days were required by fur trade brigades to negotiate the trans-montane trek known as Mountain Portage or Athabasca Portage, from the Athabasca River to Columbia River watersheds. The portion of this route in the Athabasca watershed falls within Jasper National Park and is reasonably well preserved today. Although a nearly error-free placard at the mouth of the Whirlpool River commemorates the route, more non-intrusive interpretation of this dramatic portion of a pan-continental route could be undertaken. When it is, reference should be made in particular to a map of the route drawn in May 1846 by English military officer, Henry James Warre. Although not himself a fur trader (indeed, perhaps because he was not), Warre travelled across the portage during the height of its use by the Hudson's Bay Company, when as many as six brigades crossed in a single year, usually in late fall/early winter and early spring. Because Warre had been sent to spy on the Oregon Crisis, he and his colleague, Royal Engineer Mervyn Vavasour, had the habit of estimating the challenged to troop

deployment that terrain presented. It was from this perspective that they regarded the Portage. An analysis of Warre's map will ground the discussion about the opportunities for historical interpretation by Parks staff.

16.Traditional plant use by First Nations peoples

Peter McCoy
Ethnobotanist, Ktunaxa/Kinbasket Tribal Council, Cranbrook, B.C.

Abstract not available.

17.Repeating the Bridgland Survey: Tracing the changing landscapes of Jasper National Park through photographs

Jeanine Rhemtulla
Graduate Student, Dept. Renewable Resources, University of Alberta

In June of 1915, M. P. Bridgland, Dominion Land Surveyor, arrived in the newly established Jasper National Park to supervise a photo-topographical survey of the area. In the space of four months, he and his crew established 93 photographic survey stations on mountain tops, cliff edges, and prominent points at ground level. The Bridgland photographs, 750 of them in total, have become an extremely valuable visual record of the state of the park in its early years. Systematically taken and comprehensive in coverage, they are unparalleled by any other early historical records in the area, and few in the Rocky Mountain region as a whole. In 1998, we began the work of returning to each of the survey stations and rephotographing the same views. By pairing these repeat views with the originals, changes in the landscapes of the park over the last 80 years are immediately visible, some of them quite dramatic. The paired pictures provide essential data on historical ecological change in the park, and how this may be linked to past and current human activities. To date we have used some novel methods to quantitatively analyze vegetation changes in the montane ecoregion of Jasper using the paired images. Other research interests include exploring changes in riparian systems, and cultural activities on the landscape. We will present examples of both the paired images and the analysis that we have undertaken of them, as well as discuss how else the photographs can be used to help inform future park management.

18.Indians and national parks: the Waterton-Glacier International Park experience

Brian Reeves
Professor Emeritus, Department of Archaeology, University of Calgary

The Eastern Slopes of Waterton-Glacier International Peace Park are part of the traditional homelands of the Piikani Nation of the Blackfoot speaking First Nations who reside today on the Peigan Reserve in Southwestern Alberta and the Blackfeet Reservation in Northern Montana, which once included the eastern slope of today's Glacier National Park.

From the beginning in Glacier in 1910, the Peigan (Blackfeet) were very actively promoted/exploited by the Great Northern Railroad/ Glacier Park Company as part of the park 'experience' which ranged from Indian Chief greeters at your train, regular evening pow-wows in the hotel lobby, to being able to rent a tipi and 'Glacier Park Indian' guide. Tipi encampments were set up for still and motion picture shoots and thousands of shots/feet taken which with the passage of time have now become 'real' camps and traditional sites. Many mountains which had no Peigan names received Indian names proposed by the Park Service and others. These names are also now 'traditional' in origin. Relationships with U.S. Park administration, while less amicable because of disagreements over traditional rights, claims, poaching, etc. became confused both by Indians and Whites with those with the Glacier Park Company. To the travelling/visiting public in those early years, the Park was in many ways 'the Glacier Park Company' experience. The result is a non-traditional image of Piegan/Blackfeet association with Glacier became entrenched in both Indian and White popular culture, elements of which continue to cloud perceptions, and complicate issues to this day. A perception also arose which was reinforced by several popular histories, that there were no Indians in the Park before the coming of the horse. Glacier was part of the Primaeval American Wilderness untouched and untrammelled by human hands. Indians were late comers just like us.

In Waterton, the Peigans were placed on a reserve some 40 miles distant and they and their close relatives the Bloods who had received a timber limit in 1883 now enclosed within the Park; had a very different experience with the Park than the Peigan at Glacier; they were essentially ignored by the concessionaires and park administration. Other than poaching there was little or no interaction. No mountains were renamed, no tipi villages erected, no Indians danced for the guests at the Glacier Park Company's Prince of Wales Hotel for it was to be an 'English' experience. Indians are absent from Park promotional movies of the time. The most remembered presence from the Pre WW II years were the annual Blood Residential School Summer Camps/Student Parades/ Bands in the townsite. Hardy a 'traditional' presence, but in keeping with government policy of the time. There was no earlier Indian presence in Waterton and if it was it was only very recent.

Archaeological research over the last 30 years in Waterton, recent ethnological work in Waterton as well as recent archaeological and ethnological studies in Glacier for the

respective Park Services tell a much different story and are gradually changing these long held popular and scholarly perceptions of the role and relationship of the Indians and the International Peace Park. Natives returned to these lands, along with the other 'beings' (plants, animals) at the Recreation of the World at the end of the last Ice Age 10,000+ years ago, becoming and remaining an integral part of the mountain ecosystem and critical to its continuance until their removal in the late 1800s.

19.Aboriginal burning in northwestern Montana: Evidence and implications

Rebecca Timmons
Forest Archaeologist, USDA Forest Service, Northern Region, Kootenai National Forest

Fire has been a natural disturbance force in Northern Rocky Mountain ecosystems for millenia. Ecosystems on the Kootenai National Forest have likewise been affected by fire. Plant and animal species have evolved through fire's effects on the landscape. Prior to the turn of the century, fires were started naturally by lightning and purposely set by indigenous people for various reasons. Ethnographic, palynological, and historical information provide lines of evidence that verify the use of fire by aboriginal people in Northwestern Montana.

In the early 1900's, forest managers embarked on suppression efforts to remove fire from forest ecosystems. Fire suppression over the last 80 years has produced unprescendented fuel loads, putting todays forests at extreme risk. Introducing fire back into the landscape is seen as a valuable tool for the restoration of ecosytems. KNF has increased prescribed fire targets by 25% and is expecting these to increase to 50% in future years. Understanding the use of fire by aboriginal people can provide valuable insight and has profound implications for current fire management practices.

20.Aboriginal Burning and Fire Management

Leo Williams
Elder - Ktunaxa/Kinbasket Tribal Council, Cranbrook, B.C.

Abstract not available.