

**HUNTER-GATHERER SETTLEMENT AND LAND USE IN
THE CENTRAL CANADIAN ROCKIES, AD 800-1800**

Thesis submitted for the degree of
Doctor of Philosophy
at the University of Leicester

by

Roderick James Heitzmann MA (Calgary)
School of Archaeology and Ancient History
University of Leicester

April 2009

ABSTRACT

Hunter-Gatherer Settlement and Land Use in the Central Canadian Rockies, AD 800-1800

Roderick J. Heitzmann

Hunters and gatherers can be viewed as part of ecosystems. Through their actions, hunter-gatherers can modify, alter and shape ecosystem structures and components. The Central Canadian Rockies ecosystem was selected to explore the impact and role of humans in this ecosystem as a case study. This study examines the archaeology of the Central Canadian Rockies from the perspective of hunter-gatherer research, theory and concepts. Even in this marginal environment, archaeological investigations have shown that people lived and travelled here. This study examines and evaluates several classes of data including site types, stone tool utilisation, tool technology, subsistence and seasonality, complemented with examination of potentially available ecological resources. Several alternate models of hunter-gatherer utilisation are formulated for the Central Canadian Rockies between AD 800 and AD 1800. The result is a reconstructed ethnology of the area's occupants that models how these people may have organised themselves through a yearly cycle to best utilise limited resources. Associational and sacred landscape features are examined to further evaluate the models. Changing social dynamics identified in historic and ethnographic records are reviewed and synthesised with the reconstructed Late Precontact ethnology to better understand Native peoples' utilisation of the Central Canadian Rockies in this period. Conclusions are drawn about the application of hunter-gatherer research, theory and models in reconstructing an ethnology of hunter-gatherers based on limited archaeological and palaeo-ecological data, and in assessing the impacts of hunter-gatherers to this mountain ecosystem.

ACKNOWLEDGEMENTS

Writing this thesis has been a challenging task. Tackling it has been made possible through the support and encouragement of many people and for their support I am truly grateful.

Marty Magne, my manager at Parks Canada, was very supportive when I first proposed the idea. He continued to be supportive throughout the research and writing phases providing references, supporting research trips to Edmonton and Victoria, and providing useful comments and review of my drafts. Orysia Luchak, former Director of the Western and Northern Service Centre of Parks Canada, has also been extremely supportive and generously funded university fees and trips to Leicester. She also took an interest in my progress throughout the years. I also acknowledge my co-workers at Parks Canada, Gwyn Langemann, Peter Francis, Bill Perry and Jack Porter who provided an atmosphere of support and cheerfully took on some of my tasks while I worked on this project. Jack Porter also searched out some photographs of the ecoregions. Gwyn Langemann also provided comments on a draft of this study.

I would like to extend my appreciation and thanks to my thesis advisors Prof. Graeme Barker, now at Cambridge University, and Dr. Mark Pluciennik, for providing direction throughout this study. Their penetrating questions never failed to stimulate discussion and thought. I would also like to thank other staff members at the School of Archaeology and Ancient History, University of Leicester, for their inclusiveness and enthusiasm for students. In particular I thank Prof. Marilyn Palmer, and Drs. David Mattingly, Alan McWhirr, Graham Shipley, and Terry Hopkinson.

My viva examination was conducted in the spring of 2009. I thank my committee: Drs. Simon James and Terry Hopkinson of the University of Leicester and especially my external examiner, Professor Brian Kooyman of the University of

Calgary, Canada. All of them were very patient over some confusion of printing the review copies while I was doing a pilgrimage in Spain.

At the Archaeological Survey of Alberta, Joan Damkjar provided access to site files and the Historical Resources Library. Eric Damkjar did an electronic database search for me as well. Discussions with Eric Damkjar, Rod Vickers, Trevor Peck and Heinz Pyszczyk were useful to clarify some of my ideas.

In Victoria, Doug Glaum kindly provided access to the library of the Archaeology Branch, British Columbia Ministry of Sustainable Resource Management. Grant Keddie, Curator of Archaeology, and Martina Steffen, Archaeology Collections Manager, generously provided access to the collections at the Royal British Columbia Museum.

Discussions with Wayne Choquette and Michael Keefer, formerly with the Ktunaxa Kinbasket Tribal Council, provided me with some alternative viewpoints of the issues discussed in this study. I also thank Thomas Head and Michael Entz who provided some photographs of key sites. Rebecca Balcom of Golder Associates, Calgary, generously provided a copy of the final report for the Pigeon Mountain site.

I dedicate this study to my wife Marie who has constantly provided encouragement and support.

TABLE OF CONTENTS

ABSTRACT	
ACKNOWLEDGEMENTS	i
TABLE OF CONTENTS	iii
CHAPTER 1 INTRODUCTION	1
Problem identification	1
Research goals and purpose	9
Thesis structure	10
CHAPTER 2 THE STUDY AREA	13
Introduction	13
Ecoregions in the Central Canadian Rockies	17
Alpine	17
Subalpine	22
Montane	23
Interior Douglas Fir	25
Interior Cedar Hemlock	27
Upper Boreal Cordilleran	28
Lower Boreal Cordilleran	28
Lower Boreal Mixedwood	30
Aspen Parkland	30
Animal population abundance	31
Conclusions	33
CHAPTER 3 ETHNOGRAPHIC SETTLEMENT/SUBSISTENCE IN THE CENTRAL CANADIAN ROCKIES	36
Introduction	36
Tribal Territories in the Protohistoric Period	37
Tribal territories in the Historic Period	38
Seasonal rounds of Aboriginal groups in the nineteenth century	45
The Northwestern Plains	46
The Columbia Trench	51
The Secwepemc (Shuswap)	57
Conclusions	58
CHAPTER 4 ARCHAEOLOGY OF THE LATE PRECONTACT PERIOD	60
Introduction	60
Regional archaeological frameworks	64
Northwestern Plains	65
Kootenay and Upper Columbia Basin	80
Canadian Plateau	81

Banff National Park	84
Problems posed by the regional archaeological cultural frameworks	89
Conclusions	92
CHAPTER 5 ARCHAEOLOGICAL SITES IN THE CENTRAL CANADIAN ROCKIES ECOSYSTEM	93
Introduction	93
Nature of the data	94
Archaeological site inventory data	94
Dating Late Precontact sites in the Central Canadian Rockies	95
Calibrated radiocarbon dates	97
Recorded archaeological sites	109
Site types	112
Site type distribution	118
Ecoregions and sites	119
Site density per ecoregion.	124
Geographic features and site types	126
Vegetation cover and site types	128
Altitude of archaeological sites	132
Conclusions	136
CHAPTER 6 EXCAVATED ARCHAEOLOGICAL SITES IN THE CENTRAL CANADIAN ROCKIES	139
Introduction	139
Archaeological excavation data	139
Collections and analyses	140
Eastern Slopes-Foothills Sites	141
Hunter Valley Site (EiPp-16)	141
Sibbald Creek Site (EgPr-2)	144
Site EfPq-5	149
Site EfPq-6	153
Site EdPp-21	155
Missinglink Site (EdPq-16)	159
Upper Bow Valley/Front Range Sites	163
Pigeon Mountain Site (EgPt-28)	163
Vermilion Lakes Site (153R, 502R)(EhPv-8)	167
Echo Creek Site (515R; EhPv-78)	168
Christensen Site (360R; EhPw-1)	170
Site EhPw-2	174
Muleshoe Lake Site (EhPw-4)	175
Upper Columbia and Kootenay Valley Sites	177
Site 399T (EfPa-8)	177
Site 494T (EdPx-N1)	178
Salmon Beds Site (EdQa-121)	180
Columbia Lake Site (EbPw-1)	183
Site EcPx-5	186
Conclusions	188

CHAPTER 7 ANALYSIS OF EXCAVATED ARCHAEOLOGICAL MATERIALS IN THE CENTRAL CANADIAN ROCKIES	191
Introduction.	191
Methodology	191
Subsistence and diet breadth	192
Ranking prey resources	192
Seasonality of use	200
Faunal processing.	201
Lithic material use	205
Exotic quarry sources	210
Lithic materials used for core production	213
Stone tool lithic assemblages	212
Lithic materials used for tool production	213
Tool type assemblages	216
Tools reflective of occupation lengths	226
Stages of lithic technology	230
The organisation of lithic technology	230
Conclusions	240
 CHAPTER 8 MODELS OF SETTLEMENT SUBSISTENCE	 245
Introduction	245
Concepts of hunter-gatherer behaviour	245
Optimal foraging	246
Movement between habitats	247
Risk and uncertainty	248
Hunter-gatherer organisational models	249
Foragers and collectors	249
Opportunistic versus controlled exploitation	252
Effective temperature and mobility patterns	254
Travellers and processors	254
Adaptive peaks	255
Population and group size	256
Non-energetic variables	256
Settlement location and territoriality	257
Stone tool technology and territoriality	257
Framework of the models	258
Influencing factors	260
Climate	260
Landforms	261
Vegetation	261
Biota	262
Group size	263
Intensity of occupation	263
The Models	264
Model A: trans-mountain model	264
Model B: territorial exclusion model	266
Model C: shared use model	269
Model D: infrequent use model	271

Evaluating the models	273
Regional site patterning	273
Faunal assemblage composition	274
Stone tool assemblage composition	276
Lithic assemblage composition	277
Strategy groups	279
Lithic technology	280
Discussion	281
Logistics versus collector pattern in the Central Canadian Rockies	284
Conclusions	289
CHAPTER 9 PAST HUMAN INTERACTIONS WITH THE ENVIRONMENT	293
Introduction	293
Environmental shaping by fire	294
Fire frequencies in the Central Canadian Rockies	296
Fire histories and climate change	298
Forest fires and animal productivity	300
Locations of Aboriginally ignited fires	300
Fires and grassland maintenance	302
Conclusions.	305
Hunter-prey relationships	307
Gatherer-plant relationships	307
Sacred and associational landscape in the Rocky Mountains	308
The Ktunaxa creation account.	308
White Swan Lake	312
Paint Pots	312
Hot springs	313
Distinctive mountains	313
Rock art	314
Columbia Plateau Tradition	314
Foothills Abstract Tradition	315
The Flute Player of Grotto Canyon	316
Discussion	317
Conclusions	318
CHAPTER 10 IMPACTS OF EURO-CANADIAN CONTACT	320
Introduction	320
Changing population levels	320
Aboriginal populations prior to AD 1800	320
Native movements after AD 1800	322
The horse and gun revolution in the Central Canadian Rockies	322
Conclusions	326
CHAPTER 11 CONCLUSIONS	327
Introduction	327
Hunter-gatherer dynamics	327

Evaluation of the application of hunter-gatherer models to a mountain ecosystem	330
Diversity and stability	330
Optimal foraging	331
Movements among habitats	331
Risk and uncertainty	332
Organisational based approaches	333
Effective temperature and mobility patterns	333
Travellers and processors	334
Adaptive peaks	334
Population and group size	334
Stone tool technology and territoriality	335
Further approaches to research	335
Conclusions about the Late Precontact Period	336
Conclusions about the Historic Period	338
Conclusions	339
Implications for protected areas management	340
APPENDICES	
APPENDIX I Late Precontact Sites in the Central Canadian Rockies	342
APPENDIX II Tool categories	372
APPENDIX III Glossary: synonymy of current First Nations/Tribal names	374
REFERENCES	375

LIST OF FIGURES

	Page
Figure 1.1 Map of Canada showing the study location	5
Figure 1.2 Map of Western Canada showing principal rivers and study area	6
Figure 1.3 Satellite mosaic of the Central Canadian Rockies Ecosystem, southwestern Alberta and southeastern British Columbia, Canada	7
Figure 2.1 Natural regions surrounding the Central Canadian Rockies	16
Figure 2.2 Ecoregions and biogeoclimatic zones of the Central Canadian Rockies	18
Figure 2.3 A meadow typical of the Alpine ecoregion at Numa Pass, Kootenay National Park of Canada. (Photo: R. Heitzmann, PC 9001T263t)	22
Figure 2.4 View of a portion of typical Subalpine ecoregion, Mount Burgess, Yoho National Park of Canada. (Photo: R. Heitzmann)	23
Figure 2.5 Montane grasslands at Yahatinda Ranch, Red Deer River, Alberta. (Photo: J. Porter, PC 9009R037t)	24
Figure 2.6 Typical view of the Interior Douglas fir biogeographic zone at Kootenae House National Historic Site of Canada. The Columbia River is located in the valley bottom beyond the trees. (Photo: R. Heitzmann)	25
Figure 2.7 Part of the Interior Cedar-Hemlock biogeographic zone in Yoho National Park of Canada. (Photo: R. Heitzmann, PC 9009T003t)	26
Figure 2.8 View west of the Upper Boreal Cordilleran ecoregion along the Red Deer River, Banff National Park of Canada. (Photo: J. Porter, PC 1367R213t)	29
Figure 2.9 Lower Boreal Cordilleran ecoregion along the Elbow River, Alberta. (Photo R. Heitzmann)	29
Figure 2.10 Typical Aspen Parkland ecoregion, Banff National Park of Canada. (Photo: G. Langemann, PC 9004T012t)	31
Figure 3.1 Distribution of tribal groupings about 1730.	39
Figure 3.2 Distribution of tribal groupings about 1810	40
Figure 4.1 Major culture areas and sub-culture areas surrounding the study area	61

Figure 4.2 Archaeological sequences in the Central Canadian Rockies and adjacent areas	62
Figure 4.3 The battleship-shaped curves for late side-notched projectile point varieties as Forbis (1962:95) presented them for the Women's Buffalo Jump, with examples of the varieties above each frequency polygon (from Peck and Ives, 2001:187).	68
Figure 4.4 The small side-notched point system of the Northwestern Plains. (After Kehoe, 1973)	70
Figure 4.5 Representative ceramic and projectile point styles for the Late Precontact Period on the Northwestern Plains. (After Peck and Hudacek-Cuffe, 2003)	71
Figure 4.6 Cultural traditions on the Northwestern Plains of North America. (After Reeves, 1983; Vickers, 1986)	72
Figure 5.1 C14 dates in the Central Canadian Rockies ecosystem, 1600-100 years BP shown in chronological order	105
Figure 5.2 C14 dates from archaeological sites over the last 1600 years in the Central Canadian Rockies Ecosystem, shown for each site	106
Figure 5.3 Calibrated C14 dates in the Central Canadian Rockies Ecosystem, 200-1900 AD, shown in chronological order	107
Figure 5.4 Calibrated C14 dates in the Central Canadian Rockies Ecosystem, 200-1900 AD, shown for east and west slopes sites	108
Figure 5.5 Map of the distribution of all site types in the Central Canadian Rockies	111
Figure 5.6 Site EfPq-12, vision quest structure, Moose Mountain, view to the southwest (Photo: R. Heitzmann, 2007)	114
Figure 5.7 Distribution of Late Prehistoric archaeological sites in relation to ecoregions in the Central Canadian Rockies	121
Figure 5.8 Map of distribution of base camps, cultural depressions, stone circles and workshops in the Central Canadian Rockies	123
Figure 5.9 Schematic diagram of the altitude of all Late Precontact Sites in the Central Canadian Rockies	133
Figure 5.10 Schematic illustration of the altitude of sites in metres above sea level. Each type of site is illustrated and clustered by major river basin	134

Figure 6.1 Excavated archaeological sites in the Central Canadian Rockies Ecosystem	142
Figure 6.2 Hunter Valley Site (EiPp-16). View to the southwest. The site is in the valley bottom near the gap in the trees (Photo courtesy of Thomas Head)	143
Figure 6.3 Sibbald Creek Site (EgPr-2) located in the right foreground overlooking a grassland meadow. View to the southwest (Photo: Heitzmann, 2007)	146
Figure 6.4 Site EfPq-5, view to the west along the Elbow River. The site is located in the left foreground. (Photo: Heitzmann, 2007)	150
Figure 6.5 View west of Site EfPq-6, overlooking the Elbow River. The site is in the foreground. (Photo: Heitzmann, 2007)	153
Figure 6.6 View west of Site EdPp-21 located on a high terrace overlooking the Sheep Valley (Photo: Heitzmann, 2007)	156
Figure 6.7 View to the northwest of the Missinglink Site located on a high terrace overlooking Gorge Creek (Photo: Heitzmann 2007)	160
Figure 6.8 View to the east of Pigeon Mountain site (EgPt-28). The site is located in the cleared pipeline right of way in the centre right (Photo: Heitzmann, 2007)	164
Figure 6.9 View north of Vermilion Lakes Site located on a colluvial fan (Photo: Parks Canada 9002R712t)	168
Figure 6.10 View southeast of Echo Creek Site located at the east end of the Vermilion Lakes. Mount Rundle is the prominent peak beyond the Town of Banff (Photo: Parks Canada 9002R716t)	169
Figure 6.11 View west of the Christensen Site (360R). The Bow River borders the site to the south at the left of the photograph (Photo: Parks Canada 360R11t)	171
Figure 6.12 View south of the location of Site EhPw-2. The site is located along the edge of the parking lot overlooking the Bow River (Photo: Heitzmann, 2007)	175
Figure 6.13 View southwest of Muleshoe Lake Site, EhPw-4. Muleshoe Lake is an oxbow channel separated from the Bow River by the rail bed (Photo: Heitzmann, 2007)	176
Figure 6.14 View of Site 399T located on Kootenay Pond, visible through the trees on the left (Photo: Parks Canada 399T1t)	179

Figure 6.15	View west of Site 494T located on the terrace on the right overlooking a small oxbow pond (Photo: Parks Canada 494T27t) . . .	179
Figure 6.16	Part of the living floor excavated at Site 494T showing fire broken rock, an anvil, and flaking debris (Photo: R. Heitzmann, Parks Canada 494T26t)	180
Figure 6.17	View north of the Salmon Beds sites. The site is located in the grass covered terrace in the foreground left . (Photo : R. Heitzmann, Parks Canada 9001T123t)	182
Figure 6.18	View east of the Columbia Lake Site (Photo: R. Heitzmann, 2007)	183
Figure 7.1	Percentages of lithic materials (including tools and debitage) utilised at excavated sites in the Central Canadian Rockies	208
Figure 7.2	Locations of exotic stone sources for materials found in the Central Canadian Rockies	211
Figure 7.3	Exotic lithic materials in the total lithic assemblages for sites in the Central Canadian Rockies	212
Figure 7.4	Percentages of cores made from different lithic materials from excavated sites in the Central Canadian Rockies	215
Figure 7.5	Percentage distribution of the lithic materials used for making stone tools from excavated sites in the Central Canadian Rockies	217
Figure 7.6	Percentages of tools made from exotic materials derived from outside the study area	220
Figure 7.7	Percentages of tool assemblages at excavated sites in the Central Canadian Rockies	224
Figure 7.8	Percentage of stone tools by 'strategy groups'	229
Figure 7.9	Percentage of major classes of lithic manufacturing from excavated sites, Central Canadian Rockies	234
Figure 7.10	Stages of lithic reduction	235
Figure 7.11	Percentage of stages of lithic reduction from excavated sites, Central Canadian Rockies	238
Figure 7.12	Cumulative percentage graph of debitage reduction stages from excavated sites	239
Figure 8.1	Model A: trans-mountain model, seasonal settlement dynamics, Central Canadian Rockies	265

Figure 8.2	Model B: territorial exclusion model, seasonal settlement dynamics, Central Canadian Rockies	267
Figure 8.3	Model C: shared use model, seasonal settlement dynamics, Central Canadian Rockies	270
Figure 8.4	Model D: infrequent use model, seasonal settlement dynamics, Central Canadian Rockies	272
Figure 8.5	Map of distribution of base camps, cultural depressions, stone circles and workshops in the Central Canadian Rockies. The circles indicate 10 km radius catchment areas	285
Figure 8.6	Map of distribution of all site types in the Central Canadian Rockies. The circles indicate 25 km radius catchment areas from base camps or clusters of base camps	287
Figure 8.7	Model E: integrated use model showing seasonal settlement Dynamics in the Central Canadian Rockies	291
Figure 9.1	Fire return cycles in the Central Canadian Rockies and adjacent areas	297
Figure 9.2	Sacred and associational landscape locations	310
Figure 9.3	Hoodoos at Dutch Creek (Photo: R. Heitzmann, 2007)	311
Figure 9.4	Some pictographs of the Foothills Abstract Tradition from Pekisko Cave, just east of the study area. (Photo courtesy of Mike Ents) . . .	315
Figure 9.5	Some pictographs from Grotto Canyon (Magne and Klassen 2002:7)	316

LIST OF TABLES

	Page
Table 2.1 Summary of ecoregions in the Central Canadian Rockies	19 - 20
Table 5.1 Radiocarbon dates from archaeological sites in the Central Canadian Rockies Ecosystem, 1600 – 100 BP	98 - 104
Table 5.2 Distribution of Late Prehistoric site in the major river drainages in the Central Canadian Rockies Ecosystem	110
Table 5.3 Site types in the Central Canadian Rockies Ecosystem	118
Table 5.4 Numbers of Late Precontact archaeological sites in ecological regions of the Central Canadian Rockies Ecosystem	122

Table 5.5	Archaeological sit density of each ecoregion expressed as sites per 1000 km ²	125
Table 5.6	Geographic locales associated with archaeological sites in the Central Canadian Rockies Ecosystem	127
Table 5.7	Current vegetation cover at Late Precontact archaeological sites in the Central Canadian Rockies	130
Table 5.8	Numbers and percentages of site types and vegetation cover	131
Table 6.1	Summary of site occupations	186
Table 7.1	Ranking prey species in the Central Canadian Rockies	194
Table 7.2	Live weights of principal animal species hunted in the Central Canadian Rockies	195
Table 7.3	Identified species from excavated archaeological sites in the Central Canadian Rockies	197 –199
Table 7.4	Rank order of sites based on total number of species represented by faunal remains	200
Table 7.5	Percentages of identifiable fragments of major classes of animal species recovered from archaeological sites in the Central Canadian Rockies	203
Table 7.6	Percentage of major lithic material categories, excavated components, Central Canadian Rockies	207
Table 7.7	Total number tools made from different lithic materials.	218
Table 7.8	Number of tools by tool types in excavated assemblages	223
Table 7.9	Functional lithic assemblages by ‘strategy groups’ – raw data	229
Table 7.10	Percentages of stone tools by ‘strategy groups’	229
Table 7.11	Major classes of lithic materials, excavated sites, Central Canadian Rockies	235
Table 7.12	Reduction stages of debitage from excavated sites in the Central Canadian Rockies	237

CHAPTER 1

INTRODUCTION

PROBLEM IDENTIFICATION

The origins of humans as a species derive from complex interrelationships with the environments of which they are a part. With the development of social organization, language, tools, and actions humans are able to modify their environments. Study of human impacts on ancient environments is a relatively recent trend (Barker, 1995; Blackburn and Anderson, 1993; Crumley, 1994; Redman, 1999; Simons, 1989).

Human-ecosystem interactions can have varied effects. “The archaeological record encodes hundreds of situations in which societies were able to develop long-term sustainable relationships with their environment, and thousands of situations in which the relationships were short-lived and mutually destructive.” (Redman, 1999:4). The inter-relationship between environmental and cultural processes is complex. Because environmental and cultural processes in an ecosystem are often connected these processes should be examined in concert and not in isolation. Often subsistence strategies, social institutions and natural environments coevolved, “...each helping to shape the characteristics of the others” (Redman, 1999:6). The inter-relationship of human cultures with their ecosystems can be multilayered over both space and time. In addition, investigation of changing ecosystem processes should consider differing timescales, with some elements operating over short periods and others nested within longer durations (Braudel, 1972).

Throughout most of the time of mankind’s existence, human societies have been small scale and based on hunting and foraging economies. Studies of hunter-gatherer societies are numerous in anthropology and archaeology. However, few studies have

focussed on the environmental impacts of small scale hunting and gathering societies (Crumley, 1994; Redman, 1999). Hunter-gatherer studies with an environment-based approach draw on concepts and data borrowed from biology and other natural sciences. These studies commonly identify the available resources in a particular area and examine human approaches to resource exploitation. Ethnographic studies of contemporary hunters-gatherers have been used repeatedly as models and analogues for the analysis of archaeological hunter-gatherer societies. The highly influential volume edited by Richard Lee and Irven DeVore (1968) *Man the Hunter* reviewed commonly-held definitions about hunter-gatherers and in that volume Marshall Sahlins (1968) formulated the then revolutionary idea that hunter-gatherers were the original “affluent society”.

For archaeologists and prehistorians, understanding how hunting and gathering societies are structured, function, and relate to their environment is a primary research thrust. Consideration of the relationship of culture and the environment in a formalised way began in the first half of the twentieth century, especially in the works of Steward on cultural ecology (Steward, 1936; 1938). Approaches that link hunter-gatherers, culture, environment, and subsistence adaptation have been common (Binford, 2001; Burke, 2004; Childe, 1951; Gamble, 1978; Harris, 1969; Murphy, 1970; Panter-Brick *et al.*, 2001; Service, 1962; 1966; Sheehan, 2004; White, 1959). This approach has continued to some degree “...in a more comprehensive perspective of culture-environment interaction, which has been termed the “new ecology” (Bettinger, 1980; Jochim, 1979; Thomas, 1972; Willey and Sabloff, 1974). However, others (e.g. Asch *et al.*, 1972; Baumhoff, 1963; Winters, 1969) argue that cultural diversity is not strongly related to environmental diversity.

How hunters and gatherers use their environment and its resources is often used to explain archaeological remains. Conversely archaeological remains have sometimes been used to explain hunter-gatherer strategies. There is a large and extensive body of literature related to the archaeology of hunter-gatherers (Myers, 1988). Many of these approaches are being explored in contemporary archaeology (e.g. Crowthers, 2004; Duke, 1991; Jochim, 1998; Skibo *et al.*, 1995; Tilley, 1996).

My specific interest in this study is how hunter-gatherers occupied, and utilised the area of the Central Canadian Rockies and the adjacent Rocky Mountain Trench, during the Late Precontact (Prehistoric) Period. Were these areas utilised annually, infrequently or as a last resort in times of stress? Were these areas modified by human use? Answers to these questions may contribute to an enhanced understanding of long term ecosystem states and affect the management policies used in the many protected areas in the region (national and provincial parks).

Recently, the National Parks of Canada have redirected their primary efforts to the protection and maintenance of ecological integrity in Canada's national parks (Parks Canada Agency, 2000). In the Central Canadian Rockies, past human actions have been placed within an ecosystem model that incorporates elk, aspen, wolves, fire and humans as key ecosystem components (Kay *et al.* 1999). However, the Central Rockies Ecosystem has evolved over the last 10,000 to 12,000 years since the retreat of the Wisconsin glaciation, and hunter-gatherers have been part of this ecosystem throughout most of this time. A more detailed exploration of long-term human effects on the animal and plants of the region has not been attempted. As predators, hunter-gatherers could have affected the number and distribution of prey species, as well as other predator species. Through intentional burning of selected areas, hunter-gatherers might have affected forests' and grasslands' composition and distribution.

Protected areas management might consider re-introducing or mimicking long-term ecosystem processes or elements. Such aspects might include permitting limited hunting, expanding or modifying the prescribed burn programme, or re-introducing extirpated species such as bison. Thus, although focussed on the past, this thesis potentially has implications for present and future practices.

The Central Canadian Rockies was chosen as a focus for this study because this ecosystem contains three of Canada's prominent national parks: Banff National Park (established 1885), Yoho National Park (1886) and Kootenay National Park (1920). These parks and adjacent lands have been defined as the Central Canadian Rockies ecosystem (Komex, 1995) based on ecological characteristics, and natural and political boundaries (Figures 1.1, 1.2 and 1.3).

This study examines the question: Can anthropological models of hunter-gatherer societies be applied to provide an understanding of ecosystem dynamics in the Central Canadian Rockies and the role of humans in that ecosystem? As hunter-gatherer societies subsist by economic utilisation of natural resources, an ecosystem may be an appropriate framework for the consideration of human interactions with that environment. There has been considerable research conducted on how hunter-gatherer societies function within specific environments (Bettinger, 1991; Binford, 2001; Jochim, 1976, 1998; Mithen, 1990; Panter-Brick *et al.*, 2001; Smith, 1991). Some of these ideas on how humans organise themselves to maximise resources within ecosystems are tested in this thesis.

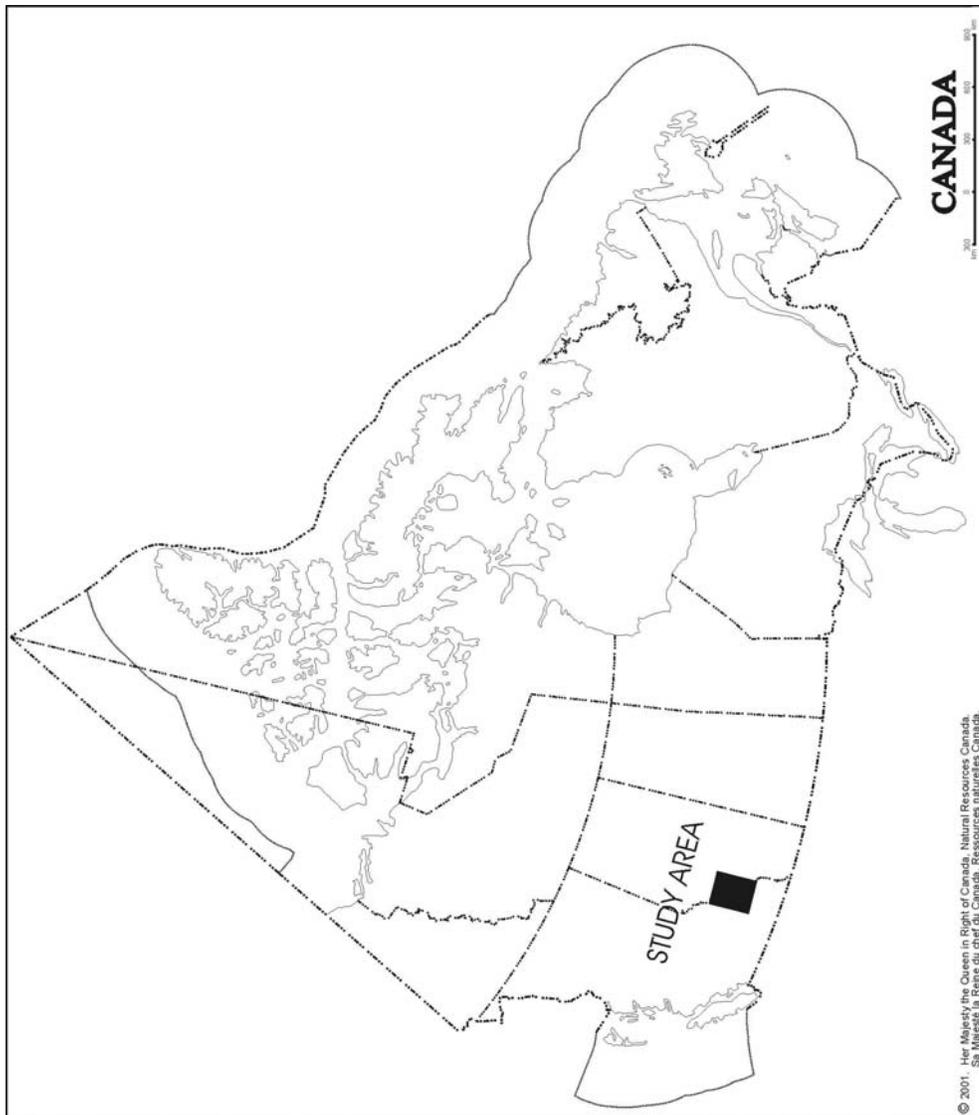


Figure 1.1 Map of Canada showing the study location.

Defining the long-term ecosystem dynamics of the Central Canadian Rockies requires reconstruction of both natural and human use characteristics. Recent effects of modern civilization, construction of railways, highways and towns, and establishment of parks, have changed the nature of human land use. Defining long-term ecosystem characteristics has been based on analogy with modern ecological characteristics and processes, as well as on reconstructing missing elements of the ecosystem. For example, the Central Canadian Rockies Ecosystem no longer sustains bison and the current fire regime has changed through control of wildfires. Changes in climate over the last millennium have been documented largely through

palynological records (Hallett, 1996; Reasoner and Hickman, 1989), tree ring analyses (Luckman, 1986, 1993) and fire histories (Masters, 1990; Tande, 1979; Tymstra, 1991). Another modified ecosystem process in the Central Canadian Rockies Ecosystem is the restriction of hunting and gathering to particular seasons of the year and, in some portions of the area, these activities are totally banned. This study explores long-term human use of this ecosystem in the period from AD 800 until the construction of the railways and the establishment of National Parks in 1885.

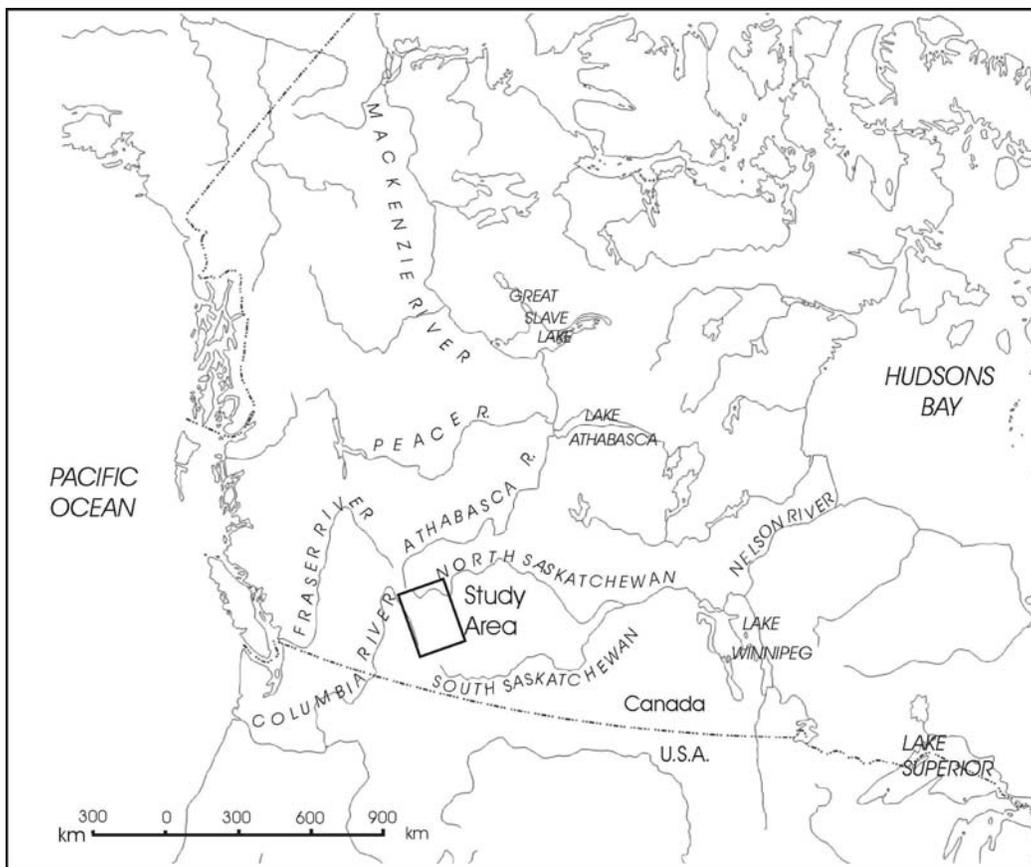


Figure 1.2 Map of Western Canada showing principal rivers and the study area.

Evidence of human occupation in this period (termed the Late Precontact Period) is exclusively archaeological until approximately AD 1720. Between AD 1720 and 1885 the data on human activities are supplemented by accounts of

European explorers and fur traders (termed the Proto-Historic and Historic Periods). Beginning in the late nineteenth century, traditional lifestyles of aboriginal people were described in ethnographies prepared by anthropologists based largely on interviews with indigenous peoples. First Nations oral traditions might also enhance a better understanding of use of this area in the past.

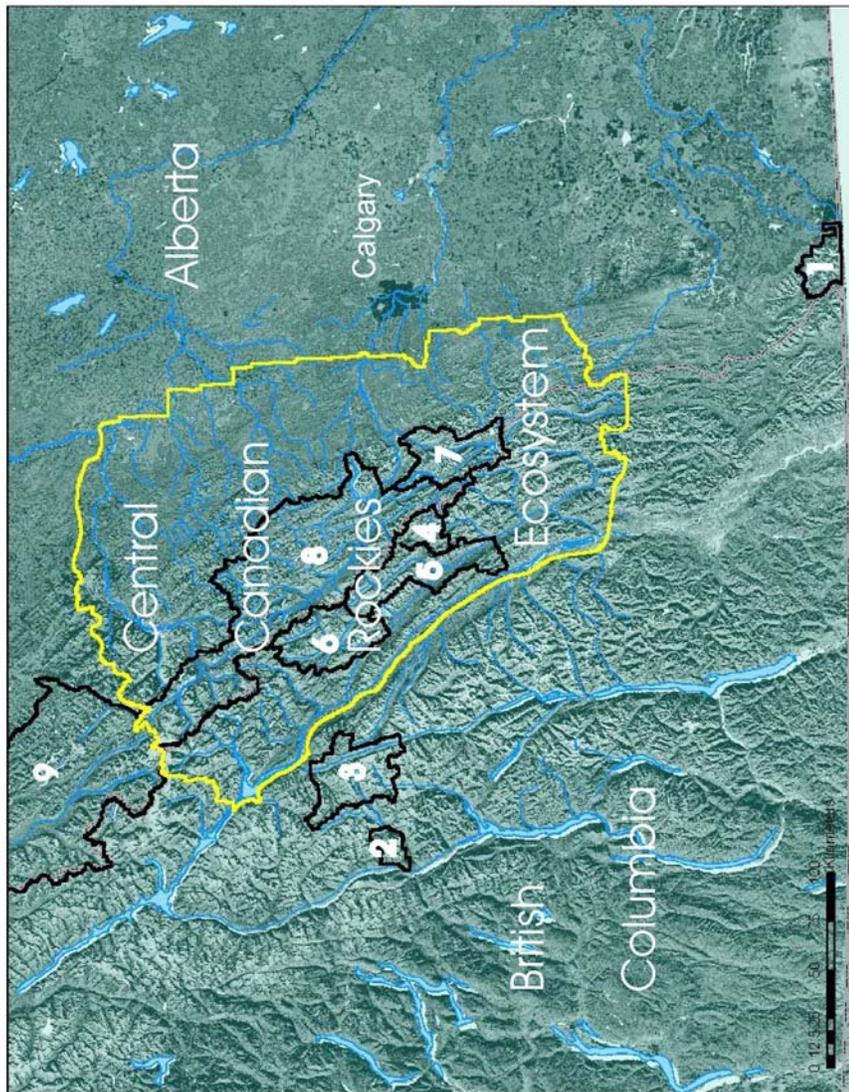


Figure 1.3 Satellite mosaic of the Central Canadian Rockies Ecosystem, southwestern Alberta and southeastern British Columbia, Canada. The number areas are 1. Waterton National Park (NP), 2. Mt. Revelstoke NP, 3. Glacier NP, 4. Mt. Assiniboine Provincial Park, 5. Kootenay NP, 6. Yoho NP, 7. Peter Lougheed Provincial Park, 8. Banff NP, 9. Jasper NP. The white dotted line is the continental divide.

The effects of humans on the ecosystems of the Central and Southern Canadian Rockies in the past are a matter of some debate (Kay *et al.*, 1999; Vale, 1998; White, 2001). Kay *et al.* (1999) reviewed several lines of evidence to assess the

long-term ecosystem states and processes in the Central Canadian Rockies. They examined historical observations, faunal remains from archaeological sites, repeat photography, fire history and ecology, and aspen ecology. Their study concluded that Native Americans played a pivotal role in this ecosystem. In fact, they state “we believe that Native Americans were the ultimate keystone species prior to European presence in the New World” (Kay *et al.*, 1999:1-7). Aboriginal burning in combination with predation from wolves and humans “...structured entire ecosystems including the Canadian Rockies, in pre-Columbian times and even into the early historical period”(Kay *et al.*, 1999:7-11). Their study identified lack of aspen poplar regeneration, large populations of elk (*Cervus elaphas*), and forest invasion of grasslands as indicative of an ecosystem under stress. Frequent burning normally stimulates aspen regeneration. Currently, however, overgrazing by elk is inhibiting aspen, causing declines in aspen-dominated areas. They conclude that aboriginal hunting in the past was a key factor in maintaining low elk populations. Low elk populations, in combination with human ignited fires, resulted in aspen poplar success in the past.

Kay *et al.*'s 1999 study can be challenged on several different points. Yochim (2001) has critiqued Kay's (1994, 1995) interpretations, data sources, logic and use of the data. These criticisms could also be applied to Kay *et al.*'s 1999 study. Specifically, I believe Kay *et al.*'s 1999 study does not adequately consider the archaeological data. For example, they used faunal data derived from sites spanning approximately 10,000 years but treated these as a single sample. Kay *et al.* concentrated on elk in the archaeological samples, without adequately considering entire faunal assemblages which also include large percentages of bison and bighorn sheep. Nor do they consider the ecological interrelationship of elk and bison, nor the

impact that bison may have had on the ecosystem prior to its extirpation. More seriously, if aboriginal people were structuring the entire ecosystem to human benefit as Kay *et al.* (1999:7-11) contend, there should be evidence of increasing, continuing or cyclical use. For example, if aboriginal ignition was occurring frequently, there should be archaeological evidence of increased hunting, and ecological evidence of high frequency burning of selected areas. In addition, Kay *et al.* (1999) focus their attention exclusively on faunal materials and do not consider other archaeological information such as site types, functions, or utilization patterns. Finally, their analysis does not examine the data within the theoretical framework of hunter-gatherer behaviour (Bettinger, 1991; Binford, 2001). Their analysis lacks consideration of individual and group decision-making (Mithen, 1990) concerning risks and opportunities within an optimal foraging model nor do they examine the data from settlement, mobility and resource extraction models such as collectors and foragers systems (Binford, 1980; 2001), opportunistic versus controlled exploitation (Bailey, 1981), and traveler versus processor strategies (Bettinger and Baumhoff, 1982). At the very least, then, there is a need for a study that takes into account all the archaeological evidence and offers a higher-resolution and more dynamic modelling.

RESEARCH GOALS AND PURPOSE

This study seeks to understand more fully the nature of human use and interactions in the Central Canadian Rockies. The objective is to consider archaeological data in an integrated perspective--one that examines archaeological sites as part of an organised system of hunter-gatherer utilisation and considers archaeological materials in a context of hunter-gatherer behaviour. This thesis considers a broad range of archaeological data within more exacting temporal boundaries. It develops and tests

several models of human settlement and utilization, and examines how these changed through the past millennium. Correlations are explored between site location and subsistence resources, termed the gravity model (Jochim, 1976); the selection of site locations that maximise different types of subsistence resources, called the optimal location model (Wood, 1978); and the polythetic-satisficer model (Thomas and Bettinger, 1976; Williams *et al.*, 1973), where the effects of distance between resources and sites do not act continuously on site locations but come into effect at certain critical threshold values.

The study of hunter-gatherer adaptations to mountain environments can contribute to broader anthropological perspectives on human adaptation. For example, Perlman (1980, 1985) has hypothesised that high-relief areas often have lower productivities than flatter terrains in the same region. The lower productivity of such areas limits group size by reducing the population densities. Less food availability restricts overall population size. High relief zones also restrict the size of a catchment area that can be searched in a set length of time, and increase the input costs of mobility, making longer distance travel inefficient except if returns are high. This study examines if these hypotheses can be applied appropriately to the study area.

THESIS STRUCTURE

This study is divided into 11 chapters. After this introduction (Chapter 1) to the overall study through identification of the general research problem and objectives, Chapter 2 provides an overview of the study area and examines the complex natural structure of the Central Canadian Rockies Ecosystem. It also reviews some basics of ecosystem dynamics. This chapter identifies what resources would have been

available to hunter-gatherers in the past and the environmental challenges they might have faced in utilising the region effectively.

Chapter 3 provides a review of the ethnographically-identified tribal groups and territories that occupied the region at the time of contact with Europeans in the eighteenth and nineteenth centuries. The seasonal rounds of these groups, that is a description of when and how they moved about on the landscape, are also reviewed to identify how these groups utilised the Central Canadian Rockies areas in early historic times.

The archaeological background to the study is reviewed in Chapter 4. This places the study within the larger framework of existing archaeological culture histories from surrounding areas and previous research within the study area itself. It identifies problems presented in the regional archaeological frameworks relating to the Central Canadian Rockies Ecosystem.

Chapter 5 provides a detailed review of recorded archaeological sites within the study area. It examines radiocarbon dates, recorded site types, site distribution within ecological zones, associations with geographic features, vegetation and altitude.

There are a number of excavated archaeological sites within the Central Canadian Rockies Ecosystem. Summaries of these are provided in Chapter 6. Excavations from these sites form a core data set and Chapter 7 analyses the cultural materials recovered from excavated archaeological sites to identify patterns of human use in the Central Canadian Rockies Ecosystem. Sites are analysed by their location, and by the subsistence, diet breadth, seasonality of use, faunal processing, lithic material use patterns, stone tool assemblages, tool type assemblages, and lithic technology, shown at them.

Chapter 8 builds on Chapters 5, 6, and 7. Here patterns identified in the archaeological record are used to construct settlement-subsistence models. These provide schematic scenarios that might have been operative in the Central Canadian Rockies.

Chapter 9 examines how human use might have impacted the environment. These include effects on the fire cycle, animal populations through the hunter-prey relationship and impacts on plant ecology from collecting.

The impacts of Euro-Canadian contact are discussed in Chapter 10. This reconstructs how the introduction of disease, horses and guns affected the cultural dynamics of the Central Canadian Rockies ecosystem.

Finally in Chapter 11, conclusions are drawn about the relationship of the data from the Central Canadian Rockies and concepts of hunter-gatherer behaviour. Conclusions are drawn about the application of hunter-gatherer concepts to archaeology and ecology. Finally, the implications of this study are considered in regard to the management of protected areas.

CHAPTER 2

THE STUDY AREA

INTRODUCTION

What makes an ecosystem? In 1963, the famous ecologist, Eugene Odum, defined an ecosystem as "...all of the organisms in a given area interacting with the biotic and physical environment. An ecosystem is characterised by energy flows, food chains, biotic diversity, and cycling of materials" (Odum, 1963).

Ecosystems are human constructs used to help people describe the complexity of the natural world. They have been defined as units composed of both non-living components such as air, soil, and water, and living components such as plants, microbes and animals, that interact with each other in a particular area. Ecosystems are designated by whatever makes them distinct from adjacent areas and at whatever spatial scale is of interest, -- a fallen log, a pond, a forested water shed, a physiographic region (Feick, 2000: 58).

For this study, I focus on the Central Rockies Ecosystem as defined by the Central Rockies Ecosystem Interagency Liaison Group (CREILG) (Komex, 1995). This area is appropriate for this study because it includes significant portions of the Rocky Mountain Main Range and several large valleys to the east and west.

Differences in altitude play a key role in affecting weather patterns, land forms, soils, and plant and animal lifeforms. Plant and animal communities can vary significantly over short distances. Past human use of this area may reflect the principle of "verticality" (Forman, 1988:134). The original model of verticality, "*staffelsysteme*", was an effort to understand cultural responses to the vertical zonation and extreme environmental variability of the Andean region (Troll, 1943; Uhlig, 1984). The model recognises that within each zone there is also a high degree of local and regional variation that "...is a function of the interplay of such factors as elevation, latitude, geologic and edaphic conditions, steepness and orientation of

slope, wind and precipitation patterns, mountain mass and relief of terrain” (Forman, 1988:134).

All elements in an ecosystem are bound together in a set of inter-relations. Altering one element will cause changes in other elements of the ecosystem (Odum, 1983). Often the nature of change is cyclical. One example of this is fire in forest ecology. Fire often triggers a forest to pass through a series of vegetation stages until the forest again reaches a point of high susceptibility to fire. “Change is always taking place in an ecosystem, but what is important is whether the change is of sufficient magnitude to permanently alter it” (Redman, 1999: 38). In the short time frames of a single human generation, most natural and human systems seem “primarily governed by *negative feedback*, which allows the system’s values to oscillate but keeps them within limits so that the basic nature of the system remains stable”(Redman, 1999: 39). Often the trajectory of changing ecosystems is more readily observable over hundreds or thousands of years.

The Central Canadian Rockies are part of the Rocky Mountain range that runs along the western part of North America. The Rocky Mountains are the highest on the continent and divide water drainage systems that ultimately flow into the Pacific, Atlantic or Arctic Oceans. The spectacular scenery of glacier-topped mountains and dark green forests has long been recognised and led to the creation of national and provincial parks for protection and enjoyment. The contiguous Banff, Jasper, Kootenay, and Yoho National Parks of Canada and Mount Assiniboine, Mount Robson and Hamber Provincial Parks of British Columbia are designated as a World Heritage Site (Komex, 1995:2). The Central Canadian Rockies Ecosystem consists of

an area of approximately 40 000 km², nearly equal in size to Switzerland¹ (Figure 2.1). It extends from the Columbia River Valley in the west to the eastern boundary of the Alberta Foothills. The northern limit is defined by the upper drainage of the North Saskatchewan River while the southern boundary follows the upper White, Elk and Highwood river basins.

The Central Canadian Rockies are part of the Canadian Rocky Mountains physiographic region that extend from the Prairie Grassland (Interior Plains) on the east to the Columbia Mountains on the west (Figure 2.1). The region is characterised by steeply sloped mountains that reach heights between 3000 and 4000 meters above sea level (Mt Robson at 3954 m is the highest peak in the Canadian Rockies). The Interior Plains physiographic region slopes gently to the east from elevations of approximately 1000 metres. The Rocky Mountain Trench that divides the Rocky and Columbia Mountains "...is one of the great lines on the globe...visible in photos taken from the moon" (Gadd, 2000:22). The Trench extends 800 km north to south but is rarely more than 10 km wide. The elevation of the valley bottom is generally less than 800 m and contains extensive wetlands including small natural lakes (Windermere and Columbia Lake) and significantly larger man-made impoundments (Koochanusa and Kinbasket Lakes). These physiographic regions significantly affected human use of this area as each region is characterised by climate, elevation, vegetation and landscape differences.

¹ The area of Switzerland is 41,284 square kilometers (Times World Atlas)

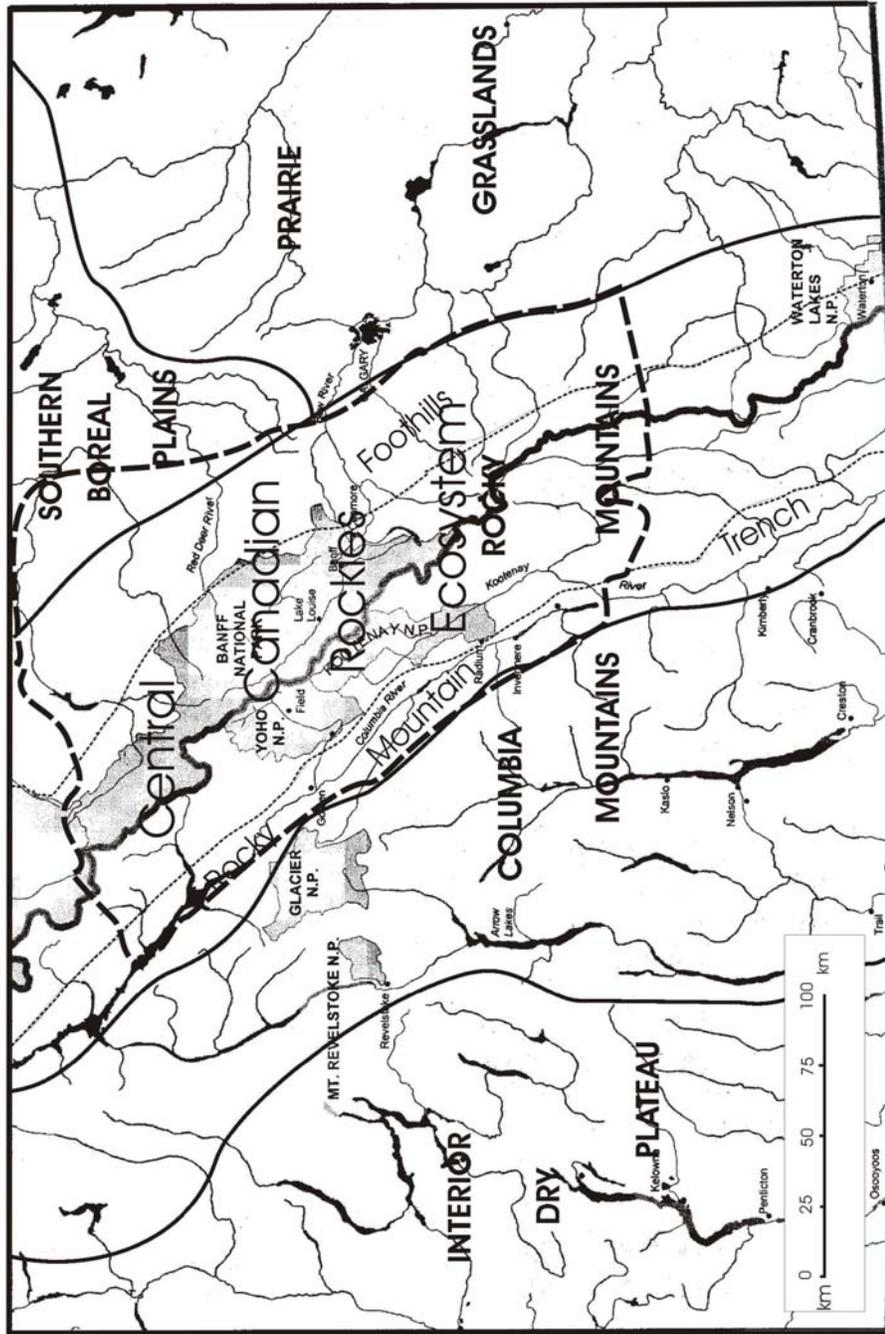


Figure 2.1 Natural regions surrounding the Central Canadian Rockies. (After Parks Canada 1997)

ECOREGIONS IN THE CENTRAL CANADIAN ROCKIES

The Central Canadian Rockies Ecosystem has been divided into a number of “biogeoclimatic zones” in British Columbia (Braumandl and Curran 1992; Meidinger and Pojar 1991) and as “ecoregions” in Alberta (Achuff *et al.*, 1984; Holland and Coen 1982; Strong 1992) (Figure 2.2). Ecoregions in the Central Canadian Rockies are Alpine, Subalpine, Montane, Upper Boreal-Cordilleran , Lower Boreal Cordilleran, Lower Boreal Mixedwood and Aspen Parkland (Figure 2.2, Table 2.1). Biogeoclimatic zones are Undifferentiated Interior Douglas Fir, Kootenay Dry Mild Interior Douglas Fir, Kootenay Moist Cool Interior Cedar-Hemlock, Golden Moist Warm Interior Cedar/Hemlock, N. Monashee Dry Cool Engelmann Spruce/ Subalpine fir, Wet Mild Engelmann Spruce/Subalpine fir, Montane Spruce, Cold Alpine Tundra and Dry Cold Alpine Tundra (Figure 2.2). Key characteristics of these are summarised below. For ease of discussion, the biogeoclimatic zones are combined and/or equated with ecoregion descriptions. The two types of Interior Douglas fir are combined into one ecoregion. The two types of Interior Cedar/Hemlock are combined as Interior Cedar/Hemlock. The two types of tundra are included as Alpine. Three types of Englemann Spruce/Subalpine Fir are include as Subalpine. Montane Spruce is included with the Montane ecoregion.

Alpine

The Alpine ecoregion is formed by high elevation in the Central Rockies (>2,150 m). It constitutes 25% of the entire ecosystem. The landscape consists mainly of rock and ice. “Cold temperatures and high snowfall limit vegetation growth”(Komex, 1995:11).

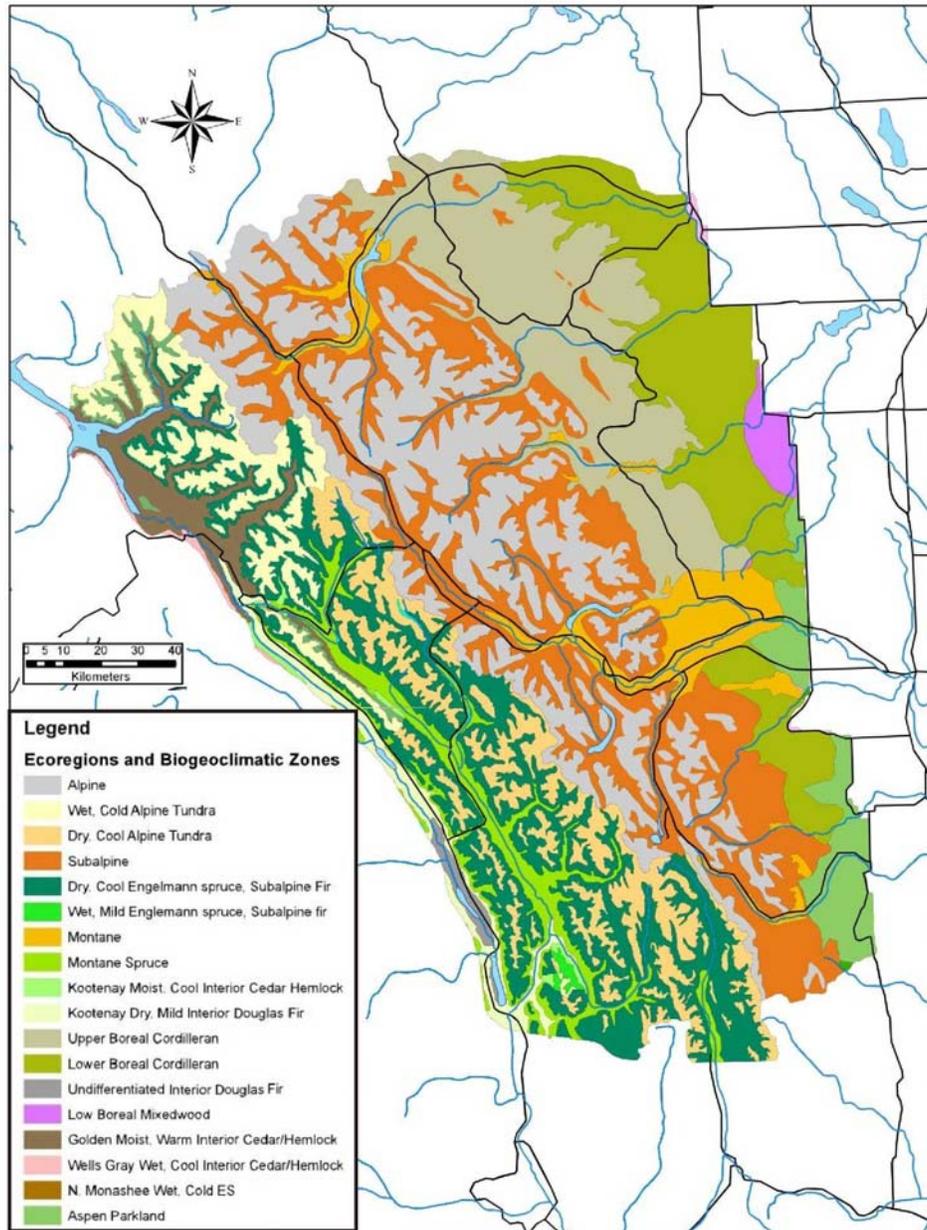


Figure 2.2 Ecoregions and biogeoclimatic zones of the Central Canadian Rockies.
 (After Komex 1995)

ECOREGION	PERCENTAGE OF AREA	ALTITUDE	CLIMATE	VEGETATION	PRINCIPAL GAME ANIMALS
Alpine	25%	>2150 m	Short cool summers, long cold winters, high snowfall	Lichens, heather, shrubs, stunted trees, none	Summer: bighorn sheep, Mountain goat, grizzly bear
Subalpine	32%	1500-2200 m	Short cool, wet summers, cold winters, high snowfall	Closed forest of spruce, subalpine fir, lodgepole pine	Summer: moose, mule deer, black bear, grizzly bear
Montane	7.8%	1100-1700 m	Warmer and drier summers, relatively light snowfalls in winter	White spruce and poplar in wetter areas, Douglas fir, lodgepole pine, grasslands in drier areas	Year-round: elk, mule deer, white-tailed deer, bighorn sheep, black bear, grizzly bear, bison (extirpated) Winter: as above with moose
Interior Douglas Fir	2.4%	<1200 m	Hottest and driest summers in area, winter snows shallow and shorter timespan	Douglas fir-blue bunch wheatgrass savannah, grasslands	As for Montane, populations higher in winter
Interior Cedar-Hemlock	3.4%	<1400 m	Warm and moderately wet summers; cool wet winters, deep snowfalls	Dense forests of western red cedar, white spruce, subalpine fir	Year-round: moose, mule deer, black bear

Upper Boreal-Cordilleran	12.0%	1400-1800 m	Cool wet summers, cold dry winters with shallow snowfall	Dense forests of lodgepole pine, subalpine fir, white spruce, black spruce	Year-round: elk, mule deer
Lower Boreal Cordilleran	11.6%	1300-1500 m	Wet, warm summers; cold dry winters	Mixed forests of aspen, balsam poplar, paper birch, lodgepole pine, white spruce	Year-round: moose, elk, mule deer, white-tailed deer, bighorn sheep, black bears
Lower Boreal Mixedwood	1.0%	<1300 m	Wet, warm summers; cold winters, moderate snowfalls	Tall shrub wetlands, deciduous forest of aspen, balsam poplar	Year-round: moose, mule deer, white-tailed deer
Aspen Parkland	3.0%	<1400 m	Warmer and drier summers; low winter snowcover due to Chinooks	Mixed aspen clones, fescue grasslands, and shrub cover	Year-round: elk, mule deer, white-tailed deer

Table 2.1 Summary of ecoregions in the Central Canadian Rockies.

Vegetation consists of slow-growth plant communities, heather (*Cassiope sp.*) communities on moderately well-drained sites, white mountain aven (*Dryas octopetala*) or stonefield lichens (blistered rocktripe, *Umbilicaria hyperborea*; frosted rocktripe, *Umbilicaria vellea*; freckle pelt, *Peltigera aphthosa*; pink-eyed rockbright, *Rhizoplaca chrysoleuca*; elegant orange, *Xanthoria elegans*) on drier sites (Figure 2.3). Areas of poor drainage are characterised by low shrub willows (*Salix* spp.), birch (*Betula nana*) and sedges (*Carex* spp.). At lower elevation fringes is the krummholz zone, consisting of a stunted forest of Engelmann spruce (*Picea engelmannii*), subalpine fir (*Abies bifolia*), or alpine larch (*Larix lyallii*) (Kershaw *et al.*, 1998; Komex, 1995:11).

Few animal species are found in the Alpine ecoregion. Permanent residents consist primarily of rodents such as marmot (*Marmota sp.*) and pika (*Ochotona princeps*). The alpine zone also provides an important habitat for mountain goats (*Oreamnos americanus*) and bighorn sheep (*Ovis canadensis*), especially in the summer. Grizzly bears (*Ursus arctos*) are also a commonly-found visitor. Mountain caribou (*Rangifer tarandus caribou*) are very rare and found only in isolated alpine areas in the north of the Central Rockies Ecosystem.

On the western side of the continental divide, this region is divided into two sub-types: Wet Cold Alpine Tundra and Dry Cold Alpine Tundra. Varying moisture conditions results in slight differences of vegetation communities.



Figure 2.3 A meadow typical of the Alpine ecoregion at Numa Pass, Kootenay National Park of Canada. (Photo: R. Heitzmann, Parks Canada 9001T263t)

Subalpine

Thirty-two percent of the region is classified as subalpine. Elevation ranges from 1500 to 2200 m. The ecoregion has a relative cold and wet climate, with high winter snowfall. The area consists primarily of closed forests of Engelmann spruce (*Picea engelmannii*), subalpine fir (*Abies bifolia*), and lodgepole pine (*Pinus contorta*) (Figure 2.4). Most of this area occurs on relatively steep slopes. Valley bottoms in the subalpine are often poorly drained sedge wetlands or braided streams (Komex, 1995: 11). Large mammals commonly found in the subalpine are moose (*Alces alces*), mule deer (*Odocoileus hemionus*), and black bear (*Ursus americanus*). Grizzly

bears (*Ursus arctos*) are found in lower densities. West of the continental divide, this ecoregion is divided into three sub-types: Dry Cold Engelmann Spruce Sub-Alpine Fir, Wet Mild Engelmann Spruce Sub-Alpine Fir and North Monashee Wet Cool Engelmann Spruce. These types are distinguished by slight differences in temperature and moisture levels. Moose normally leave this zone in winter due to deep snows (Meidinger and Pojar, 1991).



Figure 2.4 View of a portion of typical Subalpine ecoregion, Mount Burgess, Yoho National Park of Canada. (Photo: R. Heitzmann)

Montane

“The Montane ecoregion occurs below the subalpine zone on the lower slopes and bottoms of large valleys in the central mountainous section of the [Central Rockies Ecosystem]. It forms only 7.8% of the area or 3380 km². In Alberta, the Montane is

concentrated in the valleys of the Bow, Red Deer and North Saskatchewan Rivers” (Komex, 1995:11-12). Elevations range from 1100 to 1700 m. In British Columbia, this ecoregion is termed Montane Spruce and is found in a narrow strip along the floor of the Kootenay Valley. “One of the most distinctive features of MS is the extensive, young and maturing seral stands of lodgepole pine that have formed following wildfire” (Meidinger and Pojar, 1991:184).

The climate is warmer and drier than the subalpine and snowfall is relatively light. Vegetation cover is characterised by white spruce (*Picea glauca*) and poplar (*Populus balsamifera*) in wetter areas and Douglas fir (*Pseudotsuga menziesii*), lodgepole pine (*Pinus contorta*) and limber pine (*Pinus flexilis*) in drier areas. Drier conditions and more frequent fires contribute to extensive grasslands (Figure 2.5).



Figure 2.5 Montane grasslands at Yahatinda Ranch, Red Deer River, Alberta. (Photo: J. Porter, Parks Canada 9009R037t)

Large mammals include elk (*Cervus elaphas*), mule deer (*Odocoileus hemionus*), white-tailed deer (*Odocoileus virginianus*), bighorn sheep (*Ovis canadensis*), caribou (*Rangifer tarandus*), black bears (*Ursus americanus*) and grizzly bears (*Ursus arctos*). Bison (*Bison bison*) were formerly found in Montane areas on the eastern side of the Rockies and possibly on the western side as well. West of continental divide “with the exception of caribou and occasional moose most ungulates migrate to lower elevations during winter to escape deep snow” (Meidinger and Pojar, 1991:191).

Interior Douglas Fir

The Interior Douglas Fir biogeographic zone is only found in the southern half of the Columbia Trench (elevations <1,200m) and accounts for only 2.4% of the entire region. Climate is controlled largely by the “rain shadow” from the Selkirk and Purcell mountain ranges to the west. This zone has the hottest and driest summers in the study area. Winter snows are shallow and of short duration.

Old growth forests are rare and dominated by Douglas fir (*Pseudotsuga menziesii*) (Figure 2.6). In dry locations “a Douglas fir/junegrass/bluebunch wheatgrass savannah predominates” (Komex, 1995:12). The Columbia Valley Marsh extends from Golden to Invermere on the valley bottom of the Rocky Mountain Trench and is the largest wetland in the Central Rockies Ecosystem. This ecoregion is divided into two sub-types: Kootenay Dry Mild Interior Douglas Fir and Undifferentiated Interior Douglas Fir. These vary slightly in vegetation community structure.



Figure 2.6 Typical view of the Interior Douglas fir biogeographic zone at Kootenae House National Historic Site of Canada. The Columbia River is located in the valley bottom beyond the trees. (Photo: R. Heitzmann)

The range of large mammals that utilise this zone is similar to that of the Montane. Large mammals include elk (*Cervus elaphus*), mule deer (*Odocoileus hemionus*), white-tailed deer (*Odocoileus virginianus*), Bighorn sheep (*Ovis canadensis*), black bears (*Ursus americanus*) and grizzly bears (*Ursus arctos*). Bison (*Bison bison*) were formerly found in Interior Douglas Fir areas on the western side of the Rockies but their populations were probably small. “Low elevation south facing aspects attract many animals during winter. Mule deer, White-tailed deer, Bighorn sheep and Rocky Mountain Elk can migrate long distances (up to 80 km) to winter in this zone” (Meidinger and Pojar, 1991).

Interior Cedar-Hemlock

This biogeographic zone is found only in the northwest corner of the Central Rockies Ecosystem along the Columbia Trench at elevations of less than 1400 m. It accounts for only 3.4% of the entire region. Climate is warm and moderately wet in the summers, and cool and moist in winters. Snowpack is deep and of long duration. It is indicated as Kootenay Moist Cool Interior Cedar Hemlock, Golden Moist Warm Interior Cedar Hemlock and Wells Gray Wt Cool Interior Cedar Hemlock on Figure 2.2.



Figure 2.7 Part of the Interior Cedar-Hemlock biogeographic zone in Glacier National Park of Canada. (Photo: R. Heitzmann, Parks Canada 9009T003t)

Most of this area is densely vegetated with forest dominated by western red cedar (*Thuja plicata*), white spruce (*Picea glauca*) and subalpine fir (*Abies bifolia*) (Figure 2.7). Following fires, regenerating forests contain lodgepole pine (*Pinus*

contorta) and Douglas fir (*Pseudotsuga menziesii*). The most common large mammals are moose (*Alces alces*), mule deer (*Odocoileus hemionus*), and black bear (*Ursus americanus*).

Upper Boreal-Cordilleran

This ecoregion is an area of the Alberta foothills consisting of high forest covered hills at elevations from 1400 to 1800 m. These form 12% of the study area. The majority of precipitation is received in the summer months. Winters are cold but relatively dry. Snowcover is relatively shallow (about 50 cm). Vegetation consists of dense forests of lodgepole pine (*Pinus contorta*) with older forests of subalpine fir (*Abies bifolia*), white spruce (*Picea glauca*) and black spruce (*Picea mariana*) (Figure 2.8). Mule deer (*Odocoileus hemionus*) and elk (*Cervus elephas*) are the most common ungulates found in this ecoregion.

Lower Boreal-Cordilleran

This ecoregion consists of the low rolling foothills of Alberta (elevations 1,300-1,500 m). Precipitation is higher in summer than winter. This area composes 11.6% of the study area. Vegetation consists of mixed forests of aspen, balsam poplar, paper birch, lodgepole pine and white spruce (Figure 2.9). The most common large mammals are moose (*Alces alces*), elk (*Cervus elephas*), mule deer (*Odocoileus hemionus*), white-tailed deer (*Odocoileus virginianus*), bighorn sheep (*Ovis canadensis*), and black bears (*Ursus americanus*).



Figure 2.8 View west of the Upper Boreal Cordilleran ecoregion along the Red Deer River, Banff National Park of Canada. (Photo: J. Porter, Parks Canada 1367R213t)



Figure 2.9 Lower Boreal Cordilleran ecoregion along the Elbow River, Alberta. (Photo R. Heitzmann)

Lower Boreal Mixedwood

This ecoregion forms a narrow sliver along the eastern margin of the area at elevations less than 1300 m. It forms only 1.0% of the study area. It is considered ecologically rich due to abundant tall shrub wetlands surrounded by mature deciduous forest of aspen (*Populus tremuloides*) and balsam poplar (*Populus balsamifera*) (Komex, 1995:13). Common large mammals are moose (*Alces alces*), mule deer (*Odocoileus hemionus*), and white-tailed deer (*Odocoileus virginianus*).

Aspen Parkland

Along the eastern boundary of the foothills the aspen parkland ecoregion is found at elevations below 1400 m. It is characterised by a warmer and drier climate with peak precipitation in July. Low winter snowcover is due to melting by periodic chinooks, foehn-like winds that can raise temperatures as much as twenty degree Celsius in a few hours. Vegetation is characterised by a mix of aspen (*Populus tremuloides*) clones (clusters of aspen trees of identical genetic composition), interspersed by fescue (*Festuca* sp.) grasslands and shrub cover (Figure 2.9). Only 3.0% of the area is aspen parkland. The most common large mammals are elk (*Cervus elephas*), mule deer (*Odocoileus hemionus*), and white-tailed deer (*Odocoileus virginianus*). This area was formerly an important bison wintering area.



Figure 2.10 Typical Aspen Parkland ecoregion, Elk Island National Park of Canada.(Photo: G. Langemann, Parks Canada 9004T012t)

ANIMAL POPULATION ABUNDANCE

Although the area of the Central Rockies Ecosystem is huge much of the area is largely uninhabitable with nearly 60% being rock, ice, and steeply-sloped closed forest (Alpine 26.7%, Subalpine 32%). Areas able to support larger ungulate populations and, in turn, human populations are restricted, mainly limited to Montane (7.8%), Interior Douglas Fir (2.4%), and Aspen Parklands (3.0%). These areas occur at lower elevations and have generally warmer temperatures. They are distributed primarily along valley bottoms and are dispersed throughout the area.

In the Central Rockies, there are a number of diverse resources that could have been exploited seasonally or year-round. Current population estimates of the entire region indicate that mule deer (*Odocoileus hemionus*) are the most populous of the large mammals (approximately 20,000). Elk (*Cervus elephas*) and white-tailed deer

(*Odocoileus virginianus*) each have populations of between 10,000 and 15,000 animals. There are between 5000 and 10,000 of each of moose (*Alces alces*), mountain goats (*Oreamnos americanus*), and bighorn sheep (*Ovis canadensis*). Carnivores such as grizzly bears (*Ursus arctos*), black bears (*Ursus americanus*), cougars (*Felis concolor*), and wolves (*Canis lupus*) occur in low numbers (<1000). Caribou (*Rangifer tarandus caribou*) is the rarest mammal in the area with a population of less than 50 animals (Komex, 1995: 17). A variety of smaller animals (eg. hares, ground squirrels, marmots) are also present.

To the east of the Rocky Mountains bison (*Bison bison*) were formerly a key resource. Millions of bison were present on the plains and sustained a year-round hunting culture for thousands of years. Peck (2001) has reviewed the ethology of bison. During the spring and summer, herds of bison were found scattered on the grass-covered plains. During the fall and winter bison migrated into the foothills where trees and topography provide shelter. In addition, some bison may also have lived year-round in the Rocky Mountains (Kay *et al.*, 1999: 7-11).

Fish are present in rivers and lakes throughout the region, but most lakes are relatively small. Probably the most important exploited fish stocks were anadromous salmon that had runs on the uppermost Columbia River (Heitzmann, 1999b; Mohs, 1981; Yip, 1982). Chinook salmon (*Oncorhynchus tshawytscha*) are anadromous fish with a four year lifecycle. They hatch in the rivers and streams that drain into the northern Pacific Ocean. Young fish travel downstream to the Pacific Ocean where they spend most of their lives. Once fully mature, adults return upstream to the location where they originally hatched, to spawn a new generation. Spawning in the uppermost Columbia River occurred from late August to October.

Throughout the Central Rockies Ecosystem there are numerous plant resources for food and medicinal purposes. The range of species that can be exploited has been documented for the surrounding regions (Keefer and McCoy, 1999; Kershaw *et al.*, 1998; Lowen, 1998; Peacock, 1992; Turner *et al.*, 1980). Some important plants are the corms of glacier lily (*Erythronium grandiflorum*), camas (*Camassia quamash*), and bitterroot (*Lewisia rediviva*), although the last two are not found in the study area. A variety of berries are also important --saskatoons (*Amelanchier alnifolia*), wild strawberries (*Fragaria virginiana*), raspberries (*Rubus idaeus*), blueberries (*Vaccinium cespitosum*), huckleberries (*Vaccinium membranaceum*), and soapberries/soopolallie (*Shepherdia canadensis*) are among the most commonly eaten today. These are collected and eaten fresh from spring to late summer or dried for use later in the year.

CONCLUSION

There are a number of natural resources existing today that could have provide subsistence for hunter-gatherers in the past. These consist primarily of large ungulates, small mammals, fish and a limited variety of plants. Two resources, bison and salmon, have been extirpated from this region and the influence they had on the ecosystem is not well understood . In adjacent areas, where bison or salmon were present in large numbers, these were key prey species. For the Central Canadian Rockies there are no estimates of the numbers of either of these species in the past. It is, however, unlikely that in the past this ecosystem functioned as it does today.

An additional complicating factor is the presence of protected park areas that form a large part of the Central Canadian Rockies Ecosystem today. These areas

prohibit hunting outright. In other areas of the ecosystem, hunting is permitted, but only under regulations that control the number of animals that can be hunted and restrict hunting to certain seasons on the year. Hunting regulations also impose restrictions on animals to certain sizes, ages, and sexes. These kinds of restrictions would not have existed for hunter-gatherers in the past. There are no ecosystem reconstructions of the Central Canadian Rockies prior to the recent historic period (before 1885), nor is there a clear understanding of how it functioned.

What was the role of humans in the Central Canadian Rockies prior to arrival of Euro-Canadians? Did people utilise the region? If so, how often? Was it on a year-round, seasonal or occasional basis? Did hunter-gatherers develop strategies to exploit these resources? Did they, for example, adopt a strategy of frequent movements to maximise their returns? Were some strategies, such as burning, employed to enhance the productiveness of selected resources? Did hunter-gatherers in the region take advantage of seasonal abundances through storage? Was their seasonal round of activities governed by resources that were particularly abundant, perhaps by salmon along the uppermost Columbia River during spawning runs and/or by bison from fall to early spring on the Eastern Slopes especially in the Foothills and Aspen Parkland? Were some plants also collected and dried where they were seasonally abundant?

Did hunting affect the function of ecosystem through alteration of the predator/prey relationship? Did hunter-gatherers create an ecosystem that functioned in a consistent way (steady state) or did humans create a dissonant system characterised by rising and falling populations of both humans and animals? For hunters-gatherers in this ecosystem, fire was the most likely tool that could have been

used. Selective burning of specific localities could have created locations where some desired plants could have produced increased yields or where grasslands could have resulted in better ungulate grazing.

Human use in the past in the Central Canadian Rockies need not have been confined to the ecosystem. The natural environment imposed no external boundaries on human groups and humans could easily have entered to or from surrounding areas to take advantage of higher density resources or flee periods of resource depletion.

In the subsequent chapters, I examine the evidence of human use in the Central Canadian Rockies, and develop models for how humans might have used this area.

CHAPTER 3

ETHNOGRAPHIC SETTLEMENT/SUBSISTENCE IN THE CENTRAL CANADIAN ROCKIES

INTRODUCTION

This chapter reviews the ethnohistoric and ethnographic data available for the Central Canadian Rockies Ecosystem. These data are examined to construct a view of the land and people at the time they were first encountered, approximately 200 years ago.

Aboriginal people did not maintain written records at that time and, as a result, the only written documentation was prepared by fur traders, explorers and missionaries. Most of these had only a limited ability to speak native languages and were not trained observers. Most of the earliest materials were written by employees of the Hudson's Bay Company that required traders to maintain detailed records and diaries of the trade, events, and observations on their trading partners. Most of these employees relied on native informants for information of distant lands and peoples. Some records were also written by employees of other fur trade companies. Perhaps the most significant of these was David Thompson who worked for the North West Company as a fur trader, surveyor and explorer from 1797 to 1812 (Tyrrell, 1916).

Ethnographic studies of Aboriginal people who occupied the area differ somewhat from the historical and ethnohistorical data. Ethnographies are prepared by trained anthropological observers and are based on detailed studies and interviews with elders and other knowledge-holders. However, most ethnographies were written more than a hundred years after first contact. The intervening century saw considerable cultural disruption. Most ethnologies attempt to describe Aboriginal cultures in their "pure" form unaffected by European contact. The near extinction of the bison in the 1870s, the

establishment of the North West Mounted Police (1873), the signing of Treaty 7 with the Blackfoot and associated tribes (1877), and the completion of the Canadian Pacific Railway (1885) effectively ended Aboriginal peoples' unrestricted access to their traditional lands.

For the Central Canadian Rockies study area, direct historical observations are restricted to a few first-hand observers in the period prior to 1880. All of the ethnographic studies occurred after that time and focus primarily on groups using lands outside the study area.

TRIBAL TERRITORIES IN THE PROTOHISTORIC PERIOD

The Protohistoric Period began 200 to 300 years ago with the first arrival of European trade goods, horses, and epidemic diseases. These items arrived up to a century or even more before the arrival of Euro-Canadians themselves and triggered considerable culture change before direct contact (Binnema, 2001; Ewers, 1955, 1958; Smyth, 2001). It was not until the late eighteenth century that regular direct contacts occurred between indigenous people of the Rocky Mountains and Euro-Canadians.

The first documented direct encounter with the Niitsitapi (Blackfoot) people occurred 1 October 1754 when Anthony Henday visited a large camp probably near present-day Red Deer, Alberta (Smyth, 2001:114). Henday, an employee of the Hudson's Bay Company, was sent inland to invite the inland tribes to come to trade at York Factory (Smyth, 2001:109). At the camp, Henday met people who were probably members of the Blackfoot alliance, either Blackfoot (Siksika), Blood (Kainai), Gros Ventre or Peigan (Piikani). The people were unwilling to make the long journey to Hudsons Bay to trade and it was only after fur trade posts were established on the lower

North Saskatchewan River after 1781 that "...direct trade in significant volume [occurred] between the Euro-Canadians and the five member peoples of the Blackfoot alliance (Smyth, 2001:162). By 1799 the adjacent fur trade posts of Rocky Mountain House and Acton House were constructed along the North Saskatchewan River on the eastern edge of the study area. Kootenae House (1807) established by David Thompson was the first trading post built west of the Rocky Mountains along the Columbia River. These posts and later trading posts ensured a steady supply of Euro-Canadian goods into the region.

TRIBAL TERRITORIES IN THE HISTORIC PERIOD

At the time of First European contact, several Aboriginal groups were reported or encountered in the area surrounding the study area (Figures 3.1 and 3.2). However, the location of tribal territories and organizational sub-groupings such as bands or family groups were fluid and subject to considerable movement. Even prior to the arrival of explorers and other observers in the early nineteenth century, there had already been considerable social disruption due to the effects of introduced epidemic diseases, the gun and the horse (Magne *et al.*, 1987). Changes continued through the nineteenth century partly due to effects of the fur trade and European settlement. On the eastern slopes of the Rockies, Blackfoot (Siksika), Peigan (Pikani), Kootenay (Ktunaxa), Stoney (Nakota),

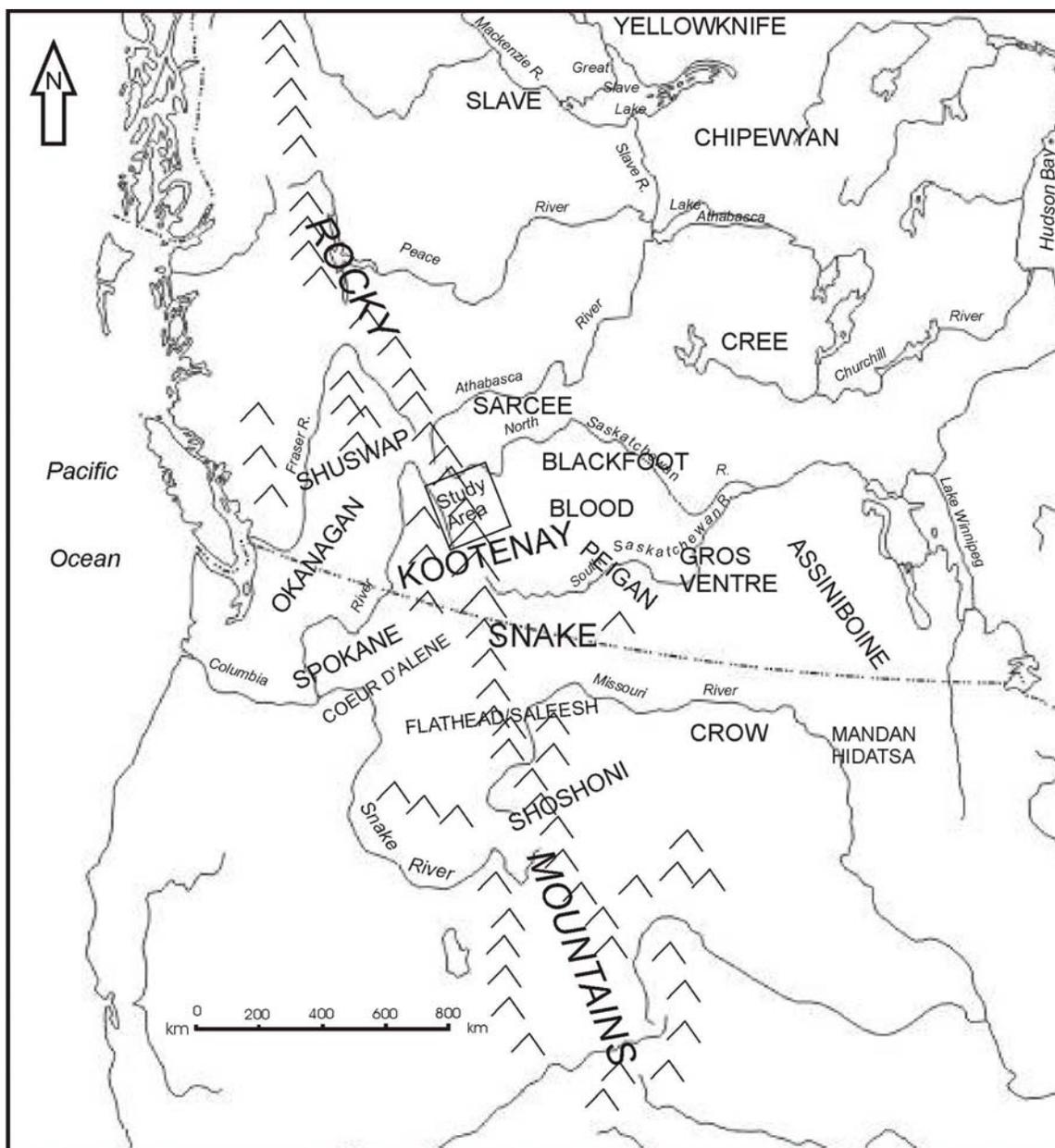


Figure 3.1 Distribution of tribal groupings about 1730. (After Binnema, 2001; Magne *et al.*, 1987; Smyth, 2001)

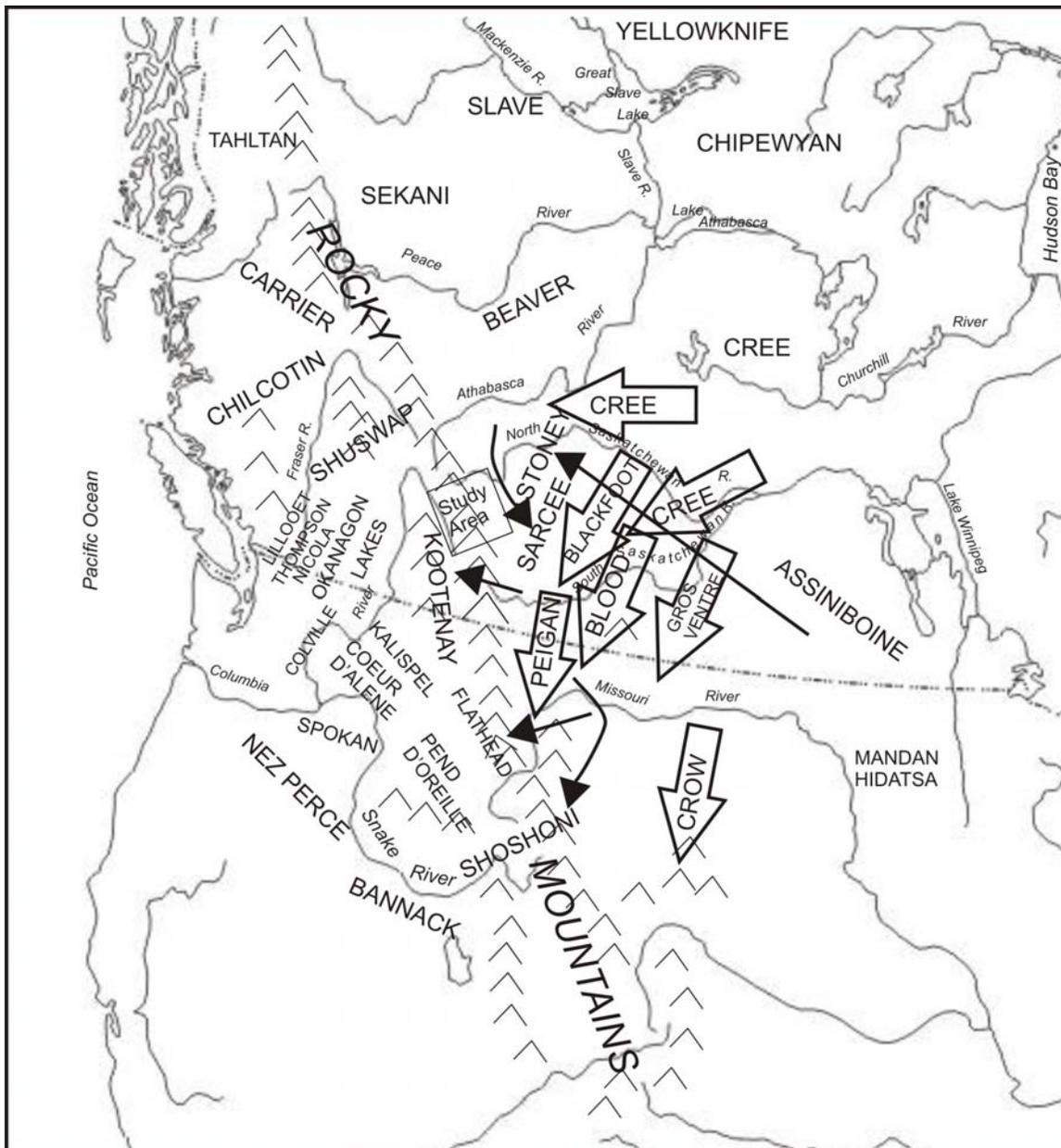


Figure 3.2 Distribution of tribal groupings about 1810. (After Binnema, 2001; Magne *et al.*, 1987; Smyth, 2001) Arrows indicate group movements after 1730.

and Sarcee/Sarsi (Tsuu T'ina)¹ were most commonly noted by early visitors. West of the continental divide the Kootenay (Ktunaxa), Mountain Shuswap (Secwepemc), Lakes (Snaitcekest) and Peigan (Pikani) were encountered.

Brink (1986) reviewed historical and ethnographic data on the locations of various native Indian groups across Southern Alberta at the time of first contacts with Europeans and European culture. David Thompson, fur trader and surveyor, interviewed an Old Cree Indian, Saukamappee, about the earlier locations of Indian tribes (Coues, 1897). Saukamappee's first memories would have been when he was a boy about 1730 AD.

Thus, according to Saukamappee, the Snake Indians controlled or occupied southern and parts of central Alberta at the end of the Prehistoric Period, and the Blackfoot were positioned on the northern parkland/prairie fringe. A combination of battle victories and smallpox epidemics caused a southern advance of the Blackfoot and a corresponding retreat by the Snake...[by] the late eighteenth century, the Blackfoot had gained control of the Bow Valley (Brink, 1986: 19).

The identification of the Snake Indians with any modern group remains unresolved. Brink suggests that "Shoshoni remains the most likely identity of the Snake Indians..."(1986: 49). Smyth (2001: 167) accepts this identification without question. The Snakes may be the same people known as the Plains Shoshoni who later occupied the area from the Yellowstone River north to the Sweet Grass Hills (Teit, 1930: 304). Magne and Klassen (1992) however, argue that the Shoshoni are unlikely to have created the pictographs at Writing-on-Stone in Southern Alberta. Based on analysis of design motifs such as the V-neck and shield-bearing anthroporphs they identified that there was "considerable continuity in style if not technique" (Magne and Klassen, 1992:456).

¹ Most First Nations groups in Canada prefer to be referred to by the name they call themselves rather than by names used historically. The current modern name is bracketed. See Appendix III. Throughout this study, I will use the common historical name unless referring to modern groups.

They suggest that because historic rock art of similar design is known to have been created by the Blackfoot or other groups in the Northwestern Plains that these groups are also the likely creators of the pictographs at Writing-on-Stone.

Thompson wintered with the Peigan Indians in the foothills east of the Rocky Mountains between the Bow and Oldman rivers in 1786-88. Thompson recorded that: “All these Plains, were formerly in full possession of the Kootenaes, northward; the next the Salish [Flatheads] and their allies, and the most southern the Snake Indians” (Coues, 1897: 328). This seems to conflict with Saukamappee’s recollections of the Snake Indians occupying the northern plains. However, Thompson may have been referring to tribal locations after the 1730s.

Fur trader Peter Fidler travelled to southwestern Alberta from Buckingham House on the North Saskatchewan River in 1792, to winter with the Peigan. In December 1792, they met some Kootenay camped near the headwaters of the Oldman River in the Porcupine Hills.

Ethnographer Claude Schaeffer reconstructs the demise of one Plains Kootenay band, which he calls the Michel Prairie band (1982: 4). The group was named after their main campsite location on a tributary of the Elk River on the western side of the Crowsnest Pass. In winter this group would cross to the Waterton Lakes region. Schaeffer argues that an early smallpox epidemic around the 1730s decimated the Michel Prairie band and forced the survivors south and west to join other Kootenay or Flathead groups (1982: 49). Teit notes that the Plains Kootenay occupied the eastern slopes of the Rockies including Banff and east along the Bow River (1930: 307). “This eastern or Plains Kootenay tribe was composed of several bands, most of whom made their

headquarters in the eastern foothills of the Rockies...”(Teit, 1930: 307). The Michel Prairie band may have been one of these, but there are no other supporting references for other Kootenay bands on the Eastern Slopes.

The situation in the adjacent Rocky Mountain Trench was also fluid and complex. The most frequently encountered group was Kootenay. In 1807, David Thompson traversed the Rocky Mountains by way of Howse Pass and went south along the Columbia River. He constructed Kootenae House, the first fur trade post in the region. Most of the native people he encountered were “Kootenae”, but many of these were noted to be “pitching off to a great distance”(Belyea, 1994: 59). He also recorded that a battle between the Peigan and Salish (Flathead) had occurred further south in the spring of 1807. On August 27 1807, twelve Peigan young men and two women arrived at Kootenae House “...to see how we are situated” (Belyea, 1994: 64). Thompson had been expecting them as the Peigan had tried to prevent previous attempts by the Kootenay to trade at Rocky Mountain House, on the east side of the Rocky Mountains. It is likely that the group of Peigan who came to Kootenae House was a raiding party that came over the mountains to harass the fur traders and discourage them trading with the Kootenay. In fact, the Peigan soon stole three horses from the Kootenay and left September 1, 1807. Also in September of 1807, several Lower Kootenay Indians (Thompson called them Lakes Indians) came to visit and trade but Thompson makes it clear that their territory was further west and south.

A second group that regularly used the area on the west side of the Rocky Mountains was a Shuswap [Secwepemc] group known as the *Texqokallt*, or North Thompson Band. They hunted from Kinbasket Lake area and the upper Frazer River into

the areas of Jasper and Banff (Dempsey, 1998: 65). Another band of Shuswap that once occupied the area around Jasper are known as the Snares. Fur trader Alexander Henry noted that they had "...retired northward to an uninhabited part of the Rocky mountains [probably north of Jasper], where they continue to wander, a most wretched and defenceless people, who never war upon any of their neighbours" (Coues, 1897: 706). About 1840, the Snares were lured to peace treaty talks with the Stoney at the mouth of the Snake Indian River near Jasper. The Stoney instead attacked and killed most of the Snares (Dempsey 1998: 68). A few managed to escape including a chief named Capote Blanc whose picture was later painted by Paul Kane in 1846 at Jasper House. The two met again near Boat Encampment in 1847 and Capote Blanc was met by James Hector of the Palliser Expedition in 1859 near Golden.

The historic record clearly indicates that on the Northwestern Plains, tribal boundaries were not fixed, but were fluid in space and time. Bands were frequently subject to variations in size and composition. For the Blackfoot:

Wissler (1911:19) observed that when a band began, it might form around two or three brothers, fathers and grandfather. Later, friends or admirers of the head man in this family might join until the band became very large. Bands could also split through dissension, with parts of one band joining another or forming a new one. Dempsey (1982:94) documented a historical range for Kainai (Blood) bands of from 18 to as many as 200 lodges...they were invariably highly exogamous (Peck and Ives, 2001: 185-186).

Bands need not even contain exclusively members from one tribal group. Peck and Ives suggest that "...one explanation of the greater degree of variability *within* the Cayley Series [of projectile point styles] might therefore be the routine presence of other peoples among a Blackfoot majority" (2001: 185). Alternately, they suggest that variations of

projectile point styles may be related to social structures such as small groups or camps of extended families, bands, or age-grade societies (2001: 185-187).

The Nakoda (Stoney) are one of three branches of the Sioux nation. They are also known as Assiniboine. This group separated from their parent tribe near the Great Lakes in the 1600s. “By the early 1700s, they had migrated west to the Rocky Mountains where they found excellent hunting and trapping along the foothills” (Dempsey, 1998: 13).

There they dispersed into several small bands and developed a subsistence pattern based on hunting, fishing and trapping.

SEASONAL ROUNDS OF ABORIGINAL GROUPS IN THE NINETEENTH CENTURY

A seasonal round model examines “...how people moved and positioned themselves on the landscape” (Peck, 2001: 12). Hunter-gatherer groups varied considerably in the extent of their movements. In most cases they moved on a relatively regular basis to take advantages of key resources. However, many animal resources are themselves subject to variations. For example, anadromous salmon spawn on a four year cycle but the volume of the salmon runs is not consistent year over year. People dependent upon such resources may be forced to obtain alternate food resources in years of poor returns. Similarly bison may follow a generalised behaviour pattern throughout the year, but variations in moisture and other weather conditions and grass fires due to natural or human ignition may have affected bison movements locally.

The Northwestern Plains

For the study of Northwestern Plains cultural dynamics, Peck (2001: 12) identifies three general approaches to seasonal round models. The first approach is based on reviews of historic and ethnographic information. The second is based on the study of bison ecology and how that relates to the movement of people. The third approach involves examination of archaeological sites and materials themselves.

Peck (2001) used these approaches concurrently to test alternate seasonal round models during the Old Women's Phase (1250 BP to Historic Period) on the Northwestern Plains. For ethnographic models he draws on a Blood informant's account (Uhlenbeck, 1912) and on several Blackfoot accounts described by Ewers (1955; 1958). He clusters bison ecology models into two main groups: migrationist and anti-migrationist (Peck 2001: 17). The migrationist model views bison movements as analogous to caribou or other large herds, where bison moved seasonally from north to south and back again following a predictable pattern. Anti-migrationists view bison herd movements as one where herds moved towards the short grass plains in the spring and summer and then retreated to transitional zones at the margins of the plains in fall and winter. Existing archaeological models are largely formulated on the basis of these bison ecology models (Arthur, 1975; Malainey and Sheriff, 1996; Moodie and Ray, 1976; Oliver, 1962; Reeves, 1990; and others).

After examining the historical, ethnographic and archaeological data, Peck concludes that people of the Old Women's Phase followed a pattern of subsistence based largely on relatively regular and predictable movements of bison. The bison and the people who depended upon them "...summered on the open plains and wintered in the

parkland, large river valleys, and wooded uplands” (Peck, 2001: 245). Both bison and people retreated into the foothills region on the east slopes of the Rocky Mountains, as well.

Bison behaviour on the Northwestern Plains was governed by the availability of food. The grass communities vary with elevation and moisture levels. The northern mixed prairie dominates most of this region. This is further divided into xeric (dry) mixed grasslands and the more productive mesic (moist) mixed grasslands. The xeric mixed grassland subregion has a mix of cool-season and warm-season grasses. Cool-season grasses like needle-and-thread (*Stipa comata*) begin growing as early as late March and peak in May and June. Warm-season grasses are dominated by blue grama grass (*Bouteloua gracilis*) which sprouts later in the spring but continues to grow into August.

The moist mixed grasslands are dominated by heavier yielding, medium height, cool-season grasses including western porcupine grass (*Stipa curtisetata*), Western wheat grass (*Agropyron smithii*), needle-and-thread (*Stipa comata*), and the early June grass (*Koeleria cristata*). These sprout a little later in the spring but remain green longer. The moist grassland usually had twice the carrying capacity of the dry prairie by the end of April (Binnema, 2001: 24).

Forming a crescent along the northern and western fringe of the mixed grasslands is an area of fescue grasslands. Fescue grasses are dominated by foothills rough fescue (*Festuca campestris*) or plains rough fescue (*F. hallii*). These are associated with the aspen groves through the parklands and along the foothills of the Rocky Mountains. The foothills rough fescue penetrated into the mountains along major valleys such as those of

the Bow and Crowsnest Rivers. These grasses were the most productive species on the Northwestern Plains and provided fine bison habitats that were especially important during the winter (Binnema, 2001: 25). This was because fescue grasses are particularly good dormant-season forage as they retain high crude protein levels.

In this region, spring begins in late March and early April, with the first greening of native cool-season grasses. Even at this time, heavy snowfalls and late frosts are common and snow persists in sheltered parklands, foothills, uplands and valleys. Bison cows give birth to calves between March and late June. The herds move east and south towards the dry mixed grasslands which grow rapidly in the spring rains of May and June. Bison populations peaked in the spring but were dispersed widely.

Human hunters found it difficult to depend on the small and widely dispersed herds in spring. When hunters had a store of dried food, they could have remained in their sheltered winter camps, protected from the common April and May snowstorms...They also turned to alternate species like elk, deer, and bighorn sheep or supplemented their diet with wildfowl eggs. Bands could also gather or trade for bitterroot, prairie turnips, and camas bulbs in spring and early summer...These products were eaten immediately or dried and kept for later use. (Binnema, 2001: 40-41)

Most of the human groups dispersed throughout the moist mixed grasslands following the bison in the spring. Bison were generally hunted with bow and arrows at this time. Indians sometimes hunted bison from horseback and sometimes with guns, but this was rare before 1860 (Binnema, 2001: 41).

By late spring and early summer the weather became warmer and drier and growth of cool-season grasses slowed. Warm-weather grasses like blue grama grew quickly in the dry mixed grasslands. Bison bulls reached peak condition in July and came into rut in midsummer, peaking in early August. Large herds of bulls and cows formed in the dry mixed grasslands. Human groups formed larger encampments at this

time, especially after the introduction of horses. Women gathered berries, especially saskatoon berries, which were both eaten fresh and dried for later use.

By late summer, water sources dried up, grasses dried and forage became scanty. Bison drifted to the moist mixed prairie and river valleys where water and forage were more available. Human groups followed, usually in small groups. The bison continued to be hunted mainly by stalking and surrounds by small groups of hunters.

September and October are usually dry on the Northwestern Plains. Bison drifted to the fescue grasslands but tended to stay in open areas as long as forage and water were available. At this time the bands repaired the buffalo jumps and pounds. Jumps were strategically situated cliffs over which bison herds could be directed. Bison that fell over the cliffs were commonly killed or injured by the drop. Some hunters with bows and arrows were stationed at the cliff base to kill any survivors. Pounds were circular corrals surrounded with high fences constructed of trees. Bison herds were chased or enticed to enter the corrals, after which the entrance was barricaded and the hunters could then use bows and arrows to kill the trapped animals.

In the fall, “[h]unters attempted communal bison hunts whenever circumstances permitted” (Binnema, 2001: 45). The proper topography and wind conditions were essential to use a jump or pound effectively. These also required cooperation of all the band members. Human groups set up camps in sheltered foothills and parklands where trees for shelter and winter fuel were available.

During the winter bison were able to sustain themselves on the fescue grasses frequently exposed along the foothills by the foehn winds known locally as “chinooks”. These warm dry winds are created by differential air pressure and moisture conditions as

air passes over the Rocky Mountains. As a result, “part of the region remains generally snow free and relatively warm for much of the winter” (Binnema, 2001: 29).

Over the winter, bison lost weight and were lean by spring. “Each animal’s potential to provide sustenance for humans reached its lowest level in late March or early April” (Binnema, 2001: 50). Humans at this time were often fat deficient and were forced to depend on meat and pemmican dried earlier in the season. At times they killed large numbers of animals only to harvest tongues, backfat, and foetuses (Binnema, 2001: 51).

The concentration of bison along the margins of the plains in the foothills and parklands brought plains peoples into contact with “subarctic and trans-mountain bands along the margins of the plains” (Binnema, 2001: 52). These groups sometimes traded, “but sometimes fought” (Binnema, 2001: 52).

At this point, there has been no quantification of the relative time each band spent in the various ecoregions. In fact, it is likely that specific bands expended different lengths of time in various ecoregions. Some foothills groups may have spent little time on the plains. Henry and Thompson (Coues, 1897: 723-4) note that for the Peigan there were “...30 or 40 tents who seldom resort to the plains, either in the summer or winter” but “...generally inhabit the thick, woody country along the foot of the mountains...”(Kidd, 1986: 14).

The seasonal round pattern outlined above is considered fairly typical of the Blackfoot (Siksika), and Peigan (Pikuni) of the Northwestern Plains in the first half of the nineteenth century and of the preceding Old Womens Phase (*c.*1750/1250 BP – *c.*225 BP).

The Columbia Trench

On the western side of the Rocky Mountains is the traditional territory of the Kootenay (Ktunaxa), centred on the Rocky Mountain Trench. Ethnographies for the Kootenay have been prepared by Johnson (1969), Schaeffer (1940), Smith (1984), and Turney-High (1941). In the northern part of Ktunaxa territory is a small group of Secwepemc speakers named the Kinbasket. They developed as a band in the mid-nineteenth century. No specific ethnology has been prepared for them, but they are acknowledged as part of the larger Shuswap group (Teit, 1909).

The Kootenay (Ktunaxa , Kootenai) Indians are an indigenous group who occupy the upper Kootenay and Columbia Valleys along the west side of the Rocky Mountains. They are usually divided into two main divisions, the Upper Kootenay and the Lower Kootenay, based on the locations of the territory they normally occupy. There are slight differences in dialect and culture between the two. The Upper Kootenay occupy the area of upper Columbia River southwards to approximately Kootenay Falls on the Kootenay River. The Upper Kootenay are viewed as more mobile, had a greater emphasis on bison hunting in the eastern foothills of the Rockies, utilised horses more than canoes, and used skin tipis (Smith, 1984: 31). The Lower Division occupy the area from Kootenay Falls down river to Kootenay Lake. The Lower Division was generally more sedentary with a greater emphasis on deer and duck hunting and on fishing. They made greater use of canoes and long, tule-covered lodges (Smith, 1984: 31).

Various ethnographers of the Kootenay have recorded names and territories associated with different bands. Identified bands are reviewed by Smith (1984). The largest number of bands was documented by Schaeffer (1935), who recorded that there

were seven Upper Kootenay bands and three Lower Kootenay bands. The northernmost band was called agiskənəkkinik, who occupied the area between Columbia and Windermere Lakes, with their principal location near Fairmont Hot Springs (cited in Smith, 1984: 38). Schaeffer recorded their territory as extending northwest along the Spillamacheen River. “After the Tobacco Plains band ... began hunting bison, these northern people joined them seasonally, travelling eastward by way of Sheep Creek and across the Continental Divide.” (Smith, 1984: 38).

A second band recorded by Schaeffer (1935) was the agámnik.

This band lived in the Ft. Steetle area in the pre-horse period but were exterminated by dysentery. They crossed to the eastern slopes to hunt bison by way of North Kootenay Pass. This group did not cultivate tobacco but gathered wild plants near Canal Flats. A subgroup (the gainta-k) lived on the large flat west of Whiteswan Lake, B.C. (Smith, 1984: 38).

A third major band was the aganahó.-nek. Their principal base was at Tobacco Plains.

In the Kootenai Valley to the north, they journeyed as far as White River,...Along the Columbia, however, they travelled still farther north. For well over a hundred years ago [i.e., before 1835] they . . . [were accustomed to hunt] moose and elk with the . . . [Ferne “Plains”] group downriver from the Columbia Lakes (Smith, 1984: 38).

Smith constructed a generalised seasonal round for the Upper Kootenay. He noted that there were major differences between the Upper Kootenay subsistence pattern and that of surrounding groups. The Kootenay did not have

...a limited sequence of relatively distinct periods of intensive, focused, and different subsistence activities. Rather the upriver bands hunted and fished to a varying but still significant degree throughout the year and their root digging and berrying activities involved a broad spectrum of plants as they ripened during the growing season. This different resource management strategy is clearly a functional response to a very different resource

environment, one without fine salmon fisheries, large camas fields, and rich bitterroot grounds. (Smith, 1984: 78).

The Upper Kootenay seasonal round developed by Smith (1984: 79) is focused on the bands based along the Kootenay River. It began in the spring in March and April when new growth of plant shoots began. Balsamroot (*Balsamorhiza sagittata*) was one of the earliest spring plants whose roots were dug up and eaten fresh. Spawning trout were also collected in basket traps and weirs. Caribou hunting was undertaken to secure "...animal fat that had been missing in the winter diet" (Schaeffer, 1940: 27, cited in Smith, 1984: 79). Hunting of deer and elk was also undertaken. In May families moved southward to be near the various root grounds and the women began "the serious root digging season" which focused on bitterroot and camas south of Tobacco Plains on the Canada-US border (Smith, 1984: 80). Bitterroot (*Lewisia rediviva*) and camas (*Camassia quamash*) were not available in the Central Canadian Rockies, but yellow avalanche lily corms (*Erythronium grandiflorum*) became available at lower elevations beginning in late May. Men continued to hunt deer during this season (Smith, 1984: 80).

In mid-June, groups of Upper Kootenay crossed the Rockies onto the Northwestern Plains around Crowsnest Pass and southward into Montana. The acquisition of horses made this early summer bison hunt possible according to Schaeffer (Smith, 1984: 81). The Upper Kootenay travelled in a large group of over 80 lodges to ensure protection from possible attacks of Piegan and Blood. Within four weeks all the meat required was obtained and then transported back to Kootenay Valley.

In July, the Upper Kootenay caught whitefish (*Coregonus clupeaformis* and/or *Prosopium williamsoni*) along the creeks that entered Columbia Lakes (Schaeffer, 1940: 32). Hunting of deer, bear, elk, moose, caribou and bighorn sheep was also undertaken

at this time. Deer and elk were driven down from higher altitudes to waiting bowmen (Schaeffer, 1940: 22). Throughout the summer a variety of berries was collected beginning with saskatoons (*Amelanchier ainifolia*) and soapberries (*Sheperdia canadensis*), followed by wild raspberries (*Rubus idaeus*), blueberries (*Vaccinium cespitosum*, *V. membranaceum*), thimbleberries (*Rubus parviflorus*), “red willow” berries (red-osier dogwood berries, *Cornus sericea*), and wild gooseberries (*Ribes oxyacanthoides*) and currants (*Ribes cereum*, *R. hudsonianum*). As summer progressed, berries at higher elevations ripened including mountain blueberries and huckleberries (*Vaccinium membranaceum*), as well as white-bark pine nuts (*Pinus monticola*). All of these were eaten fresh, but were also dried and stored for later use (Smith 1984: 82). Black tree lichen (*Bryoria fremontii*) was also collected and made into cakes or loaves. At this time the people were scattered in small family groups.

David Chance (1973) reviewed the utilization of a key salmon fishing location at Kettle Falls, located along the Columbia River, just south of the British Columbia – Washington border. He utilised the records of the Hudson’s Bay Company which maintained the Colvile fur trading district from 1821 to 1871. Fort Colvile was the principal post of this district located at Kettle Falls. During this period the Kootenay Indians were served by a subsidiary post called Fort Kootenay. The prolific supply of salmon² at Kettle Falls was a major attraction to all the tribes of the region and the sharing of these resources was a standard practice. The salmon run at Fort Colvile occurred between June and September. The Kootenay were one of the groups who came

² There are five Pacific salmon species. The ones caught most commonly at Kettle Falls were likely Coho (*Oncorhynchus kisutch*) and Chinook (*O. tshawytscha*) salmon.

regularly to obtain a share of these resources. In 1830, they were trading at Fort Colville in June and July (Chance, 1973: 19). Most of the other groups who regularly came to Kettle Falls were there either through the entire four months or came in August and September. Kettle Falls was closer to the Lower Kootenay territory and it is probable that the Lower Division of the Kootenay may have used the falls more regularly. Perhaps the falls also attracted some of the Upper Kootenay.

In late August, some families moved northward to the salmon fishing areas along the Columbia River. The salmon runs lasted until late September or early October. Those families who arrived earliest in August would assess the volume of the salmon run. If it was anticipated to be extensive, messengers would be sent to notify other groups to join in (Smith, 1984: 83).

In early September some groups began to head to the plains for the fall hunt. On the way they would hunt elk, bighorn sheep and mountain goats (Schaeffer, 1940: 29, cited in Smith, 1984: 83). Those groups who remained in the Columbia Valley hunted elk, which were “still in high elevations at the edge of the timber” (Schaeffer, 1940: 23, cited in Smith, 1984: 83). As autumn progressed, a new set of berries ripened including bog cranberries (*Vaccinium oxycoccus*), wild rose hips (*Rosa* spp.) and kinnikinnick (*Arctostaphylos uva-ursi*). These could be harvested even after being frozen. Men fished for trout (*Oncorhynchus mykiss*, *Salvelinus malma*) and char (*Salvelinus namaycush*) along the Kootenay and Elk Rivers. “Deer taken in drives with the aid of dogs, were chased down from the hills to waiting hunters below. Elk and caribou were also hunted especially prior to the rut. Those who had crossed the mountains on the fall hunt returned from the plains” (Smith, 1984: 84).

For the Upper Kootenay, winter was spent west of the Rocky Mountains in their own valleys. Although they lived primarily on dried and stored foods, they continued to hunt for game. Deer, elk, moose, caribou and bighorn sheep could all be hunted, often using dogs and snowshoes, where required:

...only the Michel Prairie Kutenai habitually went east to live on bison throughout the colder months [near Crownest Pass]. Later but still before horses were acquired, other bands of the upriver division, Schaeffer reports, adopted this same winter pattern...in the case of these other groups Schaeffer is apparently referring to brief winter journeys east of the Divide, not to full winter residence on the east-facing slopes (Smith, 1984: 85).

These cross-mountain trips would have been conducted on snowshoes. Hunting animals in deeper snow was not difficult and bison, elk and moose could be approached easily if hindered by deep snow. However, meat acquired at this time would have had to be carried home on peoples' backs (Smith, 1984: 86) or on sleds.

Schaeffer (1982:5) identified aspects of the annual economic cycle for the Michel Prairie Kutenai, centre in the Elk valley south of the study area:

In winter they journeyed eastward well into the eastern foothills of southwestern Alberta to hunt bison. Mostly, they seemed to have ranged between Crowsnest Lake and Waterton Lakes, but a number of their campsites extended east to the junction of the Oldman and Bow Rivers.

This, and other hunts were carried out on foot, supplemented with snowshoes during most of the winter season. At times they penetrated for some distance into the grasslands to pursue free herds, to raid the Shoshoni Indians, or to visit friendly tribes, such as the Cree. According to Kutenai informants, the Blackfoot were not resident in the foothills of extreme south-western Alberta at this time.

The Michel Prairie band were said to have used dog travois for transport in the level, tree-free country east of the Divide...There is a tradition among modern Kutenai of this group impounding buffalo east of the Rockies...The Michel Prairie people took advantage, as did all the Upper Kutenai, of the buffalo's habit of seeking shelter in the wooded country of the eastern foothills to escape the severe winter storms of the open plains. Thus winter hunting parties moving eastward from the mountains usually encountered scattered buffalo in the vicinity of Crowsnest Lake. There the animals were run into snow drifts in the

broken country of Crowsnest valley, killed with spear or bow and arrows, butchered and the meat cured nearby...In spring, the Michel Prairie band moved westward across the Divide, via Crowsnest Pass, to plant tobacco and to engage in fishing, gathering and upland game hunting...Between planting and harvesting seasons, they hunted elk and other game in Elk River valley. At other times they used to join the Tobacco Plains band in hunting moose and elk north of Columbia Lakes, occasionally going as far north as Golden, B.C.

The Michel Prairie people are believed to have taken fish in Whiteswan Lake during the summer excursion west of the Divide and occasionally in winter in the foothills streams east of the Divide...Apparently at times some of the Michel Prairie group moved north to the Columbia-Windermere Lakes for the fall migration of salmon. Others moved across the Rockies for the fall buffalo hunt, traveling south to Crowsnest Pass and across to the west side (Schaeffer, 1982:5).

The Secwepemc or Shuswap

Two bands of the Secwepemc or Shuswap utilised parts of the Rocky Mountains in eighteenth and early nineteenth centuries. The Snares lived along the Athabasca River near Jasper but little is known about the seasonal subsistence round for this group.

Another Shuswap band, call the Texqokallt or North Thompson Band, hunted along the upper Columbia River along Kinbasket Lake and ranged into the upper Red Deer and Bow Valleys. These may have moved into the area previously occupied by the Snares. This group lived by hunting a variety of game including deer, bighorn sheep, mountain goats, elk, moose, marmots, porcupines and other small animals. They also fished in lakes and streams and collected a variety of berries. During the summer they lived in conical lodges covered with bark or matting. In the winter they constructed semi-subterranean houses. These were made of logs arranged in a conical shape around a large depression. The entire structure was covered with earth except for a hole at the centre which allowed access using a log ladder and permitted the smoke to escape.

This group too may have died out or been superceded by another band of Shuswap led by Paul Ignatius Kinbasket. In 1850 he led a band of Shuswap into the Windermere area where they have become the Shuswap First Nation.

One of the early Shuswap ethnologists, James Teit, recorded that: "...buffalo and antelope did not inhabit the tribal territory, but they were known, and a few Shuswap had hunted them east of the Rocky Mountains" (Teit, 1909: 513). In addition, on his map of the Shuswap territory he shows a series of crosses that mark 'former villages' that extend across the Rocky Mountains and down the Red Deer River (Teit, 1909: 450). There are, however, no ethnographic data on when and how these were used.

CONCLUSIONS

The existing ethnologies of Aboriginal peoples rarely refer directly to the Central Canadian Rockies. This is partly because the surrounding groups were generally more focused on other areas with more prolific resources. Only some of the Upper Kootenay and Mountain Shuswap seem to have had the Rocky Mountains as their home territories.

The plains groups (Blackfoot, Peigan, Sarcee and Stoney) in historic times used the foothills as part of their seasonal round primarily in the winter and early spring. The bison jumps and pounds of the lower foothills and the plains margins were of greater importance to them and it is not clear how far into the mountain valleys they penetrated.

The groups based on the western side of the Rocky Mountains, the Kootenay and the Shuswap, used the Rocky Mountains during part of their seasonal rounds. The record for the Kootenay indicates that they commonly crossed the Crowsnest Pass to access the bison on the eastern slopes possibly as many as three times a year (June, summer and late

fall). It is not known if the Kootenay further north around Columbia Lake crossed the Central Canadian Rockies to access bison in the upper Bow Valley and the eastern foothills.

The ethnographic seasonal rounds of the Aboriginal groups reviewed above, indicate that there was a variety of ways of utilizing the study area. Many of the plains groups (Blackfoot, Peigan, Stoney, Sarcee) utilised the foothills and eastern slopes of the Central Canadian Rockies. In addition, some Kootenay bands and Shuswap hunting parties crossed the Canadian Rockies to take part in bison hunts in the nineteenth century. The key question for this study is how long has the pattern of use, documented in the seasonal rounds of Aboriginal Peoples of the eighteenth and nineteen centuries, been in existence or were different strategies practised earlier, and if so, why?

CHAPTER 4

ARCHAEOLOGY OF THE LATE PRECONTACT PERIOD

INTRODUCTION

This study focuses on human occupation of the Central Canadian Rockies during the last 1000 to 1200 years. The Late Precontact (Prehistoric) Period in the wider region of northwestern North America is largely distinguished by the development and widespread use of the bow and arrow. Bow and arrow technology replaced the dart and dart thrower (atlatl) over much of the region between 2500 and 1200 years BP. How and why this replacement occurred are not well understood but have been assumed generally to have resulted in increased hunting effectiveness and enhanced food returns. In turn, increased food acquisition seems to have enabled increased population densities which may have altered social organization and structures (Walde 2006). This period prior to Euro-Canadian¹ influence is termed the Late Precontact Period in the Central Canadian Rockies.

Development of the Late Precontact Period cultures did not occur uniformly in the regions surrounding the Central Canadian Rocky Mountains (Figures 4.1, 4.2). The most well developed models of Late Precontact Period utilisation apply to the areas east of the Rocky Mountains on the Alberta high plains and foothills and west in the interior plateau of British Columbia (Figure 4.2). Archaeologists on both sides of the Rocky Mountains have sometimes made assumptions about the role played by the Rocky Mountains area as a cultural and human barrier or filter, or as a source of cultural change. For example, Reeves postulated that the transition from the Pelican

¹ I shall use the term Euro-Canadian to refer to the peoples and cultures that arrived primarily within the last 200 – 300 years in northwestern North America. Europeans, Canadians and Americans were all active in the expansion of European culture into northwestern North American. Europeans arrived directly from Europe often employed by the Hudson's Bay Company. Canadians came from the French colony of Quebec and adjacent English colonies. Americans came from colonies that formed the United States of America.

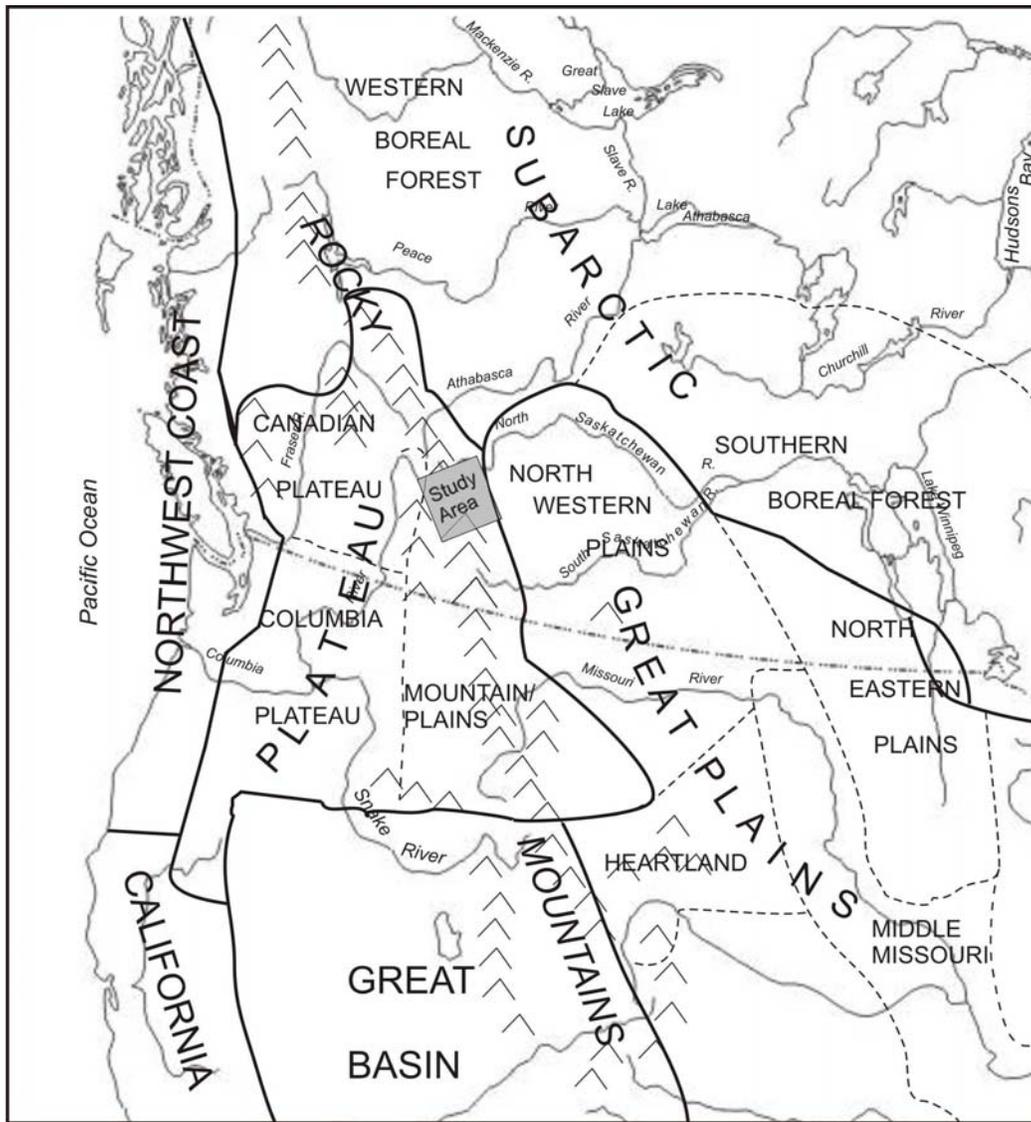


Figure 4.1 Major culture areas and sub-culture areas surrounding the study area. (After Handbook, Volume 6, 1981; Handbook, Volume 12, 1998; Schlesier, 1994)

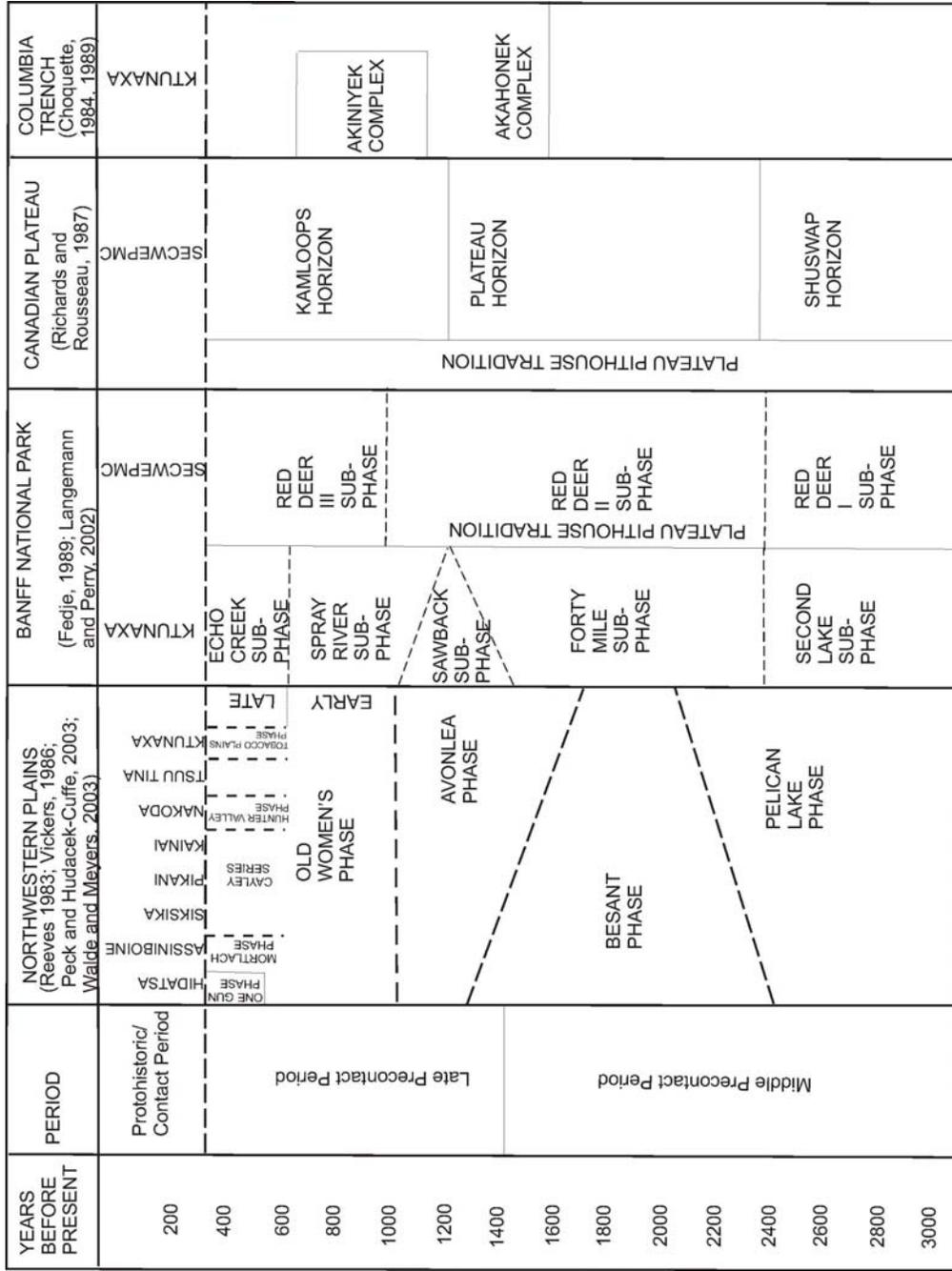


Figure 4.2 Archaeological sequences in the Central Canadian Rockies and adjacent areas.

Lake Phase to the Avonlea Phase “occurred in the eastern slopes or Rocky Mountains”(Vickers, 1994:17). A “mountain variant” of the Avonlea Phase later developed into the “Tobacco Plains Phase” which became the predecessor of the ethnographically known Kutenai (Duke and Wilson, 1994: 65). Loveseth (1980) found “[d]uring the period AD 500-1500, there seems to be evidence that there was an increasing cultural boundary between the eastern slope and the Plains ... manifested most clearly in the definition of the geographically discrete Tobacco Plains and Old Women’s phases (AD 900-1850), which are different from each other in their subsistence economies and, to some extent, artifact styles (Loveseth 1980)” (Duke and Wilson, 1994:65). Schlesier (1994:326) proposed a much more complicated model of “... at least four major movements of Athapaskan groups into the Great Plains...Initially all these groups possessed the Avonlea tradition tool assemblage.” One of these groups became the Athapaskan-speaking Sarcee group of the Contact period, while other Avonlea movements, perhaps by an intermontane route, led to the eventual establishment of southern Athapaskans (Apache, Navajo, Mescalero, etc.)(Schlesier, 1994:328-329). As in these examples, the “mountains” have sometimes become an explanation for processes not well understood and for which there is little or no evidence.

Archaeological understanding of culture development in the Canadian Rockies continues to be obscured by limited archaeological research and poorly defined cultural phases in the Upper Columbia Basin and other peripheral areas. In this chapter I review the archaeological understanding of the Late Precontact Period in the regions surrounding the Central Canadian Rockies. I will also discuss Fedje’s (1989) defined sub-phase for the Central Canadian Rockies themselves.

REGIONAL ARCHAEOLOGICAL FRAMEWORKS

Archaeologists organise archaeological materials, sites and systems into broad regional frameworks. These are gradually expanded, modified and refined over time due to new discoveries, investigation of additional archaeological sites and the progression of archaeological research, approaches and theories. These archaeological frameworks follow the approach formulated by Willey and Phillips (1958) in which archaeological units are divided into periods, traditions, complexes, horizons and phases. These units are defined based on observed differences in archaeological materials over time and space. This system continues to be used widely in North American archaeology and in the region surrounding the study area (Reeves, 1983; Richards and Rousseau, 1987; Schlesier, 1994).

The entire range of precontact history in Northwestern North America is commonly divided into broad periods spanning several thousands of years. The Early, Middle and Late Prehistoric Periods are defined based on major technological changes (Mulloy, 1958). In the Northwestern Plains, these correspond to the predominant use of thrusting spears, atlatls or arrows. The Contact Period refers to the period of contact between Euro-Canadians and Aboriginal people up to the establishment of treaties with Plains groups in 1876 and 1877.

Each period can be further divided into a number of sub-units. A phase is an archaeological unit with a distinct set of archaeological characteristics over space and time (Willey and Phillips, 1958: 22), including tool types, manufacturing techniques and subsistence strategy. These are commonly distinguished over local or regional areas and occur over defined time periods. The term subphase is used for a part of phase that is distinguished in time or space.

Phases can also be linked with other phases in larger units that span time and/or space. Where aspects of technology or economic subsistence continue over longer time spans, these can be viewed as part of larger traditions. Where phases are linked over a broad regional area these can be termed horizons. When the relationship between different archaeological assemblages is not well understood, the term complex is sometimes used.

The archaeological history of North America began more than 15,000 years ago when people first migrated to North America. Over time they dispersed widely, occupied all parts of the continent and soon developed distinct lifestyles. By the time of European contact there were hundreds of languages and cultures throughout North America.

The occupation and utilization of the Central Canadian Rockies in the past have been viewed as influenced by three surrounding cultural areas: the Northwestern (Alberta) Plains to the east; the Columbia Trench and Basin to the southwest; and the Interior Plateau of British Columbia to the west (Fedje, 1989; Fedje and McSparran, 1988; Langemann and Perry, 2002). The origins and development of the Late Precontact Period of each of these are reviewed briefly here.

Northwestern Plains

The Northwestern Plains region includes southern Alberta and Saskatchewan and portions of northern Montana (Figure 4.1). This area is characterised by vast grassland plains with relatively little relief. Broad shallow rivers flow across the region generally from west to east. Trees are limited to river valleys, some uplands and the eastern foothills of the Rocky Mountains.

The extensive grasslands once supported huge herds of bison which formed the primary food supply of the hunter-gatherer groups which developed there. Bison provided not only the primary food source but also skins for shelters, bones for tools and many other essentials for the societies. Bison were hunted both individually and collectively. Hunting herds of bison required hunters to organise complex task groups to kill multiple animals by encircling or surrounding herds; or driving herds into pounds (corrals) or over steep cliffs (jumps). The hunting-gathering societies moved frequently to take advantage of seasonal climatic variations and bison movements. During the period of first contact with Europeans, the Northwestern Plains were occupied by several different groups of Aboriginal people including the Blackfoot, Sarssee, Gros Ventre, Plains Cree, Sioux, and Assiniboine.

The Late Precontact Period began between 1750 and 1250 years BP and ended about 225 years BP. Between 1750 and 1250 years BP two distinct cultural units, the Besant and Avonlea Phases, existed contemporaneously. The Besant Phase (2500 – 1250 years BP) is considered the final phase of the Late Middle Precontact Period (Reeves, 1983:8). It existed with and shared much of the Northwestern Plains with the Avonlea Phase (1750-1150 years BP) during the initial part of the Late Precontact Period (Vickers, 1986:88). Between 1250 and 1150 years BP sites with Besant and Avonlea Phase materials were replaced or transformed with sites with a new assemblage of materials. This phase is termed the Old Women's Phase.

Old Women's Phase (1200-225 BP)

The final phase of the Late Precontact Period in the Northwestern Plains is termed the "Old Women's Phase" (Unfreed and Van Dyke, 2005:15). The term was first used in the archaeological literature by Reeves (1969). The phase is based largely on

excavations undertaken at the Old Women's Buffalo Jump (Forbis, 1962). Forbis (1962) defined a variety of projectile point styles and created battleship-shaped curves based on the distribution of these types (Figure 4.3). Definition of the Old Women's Phase has been evolutionary in the archaeological literature and the use of this phase name has not been rigidly applied. Alternative names used for this cultural manifestation are "Old Woman's phase", "late Side-Notched Series", "Saddle Butte Complex", "Pass Creek Phase" and the latter half of the "Neo-Indian" period. As Unfreed and Van Dyke comment:

Despite some similarities between these cultural and temporal units, there has been a great reluctance to organised them into a more cohesive organizational framework. This reluctance occurs despite the commonality of cultural traits identified in these variously named entities ... (2005:15).

They add that these various units are often interpreted as having the same ancestors and descendants. However, for many archaeologists both the antecedent and descendent relationships remain unclear so that some archaeologists prefer to utilise alternate or more generic terms. As Peck and Ives (2001:186) comment:

These rising and falling frequencies of varieties through time may express stylistic variability emerging, dominating assemblages and then waning through these socially channelled demographic processes affecting the large band or tribal sized entities likely to gather for communal hunting at major buffalo jumps. This might happen in two ways. It could sometimes reflect the actual appearance and disappearance of such social groups. Perhaps more commonly, however, it would reflect the circulation of people as well as ideas about projectile point manufacture in a framework where at least the larger social groups tended to persist, but where personnel composing these groups and the varieties of the points they made fluctuated across the generations.

The complexities of ancestral cultural origins and the relationships of the Old Women's Phase to descendant cultures of the Contact Period are discussed below.

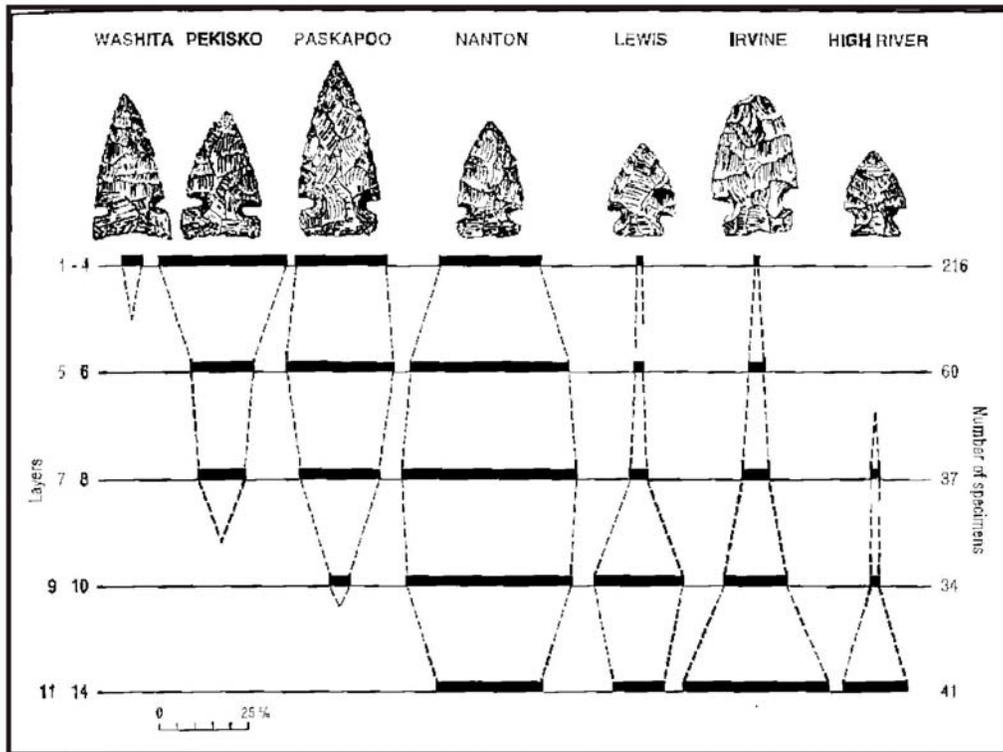


Figure 4.3 The battleship-shaped curves for late side-notched projectile point varieties as Forbis (1962:95) presented them for the Women's Buffalo Jump, with examples of the varieties above each frequency polygon (from Peck and Ives 2001:187).

A detailed definition of common traits for the Old Women's Phase has yet to be attempted, primarily due to the widespread nature of a few distinguishing traits within and beyond the Northwestern Plains (Vickers, 1986:101). This task is complicated by the large volumes of generic materials often found at sites attributed to this phase. There are, however, some characteristic features of the Old Women's Phase that are used to identify component assemblages, primarily ceramics and projectile point styles. Generally, sites that contain projectile points that conform to those named types defined at the Old Women's Buffalo Jump (Forbis, 1962; Figure 4.3) or identified as Prairie or Plains side-notched projectile point styles (Kehoe, 1973; Figure 4.4), combined with Saskatchewan Basin complex pottery (Byrne, 1973) are considered part of the Old Women's Phase (Unfreed and Van Dyke, 2005:16;

Figures 4.4 and 4.5). In a recent analysis of precontact pottery wares from Alberta, Walde and Meyers (2003) identified that the Late Variant Saskatchewan Basin complex pottery (Byrne, 1973) was equivalent to Ethridge Ware first described by Wedel (1951:131-133). Ethridge Ware pottery is now associated with later Avonlea Horizon components and continues throughout the Old Women's Phase (Walde and Meyers, 2003: 142-143).

Antecedents of the Old Women's Phase

The Old Women's Phase derives from the preceding phases dating from approximately 2500 to 1250 BP. During the latter half of this time two main cultural groupings co-existed: The Besant Phase and the Avonlea Phase.

The Besant Phase has been viewed as the final phase of the Late-Middle Prehistoric Period (Dyck, 1983; Reeves, 1969, 1983; Vickers, 1986). Besant Phase materials and sites extend from Wyoming northwards to the North Saskatchewan River of Alberta. Besant Phase occupations rarely occurred west of the Foothills fronts. They extend across the Northwestern Plains eastward into Saskatchewan and northwestern North Dakota. Characteristic artifacts include large side-notched dart or atlatl points (Besant Points), smaller side-notched arrow points (Samantha Points) and ceramics with smoothed or cord-marked exterior surfaces (Figure 4.4). Walde and Meyers (2003:137) note that ceramics in direct association with other Besant Phase materials have so far been found at only one site in Alberta, the Ross Glen Site (DIOp-2) (Quigg, 1986) although the association has been found in at least six sites in Saskatchewan. The ceramic vessels have elongated, conical shapes with straight rims. The exteriors can be either cord marked or smoothed and some have decorations consisting of punctates and bosses below the rim. Similarities exist to Plains

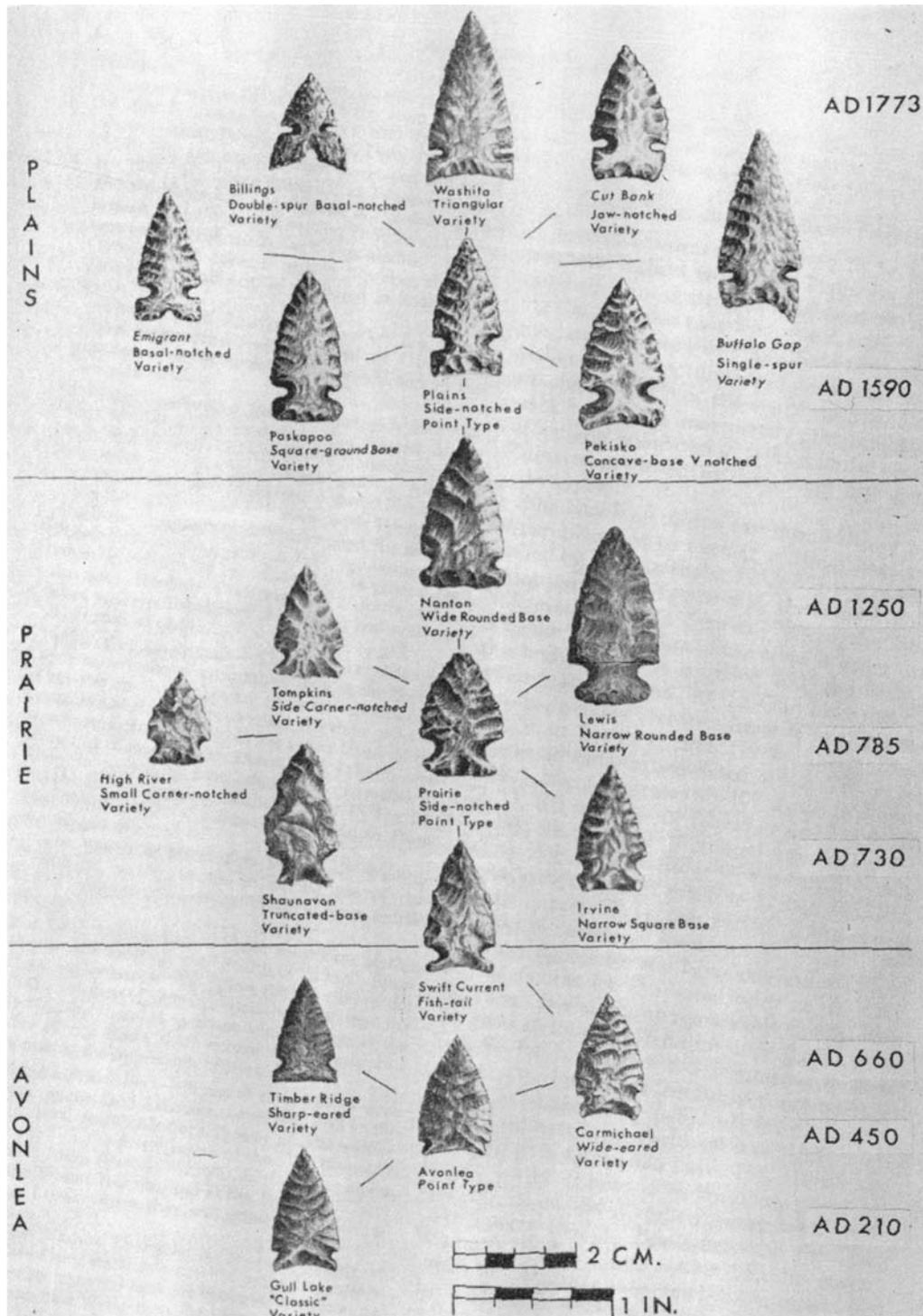


Figure 4.4 The small side-notched point system of the Northern Plains. (After Kehoe 1966:833)

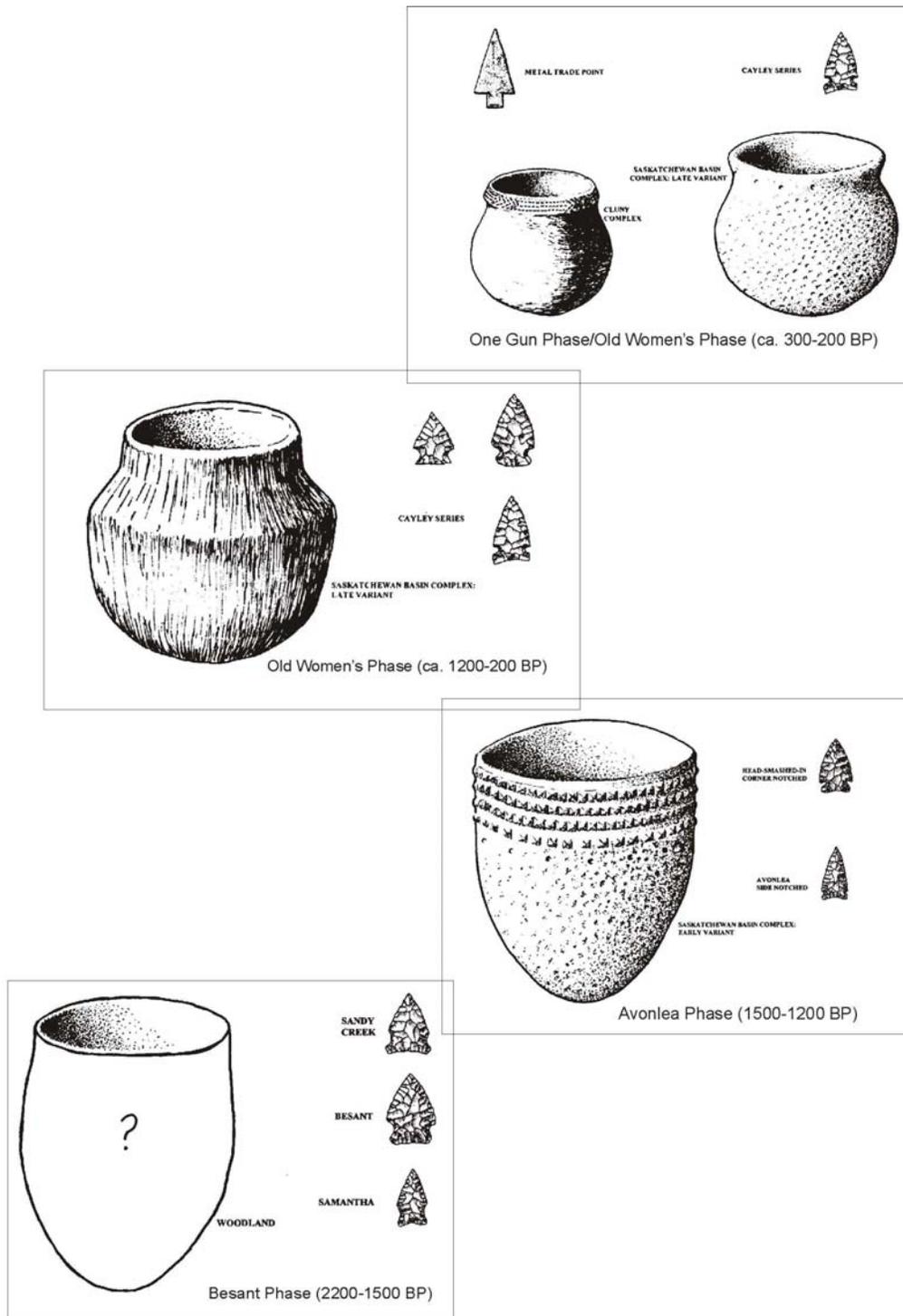


Figure 4.5 Representative ceramic and projectile point styles for the Lake Precontact Period on the Northwestern Plains. (After Peck and Hudacek-Cuffe, 2003)

Woodland assemblages found to the south and southeast. Walde and Meyers suggest that ceramic vessels may have been exchange goods rather than have been manufactured by Besant peoples (2003:139). Besant Phase peoples were highly adapted as bison hunters and the culture reached a “cultural climax” that “...was never reached again on the Northwestern Plains” (Frison, 1978:223). Besant Phase has been viewed as part of the Napikwan Tradition that derived from the earlier Oxbow Phase and possibly even earlier from the Mummy Cave Phase and continued on through the Old Women’s Phase to the historic Blackfoot (Figure 4.6).

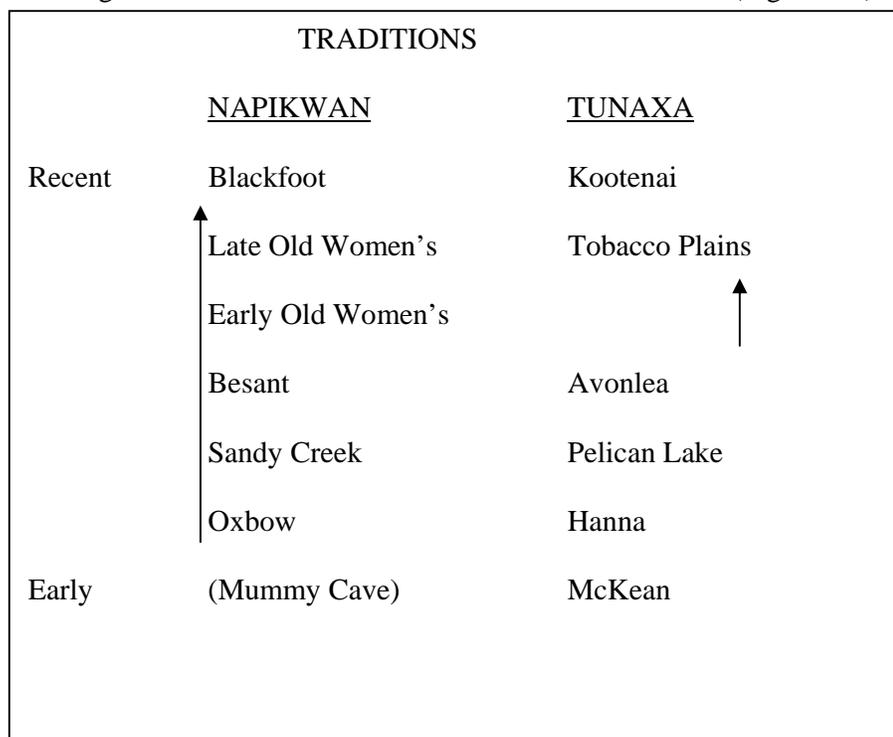


Figure 4.6 Cultural traditions on the Northwestern Plains of North America. (After Reeves, 1983; Vickers, 1986)

Major excavated Besant Phase sites in Alberta include Kenney Site, a major campsite; several bison kill sites including Head Smashed-In Buffalo Jump (Brink *et al.*, 1985; Brink and Dawe, 1989), Old Women’s Buffalo Jump (Forbis, 1962) and

Mulbach (Gruhn, 1969); and tipi ring sites Ross Glen (Quigg, 1986) and Coal Creek (McIntyre, 1978).

The Avonlea Phase began about 1800 BP and continued to approximately 1000 years BP (Peck and Hudecek-Cuffe, 2003:78). Occupation extends from Wyoming in the south to north of the North Saskatchewan River in Alberta and Saskatchewan. It has been identified from Manitoba through to the Rocky Mountain Trench of British Columbia. Walde and Meyers (2003) suggest that, due to its broad extent and regional variations, this should be termed the Avonlea Horizon. Avonlea Phase sites include bison jumps and traps including the Lost Terrace Antelope Kill on the Missouri River of Montana (Davis, 1978), Ramillies Bison Kill in southeastern Alberta (Brumley, 1976), the Estuary Bison Kill, Saskatchewan (Adams, 1977) the Wardell Trap, Wyoming (Frison, 1973), Gull Lake, Saskatchewan (Kehoe, 1973) and Head-Smashed-In, southwest Alberta (Reeves, 1978). Campsites have also been excavated along the Belly River, Alberta (Quigg, 1974), in Waterton National Park, Alberta (Reeves, 1980) and the Garrett Site, Saskatchewan (Morgan, 1979). A major Late Avonlea tipi ring site has been excavated near Empress, Alberta (Reeves, 1977).

The Avonlea Phase is characterised by small, thin, often finely-made projectile points with small side or corner notches. Many of these are made of selected thin blanks, another unique feature of Avonlea (Kooyman, 2000). Three types of projectile points are commonly recognised in Alberta: Avonlea Triangular, Timber Ridge Side Notched, and Head-Smashed-In Corner notched (Reeves, 1983:102; Vickers, 1986; Figure 4.4). The finely produced flaking and corner notches suggest similarities with the Pelican Lake Phase of the preceding Late Middle Prehistoric and led Reeves (1983) to define Avonlea, Pelican Lake, Hanna, and McKean Phases as part of the Tunaxa Tradition (Figure 4.5). The development from Pelican Lake "...is

thought to result from the diffusion of the bow and arrow from interior British Columbia and ceramics from the east” (Vickers, 1986:93). Avonlea Phase developed into the Tobacco Plains Phase in the mountains of southern Alberta and northwestern Montana (Reeves, 1983:18). He identifies the Tobacco Plains Phase as the prehistoric antecedant of the Kootenai people. On the plains, Avonlea contributed to the development of the Old Women’s Phase, but this process is not clearly defined (see below).

A distinct ceramic ware is another distinguishing artifact type of the Avonlea Phase (Figure 4.4). These are usually “...globular vessels with plain fabric/net impressed surface finish, unthickened flat or ridged lips, and decorated with bands of punctates below the lip; lip decoration occasionally occurs.”(Vickers, 1986:90). These have been classified as Saskatchewan Basin Complex Early Variant (Byrne, 1973). In Saskatchewan vessels are often conoidal and can be net impressed or spiral channelled, and sometimes partially smoothed over (Dyck, 1983:123). Walde and Meyers (2003:141) have recently identified three main types of ceramic wares associated with Avonlea: 1) Rock Lake Net/Fabric Impressed Ware; 2) Truman Parallel-Grooved Ware; and 3) Ethridge Ware. All are globular or coconut shaped with either flat or ridge lips. Ethridge Ware is typified by shouldered vessels with out-curved rims. All are commonly decorated with bands of punctates below the rim. Both Rock Lake and Truman Wares appear to have originated outside Alberta and “...represent an intrusion of ideas and/or people onto the plains at the beginning of the Late Pre-contact Period (Walde and Meyers, 2003:141). Ethridge Ware is found in Late Avonlea assemblages and becomes the dominant ware type in the Old Women’s Phase.

Origins of the Old Women's Phase

Duke (1979:7) has identified five possible hypotheses to explain the origin of the Old Women's Phase:

- 1) the phase arose when Avonlea phase people were displaced by Besant phase people, resulting in the creation of the Old Women's Phase;
- 2) the phase arose when Besant phase peoples were displaced by Avonlea phase people, resulting in the creation of the Old Women's Phase;
- 3) the Old Women's Phase is the result of an assimilation of a few Avonlea phase traits into a more dominant Besant phase culture;
- 4) the Old Women's Phase is the result of an assimilation of a few Besant phase traits into a more dominant Avonlea phase culture;
- 5) the Old Women's Phase represents an entirely new cultural tradition that displaced both the Besant and Avonlea phase cultures on the Alberta prairie/plains.

(cited in Unfreed and Van Dyke, 2005: 17).

There is as yet no uniform agreement on the developmental process of the Old Women's Phase and the topic will require considerably more analysis. There are, of course, more interpretative possibilities. Duke's five hypotheses are phrased in traditional cultural history terms in which archaeologically-defined cultures equal socio-cultural groups. Most of his hypotheses imply some type of migration or displacement of people. Other interpretations are possible such as adoptions by resident groups of new technology, or cultural modifications in response to environmental or cultural forces. However, what remains puzzling is that for close to 650 years, from approximately 1850 years BP to 1200 years ago, two distinct cultural groups (Besant and Avonlea) with distinct tool types, lithic technologies and ceramics

co-existed on the Northwestern Plains. Then the Besant Phase disappeared or transformed to be replaced by the Old Women's Phase. However, some sites of the Avonlea Phase continued as distinct for an additional 200 years until perhaps 1000 years ago when they too disappeared or were subsumed by Old Women's Phase.

Recently, Walde (2006) has suggested that increased horticulture, primarily maize cultivation, along the eastern plains about 2000 years ago enabled increased populations in the Eastern Woodlands. Horticulture expanded into the Middle Missouri sub-area of the North American plains by AD 1000. This may have stimulated the development of larger "...tribally organized, semi-sedentary communal bison-hunting peoples" (Walde 2006:298). Their emphasis on collective bison kills (jumps and pounds) enabled a life style in which "...pre-horse Late Prehistoric northern plains people were relatively sedentary for extended periods of their year, particularly during the winter months, and lived in very large groups for much of the time" (Walde 2006:303). These larger tribal societies may have been organised to resist encroachments from neighbouring tribal peoples to their southeast.

Refinement of the Old Women's Phase

Kehoe (1966) divided the small side-notched projectile points styles found on the Northwestern Plains into two primary divisions: Plains and Prairie. These groups have chronological implications with Prairie styles dating c.1200-700 years BP and Plains styles dating c.550-225 years BP (Figure 4.3). The type site of the phase, the Old Women's Buffalo Jump (EcPI-1), is located along the edge of Squaw Coulee about 90 km south of Calgary. It was excavated in the late 1950s (Forbis, 1962). One of Forbis' selection criteria for investigating this site was its association with Blackfoot mythology. The site is located at the base of a cliff over which herds of

bison were repeatedly chased and killed. The lower cultural layers (15-29) contained Pelican Lake and Besant dart points. Cultural layers 1-14 contained small side-notched points of the Late Prehistoric Period. Forbis developed a point typology that he then used to create seriation curves (1962:85ff). Differences in point styles were reduced to a number of measurements considered chronologically useful (see Vickers, 1985:98). The prevalence of some of these types varied through time during the Old Women's Phase (Figure 4.4).

More recent analyses of projectile points of the Old Women's Phase suggest that the wide variation in small notched arrow point styles may reflect tribal or band groupings encountered during the historic period (Peck and Ives, 2001). Statistical analyses of projectile points identified that a cluster of projectile points styles termed the Cayley Series was widespread across the entire region between 1250 and 650 BP (Peck and Ives, 2001). Following about 650 BP these types persisted into the Historic Period in the northwestern portion of the region (southern Alberta, northern Montana and extreme western Saskatchewan). However, a second group, termed Mortlach Group, became dominant in the area of southern Saskatchewan. These are suggested to belong to ancestral Assiniboine peoples (Peck and Ives, 2001:188). The Mortlach Group of projectile point styles is also associated with distinctive Mortlach Phase pottery (Walde, 2003; Walde *et al.*, 1995). Materials of this phase have only been found in the lower southeast corner of Alberta (Wale and Meyers, 2003:145).

As noted earlier, Ethridge Ware ceramics become the dominant ceramic style during the Old Women's Phase. These are characterised by globular, coconut-shaped vessels usually with complex profiles (necks and shoulders) (Figure 4.4). Exteriors usually have vertical cord or fabric impression but some have been smoothed or are plain. Decorations are common consisting of punctates or incisions with point tools.

Decoration occurs on or below the lip and along the shoulders (Walde and Meyers, 2003:143).

As aspects of the Old Women's Phase become more defined, both in terms of projectile point styles and ceramic styles, archaeologists are more confidently associating these with the protohistoric and modern groups who occupied the Alberta plains. Walde and Meyers (2003:150) state that: "With the advent of Ethridge Ware, we see the first development of an indigenous, probably Blackfoot, ceramic tradition in Alberta". The association of Ethridge Ware ceramics with the Cayley series projectile points and the traditional territories of the Blackfoot people are strong indications of Blackfoot origins that extend back at least 1000 years on the Alberta Plains. Given the minutely detailed variation provided by ceramic designs, it may be possible to identify even more refined group definitions over time.

Towards the latter part of the Old Women's Phase (approximately 400-200 years BP), three distinct intrusive phases indicate brief occupations in Alberta by distinct groups. The One Gun Phase, defined largely at the Cluny site (Forbis, 1977), may represent a short-lived intrusion of Middle Missouri-related people (possibly Hidatsa) about AD 1740. The Cluny site consists of a fortified earth-lodge village of the Middle Missouri style and contains a distinctive ceramic ware (Walde and Meyers, 2003:146; Figure 4.4). The Mortlach Phase briefly discussed above has been correlated with Assiniboine people of recent times. A third, Hunter Valley Phase, was identified at the Hunter Valley Site, north of Cochrane, Alberta (Head, 1995). At that site, the Old Women's Phase stone tool assemblage was associated with a distinctive pottery style termed Hunter Valley Phase Pottery (Walde and Meyers, 2003:147). Three vessels were identified with complex profiles. Decoration consists of finger pinches along the shoulders, and chevron-shaped cord-wrapped object impressions.

These vessels appear to have been constructed in a sprang bag, a different construction technique than the paddle-and-anvil style used by makers of Ethridge Ware. Walde *et al.* (1995:231-234) suggest that these vessels were made by the arriving ancestors of the modern Siouan-speaking Stoney people who now live nearby.

The Protohistoric Period (c.AD 1700 to 1874)

The Protohistoric Period is characterised by the introduction of trade goods, and horses. Trade goods included metal objects, guns, ceramic pipes, beads, copper pots and trade silver. Many of these occur alongside traditional assemblages, while other items were quickly replaced. For example, copper kettles quickly replaced ceramic ones. Manufactured items were initially traded by Native middlemen from the east, with direct trade established by European fur traders by the 1750s. Horses also arrived on the Northwestern Plains about AD 1720. Ultimately derived from Spanish Mexico, most were acquired from Aboriginal groups to the south or southwest through trade or warfare. The introduction of horses changed many key aspects of traditional Aboriginal lifestyles. The speed and size of horses allowed for the hunting of bison from horseback. Horses also allowed people to travel greater distances over shorter periods of time and to carry heavier loads. Also during this period introduced epidemic diseases periodically swept through northwestern North America. Smallpox and measles drastically reduced populations and caused widespread social disruption. The arrival of the North West Mounted Police in AD 1874, in conjunction with signing of treaties with Aboriginal peoples, marks the end of this period and the beginning of extensive Euro-Canadian settlement.

Kootenay and Upper Columbia Basin

A cultural history sequence for the Columbia or Rocky Mountain Trench area including the Upper Columbia and Upper Kootenay river drainages had been developed by Choquette (1981, 1987, 1996). This area includes portions of southeastern British Columbia, northwestern Montana and Idaho.

The Columbia Trench is a large broad northwest-to-southeast trending valley that parallels the Rocky Mountains to the west and the Purcell Mountains to the east. This area drained by the Upper Columbia and Kootenay rivers is characterised by high mountains and narrow valleys. Much of this region is forested with only small patches of grasslands in valley bottoms. This is the traditional territory occupied by the Kootenay (Ktunaxa) people. The Ktunaxa were characterised by a diverse hunting and gathering economy. The cultural development of this area is viewed as distinct: the Ktunaxa were not as heavily dependent on bison, as was typical of their eastern neighbours on the Plains, and they were also less dependent upon anadromous fish (mainly salmon) than their neighbours to the west on the Canadian Plateau.

Late Precontact Archaeological Complexes (2500 BP to contact)

During this period, gradual changes continued in technology, lithic material preferences, settlement patterns and the subsistence base. Two archaeological complexes (the Akiniyek Complex and the Akahonek Complex) have been defined for the Rocky Mountain Trench (Choquette, 1984; 1985).

The Akiniyek Complex (c.1000 – 550 BP) is focussed in the Middle Kootenai Valley in Montana. It is characterised by projectile points similar to those of the Avonlea type on the northwestern region. Lithic materials utilised consist of chert from northwestern Montana sources, predominantly the Madison Formation.

The Akahonek Complex (c.1500 BP – contact) is found on large, intensively utilised sites on alluvial terraces in the Rocky Mountain Trench. It is characterised by small side-notched and triangular projectile points. “Choquette interprets this complex as the archaeological manifestation of the pre-horse Upper Kootenay lifeway” (Langemann and Perry, 2002: 17). It is characterized by “...large winter ‘macroband’ encampments near winter ungulate range...plus small, dispersed, temporary camps at resource exploitation foci on higher terraces and in tributary mountain valleys [which] probably represent spring-summer-fall ‘microbands’ of variable composition that splintered off the main wintering group and dispersed throughout the region on hunting, fishing, and gathering ventures” (Choquette and Fedje, 1993: 43). The dominant lithic material consists of Top of the World chert.

Canadian Plateau

The culture history sequence for the Canadian Plateau has been primarily developed in the Mid-Fraser/Thompson River area of Central British Columbia. This framework is derived from Fladmark (1982), Hayden and Schulting (1997), Peacock (1998), Pokotylo and Mitchell (1998), Richards and Rousseau (1987), Rousseau (2004), Sanger (1970), Spafford (1993), and Stryd and Rousseau (1996).

The Canadian or British Columbia Plateau is a large region of low rounded mountains and broad valleys. Large and small lakes are quite common. Rivers with large volumes of water drain this region to the Pacific Ocean in the west. This area includes much of the drainage basin of the Fraser River east of the Coastal Mountain Range. The ethnographic cultures of the British Columbia Interior Plateau are characterised by semi-nomadic settlement patterns, where people aggregated at certain times of the year in order to harvest and process salmon, ungulate or plant

resources effectively and intensively. In the intervening periods people dispersed into small units. Winter housepit villages are commonly located in the major river valleys. Strong ties and cultural similarities are seen with the Columbia Plateau region to the south in the areas drained by the Columbia River in Idaho, Washington and Oregon (Prentiss *et al.*, 2005).

Late Precontact Period (c.4500 – c. 200 BP)

The Late Precontact Period is defined by the presence of semi-sedentary pithouse dwellings and the intensive use of fish and plant resources. This marks a departure from earlier occupations of the Early and Middle Prehistoric Periods that followed a more dispersed hunting and gathering economy. Richards and Rousseau (1987) have divided this period into three broad time and cultural horizons. These are primarily based on their work in the Thompson River – Shuswap Lake region, but there is considerable variation and local adaptation throughout the wider area. Stryd and Rousseau (1996) have expanded their Plateau Pithouse Tradition to include the earlier Lochnore phase as well as the Shuswap, Plateau, and Kamloops horizons.

The Plateau Horizon (c.2400 – 1200 BP)

The Plateau Horizon developed within the Plateau Pit House Tradition that began with the Lochnore Phase (c.5000-3500 BP) and continued through the Shuswap Horizon (3500-2400 BP). It is characterised by major rapid change in many aspects of material culture and subsistence and settlement. This was the period of greatest Aboriginal population density on the Canadian Plateau (Rousseau, 2004). Village sizes increased, with many continuously reoccupied over time. These are typically located near resource rich areas. Housepit depressions range from 4.0 to 8.0 m in

diameter, with a mean of 6.0 m. These are typically smaller than those of the preceding Shuswap Horizon and are believed to indicate occupations by nuclear families. Storage and roasting pits are often found associated with these. Common tools include bilaterally barbed, corner or basally notched project points, with overall decreasing size compared to those of earlier periods; an abundance of chipped stone endscrapers; and an increase in the types of bone, antler and tooth artefacts. The quality of lithic raw materials increases, along with enhanced quality of stone workmanship. Subsistence continued to be focussed on a wide variety of terrestrial and freshwater animal species as well as salmon. Root exploitation continued from preceding horizons as well (see Richards and Rousseau 1987; Stryd and Rousseau, 1996).

Increased populations and the development of an elite class on the Plateau and the desire for important foods and raw materials led to considerable interaction with the North West Coast cultures. The “Plateau Interaction Sphere” (Hayden and Schulting, 1997) formulates models of exchange in goods such as dried salmon and meat, root plants, nephrite, and high quality lithic materials (Rousseau, 2004). During this time medium-sized stocky dogs appear in the archaeological record and are hypothesised to have played an important role as pack dogs (Rousseau, 2004).

The Kamloops Horizon (c.1200 – 200 BP)

The Kamloops Horizon is marked by key aspects of continuity and change from the preceding Plateau Horizon. Continuity is seen in: “(1) a highly logistically organised subsistence and settlement strategy; (2) continued permanent and semi-permanent occupation of medium-sized and large winter pithouse villages; (3) use of upland base camps in locations proximal to major food resources; (4) continued extensive use of

mid-altitude and upland plant resources...; (5) a heavy reliance on salmon supplemented by deer and small animals; (6) active participation in well developed inter-regional exchange networks; and (7) continuation of a unique Plateau art tradition (Stryd 1983)” (Rousseau, 2004).

“Outstanding differences include: (1) use of medium and large housepits with a variety of floor plans; (2) appearance and persistence of “Kamloops side notched” arrow points; (3) elaboration in mobile art and decoration of utilitarian items; (4) a marked decline in frequency and intensity of exploitation of upland plant resources; and a widespread reduction in regional population densities” (Rousseau, 2004).

Housepit diameters range from 6.0 to 20.0 m, with a mean of 8.5 m. These can be circular, oval, rectangular, or square in outline, usually with prominent raised earth rims and occasional side entrances. The shift to larger pithouses may indicate occupation by extended family groups. These are generally larger in diameter than those of preceding periods and are associated with small circular or oval storage, cooking or refuse pit features. Artifacts include small, triangular, side-notched projectile points; small corner and basally notched projectile points; a variety of chipped stone scrapers, graters and perforators; and elaborately-decorated utilitarian implements. There is an increase in the quality, quantity and variety of ground stone (particularly slate) tools as well as the variety and frequency of bone, antler, and tooth artifacts (Rousseau, 2004).

Banff National Park

An area-specific cultural history sequence has been developed by Fedje (1989) and elaborated by Langemann and Perry (2002). Most of this sequence is based on the excavation of “some 30 occupation levels at 11 prehistoric sites in the Bow Valley in

the environs of the Vermilion Lakes” (Langemann and Perry, 2002: 19). Fedje used these data to construct a series of subphases for Banff reflecting changes in time, technology resource procurement and adaptation. Langemann and Perry updated this sequence, adding the results of additional excavations, surveys and including additional radiocarbon-dated components (2002: 19).

Fedje defined subphases as local expressions of phases defined for the Plains and the Plateau. However, he felt it was premature to assert strong links between the established sequences of phases and the Banff sequence. “Nevertheless, the Banff subphases do share a number of features with the Plains and Plateau phases...the people living in Banff were part of a larger human sphere of contact and trade, and were sharing in the technological advances that happened generally across a wide part of the continent” (Langemann and Perry, 2002: 19).

Middle Precontact Period

Fedje (1989) defined a series of Middle Precontact period subphases that are local variants of Northwest Plains phases including Bow River Subphase (including Bitterroot, Mummy Cave, Early Side-notched), Muleshoe (McKean), Beaverdam (Hanna), Second Lake (Pelican Lake), and Fortymile (Besant, Samantha). These are characterised by atlatl dart points with corner notched or concave bases. The Fortymile subphase is a local variant of the Besant Phase and is known from one excavated occupation at the Echo Creek site near Banff. It has a lithic assemblage composed almost entirely of local chert materials. This site “...may represent a short or seasonal intrusion by Plains groups [into the Banff area]” (Langemann and Perry, 2002: 27).

Beginning about 3000 BP there are several subphases associated with the Plateau Pithouse Tradition (Langemann and Perry, 2002; Richards and Rousseau, 1987). These have been termed Red Deer I (Shuswap Horizon), Red Deer II (Plateau Horizon) and Red Deer III (Kamloops Horizon; see Late Precontact Period below). The association of these subphases with the Plateau Pithouse tradition is through the presence of circular cultural depressions at these sites. Sites associated with this tradition are located in the upper North Saskatchewan, Red Deer and Bow River basins often on higher terraces along the major rivers. Depressions vary from one to thirteen at a single site, with depression diameters ranging from two to six metres in diameter. Tests in some of these indicate central hearths. Others contain large amounts of charcoal and fire-broken rock indicating their use as earth ovens or roasting pits. Bison and elk remains have been recovered from some of these. Langemann and Perry (2002: 28) suggest that these were not winter pit houses as used in the Interior Plateau but may have been waypoints periodically used by transient groups on their way to the plains to hunt bison. A series of radiocarbon dates from superimposed hearths at the Drummond Glacier site ranging from 2850 ± 60 to 920 ± 60 BP indicates that this site was used repeatedly over at least 1900 years. Lithic materials include Top of the World Chert from the Columbia Trench, basalts from the west of the Columbia Trench, Etherington chert from the Crowsnest Pass, and Montana chert. There is also use of local materials including quartz crystal, quartzite, local cherts and silicified siltstone.

Late Precontact Period Subphases

Four subphases of the Late Precontact period have been proposed for the Banff area. These subphases are Sawback (Avonlea), Spray River (Prairie Side-notched), Echo Creek (Plains Side-notched, Tobacco Plains) and Red Deer III (Kamloops Horizon).

The Sawback subphase is characterised by small finely-made projectile points comparable to those of the Avonlea Horizon of the northern plains (Reeves, 1983). Two sites with excavated components are known from the Bow Valley: Christensen Site (360R) (dated to *c.*1075 BP) and Echo Creek Site (515R) (estimated date *c.*1000 BP). Chert dominates the lithic assemblages (>85 per cent) and non-local materials are common (14 per cent), mainly derived from the Kootenay area.

The Spray River subphase is defined based on occupations at two sites in the Bow Valley, Christensen Site (360R) (Fedje, 1986a) and Site 1207R (Fedje and Landals, 1987). Both are dated to *c.*700 BP. The relationships of this subphase are somewhat problematic. As Langemann and Perry (2002: 32) state: “Fedje noted that the points compare more closely to Plains (Vickers 1986) than Plateau types, falling into the range of variation for Timber Ridge and Head-Smashed-In side notched (even though these are Avonlea phase descriptors). The dates put the Spray River subphase material into the more recent Old Women’s sequence, though.” The lithic assemblages are composed of more than 75 per cent cherts. Non-local lithics comprise about 10 per cent of the assemblages with 25 per cent of these Kootenay cherts and 15 per cent from southern Alberta or Montana.

The Echo Creek subphase is defined based on occupations at Echo Creek Site 515R (Fedje, 1986b; Robinson, 1985). These are dated to *c.*650 BP. Diagnostic projectile points are small, side-notched arrow points. There are not finely finished and commonly produced on flake preforms. They are similar to those of the Tobacco

Plains Horizon defined by Reeves (1983). A variety of other stone tools are found and include a distinctive class of microlithic tools – very small bifaces, scrapers and graters. Lithic assemblages are dominated by cherts (96 per cent). Non-local materials occur in small percentages (5 per cent). Non-local materials are Kootenay cherts (>80 per cent), with the remainder being Etherington or Montana cherts.

Red Deer III subphase includes sites characteristic of Plateau Pithouse Tradition. The Divide Creek Site (418R) includes circular depressions and two occupations dated *c.*700 BP and 300 BP (Fedje, 1987). The earlier component contained bison and sheep bones. The later component contained only limited materials. Some other sites of this subphase contain similar lithic materials but no circular depressions.

Langemann and Perry (2002: 33) described the difficulties of defining

Late Precontact Period sites:

Comparison is made difficult by the fact that there are very similar point styles present on the Plains and the Plateau at the same time; many of the diagnostic cultural traits, aside from the use of pithouses, are perishable items that are not preserved...However, at these sites the ethnographic and archaeological evidence is consistent with Reeves' Tunaxa cultural tradition. There is no evidence that these sites were occupied by Salishan people; ...it is also possible that trade contact between people of the Tunaxa tradition and the Plateau Pithouse Tradition allowed lithic materials and point styles to cross the Divide without a group of people physically moving.

Protohistoric to Historic Period Subphases

In the eighteenth and early nineteenth centuries the Central Canadian Rockies area was occupied by the K'tunaxa (Kutenai) and Secwepemc (Interior Salish) and by the nineteenth century the Eastern Slopes and foothills were occupied by Piikani (Peigan) and Nakoda (Stoney) (Dempsey, 1998). The period was one of great change and disruption as horses and firearms were traded from adjacent Aboriginal groups, and as

epidemic diseases caused considerable social and cultural disruption. “It is probable that K’tunaxa and Salish occupations are directly related to the last precontact occupations” (Langemann and Perry, 2002: 33). The protohistoric occupations of the Banff area are assignable to the Kootenay, Shuswap, Peigan and Stoney subphases. These contain a mixture of early historic European introduced items and Aboriginal objects.

PROBLEMS POSED BY REGIONAL ARCHAEOLOGICAL CULTURAL FRAMEWORKS

A principal focus in this study is to examine how the Central Canadian Rockies ecosystem was utilised by Aboriginal people within the last millennium. Occupants of any of the surrounding areas could have used the Central Canadian Rockies. The existing cultural frameworks for the Northwestern Plains and the Interior Plateau are broadly based and extend over very large areas. These areas include the traditional territories of several contemporary First Nations. One of the challenges for the Northwestern Plains has been to identify the Late Precontact archaeological assemblages with historically recorded ethnographic groups. The difficulties of clearly defining tribal boundaries have frustrated archaeologists working in the region. The direct historical approach linking historically-identified groups with archaeological assemblages did not meet with early success (Forbis, 1963). Several archaeologists have suggested links of historically-named groups with archaeological materials, but these are still open for debate (Brumley, 1971; Byrne, 1973; Forbis, 1962; McCullough, 1982; Schlesier, 1994). Greaves (1982) attempted to distinguish tribal identity based on stylistic and measured differences of projectile points. Brink (1986: 53) is highly sceptical of these results as is Greaves herself (*pers. comm.* 2001).

This issue has been addressed more recently in a re-examination of Late Side-notched projectile points by Peck and Ives (2001). Peck and Ives introduced the term Cayley Series to refer to a wide variety of Late Contact side-notched points found throughout much of the Northwestern Plains from 1250 to 650 BP. This was followed by the Mortlach Phase (650 BP to Historic Period) in the eastern portion of the area, including southern Saskatchewan and adjacent Manitoba, North Dakota and Montana (Walde, 2003). The Mortlach Phase is characterised by distinctive Mortlach Phase pottery and Mortlach Group projectile points. These have been suggested to be ancestral Assiniboine. In the western portion of the area, including western-most Saskatchewan, southern Alberta and northern Montana, projectile points of the Cayley Series continue until the Historic Period. These come from Old Women's Phase sites and are associated with Saskatchewan Basin Late Variant pottery. With the recovery of increased ceramic assemblages, detailed analytical studies of these, and more detailed analyses of lithic assemblages, some of these archaeological-ethnographic associations are being defined such as that for Mortlach Phase-Assiniboine (Walde, 2003), Hunter Valley Phase-Stoney (Walde and Meyers, 2003) and Cayley Series-Blackfoot (Peck and Ives, 2001). The association of any particular site as ancestral to a particular ethnographic group requires that an adequate assemblage of materials be obtained for each site. In particular, ceramics have become a key indicator of ethnographic association. For the Central Canadian Rockies, few ceramics have been recovered from any site except for the Hunter Valley Site, situated near the eastern boundary of the area. It is a unique site, the only site where Hunter Valley Phase ceramics have been recovered. Analyses of the archaeological record that consider variations in material culture may be a result of hunter-gatherer bands may prove a more useful approach (Peck and Ives, 2001: 185) but have yet to be demonstrated.

The association of Late Precontact assemblages with ethnographically-recorded groups in Interior British Columbia has been less of a preoccupation of archaeologists there. The entire Plateau Pithouse tradition is thought to represent the prehistory of the Interior Salish ethno-linguistic group (Richards and Rousseau, 1987:52). In most cases the association with distinct ethnographic groups has been accepted based on historical geography. As yet there are few detailed studies of subsistence and settlement patterns which could aid the development of regionally-defined phase sequences (Richards and Rousseau, 1987:56).

Choquette's framework for the Upper Columbia and Kootenay area extends the known ethnographic pattern into the Late Precontact period. This follows the historic ethnographic separation of the Kootenay into Upper and Lower Kootenay subgroups.

The cultural framework for the Banff-Bow Valley area (Fedje, 1989) draws on the larger regional cultural syntheses. It does not focus on examining settlement subsistence models.

The Central Canadian Rockies area, while large, was not the exclusive territory of any known historic tribal group. Instead the area was within the territories of several known historic ethnographic groups. This situation likely also existed in the past. The area of the Central Canadian Rockies was more likely to have included the subsistence areas of several "band" sized groups of hunter-gatherers. It may be possible to identify patterns of band level movements on the landscape that reveal how these groups used the area on a seasonal and regional basis.

The cultural history framework for the Banff-Bow Valley area (Fedje, 1989; Langemann and Perry, 2002) recognises that the archaeological materials found in this area are in some cases similar to those of the Alberta Plains and in other cases

bear similarities to archaeological materials characteristic of the Interior Plateau or the Columbia Trench. The archaeological materials and features found throughout the Central Canadian Rockies ecosystem may also result from the use of the unique resources found in the region, in particular local lithic material types.

CONCLUSIONS

Over the last two millennia most of the area of the Central Canadian Rockies and the surrounding areas was occupied by a variety of different groups. These are characterised by the widespread use of small side-notched projectile points. Although they possess general similarities in size, shape and form, analyses have shown considerable regional and temporal variation. Projectile points from Banff National Park have been identified with known types from both the Northwestern Plains to the east and the Columbia Basin and Interior Plateau to the west.

However, how these different associations relate to the ancient occupations of the Central Canadian Rockies is not clear. Do they result from continuous or discontinuous residency periods, seasonal or yearly visits? Was the area visited by one or more groups? Did these overlap during specific seasons of the year? Were there gaps of many years between occupations? These and other questions are explored below.

CHAPTER 5

ARCHAEOLOGICAL SITES IN THE CENTRAL CANADIAN ROCKIES

INTRODUCTION

Archaeological site locations were selected by past human groups in order to support their activities in the landscape. Some of these locations met basic human needs such as access to water, wood for heating and cooking, and relatively level ground to enable day-to-day living. Some sites were selected because of their proximity to specially valued resources such as specific plant species used for food or medicine, or to valued stone materials. Some sites were selected for specific purposes such as their convenience to a hunting locality or their association with a ritual location. Whilst not knowing the precise criteria used by precontact peoples, known archaeological sites can be analysed to determine underlying patterns of selection and use. This chapter provides a summary of recorded Late Precontact archaeological sites in the Central Canadian Rockies ecosystem. Recorded sites are assigned to functional categories, and their distribution across the landscape is discussed. Site locations are identified in relation to ecological regions, geographical features, modern vegetation cover, and altitude. A series of conclusions about site selection criteria is formulated. Further analyses of site data are presented in Chapter 7.

NATURE OF THE DATA

Archaeological site inventory data

Archaeological site inventory data was obtained from the Historic Resources Branch, Province of Alberta; the Archaeology Branch, Province of British Columbia; and from the Western and Northern Service Centre, Parks Canada, Calgary.

Archaeological inventory data varies somewhat in the details provided for each site. Data for every site include detailed locational information such as precise UTM or GPS location points, map references, verbal descriptions of the locations, initially recording dates, recorders, and references to published and unpublished reports about those sites. Specific archaeological data on site sizes and functions, quantities and types of materials recovered and assignment of the sites to specific cultural ages or periods are more inconsistent. Assignment of sites to functional categories (such as campsite, workshop or hunting station etc.) in site records is often subjective, lacking consistent criteria. The British Columbia Archaeology Branch site records and those maintained by the Western and Northern Service Centre, Parks Canada, Calgary, were available on-line. Alberta Historical Resources Branch records were not available on-line, but I manually searched and photocopied available records and Mr. Eric Damkjar also did an electronic search of their records using search criteria I requested.

All site records in the study area were reviewed to identify sites that were assigned or could be assigned to the Late Precontact and Contact Periods. Sites were classified according to functional criteria such as base camps, kill sites, and workshops based on factors such as site size, density and type of cultural materials, and the range of tool types. Site types are described in greater detail below in this chapter. Sites were plotted on base maps according to types. Archaeological site

distribution was analysed in relation to major river drainages, ecological regions, geographic locations, current vegetation cover and altitude.

In Chapter 8 the archaeological site inventory data and excavated site information are utilised to formulate models of hunter-gatherer utilisation of the Central Canadian Rockies.

DATING LATE PRECONTACT SITES IN THE CENTRAL CANADIAN ROCKIES ECOSYSTEM

Most archaeological sites examined in this study were assigned to the Late Precontact Period primarily on their association with small side-notched projectile points. In order to determine the temporal range represented by these sites a review of available radiocarbon dates was undertaken. Radiocarbon dates for some sites in the ecosystem are available from excavated and unexcavated archaeological sites. These were examined to identify if the sites are representative of part or all of the entire range of the Late Precontact Period.

A total of 60 radiocarbon dates is available from sites in the Central Canadian Rockies spanning the period from 1600 BP to 100 BP. These dates are listed in Table 5.1 and illustrated in Figures 5.1, 5.2, 5.3 and 5.4. Each date is shown with a one sigma range margin of error. Year “0” for radiocarbon dates is AD 1950 hence the latest dates are approximately AD 1850 with a margin of error of plus or minus 80 years. Most radiocarbon samples are from excavated sites described in more detail in Chapter 6.

Figure 5.1 illustrates the dates in relationship to their known cultural affiliation based on the cultural phases described in Chapter 4. This figure illustrates that dated sites associated with the Late Precontact Period span the period from just before 1000

BP to the Contact Period. Dates prior to approximately 1000 BP are associated with either Avonlea or Besant Phases. Only two dates, both from Echo Creek Site, are associated with the Avonlea Phase, while three sites (EfPq5, Echo Creek, and Hunter Valley) have components associated with the Besant Phase. One sample from the Christensen Site is associated with the Pelican Lake Phase, which is usually dated before 2000 BP. Because the Christensen Site has been subject to some disturbance, the association of a date of 1200 ± 200 BP with the Pelican Lake Phase is suspect. Radiocarbon dates from several sites could be associated with either Avonlea or Besant Phases and are therefore indicated as “unknown” in Figure 5.1.

The 47 dates associated with the Late Precontact Period span the entire 1000 year period in a continuous distribution (Figure 5.1). This indicates that the Central Canadian Rockies were utilised consistently throughout this time span with no large gaps in occupation.

Figure 5.2 shows radiocarbon dates for each site. Individual sites form early and late clusters. The early Late Precontact Period cluster includes sites dating before 600 years BP consisting of Christensen, Echo Creek, EhPv-126, EgPt-6 and EgPv-4. The later Late Precontact Period cluster dates from 600 to 100 years BP and includes Hunter Valley, 494T, and Pigeon Mountain. At these sites distinct soil horizons allow these cultural components to be clearly separated. Two sites, Columbia Lake and Salmon Beds, have radiocarbon dates that span the entire period.

The earlier group includes sites within the Rocky Mountains in the upper Bow Valley, whereas the later cluster include no dates from the upper Bow Valley, with Pigeon Mountain Site located near the Front Range and Hunter Valley found east of the mountains. Site 494T is located along the Kootenay River at the south end of Kootenay National Park. Although the sample size is small, this might indicate

reduced use of the mountain valleys after 1400 AD possibly as a result of cooler temperatures associated with the Little Ice Age.

Calibrated Radiocarbon Dates

As summarised by Stuiver *et al.* (2003), radiocarbon age was originally based on the assumption that atmospheric CO₂ has been constant over time. However, evidence from air trapped in glacier ice indicates that variations have occurred in CO₂ concentrations over time and, as a result, conventional radiocarbon dates should be calibrated to yield chronological dates. The calibration data set is developed from tree rings and other independent data samples. Because the available atmospheric carbon has varied over time, it is common for a date counted in radiocarbon years to be indicative of more than one calendrical age range. All of the dates in the Central Canadian Rockies Ecosystem were calibrated using the CALIB 5.0 radiocarbon calibration program (Stuiver *et al.*, 2003). These calibrated dates are shown on Table 5.1 as calendrical dates (AD or Christian era). Each date is shown with a 1-sigma confidence range or ranges. The probability of the date falling within the range or ranges is also indicated. Radiocarbon dates are frequently shown with both a 1-sigma and 2-sigma confidence range. Because most of the dates available from the Central Canadian Rockies are relatively recent, it was felt that a 1-sigma range of confidence would provide a more precise data set because of the smaller range of the resulting date. For example, a date of 830 ± 160 yrs BP provides an date range of 990 to 670 yrs BP at a 1-sigma range (a span of 320 yrs) but 1150-510 yrs BP at a 2-sigma range (a span of 640 yrs). The 1-sigma range provides a 68.3% probability of the date falling within that range, whilst a 2-sigma range provides a 95.4% probability of the date falling within the range provided (Stuiver *et al.*, 2003).

SITE	SITE NAME	NUMBER	DATE IN YEARS BP Note 1 below	CALCULATED DATE (CALIB 5.0*) 1 sigma range	PROBABILITY	SITE TYPE	CULTURAL ASSOCIATION	REFERENCE
EbPw-1	Columbia Lake	SFU-202	830+-160	AD 1028-1287	.1	base camp	Late Precontact	Yip, 1982
EbPw-1	Columbia Lake	SFU-99	100+-80	AD 1683-1734 AD 1806-1929	.287 .703	base camp	Late Precontact	CARD+
EbPw-1	Columbia Lake	SFU-77	110+-80	AD 1683-1735 AD 1805-1934	.288 .702	base camp	Late Precontact	CARD+
EbPw-1	Columbia Lake	SFU-108	140+-80	AD 1673-1707 AD 1719-1778 AD 1799-1825 AD 1832-1885 AD 1951-1952	.168 .294 .128 .259 .142	base camp	Late Precontact	CARD+
EbPw-1	Columbia Lake	SFU-89	330+-80	AD 1483-1642	.1	base camp	Late Precontact	CARD+
EbPw-1	Columbia Lake	SFU-80	480+-80	AD 1319-1351 AD 1390-1492 AD 1602-1612	.164 .799 .037	base camp	Late Precontact	CARD+
EbPw-1	Columbia Lake	SFU-79	800+-80	AD 1157-1283	.1	base camp	Late Precontact	CARD+
EcPp-24		RL-1564	800+-110	AD 1049-1084 AD 1124-1137 AD 1151-1291	.137 .047 .816	hunting station	Late Precontact	CARD+

SITE	SITE NAME	NUMBER	DATE IN YEARS BP	CALCULATED DATE (CALIB 5.0*) 1 sigma	PROBABILITY	SITE TYPE	CULTURAL ASSOCIATION	REFERENCE
EdPp-21		Beta-6321	340+/-50	AD 1485-1528 AD 1551-1634	.340 .660	base camp	Late Precontact	McCullough and Fedirchuk, 1983
EcPp-24		RL-1563	1450+-110	AD 436-490 AD 509-517 AD 529-672	.190 .026 .784	hunting station	unknown	CARD+
EdQa-121	Salmon Beds	CAMS-60322	610+-40	AD 1300-1330 AD 1338-1368 AD 1381-1397	.407 .394 .200	base camp	Late Precontact	Heitzmann, 1999
EdQa-121	Salmon Beds	CAMS-60323	400+-40	AD 1442-1512 AD 1601-1616	.847 .153	base camp	Late Precontact	Heitzmann, 1999
EdQa-121	Salmon Beds	CAMS-60324	710+-40	AD 1263-1298 AD 1370-1379	.883 .117	base camp	Late Precontact	Heitzmann, 1999
EdQa-121	Salmon Beds	BGS-2161	989+-50	AD 993-1049 AD 1084-1124 AD 1137-1151	.546 .340 .114	base camp	Late Precontact	Heitzmann, 1999
EdQa-121	Salmon Beds	BGS-2162	880+-50	AD 1048-1086 AD 1123-1138 AD 1150-1217	.295 .103 .601	base camp	Late Precontact	Heitzmann, 1999
EdQa-121	Salmon Beds	BGS-2163	988+-50	AD 993-1049 AD 1084-1124 AD 1137-1151	.541 .344 .115	base camp	Late Precontact	Heitzmann, 1999
EePx-y	494T	CAMS-41242	380+-50	AD 1447-1521 AD 1575-1583 AD 1590-1623	.675 .054 .271	hunting station	Late Precontact	Heitzmann, 1998

SITE	SITE NAME	NUMBER	DATE IN YEARS BP	CALCULATED DATE (CALIB 5.0*) 1 sigma	PROB- ABILITY	SITE TYPE	CULTURAL ASSOCIATION	REFERENCE
EfPq-5		RL1475	930+-110	AD 1019-1214	1	hunting station	Late Precontact	CARD+
EfPq-5		Beta-6322	1600+/- 140	AD 262-279 AD 327-600	.049 .951	base camp	Besant	McCullough and Fedirchuk 1983
EgPs-48		AECV- 1132 C	1230+-90	AD 688-754 AD 758-883	.340 .660	hunting station	no diagnostic material	CARD+
EgPs-48		AECV- 1137 C	1420+-90	AD 537-688 AD 754-759	.985 .015	hunting station	no diagnostic material	CARD+
EgPs-51	Spring Kill	AECV- 1147 C	300+-90	AD 1469-1664 AD 1788-1791	.992 .007	hunting station	Late Precontact	CARD+
EgPs-63		Beta- 90057	1330+-60	AD 648-721 AD 741-770	.745 .255	hunting station	Besant	Clarke <i>et al.</i> 1998
EgPt-6		S-1372	450+-80	AD 1402-1521 AD 1578-1581 AD 1591-1620	.849 .008 .144	hunting station	Late Precontact	CARD+
EgPt-6		AECV- 1144 C	480+-80	AD 1319-1351 AD 1390-1492 AD 1602-1612	.164 .799 .037	hunting station	Late Precontact	CARD+
EgPt-6		AECV- 1146 C	710+-100	AD 1218-1323 AD 1346-1393	.712 .288	hunting station	Late Precontact	CARD+
EgPt-28	Pigeon Mtn. Site	Beta- 90062	140+-130	AD 1668-1781 AD 1798-1892 AD 1907-1946 AD 1950-1953	.450 .382 .161 .008	base camp	Late Precontact	Clarke <i>et al.</i> , 1998

SITE	SITE NAME	NUMBER	DATE IN YEARS BP	CALCULATED DATE (CALIB 5.0*) 1 sigma	PROB-ABILITY	SITE TYPE	CULTURAL ASSOCIATION	REFERENCE
EgPv-14	1207R		720+/-100	AD 1213-1323 AD 1346-1392	.738 .262	?hunting station	Late Precontact	Langemann and Perry, 2002
EhPv-78	Echo Creek (515R)	BGS-1015	650+/-100	AD 1277-1400	1	base camp	Late Precontact	CARD+
EhPv-78	Echo Creek (515R)	BGS-1018	700+/-100	AD 1223-1324 AD 1345-1393	.682 .318	base camp	Late Precontact	CARD+
EhPv-78	Echo Creek (515R)	BGS-1011	710+/-100	AD 1218-1323 AD 1346-1393	.712 .288	base camp	Late Precontact	CARD+
EhPv-78	Echo Creek (515R)	BGS-1014	770+/-100	AD 1155-1305 AD 1364-1384	.923 .077	base camp	Late Precontact	CARD+
EhPv-78	Echo Creek (515R)	BGS-1012	1325+/-125	AD 606-828 AD 838-866	.917 .083	base camp	Besant	CARD+
EhPv-78	Echo Creek (515R)	BGS-1013	1540+/-100	AD 420-608	1	base camp	Besant	CARD+
EhPv-78	Echo Creek (515R)		620+/-100	AD 1288-1406	1	base camp	Late Precontact	Langemann and Perry, 2002
EhPv-78	Echo Creek (515R)		1025+/-80	AD 897-921 AD 943-1049 AD 1084-1124 AD 1137-1151	.116 .643 .180 .061	base camp	Avonlea	Langemann and Perry, 2002
EhPv-78	Echo Creek (515R)		1325+/-770	101 BC-AD1404	1	base camp	Avonlea	Langemann and Perry, 2002

SITE	SITE NAME	NUMBER	DATE IN YEARS BP	CALCULATED DATE (CALIB 5.0*) 1 sigma	PROBABILITY	SITE TYPE	CULTURAL ASSOCIATION	REFERENCE
EhPv-126		BGS 2147	720+/-40	AD 1258-1297 AD 1374-1376	.970 .030	hunting station	Late Precontact	Langemann and Perry, 2002
EhPw-1	Christensen (360R)		1025+/-80	AD 897-921 AD 943-1049 AD 1084-1124 AD 1137-1151	.116 .643 .180 .061	base camp	Late Precontact	Langemann and Perry, 2002
EhPw-1	Christensen (360R)		660+/-70	AD 1277-1323 AD 1346-1393	.500 .500	base camp	Late Precontact	Langemann and Perry, 2002
EhPw-1	Christensen (360R)		880+/-150	AD 1022-1267	1	base camp	Late Precontact	Langemann and Perry, 2002
EhPw-1	Christensen (360R)		1220+/-200	AD 647-1016	1	base camp	Pelican Lake?	PC database ²
EhPw-1	Christensen (360R)	BGS-1579	1250+/-70	AD 680-784 AD 787-823 AD 841-861	.690 .206 .104	base camp	unknown	PC database ²
EhPw-1	Christensen (360R)	BGS-1577	1360+/-80	AD 604-721 AD 741-770	.828 .172	base camp	unknown	PC database ²
EhPw-1	Christensen (360R)	BGS-1576	1290+/-70	AD 656-780 AD 793-803	.953 .047	base camp	unknown	PC database ²
EhPw-3	Spring Housepit	CAMS-44537	270+/-50	AD 1521-1591 AD 1620-1666 AD 1783-1796	.509 .411 .080		Late Precontact	Langemann and Perry, 2002

SITE	SITE NAME	NUMBER	DATE IN YEARS BP	CALCULATED DATE (CALIB 5.0*) 1 sigma	PROBABILITY	SITE TYPE	CULTURAL ASSOCIATION	REFERENCE
EiPp-16	Hunter Valley	Beta-83948	390+/-50	AD 1443-1521 AD 1578-1581 AD 1591-1620	.745 .013 .242	base camp	Late Precontact	CARD+
EiPp-16	Hunter Valley	Beta 83947	440+/-70	AD 1412-1516 AD 1596-1618	.967 .133	base camp	Late Precontact	CARD+
EiPp-16	Hunter Valley	Beta-86172	1260+/-60	AD 674-780 AD 792-805	.916 .084	base camp	Besant	CARD+
EjPu-1	Panther River	AECV-590 C	470+/-90	AD 1322-1348 AD 1392-1516 AD 1597-1617	.110 .798 .091	hunting station	Late Precontact	CARD+
EkPv-45	Gate	BGS-1784	935+/-70	AD 1026-1161	.1	base camp	Late Precontact	PC database ²
EkPv-45	Gate	CAMS-33936	800+/-50	AD 1191-1196 AD 1207-1274	.043 .957	base camp	Late Precontact	PC database ²
EkPv-45	Gate	CAMS-34970	870+/-60	AD 1047-1089 AD 1121-1139 AD 1149-1224	.281 .103 .617	base camp	Late Precontact	PC database ²
EkPx-4	Divide Creek	BGS 1155	660+/-80	AD 1275-1327 AD 1342-1395	.496 .504	camp/house pit	Late Precontact	PC database ²
EkPx-4	Divide Creek	BGS-1860	505+/-70	AD 1318-1352 AD 1390-1453	.261 .739	camp/house pit	Late Precontact	Langemann and Perry, 2002
EkPx-4	Divide Creek	CAMS 93674	585+/- 40	AD 1311-1359 AD 1387-1408	.698 .302	camp/house pit	Late Precontact	PC database ²

SITE	SITE NAME	NUMBER	DATE IN YEARS BP	CALCULATED DATE (CALIB 5.0*) 1 sigma	PROBABILITY	SITE TYPE	CULTURAL ASSOCIATION	REFERENCE
1765R	Drummond Pithouse 1765R	BGS-1950	940+/-80	AD 1021-1171	1	camp/house pit	Late Precontact	Langemann and Perry, 2002
1765R	Drummond Pithouse 1765R	BGS-1952	120+/-80	AD 1681-1738 AD 1755-1762 AD 1803-1895 AD 1903-1937 AD 1951-1953	.294 .034 .488 .171 .014	camp/house pit	Late Precontact	Langemann and Perry, 2002
1765R	Drummond Pithouse 1765R	BGS-1953	775+/-75	AD 1177-1288	1	camp/house pit	Late Precontact	Langemann and Perry, 2002
1765R	Drummond Pithouse 1765R	CAMS-25285	920+/-60	AD 1036-1163	1	camp/house pit	Late Precontact	Langemann and Perry, 2002

Note 1: The \pm value is a standard measure of error provided by the radiocarbon laboratory at a 1 sigma range that indicates a 68.3% probability of the date occurring within that range.

* (Stuiver *et al.*, 2003).

+ (CARD = Canadian Archaeological Radiocarbon Database, n.d.)

² PC database = Parks Canada, Cultural Resource Services, Western & Northern Service Centre, Calgary, unpublished database.

Table 5.1 Radiocarbon dates from archaeological sites in the Central Canadian Rockies, 1600 – 100 BP.

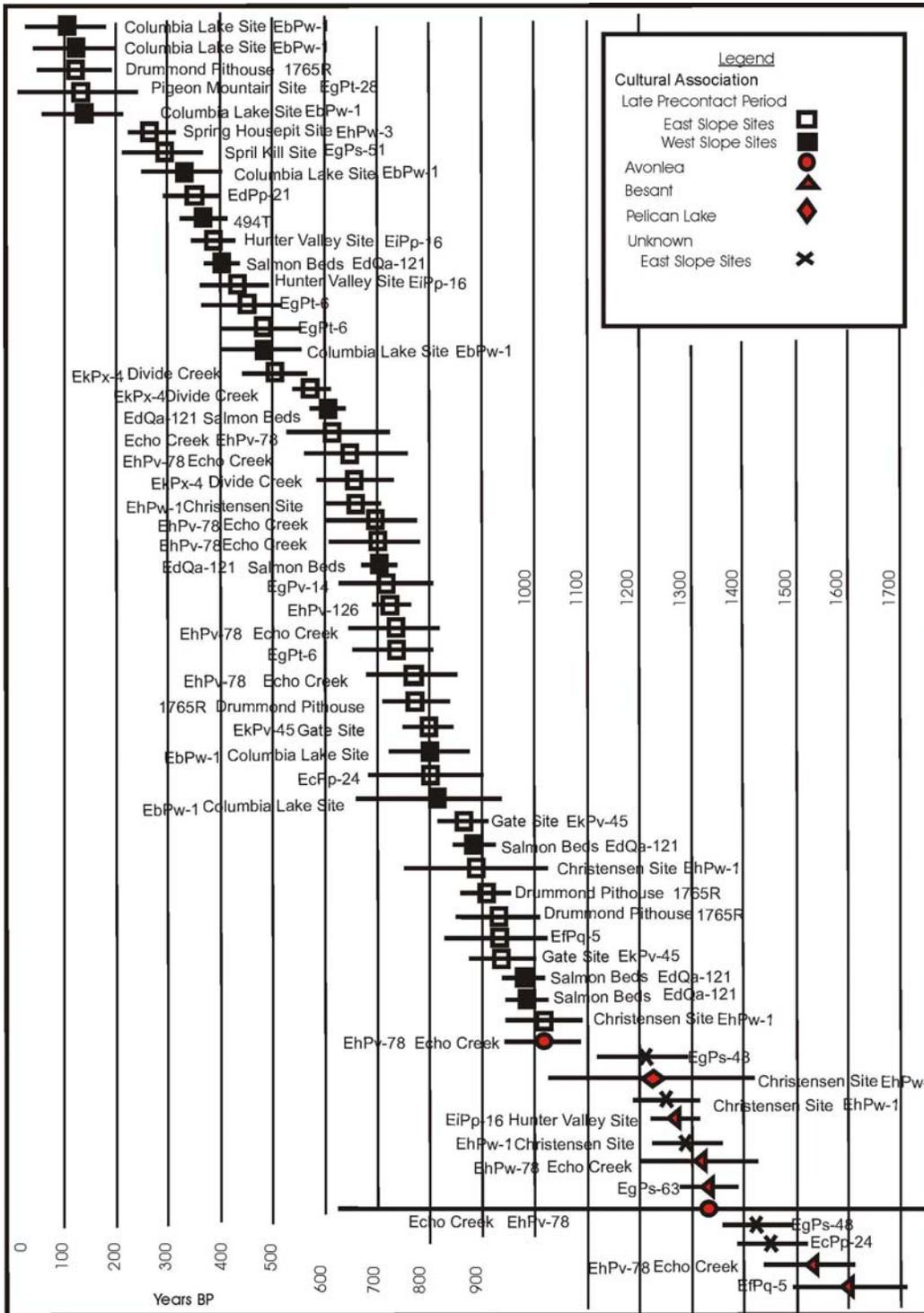


Figure 5.1 C14 dates in the Central Canadian Rockies Ecosystem 15000-100 BP shown in chronological order.

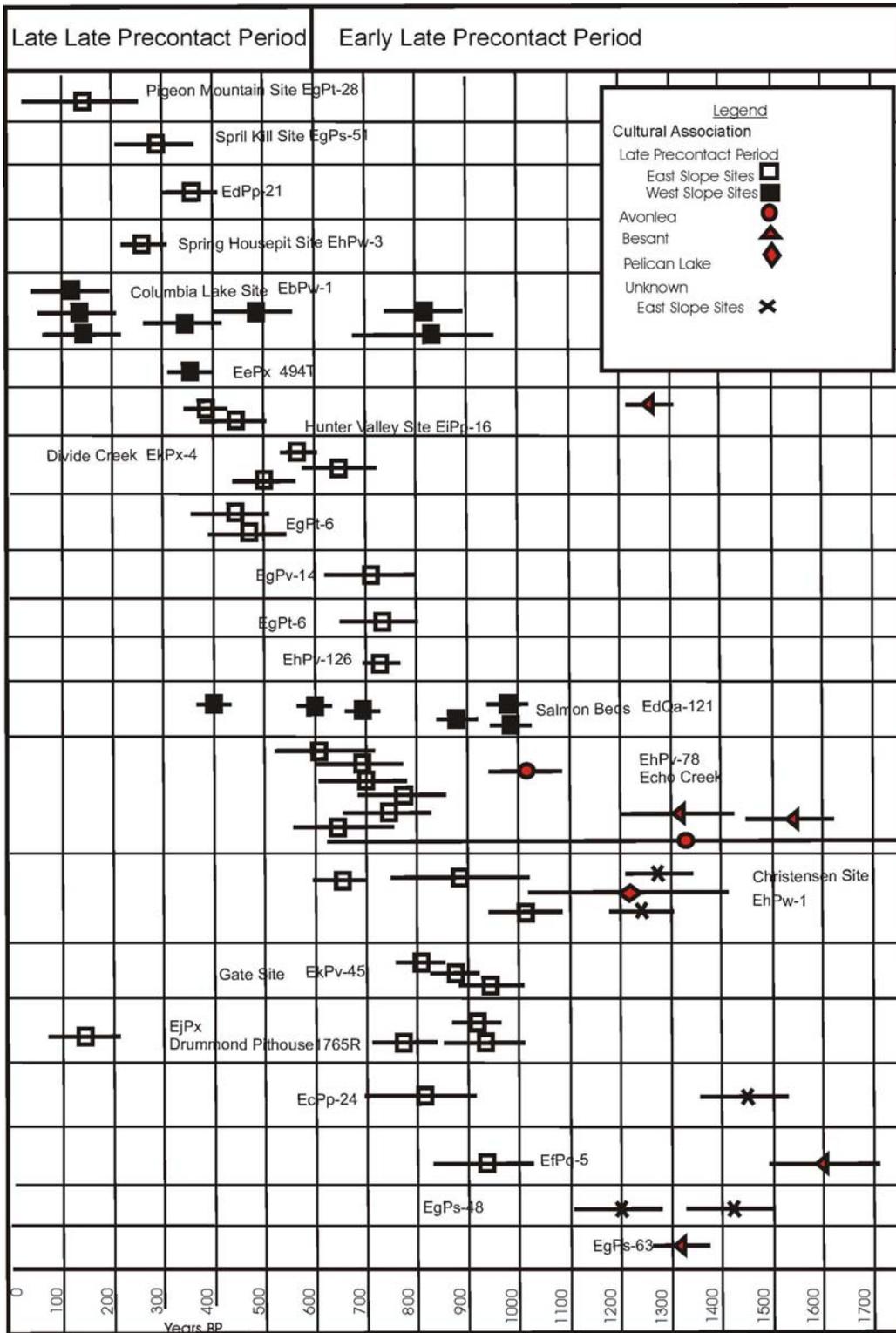


Figure 5.2 C14 dates from archaeological sites over the last 1600 years in the Central Canadian Rockies Ecosystem, shown for each site. The Early Late Precontact Period dates from before 600 BP; the Late Late Precontact Period dates from 600 BP to 100 BP.

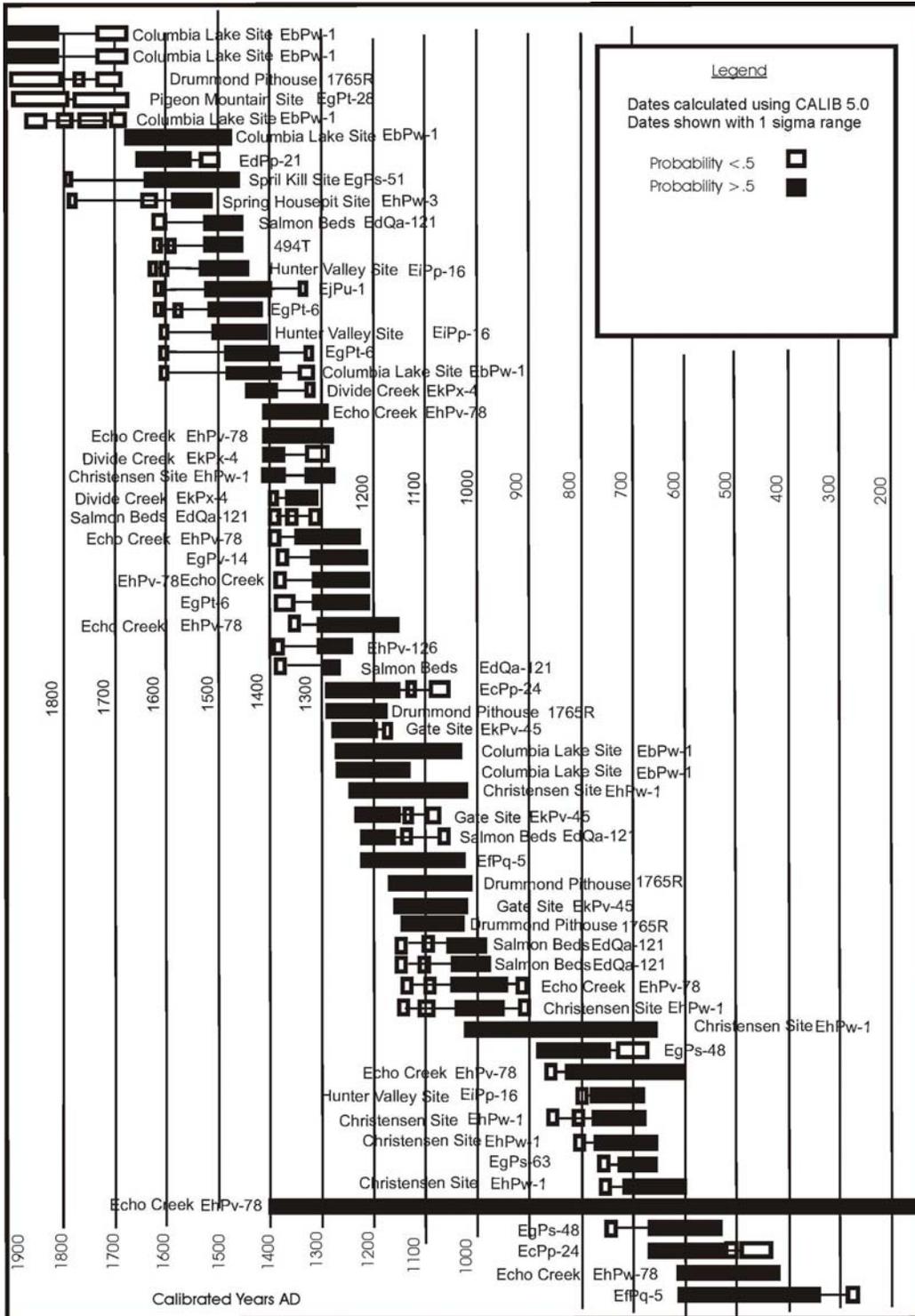


Figure 5.3 Calibrated C14 dates in the Central Canadian Rockies Ecosystem, AD 200-1900, shown in chronological order.

Figure 5.3 shows the calibrated C14 dates in the Central Canadian Rockies. It shows that continuous occupation occurred in the Central Canadian Rockies Ecosystem from AD 200 to AD 1900. On Figure 5.4 the dates are clustered into western and eastern slope sites. Note that there are no dated sites between AD 200 and AD 1000 on the western side of the continental divide. This is because there are no excavated sites of this period in the Central Canadian Rockies. A larger sample of excavated sites from this area would likely fill this gap. On Figure 5.4 none of the dates after AD 1400 are from the upper Bow Valley near Banff, whereas many of the dates from AD 1000 to AD 1400 are from Echo Creek Site or the Christensen Site (see also Figure 5.2). This suggests a declining population or reduction of use of this area after 1400 AD.

RECORDED ARCHAEOLOGICAL SITES

A total of 158 sites in the Central Canadian Rockies has been recorded as associated with the Late Precontact Period (Appendix 1). The sites are located in four major river drainages (Figure 5.5, Table 5.2). The largest number of sites is found in the Bow River drainage (n=77)* located in the southeastern portion of the study area. These are found along the Bow River and its major tributary rivers such as the Highwood, Sheep and Elbow rivers. Forty sites (n=40) are associated with the Columbia River drainage, which includes a small number of sites along the Kootenay River, as well as those along the Columbia River, Columbia Lake and Windermere Lake. Twenty-five sites (n=25) are found in the Red Deer River drainage, which includes a large section of the east central part of the study area. Sixteen sites (n=16) are associated with the North Saskatchewan River, located in the northeastern portion of the study area.

* n= number

Major river drainage	Site Numbers	Number of sites
Bow River	EbPp-19, 23, 29, 31, 42, 65, 66; EcPp-24; EcPq-1, 23; EdPp-21; EdPq-16; EdPr-25; EdPs-4, 31, 46, 51; EePo-16; EePr-9, 18, 23; EfPq-5, 6, 12; EgPp-12; EgPq-11; EgPr-2; EgPs-3, 48, 51; EgPt-1, 3, 6, 22, 27,28; EgPu-2, 4, 26; EgPv-14; EgPw-3; EhPo-36, 40, 44, 54; EhPp-1, 61, 62; EhPu-1, 5, 6; EhPv-5, 7, 8, 9, 10, 15, 16, 20, 24, 38, 43, 51, 58, 71, 78, 81, 126, N1; EhPw-1, 2, 3, 4; EhPx-8; EiQa-2, N1; EiQb-1	77
Red Deer River	EiPp-3, 16; EiPr-5, 9; EiPs-6, 13; EjPq-1, 4; EjPw-9, 10, 11, 22; EjPx-3, 4, 30, N1; EjQa-8; EkPp-14, EkPt-3; EkPw-4, 13, 15, N1; EkPx-4, 7	25
North Saskatchewan River	EkQa-N1; ElQe-10; FaQc-1, 4, 11, 12, 14, 22; FbQc-1, 8, 9, 10, 12, 13, 14, 15	16
Columbia River	EbPw-1; EbPx-5, 10, 16, 57, 66, 78, 79; EcPx-4, 5, 15, 19, 25, 40, 47, 48, 49, 50, 52, 53, 54, 60, 69; EdPs-27, 28; EdPx-N1, EdQa-4, 13, 17, 25, 121, N1, N2; EeQa-1, 4; EeQb-1, 3, 13; EfQa-1, 8	40
Total		158

Table 5.2 Distribution of Late Precontact sites in the major river drainages in the Central Canadian Rockies Ecosystem.

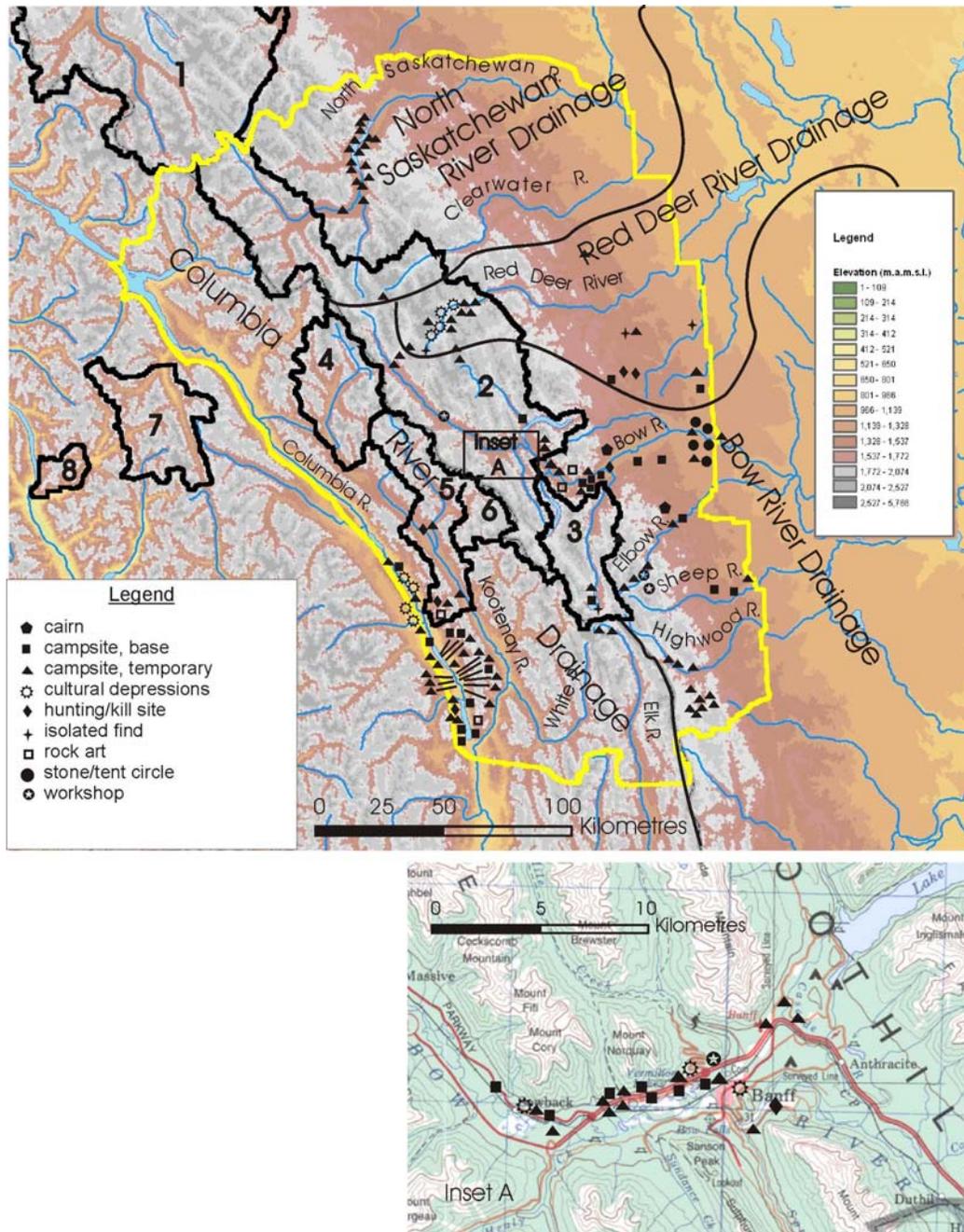


Figure 5.5 Map of the distribution of all site types in the Central Canadian Rockies. Inset A shows a dense cluster of sites along the Bow River near Banff. The black lines show the borders of 1. Jasper National Park of Canada (NPC), 2. Banff NPC, 3. Peter Lougheed Provincial Park, 4. Yoho NPC, 5. Kootenay NPC, 6. Mt. Assiniboine Provincial Park, 7. Glacier NPC, 8. Mt. Revelstoke NPC.

SITE TYPES

A variety of site types has been recorded in the Central Canadian Rockies ecosystem.

These types were determined based on the criteria discussed below.

Base Camps

Sites that I have classified as base camps are characterised by large areas with multiple layers of cultural materials or indications of use over a long time span. Such sites are typically larger than 2000 square metres. A variety of activities likely occurred at these sites such as habitation, butchering, plant and animal processing, food preparation, tool manufacture and repairs. They were also likely the starting point for hunting and gathering expeditions. The resultant assemblages of tools comprise several tool types (projectile points, scrapers, knives, multipurpose tools, etc.) They usually contain a wider range of animal species remains. Features can include hearths and storage pits. They may have been occupied for long period of time throughout the year (perhaps several weeks) and/or were returned to frequently over several years. Sites with tent rings or house pit depressions are treated as separate categories below. Excavated base camps such as Vermilion Lakes Site and Echo Creek Site are described in detail in Chapter 6.

Transitory Campsite

Sites that I have classified as transitory campsites usually occupy small areas and have sparse or scattered materials. Most transitory camps are less than 2000 square metres in area, although some may be larger, presumably because they were occupied on more than one occasion. Few temporary campsites in the study area have been archaeologically tested, although most of these have been probed with small shovel tests. Because of the limited investigation of these sites it is difficult to determine

specific activities that occurred at these sites. Most transitory campsites were occupied for short lengths of time, usually by small task groups. As a result, the range of tool types is limited. The lithic materials at these sites typically represent fewer stages of tool manufacture. Faunal remains are commonly limited to a few species and are usually less highly processed than those from base camps. Features may consist of small hearths and clusters of stone or bone working debris. Some transitory campsites may have been used for hunting stations, butchering, stone tool working, and/or plant processing. For example, testing at Site 494T in the Kootenay Valley yielded a small amount of stone tools and debitage, a grinding stone, and fire broken rock that has been interpreted as a small hunting station probably occupied on only one occasion (Heitzmann, 1999a; see Chapter 6).

Cairns and ‘Vision Quest’ Structures

Cairns and ‘vision quest’ structures are purposefully constructed piles of rocks. Cairns can vary from fewer than ten to several thousand rocks. Further east on the plains, they are commonly found on prominent hills or ridges. Several different functions have been suggested for cairns including ceremonial sites, blinds for hunting, markers for human burials, caches, trails, parts of dead fall traps and others (Brink *et al.*, 2003). Only one cairn has been recorded in the Central Canadian Rockies Ecosystem, Site EgPs-3, believed to be a ceremonial cairn. This small rounded pile of rocks contained several artefacts including projectile points, beads and ceramic pieces.

Vision quest structures are shallow depressions with low rock walls constructed around the margins of the depression commonly in a ‘C’ shape. In southern Alberta they are commonly situated with a view of one of three focal mountains: Sweetgrass Hills, Chief Mountain and Crowsnest Mountain (Dormaar, 2003). Vision quest

locations might also be situated with views of other sacred geography. The identity of some sacred geographical features maybe unrecorded or unknown. Vision quest structures are interpreted as resulting from the traditional native spiritualism practice in which a person (usually an adolescent man) seeks an encounter with the spirit world (Dugan,1985; Irwin, 1994). Typically the supplicant spends several days in an isolated locality. There he fasts and prays alone. The supplicant can be given gifts of strength, knowledge, art, curing or some other quality that can aid themselves or others throughout their life. Only one site, Site EfPq-12, contains several vision quest



Figure 5.6 Site EfPq-12 Vision quest structure, Moose Mountain, view to the southwest (Photo: Heitzmann 2007).

structures in the study area, near the top of Moose Mountain (Figure 5.6). None of the focal mountains identified by Dormaar (2003) can be viewed from the vision quest structures on Moose Mountain.

Cultural Depressions

I have termed 'cultural depressions' as excavated pits dug into the ground. These are usually classified into two groups: 1) storage pits and/or roasting ovens for plants or meat; and 2) semi-subterranean house pit floors. Storage pits and roasting pits are generally less than 150 cm in diameter and 100 cm deep. They are characterised by considerable cultural fill consisting of fire cracked rocks and charcoal, and can also contain bones and some stone tools and debitage.

Semi-subterranean winter houses consisted of shallow (50 to 150 cm deep) bowl-shaped pits. Similar pits of the Late Precontact Kamloops Horizon range from 5 to 12 m in diameter averaging 8.66 m (Richards and Rousseau, 1987: 41). The cultural depressions in the Central Canadian Rockies are much smaller, often 2 - 3 metres in diameter. These are interpreted as winter houses of the kind characteristically constructed by most British Columbia Plateau groups to the west of the study area (Teit 1909). Above the pit stood a superstructure of poles laid against a set of four internal upright poles. These were usually covered with earth, but may also have been covered with bark, woven mats, animal skins or moss. Several of the cultural depressions along the upper Red Deer and Bow rivers have been archaeologically tested (Fedje and McSparran, 1988; Langemann and Greaves, n.d.) but have yet to be reported on in detail.

Stone/Tent Circles

Stone/tent circle sites consist of a ring or circle of rocks. The number of rocks employed can vary from about 30 to over 100. Stone circles vary considerably in inside diameter from under 3 metres to over 9 metres (Oetelaar, 2003:104), but most fall in the range of 4 - 6 metres (Dau, 2005:190).

I interpret these as the former locations of conical tents (tipis), formed when the margins of tipi were weighed down by rocks. Stone circles are found frequently on the grassland plains east of the study area. Stone circle sites could be either base or temporary campsites, depending on the length of occupation and the intensity of activities that occurred there.

Stone circles are only recorded along the eastern margin of the study area. The absence of stone circles elsewhere in the Central Canadian Rockies may be because: (1) people using tipis did not enter into the Central Canadian Rockies; or (2) stone tipi weights were replaced with wooden stakes; or (3) people may have used different types of shelters when they entered the Central Canadian Rockies.

Hunting/Kill Sites

I have identified as 'hunting/kill sites' as locations characterised by abundant animal bones and relatively small amounts of stone tools. However, sites of this type are often difficult to identify in forest areas due to acidic soils which rapidly degrade and disintegrate bone. The stone tool assemblages at these sites often consist of a small number of tool types and lithic debitage representing later stage tool sharpening or refurbishing.

Workshops

'Workshops' in my classification scheme are locations where unformed stone materials were worked into more manageable pieces, in the form of either cores, preforms or finished tools. Workshops are characterised by a large amount of waste flaking debris. They are often located near a stone material source. Sources could be either primary quarry sources, where rock was removed from a geological formation or bed, or secondary sources such as glacial tills or river bed gravels.

Isolated Finds

An isolated find is the location of a single artefact, most often a stone projectile point or other tool. All isolated finds included in this study are single side-notched projectile points typical of the Late Precontact Period. They are assumed to have been lost or discarded. Examples of possible loss agencies might be loss of an arrow going astray during hunting (a missed shot) or loss from a target animal being hit but not immediately killed by an arrow (an ineffective shot). A projectile point might also have been discarded due to breakage or poor performance due to its shape or weight.

Rock Art

Rock Art sites consist of pictures or designs painted on rock surfaces (pictographs) or inscribed into rock (petroglyphs). Paintings were created using a mixture of red ochre (an iron based pigment) mixed with an organic material usually assumed to be animal fat. Themes often consist of human, animal or geometric patterns. These are found on cliff faces, usually in isolated locations. In the study area, pictographs are assumed to date to the Late Precontact Period because of observed degradation in the twentieth

century. Some pictographs are associated with base camps (e.g. Columbia Lake Site) but most are not associated with other site types.

SITE TYPE DISTRIBUTION

All identified Late Precontact sites in the Central Canadian Rockies have been classified into one of the types discussed above (Table 5.3, Figure 5.5), as follows: cairns/ vision quest structure (n=2), base campsites (n=29), temporary campsites (n=94), cultural depressions (n=10), hunting/kill sites (n=7), isolated finds (n=4), rock art (n=3), stone/tent circles (n=5), and workshops (n=4).

SITE TYPE	SITES	NUMBER
Cairn	EfPq-12; EgPs-3;	2
Campsite, base	EbPw-1;EbPx-5, 10, 16; EcPx-4, 15, 52; EdPp-21; EdPq-16; EdPs-51; EdQa-121; EeQb-1; EfPq-5; EgPq-11; EgPr-2; EgPs-48; EgPt-3, 27, 28; EhPu-1; EhPv-8, 51, 58, 78, 81; EhPw-1, 4; EiPp16; EiPs-6;	29
Campsite, temporary	EbPp-19, 23, 29, 31,42, 65, 66; EbPx-57, 66, 79; EcPp-24; EcPq-1, 23; EcPx-5, 19, 25, 40, 47, 48, 49, 50, 53, 54, 60, 69; EdPs-4, 27, 28, 31; EdPx-N1; EdQa- 25, N2; EePo-16; EePr-9, 23; EeQa-4; EeQb-3; EfPq-6; EfQa-1; EgPp-12; EgPt-6, 22; EgPu-2, 26; EgPv-14; EgPw-3; EhPo-44, 54; EhPu-5, 6; EhPv-5, 7, 9, 10, 16, 20, 24, 43, 71; EhPw-2; EiQa-2, N1; EiQb-1; EiPp-3; EiPs-13; EjPq-1; EjPw-9, 10, 11, 22; EjPx-3, 4; EjQa-8; EkPt-3; EkPw-4, 13, 15, N1; EkPx-7; ElQe-10; FaQc-1, 4, 11, 12, 14, 22; FbQc-1, 8, 9, 10, 12, 13, 14, 15;	94
Cultural Depressions	EdQa-13, 17; EeQa-1; EeQb-13; EhPv-38, N1; EhPw-3; EjPx-30, N1; EkPx-4;	10
Hunting/kill site	EbPx-78; EdQa-N1; EfQa-8; EgPs-51; EhPv-126; EiPr-5, 9;	7
Isolated find	EdPs-46; EjPq-4; EkPp-14; EkQa-N1;	4
Rock art	EdQa-4; EgPt-1; EgPu-4;	3
Stone/tent circle	EhPo-36, 40; EhPp-1, 61, 62;	5
Workshop	EdPr-25; EePr18; EhPv-15; EhPx-8;	4
TOTAL		158

Table 5.3 Site types in the Central Canadian Rockies Ecosystem.

Of all the sites, temporary campsites are the most numerous. These, along with hunting/kill sites, are probably under-represented in the archaeological record. Because they are usually small sized and have limited amounts of materials, they are harder to find and more easily overlooked in site surveys. Base campsites and cultural depressions are easier to locate due to their larger size, higher artefact assemblages, and greater visibility. The stone/tent circles may also be under-represented because of agricultural land disturbance along the eastern margin of the study area.

The distribution of base camps, cultural depressions, stone circles and workshops is shown on Figure 5.7. These three site types are locations where occupations were focussed over longer lengths of time as indicated by larger site size, greater artefact density, or the presence of structures (processing or house pits) and tipi stone weight rings. These larger sites are concentrated in only a few localities. Clusters of these site types are located along the Columbia River, upper Red Deer Valley, Bow Valley near Banff, Bow Valley near the Front Ranges, and Bow Valley on the eastern edge of the study area.

ECOREGIONS AND SITES

The association of sites with ecoregions could be useful in identifying what kinds of activities were undertaken in the different parts of the Central Canadian Rockies Ecosystem. The number of sites in each of the major ecoregions is shown in Table 5.4 and illustrated in Figure 5.7. The most preferred ecoregions for aboriginal use during the Late Precontact Period were the Montane (n=58), Subalpine (n=41), and Interior Douglas Fir (n=35). The other ecological regions were less intensely used and several ecological regions have no recorded archaeological sites. Ecological regions with no

recorded archaeological sites include Interior Cedar Hemlock and Lower Boreal Mixwood, both very wet or moist ecoregions in the northwestern and northeastern parts of the study area (Table 5.4, Figure 5.7). Site types in the different ecological regions vary considerably.

Preferred ecoregions for base camps are the Montane (n=11, 39.3% of all base camps), and Interior Douglas Fir (n=9, 32.1%) (Figure 5.8). Small numbers of base camps are also found in the Lower Boreal Cordilleran (n=3, 10.7%), Aspen Parkland (n=2, 7.1%), Subalpine (n=2, 7.1%), and Upper Boreal Cordilleran (n=1, 3.6%) all on the east slopes of the Rocky Mountains. These ecoregions are mostly located at lower altitudes and have generally drier environments than the other ecoregions of the area.

Transitory camps are also most commonly found in the Montane (n=39, 41.1%), Subalpine (N=28, 29.5%), and Interior Douglas Fir (n=19, 20.0%). Transitory camps are found in low numbers or not at all in the other ecoregions (Table 5.4).

Stone circles or tipi rings are found exclusively in the Aspen Parkland along the eastern edge of the study area. Cultural depressions are found in the Subalpine ecoregion along the upper Red Deer River (n=3, 30%), in the Montane ecoregion along the upper Bow River (n=3, 30%) and in Interior Douglas Fir along the Columbia River (n=4, 40%). Hunting/kill sites have been identified in the Montane (n=3, 42.9%), Upper Boreal Cordilleran (n=2, 28.6%), and Interior Douglas Fir (n=2, 28.6%) (Table 5.4).

Workshop sites have only been identified in the Subalpine (n=3, 75%) and in the Montane (n=1, 25%), which likely results from exposures of suitable rock materials in these areas.

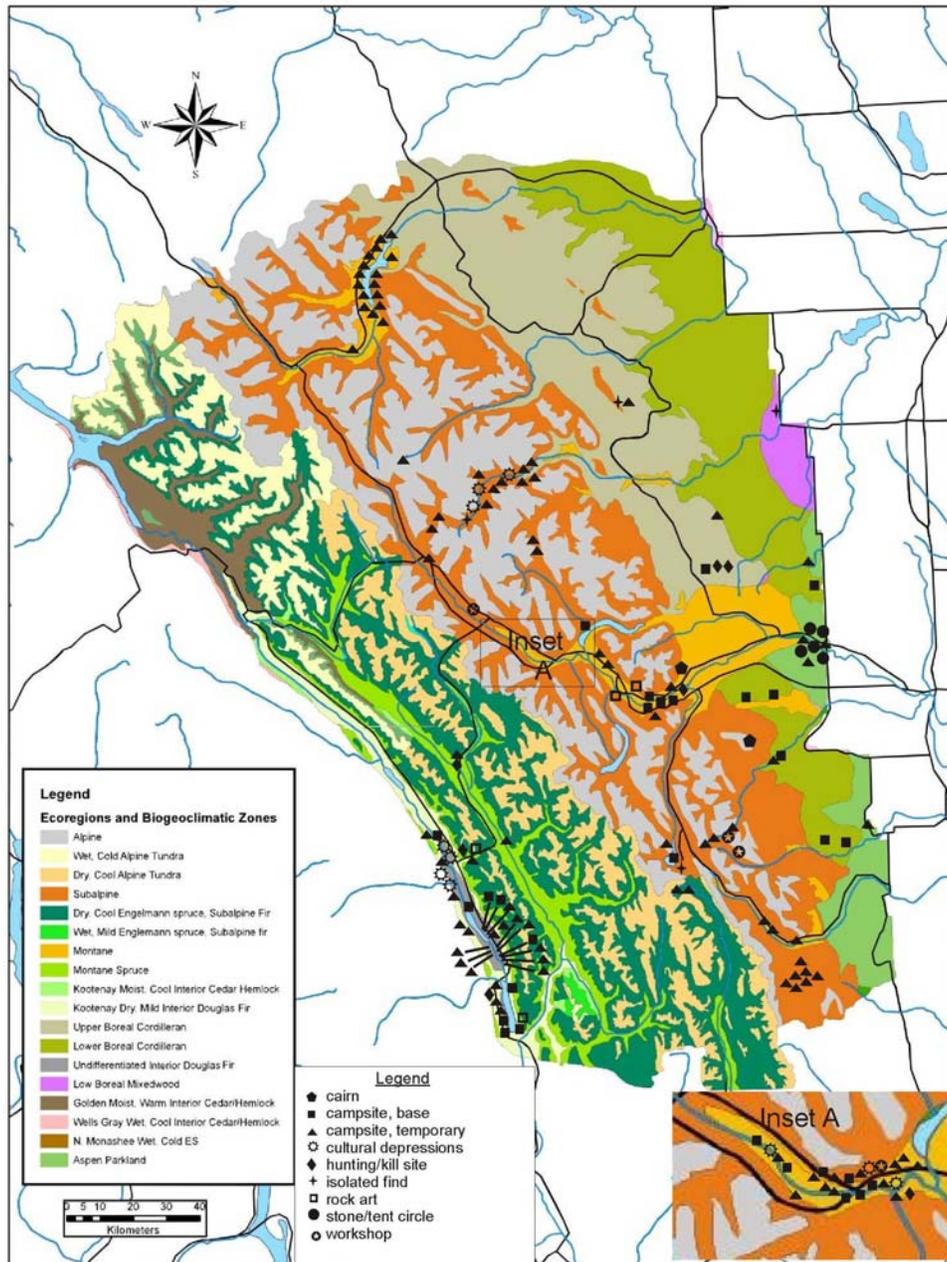


Figure 5.7 Distribution of Late Precontact archaeological sites in relation to ecoregions in the Central Canadian Rockies. Inset A shows a concentration of sites in the upper Bow Valley near Banff.

ECOLOGICAL REGION	SITES	SITE TYPES	NUMBER
Alpine	EfPq-12	Cairn 1	1
Subalpine	EbPp-19, 23, 29, 31, 42, 65, 66; EdPq-16; EdPr-25; EdPs-4, 27, 28, 31, 46, 51; EePr-9, 18, 23; EgPt-1; EgPu-4; EhPx-8; EiQa-2, N1; EiQb- 1; EjPw-9, 10, 11, 22; EjPx-3, 4, 30, N1; EjQa-8; EkPp-14; EkPw-4, 13, 15, N1; EkPx-4, 7; EkQa-N1;	Base camps 2 Transitory camps 28 Cultural depressions 3 Isolated finds 3 Pictographs 2 Workshops 3	41
Montane	EcPp-24; EcPq-1, 23; EdPp-21; EdPx-N1; EfQa-1, 8; EgPs-3, 48, 51; EgPt-3, 6, 22, 27, 28; EgPu-2, 26; EgPv-14; EgPw-3; EhPu-5, 6; EhPv-5, 7, 8, 9, 10, 15, 16, 20, 24, 38, 43, 51, 58, 71, 78, 81, 126, N1; EhPw-1, 2, 3, 4; ElQe-10; FaQc-1, 4, 11, 12, 14, 22; FbQc-1, 8, 9, 10, 12, 13, 14, 15	Cairns 1 Base camps 11 Transitory camps 39 Cultural depressions 3 Hunting/kill sites 3 Workshops 1	58
Interior Douglas Fir	EbPw-1; EbPx- 5, 10, 16, 57, 66, 78, 79; EcPx-4, 5, 15, 19, 25, 40, 47, 48, 49, 50, 52, 53, 54, 60, 69; EdQa-4, 13, 17, 25, 121, N1, N2; EeQa-1, 4; EeQb-1, 3, 13	Base camps 9 Transitory camps 19 Cultural depressions 4 Pictographs 1 Hunting/kill sites 2	35
Interior Cedar Hemlock			
Upper Boreal Cordilleran	EiPr- 5, 9; EiPs-6, 13; EkPt-3;	Base camps 1 Transitory camps 2 Hunting/kill sites 2	5
Lower Boreal Cordilleran	EfPq-5, 6; EgPp-12; EgPq-11; EgPr-2; EjPq-1, 4	Base camps 3 Transitory camps 3 Isolated find 1	7
Aspen Parkland	EePo-16; EhPo-36, 40, 44, 54; EhPp-1, 61, 62; EhPu-1; EiPp-3, 16	Base camps 2 Transitory camps 4 Stone circle sites 5	11
Lower Boreal Mixwood			
	TOTAL		158

Table 5.4 Numbers of Late Precontact Archaeological Sites in Ecological Regions of the Central Canadian Rockies Ecosystem.

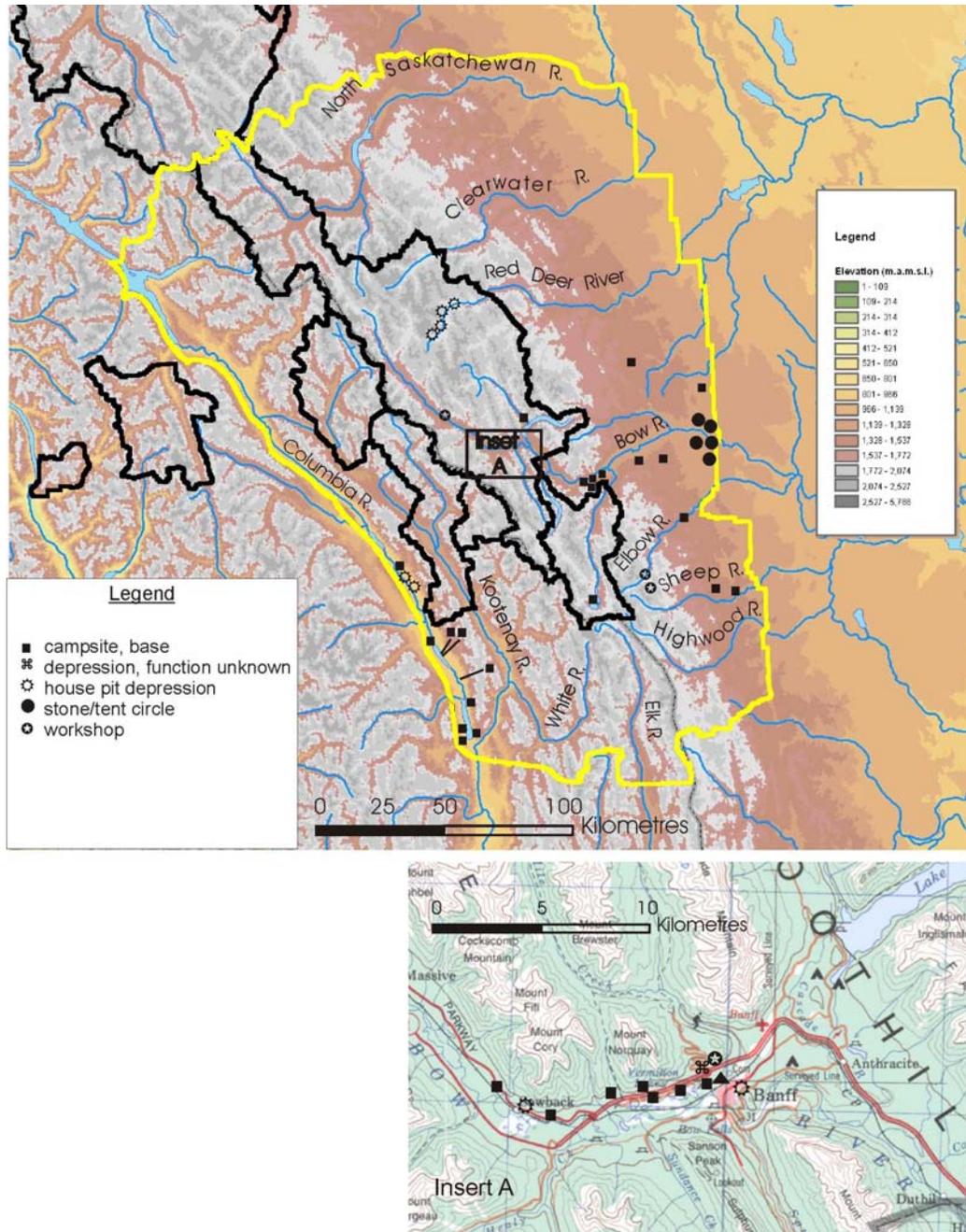


Figure 5.8 Distribution of base camps, cultural depressions, stone circles and workshops in the Central Canadian Rockies. Inset A shows a concentration of sites in the upper Bow Valley near Banff.

The Montane was the preferred ecoregion for base campsites and transitory camps. This is probably a result of the lower elevations, partially open forest cover and its high ungulate carrying capacity. The second most preferred ecoregion for transitory camps was the Subalpine (n=28, 29.5%). This indicates that most Subalpine ecoregions were of less significance than the Montane and that the Subalpine was used to a lesser extent, probably mainly for hunting.

SITE DENSITY PER ECOREGION

The density of Late Precontact sites throughout the region is shown in Table 5.5. The density of sites is expressed as sites per 1000 km², which reduces the number of zeros that would be required if expressed as sites per km². The overall density of known sites of Late Precontact age is 3.641 sites per 1000 km². There are a number of reasons that this density is so low. Firstly, most of the Rocky Mountains are characterised by steep slopes, dense forest, and low game animal populations, which together would have made these areas unattractive to hunter-gatherers. Secondly, many parts of the region have not been subject to systematic archaeological inventory. In fact, most of the ecoregions with the lowest site densities (Alpine, Interior Cedar Hemlock, Upper Boreal-Cordilleran, Lower Boreal Cordilleran, and Lower Boreal Mixwood) have seen only minimal archaeological inventory. However, it is difficult to assess whether this is a causative factor. Steep slopes and dense forests may also be factors that have discouraged archaeologists from selecting these areas for site surveys. A third reason that site densities are low may be my selection criteria for including sites in this study. Sites were only included in this study if they could be dated to the Late Precontact Period, either through carbon dating, or with diagnostic artefacts. This excluded sites

Ecoregion in CCRE*	Area (km ²)	Cairns	Base Camp-sites	Transitory camp-sites	Cultural depressions	Hunting/kill sites	Isolated Finds	Rock Art	Stone/tent circles	Workshops	Total Sites	Rank
Subalpine	13,900		0.144	2.014	0.216		0.216	0.144		0.216	2.950	4
Alpine	11,598	0.086									0.086	7
Upper Boreal-Cordilleran	5,220		0.191	0.383		0.383					0.958	6
Lower Boreal-Cordilleran	5,031		0.596	0.596			0.199				1.391	5
Montane	3,380	0.296	3.254	11.538	0.888	0.888				0.296	17.160	2
Interior Cedar Hemlock	1,461											8
Aspen Parkland	1,323		1.512	3.023					3.78		8.314	3
Interior Douglas-fir	1,026		8.772	18.518	3.899	1.949				0.974	34.113	1
Lower Boreal Mixwood	455											8
All Ecoregions	43,394	0.046	0.668	2.166	0.230	0.161	0.092	0.069	0.115	0.092	3.641	

- CCRE = Central Canadian Rockies Ecosystem

Table 5.5 Archaeological site density of each ecoregion expressed as sites per 1000 km². The ecoregions are shown from largest to smallest in area. The 'rank' indicates ecoregions from highest to lowest site densities.

dating to other periods, as well as sites that have been located but not assigned to a cultural period.

There are several ecoregions with relatively high site densities. The Interior Douglas-fir ecoregion has a site density of 34.113 sites/1000 km². Other ecoregions with relatively high site densities were Montane (17.160 sites/1000 km²), Aspen Parkland (8.314 sites/1000 km²), and Subalpine (2.950 sites/1000 km²). In contrast to areas of low site density, all these areas have some grasslands, low slopes, and higher ungulate populations. They have also been subject to at least some systematic archaeological inventory.

Site density of almost all major site types (base campsites, transitory campsites, cultural depressions, hunting/kill sites and workshops) was highest in the Interior Douglas-fir ecoregion. The Montane ecoregion was the second most important ecoregion for these types. The Montane had the highest density of cairns. Rock art and isolated finds were of highest density in the Subalpine.

GEOGRAPHIC FEATURES AND SITE TYPES

Geographic features may have been one of the selection factors for the location of archaeological sites. Archaeological sites could be located on geographical features such as terraces, hills, moraines etc. To determine if there were preferences for particular geographic features, all the Late Precontact sites and their functional types were tabulated. This information is indicated in Table 5.6.

Base camps were most likely to be located on terraces (n=17, 58.6%). Of these, there was a preference for high terraces (n=8, 47.0% of all base camps on terraces), followed by low terraces (n=5, 29.4%) and medium terraces (n=4, 23.5%).

GEOGRAPHIC FEATURE	SITES	SITE TYPES	NUMBER
Alluvial fan	EeQb-1; EgPs-48, 51; EhPv-7, 8, 58, 81; FbQc-14, 15;	Base camps 5 Hunting/kill 1 Transitory campsites 3	9
colluvial fan	EdQa-17; EhPv-5, 51, N1; EhPw-1;	Base camps 2 Cultural depressions 2 Transitory campsites 1	5
sand dune, former beach	EhPv-24, 78;	Base camps 1 Transitory campsites 1	2
gully, draw, canyon	EdQa-4, 13; EePo-16; EgPt-1;	Pictographs 2 Cultural depressions 1 Transitory campsites 1	4
Island	EcPx-15	Base camps 1	1
Morraine	EdPr-25; EhPu-6;	Transitory campsites 1 Workshops 1	2
ridge, hill, knoll	EbPx-78, 79; EcPx-25, 40, 69; EdPs-27, 28, 46, 51; EdQa-N2; EfPq-12; EfQa-1; EgPt-3, 6; EhPu-5; EhPv-15; EiQa-N1; EiPp-3; EiPr-9; EiPs-6, 13; EjPw-9, 10; EjPx-3; EkPp-14; EkPw-15; FbQc-12;	Base camps 3 Cairn 1 Hunting/kill 2 Isolated finds 2 Transitory campsites 18 Workshops 1	27
Slope	EgPu-4;	Pictographs 1	1
Terrace, unknown	FaQc-4; FbQc-8, 9, 10, 13;	Transitory campsites 5	5
terrace, low	EbPp-31, 42, 65, 66; EbPx-10; EcPq-1; EcPx-4, 19, 47, 49, 50, 60; EdPs-4; EdQa-121; EePr-9; EeQb-3, 13; EgPt-28; EgPw-3; EhPo-36, 54; EhPv-71; EiPp-16; EjPw-11, 22; EjQa-8; EkQa-N1; FaQc-22;	Base camps 5 Transitory campsites 20 Cultural depressions 1 Isolated finds 1 Stone circles 1	28
terrace, medium	EbPp-19, 23, 29; EbPw-1; EbPx-16, 57; EcPx-52, 53; EdPs-31; EdPx-N1; EePr-18; EeQa-4; EfPq-6; EfQa-8; EgPp-12; EgPt-22, 27; EgPu-2; EgPv-14; EhPo-40, 44; EhPv-9, 10, 16, 126; EhPx-8; EiQa-2; EiQb-1; EiPr-5; EjPq-1; EjPx-4, 30, N1; EkPt-3; EkPw-13, N1; FaQc-1, 11, 12, 14; FbQc-1;	Base camps 4 Transitory campsites 29 Cultural depressions 2 Workshops 2 Hunting/kill 3 Stone circles 1	41
terrace, high	EbPx-5, 66; EcPp-24; EcPq-23; EcPx-5, 48, 54; EdPp-21; EdPq-16; EdQa-25, N1; EePr-23; EeQa-1; EfPq-5; EgPq-11; EgPr-2; EgPs-3; EgPu-26; EhPp-1, 61, 62; EhPu-1; EhPv-20, 38, 43; EhPw-2, 3, 4; EjPq-4; EkPw-4; EkPx-4, 7; ElQe-10;	Base camps 8 Transitory campsites 15 Cultural depressions 4 Hunting/kill 1 Isolated finds 1 Cairn 1 Stone circles 3	33
Total			158

Table 5.6 Geographic locales associated with archaeological sites in the Central Canadian Rockies Ecosystem.

Base camps were also located on alluvial fans (n=5, 17.2%), ridges, hills or knolls (n=3, 10.3%), colluvial fans (n=2, 6.9%) or sand dunes/former beaches (n=1, 3.4%).

Transitory camps were also most likely to be located on terraces (n=69, 73.4%). Of these there was a preference for medium terraces (n=29, 42.0% of all transitory camps on terraces), followed by low terraces (n=20, 28.2%), high terraces (n=15, 21.7%) and terraces of unknown configuration (n=5, 7.2%). Transitory camps were also located on ridges, hills or knolls (n=18, 19.1%), alluvial fans (n=3, 3.2%), colluvial fans (n=1, 1.1%), former sand dune/beaches (n=1, 1.1%), and in a gully or draw (n=1, 1.1%).

Cultural depressions were most likely to be found on high terraces (n=4, 40%), followed by medium terraces (n=2, 20%), colluvial fans (n=2, 20%), low terraces (n=1, 10%), and (n=1, 10%) gully/draw. The seven hunting/kill sites were located on medium terraces (n=3, 42.9%); ridges, hills or knolls (n=2, 28.6%); high terraces (n=1, 14.3%); and alluvial fans (n=1, 14.3%). The five stone circle sites were located on high terraces (n=3), a medium terrace (n=1) and a low terrace (n=1). The four workshops were located on medium terraces (n=2), a moraine (n=1), and a ridge, hill or knoll (n=1). The vision quest site was located on a ridge, the cairn on a high terrace.

Overall, sites are most likely to be located on terraces and on ridges, hills or knolls. This is probably a result of Late Precontact people's desire to camp on fairly level terrain, close to water, but away from water-saturated areas.

VEGETATION COVER AND SITE TYPES

Site type locations were examined in relation to modern vegetation cover. It is possible, even probable, that the modern vegetation pattern is considerably differently

from the one that existed in the precontact period. Recent research indicates that almost all areas are more heavily vegetated currently than in the recent past (Van Egmont, 1990; Van Wagner, 1995). This is certainly due to the effects of modern fire control (see Chapter 9), and may be due also to climate changes. Modern vegetation cover is used here as it is not possible to reconstruct what the vegetation cover was on each site in the past. In a forest-dominated environment, the assumption here is that most archaeological sites will be located in areas that are open grasslands, or with scattered trees. This would have allowed for the placement of tents or tipis, and reduced the need for tree clearing. Open areas might also have provided greater solar warmth and reduced insects. Whilst the current vegetation status does not necessarily represent conditions at the time of occupation, it can be assumed that conditions are similar or slightly more treed today than in the past because twentieth century fire control has increased the overall areas of forest cover (White 2001).

All the sites were assigned a vegetation cover category as follows: 1. grassland/not tree covered, 2. scattered tree cover (<25%), 3. open tree cover (25-50%), 4. mainly tree covered (50-75%), 5. densely tree covered (75-100%). These values were based on the description of the site provided by the site recorder and on reviews of the site locations on air photographs or on Google Earth (<http://earth.google.com>).

Table 5.7 shows the distribution of sites and site types based on their current vegetation cover. Over all, 48 sites have open tree cover (30.4%), 44 sites are mainly tree covered (27.8%), 38 sites are located in grassland, meadows or other none tree covered areas (24.1%), fifteen sites have scattered tree cover (9.5%), and thirteen sites have dense tree cover (8.2%). Base camps are only slightly more likely to be mainly tree covered (9/29, 31.0%) than to be in one of the other vegetation cover categories

VEGETATION COVER	SITES	SITE TYPES	NUMBER
grassland/ not tree covered	EcPx-4, 15; EdQa-4, 121; EePo-16; EePr-18; EeQb-1, 13; EfPq-12; EgPp-12; EgPq-11; EgPs-3; EgPt-1; EgPu-4; EhPo-36, 40, 44; EhPp-1, 61, 62; EhPv-10, 71; EhPw-2; EjPx-3; EjQa-8; EkPw-13; EkQa-N1; FaQc-1, 4, 11, 12, 14; FbQc-1, 9, 12, 13, 14, 15;	Base camps 5 Transitory camps 20 Pictographs 3 Cultural depressions 1 Cairns 2 Stone circles 5 Workshops 1	37
scattered tree cover (<25%)	EbPp-23; EbPw-1; EbPx-10, 16, 66, 79; EcPx-19; EdQa-13, 17, 25; EeQb-3; EhPw-1; EjPx-N1; EkPx-4, 7;	Base camps 4 Transitory camps 8 Cultural depressions 4	16
open tree cover (25-50%)	EbPp-19, 42, 65, 66; EbPx-5, 57, 78; EcPp-24; EcPx-5, 25, 40, 47, 48, 49, 50, 52, 53, 54, 60, 69; EdPs-4; EePr-9; EeQa-1, 4; EgPr-2; EgPt-22, 27, 28; EgPu-2; EhPu-6; EhPv-9, 15, 16, 20, 38, 58, 126; EhPw-3, 4; EiPr-5; EjPq-1; EjPw-10, 11, 22; EjPx-4, 30; EkPp-14; ElQe-10;	Base camps 7 Transitory camps 32 Cultural depressions 4 Hunting/kill 3 Isolated finds 1 Workshops 1	48
Mainly tree covered (50-75%)	EbPp-29, 31; EcPq-1, 23; EdPp-21; EdPq-16; EdPs-27, 28, 31, 46, 51; EdPx-N1; EdQa-N1; EePr-23; EfPq-5, 6; EfQa-1, 8; EgPs-48, 51; EgPu-26; EgPv-14; EgPw-3; EhPo-54; EhPu-1; EhPv-5, 8, 24, 43, N1; EhPx-8; EiPp-3, 16; EiPr-9; EiPs-6, 13; EjPq-4; EjPw-9; EkPt-3; EkPw-4, 15, N1; FaQc-22;	Base camps 9 Transitory camps 26 Cultural depressions 1 Isolated finds 3 Hunting/kill 4 Workshops 1	44
densely tree covered (75-100%)	EdPr-25; EgPt-3, 6; EhPu-5, EhPv-7, 51, 78, 81; EiQa-2, N1; EiQb-1; FbQc-8, 10	Base camps 4 Transitory camps 8 Workshops 1	13
			158

Table 5.7 Current vegetation cover at Late Precontact archaeological sites in the Central Canadian Rockies.

(Table 5.8). Transitory camps are more likely to be located in open or mainly tree covered areas (34.0% and 27.7%) or in locations with no trees (21.3%). Cultural depressions are more likely to be located in scattered or open tree locations. If this situation existed in the past at these locations, tree removal would not have been needed prior to construction of the depressions. This contrasts to base camps and transitory camps where trees may have been desired for shelter and fuel.

Hunting/kill sites were only found in open tree covered or mainly tree covered areas. If this had parallels to the past, perhaps hunters took advantage of the concealing effect of the vegetation. Both cairns and stone circles were only located in areas with no trees. Both these site types required rocks for their construction, so exposed rock would have been an advantage. Stone circles are indicative of tipis, which also require wooden poles, but these are generally lighter and easier to move than rocks.

Site types	Not tree covered	Scattered tree cover	Open tree cover	Mainly tree covered	Densely tree covered	Total
	N / %	N / %	N / %	N / %	N / %	N / %
Base camps	5/ 17.2	4/ 13.8	7/ 24.1	9/ 31.0	4/ 13.8	29
Cairns	2/ 100					2
Cultural depressions	1/ 10.0	4/ 40.0	4/ 40.0	1/ 10.0		10
Hunting/kills			3/ 42.9	4/ 57.1		7
Isolated finds			1/ 25.0	3/ 75.0		4
Stone circles	5/ 100.0					5
Transitory camps	20/ 21.3	8/ 8.5	32/ 34.0	26/ 27.7	8/ 8.5	94
Workshops	1/ 25.0		1/ 25.0	1/ 25.0	1/ 25.0	4
Totals	38/24.1	15/9.5	48/30.4	44/27.8	13/8.2	158/100

Table 5.8 Numbers and percentages of site types and vegetation cover.

The data presented in Tables 5.7 and 5.8 are based on modern vegetation cover. It cannot be assumed that the vegetation cover in the past was similar. Nonetheless, given that a large percentage of the area is tree covered today, there does seem to have been a bias towards more open and partly tree covered areas generally. Sites are not frequently found in densely treed areas today, perhaps because these areas were avoided in the past, or perhaps because archaeologist today have more difficult finding sites in densely treed areas.

ALTITUDE OF ARCHAEOLOGICAL SITES

Altitude may have had an influence on site location. In order to examine effects of this variable, the altitude of Late Precontact sites in the study area was graphed. These are shown on Figure 5.9 according to the major river drainages and listed in Appendix 1. Most of the sites east of the continental divide are clustered between 1300 and 1500 metres above sea level (asl), primarily along the Bow River, and 1200 to 1400 metres asl along the North Saskatchewan River. On the west side of the continental divide most of the sites are clustered in the Columbia River drainage between 800 and 900 metres asl in an area from its source at Columbia Lake to north of Windermere Lake. All of these areas are valley bottoms which would have had the advantages of being climatically warmer, adjacent to rivers and lakes, and generally flatter terrain which would have facilitated easier movement. Lower altitude areas in the Columbia River drainage are also generally warmer than those on the eastern slopes, with less severe winters, less snow cover, and longer growing seasons.

Figure 5.10 illustrates the site types, their altitude and their association with major river drainages. This diagram shows that all base camps are found at low elevations. On the east slopes all of the base camps are found between 1200 and 1500

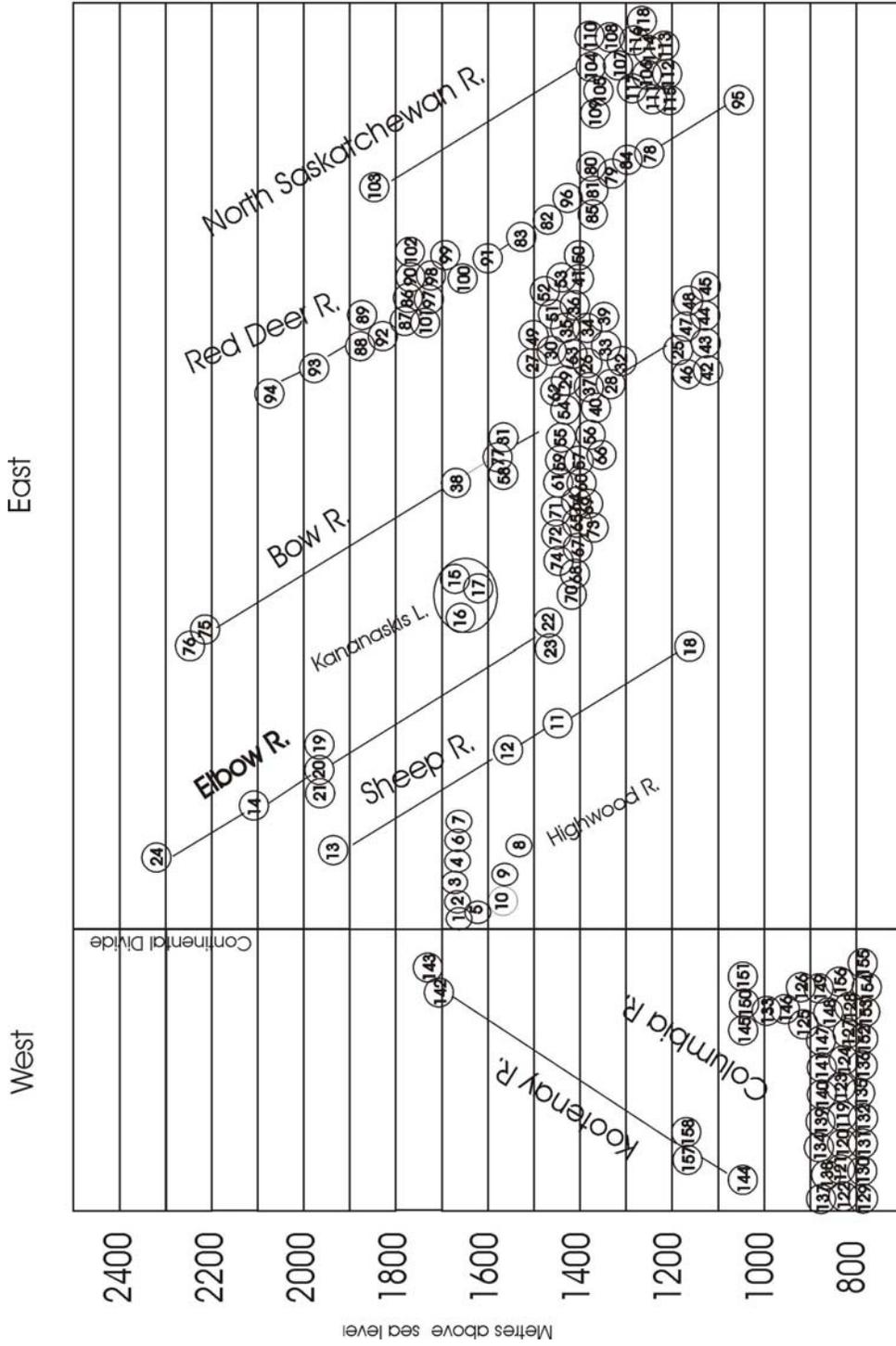


Figure 5.9 Schematic diagram of the altitude of all Late Precontact sites in the Central Canadian Rockies. These are indicated by major river drainages. Site number correspond to the sites listed in Appendix I.

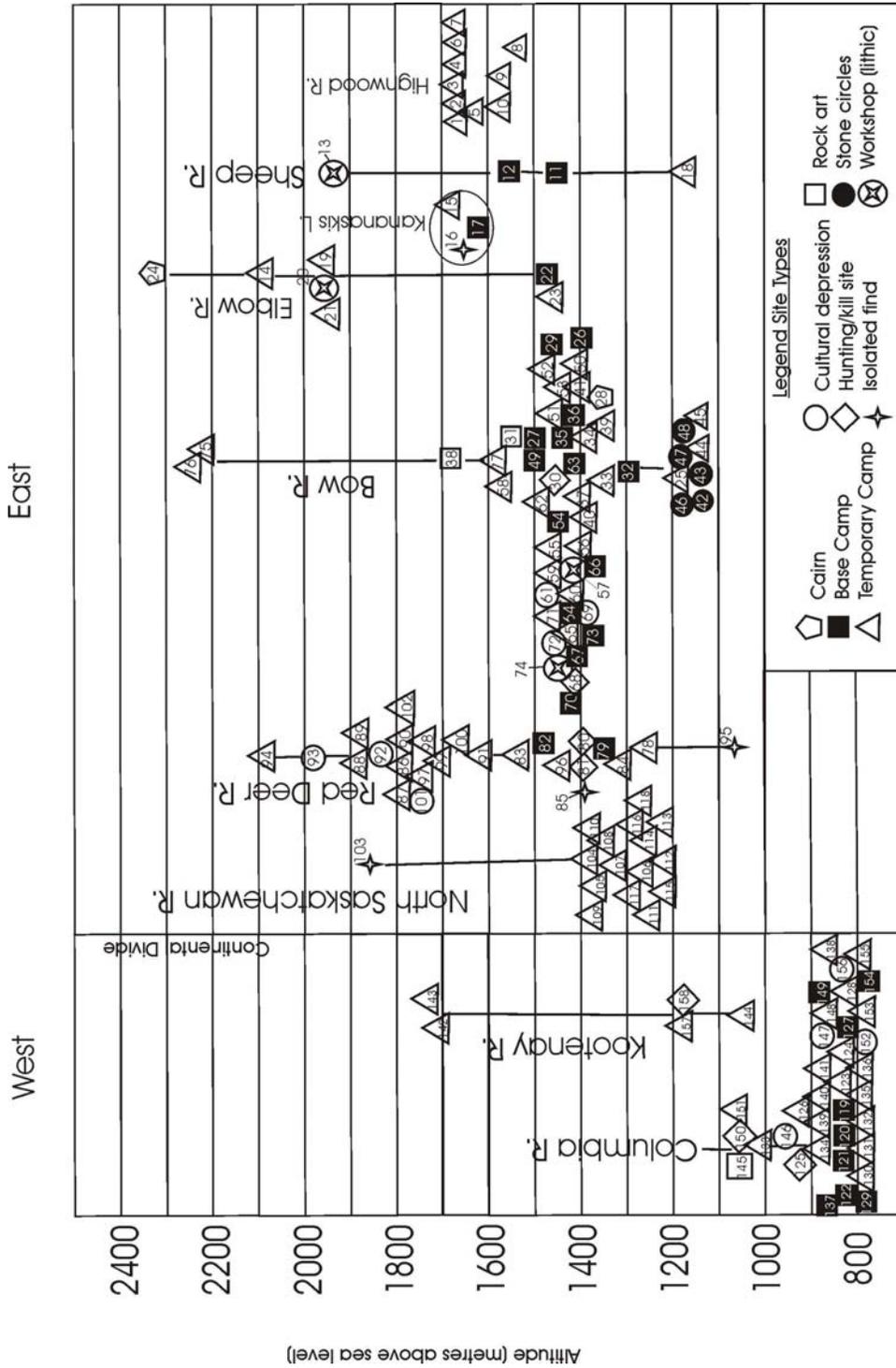


Figure 5.10 Schematic illustration of the altitude of sites in metres about sea level. Each type of site is illustrated and clustered by major river basin. Site numbers corresponds to sites listed in Appendix 1.

metres asl, with only one exception: EdPs-51 (#17) is located at 1680 masl at Kananaskis Lake, the lowest point in the upper-most part of the valley. Most of the eastern-slope base camps are located along the Bow River, but most of the other major drainages also have at least one identified base camp (Kananaskis 1, Elbow 2, Sheep 2, Red Deer 2). Two major drainages, the North Saskatchewan and Highwood rivers, do not have any identified base camps, which is likely due to limited site surveys in these areas. On the west slope all base camps are located adjacent to the Columbia River, Columbia Lake or Windermere Lake.

The site recorded at the highest altitude is the cairn and vision quest structures located near the top of Moose Mountain at 2316 m asl. Most other sites located at higher altitudes were temporary campsites, although temporary campsites are found at all altitudes in the study area. Two workshops are found at high altitudes, EdPr-25 (#13) at 1950 m asl on the Sheep River, and EePr-18 (#20) at 1981 m asl on the Elbow River. Two workshops EhPv-15 (#57) and EhPx-8 (#74) are located within the Bow Valley near Banff at 1400 and 1430 m asl respectively. All five of the stone circle sites are located between 1100 and 1200 m asl on the lowest part of the Bow River in the study area, which is likely related to the cultural use of the tipi and not to elevation *per se*.

Cultural depressions are located along the Columbia, Red Deer and Bow Rivers. These are located at altitudes between 800 and 1000 m asl along the Columbia, at 1981 m (#93), 1830 m (#92), and 1770 m (#101) on the Red Deer River, and at 1405 m (EhPv-38, #61), 1405 m (EhPw-3, #72) and 1372 m (EhPv-N1, #69) along the Bow River.

Altitude is correlated to ecoregions and also partly to vegetation cover. Examination of the relationship of altitude to types of sites shows that there was a

preference for lower altitudes for almost all types of sites. This is especially so for base camps. Other site types found at elevations higher than base camps included temporary camps, cultural depressions and workshops. This suggests that smaller task groups travelled to higher altitudes from base camps located at the lower altitudes often adjacent to lakes (Columbia, Windermere, Vermilion, Kananaskis) or rivers.

CONCLUSIONS

This review of site data from the Central Canadian Rockies Ecosystem has indicated that there is a substantial body of information that can advance the understanding of how the Central Canadian Rockies were utilised in the last thousand years.

Including the excavated sites, a total of 158 sites was assigned to the Late Precontact Period. These sites are found throughout the Central Canadian Rockies region except in the northeast corner of the region along the lower North Saskatchewan and Clearwater rivers; and in the northwest quadrant of the study area from the Columbia River to the height of the Rockies. Today, these areas tend to be wetter, cooler, more heavily tree covered and with lower population densities than other parts of the region.

An examination of the site distribution indicates that there are clusters of sites located along the Columbia River, the upper Red Deer valley, the Bow Valley near Banff, the Bow Valley near the Front Ranges, and in the Bow Valley on the eastern edge of the study area. Excavated sites are distributed in three main clusters: the Eastern Slopes/Foothills; the Upper Bow Valley/Front Ranges; and the Upper Columbia Valley. There have been no major excavated components of this period investigated outside of these clusters. Some sites have been investigated outside these clusters but all of these date to earlier cultural periods. A more detailed analysis of the materials recovered from these excavated sites is presented in Chapter 7.

The most commonly encountered site type in the study area is temporary campsites, interpreted here as the locations of small special activity groups. They are most numerous because they were used for short lengths of time by small sub-groupings of larger populations and these short term tasks had to be undertaken many times in any period. Base camps were the second most common site type. These were likely used for longer lengths of time and by larger groupings of people. They have a higher visibility in the archaeological record because they have higher densities of archaeological remains.

Base camps were most likely to be found in the Montane ecoregion (39.3% of all base camps), along the Bow Valley and other low altitude areas. Base camps are also frequently found in Interior Douglas Fir (32.1% of all base campsites) mostly located along the Columbia River. Transitory camps are most commonly found in the Montane (41.1%), Subalpine (29.5%) and Interior Douglas Fir (20.0%). Few sites of any type are found in high altitude or high precipitation ecoregions. The preference for these ecoregions indicates that hunter-gatherers in this region preferred valley bottoms adjacent to major rivers or lakes. These regions would have had the lowest altitudes and higher resource potential.

Base camps were most likely to be located on terraces (58.6%) or alluvial fans (17.2%). Transitory camps were also likely to be located on terraces (73.4%). Other site types had small numbers of sites that are not suitable for detailed site analysis.

Today most sites have at least some tree cover (25%), with only 24.1% of sites located in grasslands or meadows. An even smaller 8.2% of all sites are found in densely tree covered areas today. Hunting/kill sites were only found in open tree covered (25-50%) or mainly tree covered areas (50-75% tree cover).

Most base camps are located at the lowest possible altitudes available. On the eastern slopes of the Rockies, most base camps are located between 1300 and 1600 metres asl. On the west side of the Rocky Mountain divide all the base camps are found between 800 and 900 metres asl., that is, close to the Columbia River, Columbia Lake or Windermere Lake. On both sides of the Rocky Mountains these areas are located on the floor of wide river valleys. Transitory camps are found over a much wider altitudinal range. Cultural depressions are found at altitudes similar to base camps except in the Upper Red Deer Valley, where they are found between 1700 and 2000 meters asl.

The principal conclusion about the distribution of recorded archaeological sites is that there are a few areas where sites are concentrated in clusters: upper Columbia Valley, Bow Valley near Banff, Bow Valley near the Front Range, and upper Red Deer Valley. Most other parts of the study area have much lower densities of sites. The indications are that much past human activity probably occurred in these 'clusters' areas, whereas the rest of the study area was used much less frequently and/or intensively. In short, this first line of analysis suggests human groups utilizing the Central Canadian Rockies Ecosystem used a clustered foraging pattern, and utilised much of the remaining areas as collecting regions to support larger groups of people located within a few key locations (upper Columbia Valley, Bow Valley near Banff, Bow Valley near the Front Range, and the upper Red Deer Valley).

CHAPTER 6

EXCAVATED ARCHAEOLOGICAL SITES IN THE CENTRAL CANADIAN ROCKIES

INTRODUCTION

This chapter describes excavated archaeological sites of the Late Precontact Period in the Central Canadian Rockies. These sites provide important data towards developing an understanding of the nature of the utilisation pattern of this period. In this chapter, each excavated site in the region is summarised, with particular attention paid to describing the geographic location and characteristics. Discussion of the age, tool types, and other material culture elements is provided. Those elements that have been used to identify these sites with the Late Precontact Period are also described. In the following Chapter 7, archaeological data from these sites including faunal assemblages, artifact assemblage compositions, strategy groups and lithic technology are used to develop a improved understanding of the utilisation patterns by hunter-gatherers.

ARCHAEOLOGICAL EXCAVATION DATA

Reports of archaeological excavated sites in the Central Canadian Rockies were collected and summarised. These reports were available through the three main institutions that provide administrative cultural resource management for the Central Canadian Rockies: the Historic Resources Branch, Province of Alberta; the Archaeology Branch, Province of British Columbia; and the Western and Northern Service Centre, Parks Canada, Calgary. Artefacts excavated from these sites are stored at the Royal Alberta Museum, Edmonton; the Royal British Columbia

Museum, Victoria; and the Western and Northern Service Centre, Parks Canada, Calgary and their storage centre in Winnipeg. Some excavated artefacts were examined at the Royal British Columbia Museum, Victoria and the Western and Northern Service Centre, Parks Canada, Calgary. Initially I had intended to examine all tools in all three repositories but realised quickly that this was beyond the scope of this study because of the large size of some collections and the lack of availability of many items.

COLLECTIONS AND ANALYSES

Archaeological collections from excavated sites were reviewed utilising available reports. Many of these are so-called “grey literature”, that is, reports prepared as archaeological management reports for provincial or federal agencies but not published. There are many excavated sites in this area that have been dated to, or associated with, earlier cultural periods. The sites reviewed below are those that seem to have at least some Late Precontact or Contact materials. In the subsequent detailed analyses of cultural materials it was necessary to select only the sites with detail descriptions of lithic tools, lithic materials, and faunal remains.

Excavated sites with Late Precontact components in the Central Canadian Rockies Ecosystem can be grouped in three major clusters according to their locations in the Eastern slopes/foothills, the Bow Valley within the Front Ranges, and those in the upper Columbia River Valley (Figure 6.1). No major Late Precontact components have been excavated outside of these groups. The excavated portions of most of the investigated sites cannot be considered fully representative of the range of materials at these sites because frequently the excavated portions constitute only a small percentage of the total site areas.

In some cases, estimates of the total areas covered by these sites have not been made. Most of the sites are characterised by occupation layers that contain repeated, although frequently inseparable, occupations often contained within less than 20 cm of sediment. A few sites are distinguished by more discrete occupations such as the Hunter Valley and Pigeon Mountain sites that may represent single seasonal occupations. The Salmon Beds and Columbia Lakes sites are distinctive in having multiple occupations with radiocarbon dates that span the entire period. Each excavated site is summarised briefly below.

EASTERN SLOPES-FOOTHILLS SITES

Hunter Valley Site (EiPp-16)

Hunter Valley Site is located on an unnamed tributary of Beaverdam Creek which flows into the Red Deer River (Figure 6.1, Site 1). The site is located close to the valley bottom in undulating terrain of the lower Foothills physiographic region and contained within the Aspen-Parkland ecoregion (Figure 6.2). Although it faces northward the site is sheltered by valley walls and trees. Excavations of 135 square metres were conducted in advance of construction of a natural gas pipeline (Head, 1999). Two occupations were identified, a basal occupation assigned to the Besant Culture (2000-1300 BP), and an upper occupation associated with the Late Precontact Period (1300-200 BP). Both occupations contained large quantities of fire-broken rock and extensive lithic assemblages. The Late Precontact occupation (Occupation 2) also included a small ceramic collection from three or four vessels. These are stylistically similar to ceramic vessels from Saskatchewan associated with the Late Precontact Mortlach Phase or to the earlier Sandy Lake Phase. Mortlach and Sandy Lake have been associated with Siouan-speaking peoples (Walde, 2003). Modern

Stoney people live just south of the Hunter Valley area. Head (1999) suggests that the Hunter Valley Site was occupied by ancestral Stoney.

Three radiocarbon dates were obtained from this site. Two were derived from Occupation 2. Carbon residues from ceramic vessel 1 were dated 440 ± 60 BP (Beta-

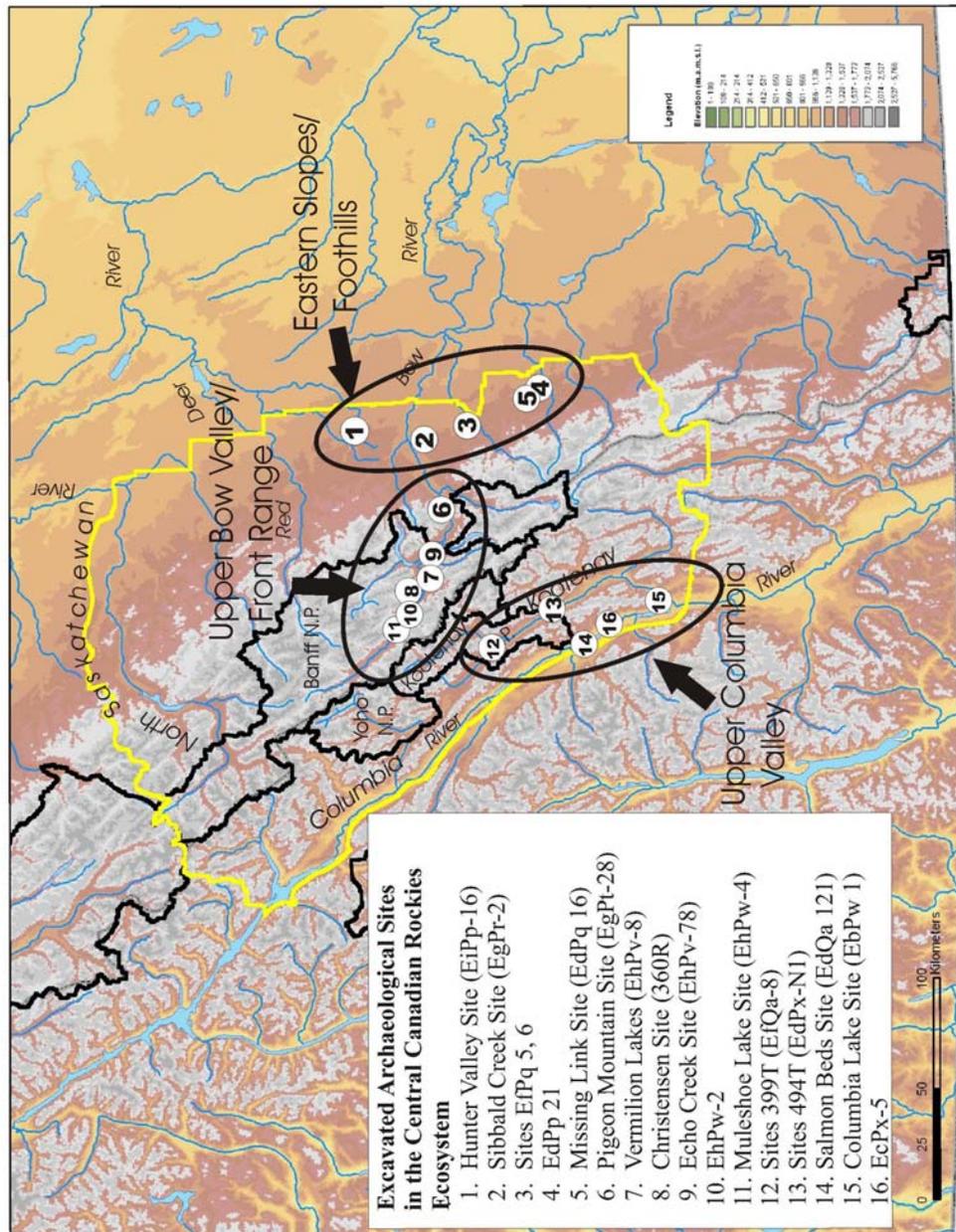


Figure 6.1 Excavated Archaeological Sites in the Central Canadian Rockies Ecosystem.



Figure 6.2 Hunter Valley Site (EiPp-16). View to the southwest. The site is in the valley bottom near the gap in the trees. (Photo: courtesy of Thomas Head.)

83947)¹ while those from ceramic vessel 3 yielded a date of 390 ± 50 BP (Beta-83948).

The third date was obtained from bone in Occupation 1 and yielded a date of 1260 ± 60 BP (Beta-86172).

The lithic assemblage is composed of 1763 items which included 233 tools (Head, 1999:155). Lithic materials utilised were predominantly locally available materials including siltstone, quartzite and chert. The tool assemblage included small side-notched projectile points, bifaces, unifacially and bifacially retouched stone tools, scrapers and bipolar cores (sometimes called wedges or *pièce esquillées*).

A single feature consisted of a small rock ring interpreted as a hearth. Large amounts of fire-broken rock, commonly associated with stone boiling, were found throughout the site. Faunal remains were heavily processed resulting in large numbers of unburned, burned and calcined bone fragments. The fire-broken rocks and

¹ All dates reported in this chapter are uncalibrated. See Chapter 5 for a discussion of calibration of radiocarbon dates.

unburned bone fragments indicates that processing for bone grease and making pemmican were major activities carried out at this site. The burned and calcined bone may result from subsequent burning of bone for site “cleaning”. The large numbers of scrapers and expedient tools indicate that hide preparation was also a major activity here (Head, 1999:156). Scrapers and expedient tools can also be used for other purposes but an edge angle and use wear analysis was not conducted.

This site is unique amongst excavated sites in the Central Canadian Rockies ecosystem because it is the only site that has been definitively assigned to a specific modern cultural group (Stoney) based on distinctive artifacts. Ceramic vessels decorated in this style have not been located at any other sites in the study area.

Sibbald Creek Site (EgPr-2)

The Sibbald Creek Site is located in the Foothills east of the Alberta Rocky Mountains (Figure 6.1, Site 2). It is located on a high terrace at an elevation of 1463 m asl overlooking a large meadow at the confluence of Sibbald and Jumpingpound Creeks (Figure 6.3). From here, Jumpingpound Creek flows east and northeast for approximately 40 km to join the Bow River. The site terrace is approximately 50 m above the level of a grassland meadow that is approximately 2 km long by 500 m wide. This meadow is a small isolated pocket of the larger Montane ecoregion found to the east and north. The surrounding vegetation consists of a mixed forest of pine, spruce and aspen. The site was located and excavated in response to the proposed widening of Alberta Highway 68 (Gryba, 1983).

The minimum site area is 50 x 20 m (1000 square metres) but due to terrain constraints of a small narrow terrace with south and southeast solar exposure much of the archaeological material is concentrated in an area of approximately 600 square

metres. Excavations were conducted in 1979 (18 square metres) and in 1980 (198 square metres). Cultural materials were located from the surface to a depth of 55 cm. Because of the general lack of visible natural stratification, the site was excavated in arbitrarily defined five cm thick spits. Evidence of vertical displacement was identified in the distribution of distinctive lithic materials and in the scattered distribution of eight pieces of a partially reassembled end scraper. Pieces of this tool were located at 5-10 cm (n=1), 10-15 cm (n=3), 15-20 cm (n=1), 20-25 cm (n=2) and 30-35 cm (n=1). Mixing of cultural material is attributable to plant root growth, uprooting of trees, possible animal burrows, and human action. Even so, a generalised progression of projectile points was recovered that is consistent with the chronological scheme currently in use for the Northwestern Plains. The earliest projectile point styles recovered were Mount Albion, Scottsbluff, Agate Basin, Midland and Fluted point styles identified as part of the Plano Tradition and dating c.9000 years BP. The upper four spits yielded projectile points classified as Plains side-notched, Plains Triangular, and Prairie side-notched of the Late Precontact Period. In levels 5-10, 10-15, 15-20, and 20-25 cm these types were found with projectile point styles characteristic of the Middle Precontact Period (Besant, Pelican Lake, Duncan and Oxbow). Three radiocarbon dates were obtained for the site. The earliest sample from 35-40 cm below surface yielded a date of 9570 ± 320 BP (GX-8808). A sample from combined screen materials from 35-40 and 40-45 cm yielded a date of 7645 ± 260 BP (GX-8810). The most recent date of 5885 ± 190 BP (GX-8809) was collected from the 25-30 cm layer.

Cultural materials recovered included 146 projectile points including 16 Plains side-notched, 3 Plains Triangular, and 7 Prairie side-notched. Other tools included 104 biface knives, five drills/perforators, 15 graters, 302 retouched flakes, 93 end

scrapers, 20 side scrapers, 38 choppers, 9 anvil stones, 43 hammerstones, 171 cores, and a small number of other tool types. Debitage was quantified from a block excavation of 133 square metres; this totalled 17, 295 flakes and flake fragments. Eighteen different lithic materials were identified, with crystalline siltstone forming the largest percentage of this assemblage (42.6%), followed by black banded siltstone (18.9%). Most of the materials were likely derived from local sources but three material types, Swan River chert, obsidian and crystal quartz, were likely transported to the site from more distant sources.



Figure 6.3 Sibbald Creek Site (EgPr-2) located in the right foreground overlooking a grassland meadow. View to the southwest. (Photo: Heitzmann, 2007)

Of the 171 cores, two different types were distinguished: multi-directional cores and bipolar cores. The 86 multi-directional cores consisted of large cobbles or blocks from which flakes were removed from multiple directions in an irregular

fashion. The 85 bipolar cores were typically worked using an anvil and hammer technique resulting in the removal of flakes from two opposing directions (top and bottom) often simultaneously. This technique was applied to split small chert pebbles, larger siltstone pieces and large quartzite cobbles. Some (n=26) of these cores have one or two wedge shaped edges with marked battering that may be *pièces esquillées*.

The distribution of cores was not uniform in all levels of the site. Bipolar cores were more common in the four uppermost levels of the large block excavation, where 41 of a total 76 cores (53.9%) were bipolar cores but only 12 of 73 (16.4%) were multi-directional cores. In the lower six levels (below 20 cm), multi-directional cores were very common 83.6% (61 of 73), whereas bipolar cores were present in reduced numbers. This indicates that in the Late Precontact Period there was a preference for bipolar cores and away from multi-directional ones.

At the Sibbald Creek Site, four small sherds of native ceramics were recovered (Gryba, 1983:120, 121). These included a rim fragment from 10-15 cm, a neck sherd from 0-5 cm, and two small body sherds. These were identified as belonging to the Saskatchewan Basin Complex (Late Variant), which is associated with the Old Womens Phase of the Late Precontact Period (Byrne, 1973).

In the near-surface portions of the Sibbald Creek Site a small number of nineteenth and twentieth century historic artefacts was recovered. These items could be separated into two groups, one dating to between AD 1850 and 1870, and the other dating between 1940 and 1960. Nineteenth century items included a small metal container cover, smoking pipe fragments, a metal teaspoon, and glass beads. The metal container cover was stamped "ELEY" and "LONDON" and contained percussion caps (a gun firing component) produced by the Eley Company after 1849.

Twentieth century items included fragments of two glass bottles, a plastic button, a .22 calibre rim fire “D” cartridge casing, a brass shotgun shell casing stamped “D.C.Co. No 12 VULCAN”, a metal can key, and covers from “Players” cigarette tobacco and “Copenhagen” snuff containers.

Faunal remains recovered at the Sibbald Creek Site were largely confined to the upper 20 cm of deposits. Below that only small calcined bone and teeth fragments were recovered. The faunal remains consisted of approximately 250 individual items. The minimum number of individual animals represent in the collection are seven bison (*Bison bison*), two beaver (*Castor canadensis*), one lynx (*Lynx canadensis*), one mountain sheep (*Ovis canadiensis*), two deer (*Odocoileus sp.*) and one elk (*Cervus elephas*). Based on the eruption of juvenile bison teeth and eruption-wear data, three juvenile bison are represented and were probably killed between October and December (Barnett, 1983:196). Based on the vertical positioning of bone items and on the separation of bone cuts produced by metal tools versus more jagged cuts produced by stone tools, most of the bison bones were associated with the Late Precontact Period. The more diverse assemblage of other species (beaver, lynx, mountain sheep, deer and elk) were assigned to the Historic Period after AD 1850. In the Late Precontact Period the faunal remains suggest “...the heavy or exclusive reliance upon bison, the taking of single animals, the bringing back to camp of the more practical cuts of muscles, the breaking up of the larger elements for their marrow, the use of stone or bone tools in the butchering and processing operations, and the littering of the habitation site with refuse...”(Barnett, 1983:211). The faunal analysis tentatively suggests that at least during the Late Precontact Period the favoured season of occupation was autumn or early winter.

The excavations at the Sibbald Creek Site provide a record of human utilisation in the Alberta Foothills that extends back to at least 9500 years ago. Human occupation was concentrated into a core site area of approximately 600 square metres due to geographic constraints. One of the primary difficulties of this site's data is that there is no visually discernable stratigraphic separation and the archaeological materials demonstrate some mixing of materials from different cultural periods. For the current study the site is significant because of the presence of Late Precontact and Contact Period remains. In particular, identifiable faunal remains recovered at the site are confined to these periods. The presence of bison exclusively in the Late Precontact Period indicates that bison hunting was a major occupation of the site's inhabitants and that autumn or early winter was the favoured season of use. One of the major difficulties of using the data from this site for further analysis is the lack of clearly distinguished tool assemblages or debitage assignable to the Late Precontact Period.

Site EfPq-5

Site EfPq 5 is located in the Foothills physiographic region near the junction of Canyon Creek with the Elbow River (Figure 6.1, Site 3). The site occurs at an elevation of approximately 1478 m asl on a high terrace overlooking the Elbow River valley (Figure 6.4). The site is located within the Lower Boreal-Cordilleran ecoregion and is vegetated with a mixed wood forest of aspen and pine. Excavations were undertaken prior to construction of Alberta Highway 66.

Excavations at Site EfPq-5 were conducted over three consecutive years. A total of 91 square metres was excavated: eighteen one-metre square test units were dug in 1980 (Quigg, 1981), 42 square metres were excavated in 1981 (Quigg, 1982),

and 31 square metres were excavated in 1982 (McCullough and Fedirchuk, 1983). All of the cultural materials were found within 30 cm of the site surface. No visual buried soil horizons were apparent and mixing of cultural remains was suspected due



Figure 6.4 Site EfPq-5. View to the west along the Elbow River. The site is located in the left foreground. (Photo: Heitzmann 2007)

to the action of tree roots and ground freeze-thaw action. Nine of twelve projectile points recovered in 1980 and 1981 were classified following the phase identifications used on the North Western Plains. A single side-notched projectile point was assigned to the Old Women's Phase of the Late Precontact Period. A radiocarbon date from a bone sample from the upper 0-10 cm level yielded a date of 830 ± 100 years BP (RL-1475), which is consistent with other sites of this period. The eight remaining projectile points were assigned to the Middle Precontact Period. Seven resembled those of the Besant Phase (2000-1300 BP) or possibly the Mummy Cave Complex (7500 – 5500 BP) (Quigg, 1982). Two additional radiocarbon dates on bone yielded dates of 1920 ± 210 BP (RL-1583) and 3900 ± 190 BP (RL-1584) (Quigg,

1982). The first of these dates supports the identified affiliation with the Besant Phase, while the second date is not consistent with either of these phases. An additional radiocarbon date was obtained in 1982 from several faunal bones collected from the 20-30 cm level. This yielded a date of 1600 ± 140 BP (Beta-6322) supporting the association with the Besant Phase.

McCullough and Fedirchuk (1983:181-184) re-analysed the projectile points previously recovered, along with those recovered in 1982. They identified that a minimum of five phase components was present at EfPq-5. These included Bitterroot (7500-5500 BP), Pelican Lake (3000-1800 BP), and Besant (2000-1300 BP) phases of the Middle Precontact Period; and Avonlea (1800-1000 BP) and Old Women's (1200-200 BP) phases of the Late Precontact Period. The Old Women's Phase is represented by Lewis (1400 – 300 BP), Nanton (1400-300 BP) and Washita (500-300 BP) projectile point styles.

Stone tool technology utilised at the site involved two primary reduction methods (McCullough and Fedirchuk, 1983:190). Chert pebbles and some quartzite cobbles were reduced by the bipolar method utilizing the hammer and anvil method (n=5). The resultant split pebbles/cobbles were used as blanks in the production of formal or expedient tools. Small flakes detached from these cores were also used as blanks or directly as expedient tools.

The second reduction method used a direct free hand percussor on siltstone and quarried cherts (n=3). On these cores, single flakes were removed from randomised platform surfaces, often selected by rotating the core for each subsequent flake removal. This produced larger flakes suitable for direct use as tools or subsequent tool making.

Based on the flaking detritus McCullough and Fedirchuk (1983:190) stated that "...there is substantial evidence for manufacture and refurbishing of bifacial forms at the site but primary reduction and blank production appear to have been conducted elsewhere." Large flakes, tool rejects and hammerstones were largely absent from this site. Expedient tools consisting of flakes with little or no modification were common. Expedient tools such as these can be used for intensive wood, bone or hide processing (Crabtree and Davis, 1968).

Most of the faunal remains recovered from EfPq-5 were extremely small and fragmentary. Only 22 items were identifiable either as bison or unidentifiable ungulate.

A single feature at the site excavated by Quigg (1982) consisted of a stone ring approximately 5 m in diameter composed of forty irregularly shaped sandstone slabs. These likely weighed down a skin tent.

Siliceous siltstone was the most common lithic material at the site forming 64.1% of the total assemblage. Chert (24.7%), quartzite (9.2%) and other materials (2.0%) made up the balance of the collection. Stone tools, however, were most likely to be made of cherts (40.9%), followed by siliceous siltstone (27.3%), quartzite (27.3%) and other stone materials (4.6%). Most of these are likely locally derived materials. The only materials derived from more distant sources were Top of the World Chert and obsidian which formed just over one per cent of the total assemblage.

The archaeological materials recovered from Site EfPq-5 indicate that at least five cultural components are present in the upper 30 cm of soil at this site. Unfortunately it was not possible to separate the various site components or to clearly distinguish materials related to the various phases. The majority of the debitage

suggests that tools were sharpened or refurbished here but that tool manufacture was not a major activity of the site. The site probably functioned as a base camp for hunting and collecting in the surrounding area.

Site EfPq-6

Site EfPq 6 is located on a middle terrace near the junction of Canyon Creek with the Elbow River (Figure 6.1, Site 3) (Figure 6.5). It is at an elevation of 1463 m asl approximately 15 metres lower than Site EfPq-5 discussed above. It is located within the Lower Boreal-Cordilleran ecoregion. Excavations were undertaken prior to construction of Alberta Highway 66.



Figure 6.5 View west of Site EfPq-6 overlooking the Elbow River. The site is in the foreground. (Photo: Heitzmann, 2007)

Excavations were undertaken at the EfPq-6 in two consecutive years. In 1981, fifteen 1 m x 1 m tests units were excavated (Quigg, 1982), while in 1982 thirty square

metres were excavated (McCullough and Fedirchuk, 1983). Cultural materials were confined to the upper 30 cm of site deposits. In 1981, a single Pelican Lake projectile point (c.3000-1800 BP) was the sole diagnostic artefact recovered. Other items recovered were one end scraper, nineteen marginally retouched flakes, 270 pieces of debitage, and 31 unidentifiable bone fragments.

In 1982 three projectile points were recovered, one of which was a lanceolate shape with a broad straight base and mildly excurvate lateral edges. This projectile point was not assigned to a cultural phase. The other two points were tip fragments and were also not assigned to a cultural phase. Other items recovered were five bifaces, four end scrapers, two side scrapers, eleven edge modified flakes, one abraider, thirteen cores, 500 unmodified flakes, four pebble fragments, one tubular pipe and eighteen unidentifiable bone fragments. One oval shaped hearth was identified. A charcoal sample from this feature submitted for radiocarbon dating yielded a modern date. The tubular pipe and ethnographic evidence for use of tanged projectile points by Kutenai (Ktunaxa) were suggested to indicate that this occupation occurred in the Late Precontact Period (c.1300-275 BP) (McCullough and Fedirchuk, 1983:232), but the ethnographic evidence is not provided and there is no known association of tubular pipes with the Kutenai.

Three core reduction strategies were identified in the 1982 excavations. The hammer and anvil method was used to reduce four small cores, three of which were chert, and one was crystal quartz. All of these possess opposing striking platforms and/or parallel opposing flake scars.

Free hand percussion was likely used to remove a small number of flakes from two slab-like sandstone cores. This same technique was used on siltstone to yield

small, blocky, angular cores. All of these had been heavily reduced so that they retained a single remnant striking platform.

The third method identified is a biface reduction strategy. Small fragments of Knife River Flint were conjoined. The reassembled artefact "...consists of a long narrow edge of cortex from which flakes have been removed bifacially" (McCullough and Fedirchuk, 1983:221).

Stone material types used at EfPq-6 were 43.6% chert, 42% siltstone, 11.6% quartzite, 2.0% sandstone, 0.5% chalcedony and 0.5% crystal quartz. Most of these materials are locally available, particularly the siltstone, grey-brown and pebble cherts, and quartzites in cobble form. Identified exotic materials were Top of the World Chert from Interior British Columbia and Knife River Flint from North Dakota or southern Manitoba.

The identification of Site EfPq-6 as a Late Precontact site based on one tubular smoking pipe and one "modern" radiocarbon date is very tenuous. The "modern" date means that a decay rate could not be determined, not that a late context is necessarily likely. Fragments of a tubular smoking pipe have also been found in a McKean occupation (4200 – 3500 BP) at the Cactus Flower site near Medicine Hat, Alberta (Brumley, 1975). McCullough and Fedirchuk (1983) do not cite a reference for the ethnographic evidence for use of tanged projectile points by Kutenai and the corner-notched point recovered in 1981 could be indicative of several phase associations.

Site EdPp-21

Site EdPp-21 is located on a high terrace overlooking the confluence of an unnamed creek and the Sheep River (Figure 6.1, Site 4). It is located within the Foothills

physiographic region and the Lower Boreal-Cordilleran ecoregion, on the southern side of Missinglink Mountain at an elevation of 1463 m asl. Modern vegetation at the site grades from grassland along the terrace edge to aspen forest away from the edge. Test excavations were undertaken prior to construction of highway improvements of Alberta Highway 546 (Heitzmann, 1982; McCullough and Fedirchuk, 1983) (Figure 6.6).



Figure 6.6 View west of Site EdPp-21 located on a high terrace overlooking the Sheep Valley. (Photo: Heitzmann, 2007)

A test excavation programme in 1981 excavated thirteen 1 m x 1 m units (Heitzmann; 1982). A total of 315 lithic artefacts recovered included four projectile points, one biface, eight unifaces, two drills/punches, four edge modified flakes, one anvil, one abraider, one core, 288 flakes and five shatter. Also recovered were four pieces of fire broken rock and 40 bone or tooth fragments. Two precontact ceramic sherds were also recovered. Two ungulate species were identified: bison (*Bison*

bison) and mountain sheep (*Ovis canadensis*). These items were recovered from eight 10 cm levels between 0 and 80 centimetres in depth with the majority of the items derived from Levels 1 through 4 (Level 1 – 17.0%, Level 2 – 26.8%, Level 3 – 32%, Level 4 – 13.8%).

Three of four projectile points were classified as identified styles: Avonlea (1800 – 1000 BP)(n=1), Besant (1800-1250 BP)(n = 1), and Pelican Lake (3000 – 1800 BP)(n=1). The two ceramic body sherds had truncated fabric/net impressions defined as the Saskatchewan Basin Ceramic Complex (Early Variant) (Byrne, 1973:56). These were found in Level 3 associated with the Avonlea point.

In 1982, an additional 71 square metres were excavated at this site (McCullough and Fedirchuk, 1983). A total of 1,149 lithic artefacts, 493 fragments of fire cracked rock and 345 bone fragments were recovered. The stone artifacts included 23 projectile points, fourteen bifaces, twelve end scrapers, eighteen edge modified flakes, eight utilised flakes, one hammerstone, one abrader, 30 cores, 1041 unmodified flakes and six pebble fragments. Most of these were found in the upper 30 cm of the site.

Eighteen of the projectile points (n=18) were assigned to previously defined diagnostic styles. These were Bitterroot (7000-5500 BP) (n=1), Oxbow (5500-3500 BP) (n=1), Pelican Lake (3000-1800 BP) (n=4), Besant (1800-1250 BP) (n = 10), and Avonlea (1800-1000 BP) (n=2).

No natural separation in the site stratigraphy was identifiable. McCullough and Fedirchuk concluded “[v]ertical distribution of projectile points indicates a temporal continuum of occupation. However, vertical distribution of the artefact assemblage does not segregate into components...Consequently, the cultural material recovered from EdPp 21 is treated as a single cultural unit” (1983:100).

Some general comments were made about the tool technology utilised at EdPp 21. McCullough and Fedirchuk noted that “[b]oth the bipolar technique, utilizing a hammer and anvil, and direct freehand percussion were used for core reduction. There is little evidence for core preparation. Suitable faces of cortex or previously produced flakes scars were used as striking platforms...Expediency of this nature in core reduction is perhaps related to the common occurrence of the raw material and related lack of technological processes which enhance conservation of raw material” (1983:106-107). However, all of the cores recovered were very small and most were remnants of larger nodules.

Blanks and performs of exotic materials were present. Alterations of these were restricted to form flaking, thinning and final edge sharpening. Larger flakes produced in this process were commonly modified into expedient tools rather than discarded.

A variety of lithic materials was present at this site. Siliceous siltstone was the most common (56.9%). Cherts composed just over one third of the total assemblage (35.0%). Exotic materials including obsidian, Montana Chert, Top-of-the World Chert, and Knife River Flint formed 14.5% of the total lithic assemblage but 30.4% of projectile points, 33.3% of scrapers, and 46.7% of retouch flakes (McCullough and Fedirchuk, 1983:107).

Identified faunal materials were bison (*Bison bison*), mountain sheep (*Ovis canadensis*), mountain goat (*Oreamus americanus*), moose (*Alces alces*), and elk (*Cervus elephas*). Bison was the most commonly identified species (56.8%) of the identifiable specimens (n=74). The presence of foetal bison remains suggest that the site may have been occupied in the spring. The remains of mountain sheep were

suggested to indicate a late autumn to winter occupation because the site is located in an area protected for mountain sheep wintering today.

One of the striking things about site EdPp-21 is that diagnostic projectile points indicate continuous use at the site from the Pelican Lake Phase (3000-1800 BP) through the Besant Phase (2000-1300 BP) to the Avonlea Phases (1800-1000 BP). There are however, no late precontact projectile points that might indicate use during the last thousand years (1000-0 BP). A single radiocarbon date from this site of 340 ± 50 years BP (Beta 6321) was obtained from a charcoal sample associated with a rock/hearth feature and adjacent to three Besant projectile points. This radiocarbon date is too recent to be comparable with other Besant Phase materials and suggests that the sample may have been contaminated.

Missinglink Site EdPq-16

The Missinglink Site is located on a broad bench on the western slope of Missinglink Mountain (Figure 6.1, Site 5). The bench overlooks the confluence of an unnamed creek and Gorge Creek, itself a tributary of the Sheep River (Figure 6.7). The site is located within the Foothills physiographic region and the Lower Boreal-Cordilleran ecoregion, at an elevation of 1585 m asl. Aspen and lodgepole pine are the dominant tree species at the site. Evaluative excavations were undertaken in 1983 (Pollock, 1984) and more extensive excavations were undertaken in 1986 (Fedirchuk, 1987). The results from both years were integrated in the report by Fedirchuk (1987).

The site was excavated in three blocks (Block A, B, and C) in 1986. Materials excavated in 1983 were termed Block D. In 1986, all of the artefacts were excavated by trowel and all items were individually measured for depth. In Block A all of the items were located within 25 cm of the surface in an upper mineral soil (Ae horizon)

with a few exceptions which were located in a sub-soil horizon (Bm). Materials in this block were "...viewed as a single cultural assemblage"(Fedirchuk, 1987:43). In Block B, three soil horizons (Ae, Bm, and C) were identified in a 35 cm soil column. However, the cultural materials recovered suggested that considerable mixing had occurred as a result of tree throw and frost action. For example, a small side-notched projectile point (Late Precontact 1800-275 BP) was lowest in the profile in the Bm horizon. Within the same soil horizon but near the top of the soil unit was a lanceolate projectile point identified as a late Early Precontact form (c. 9500-7500 BP). In Block C, based on the relative temporal relationships of projectile point styles and on their vertical provenience, five distinct assemblages existed "...in temporally correct stratigraphic relationship" (Fedirchuk, 1987:37). Block D materials were recorded by quadrant of each one metre excavation unit.



Figure 6.7 View to the northwest of the Missinglink Site located on a high terrace overlooking Gorge Creek. (Photo: Heitzmann, 2007)

A total of 3,022 cultural items was recovered from the Missinglink Site. This assemblage was composed of 2,618 lithic items, 306 firebroken rocks, 96 bone pieces, and two charcoal samples. The lithic items were sorted into eleven descriptive categories: 21 projectile points, eighteen bifaces, seven scrapers, sixteen lateral unifaces, 28 edge retouched flakes, nine split pebbles, two abraders, fifteen cores, and 2507 pieces of debitage.

The debitage was sorted into material types. The majority (88.4% of all flake types) was siltstone (including Banff Chert). Other chert materials composed 9.1% of the assemblage, followed by quartzite (1.4%). Knife River Flint, obsidian, Top of the World chert, and sandstone each comprised less than 0.5% of the total sample.

Fedirchuk (1987:54) offers an interesting discussion of the lithic material often termed “siltstone”. She states:

At the onset of the analysis it had been assumed that Banff chert and siliceous siltstone were synonymous. Banff chert or Banff Formation chert was originally described as “a banded siliceous black chert derived from the Banff formation” (Lifeway of Canada, 1973:43). Subsequent re-examination by a geologist of a sample of materials from Kananaskis Provincial Park resulted in the re-identification of the rock as “a very fine grained to extremely fine grained sandstone or siltstone” (Aresco Ltd., 1977: 146); hence the description ‘siliceous siltstone’. Fedje (1987, personal communication) has recently re-submitted the Banff chert for thin section analysis to B. Richards, Geological Survey of Canada, Calgary, who identified ‘Banff chert’ as a chert not a siltstone.

Primary quarries of Banff chert have been identified at Limestone Mountain (Reeves and Head, 1979; Head, 1980), near the Kananaskis lakes (Aresco Ltd., 1977) and east of Creston, British Columbia (Choquette, 1974; Loveseth, 1980). In the Bow River area, outcroppings of Banff Formation chert have been noted near Lake Minnewanka (McIntyre and Reeves, 1975). Secondary sources, probably in local stream beds, are distributed along the Eastern Slopes from Crowsnest Pass to Jasper National Park (Quigg, 1978). (Fedirchuk, 1987:54).

The two charcoal samples were considered insufficient for radiometric analysis, and the bone pieces too fragmented and fragile to be identified to genus or species.

Only the projectile points were time diagnostic. Sixteen of the projectile points were sufficiently complete to allow classification into recognised typological styles. One was a lanceolate style identified as an Agate Basin type typical of the late Early Precontact Period (*c.*9000-7500 BP). Five projectile points with large size and well defined side notches were identified as Bitterroot type associated with the early Middle Precontact Period (*c.*7500-5500 BP). One projectile point had a deeply indented base and basal ears assigned to an unnamed type likely dating to the middle Middle Precontact (*c.*5500 – 3500 BP). Three corner-notched projectile points were assigned to the Pelican Lake type of the late Middle Precontact Period (3000 – 1800 BP). Three projectile points with broad shallow corner notches were assigned to the Besant type of late Middle Precontact Period (2000-1300 BP). Two small side-notched projectile points were assigned to the Late Precontact Period (post 1300 BP). One of these is a Prairie side-notched classic type, the other a Prairie side-notched Swift Current fish-tail type (Fedirchuk, 1987).

Some of the materials were clustered together into assemblages based on their vertical and horizontal distributions, and their associations with projectile point types. There was, however, no assemblage of materials clustered with the side-notched points. A further statistical analysis of metric attributes of complete flakes from each excavation block was undertaken. “The results of the analyses indicate that there are no specific attributes which are consistently different between the excavation blocks” (Fedirchuk, 1987:108).

The Missinglink Site spans a long time range from the late Early Precontact Period (9000-7500 BP) to the Late Precontact (post 1300 BP). The site is characterised by limited soil deposition and lack of clear stratigraphic separation. There appears to be some horizontal distribution but the evidence is largely inferential. The site appears to have been most intensively utilised during the early and late Middle Precontact Period mainly during Bitterroot, Pelican Lake and Besant phases. The Late Precontact materials are limited and seems to be restricted to the earlier half of that period (Prairie side- notched points).

UPPER BOW VALLEY/FRONT RANGE SITES

Pigeon Mountain Site (EgPt-28)

The Pigeon Mountain Site is located within the Front Range of the Alberta Rocky Mountains (Figure 6.1 Site 6). The site is located on a low terrace at an elevation of 1640 m asl on the south side of the Bow River near the base of Pigeon Mountain (Figure 6.8). The site is located in the Montane ecoregion and has surface vegetation consisting primarily of aspen forest. The minimum site area contained within a natural gas pipeline right-of-way is 120 m x 20 m (2400 square metres) but the site extends an unknown distance beyond these boundaries.

Archaeological excavations of 225 square metres were undertaken in advance of natural gas pipeline construction (Clarke *et al.*, 1998). Two distinct cultural occupations were identified. The upper component dates between 200 –700 years BP while the lower component dates between 1800 –2400 BP based on stone tool typology. Radiocarbon determinations for the upper component yielded one modern date and one date of 140±130 BP. The lack of Euro-Canadian trade artifacts makes both dates suspect.



Figure 6.8 View to the east of Pigeon Mountain site (EgPt-28). The site is located in the cleared pipeline right of way in the centre right (circled). (Photo: Heitzmann, 2007)

Clarke *et al.* (1998) rejected these dates and suggested 200-700 BP as a probable age range. Four bone samples from the lower occupation were also undateable due to lack of useable collagen for dating purposes.

The site was used as a base for habitation and for processing large game animals, primarily bison. Features at the site indicate that cooking, bone marrow extraction and tool manufacture were major activities undertaken at the site. One small hearth feature was identified in the upper component consisting of a small circular orange stain 20 to 30 cm in diameter and approximately 3 cm thick. Some ash and charcoal flecks were identified near the centre of the hearth. Five fire cracked rock concentrations were also identified in the upper component.

A total of 657 lithic artifacts was recovered from the upper component including 31 stone tools and 626 pieces of lithic debitage. Four complete and four

fragmentary projectile points were recovered. Three of the complete projectile points are stylistical Plains side-notched forms while one is a small corner-notched point that is similar to the Head-Smashed-In corner-notched type (Avonlea) (Brink and Dawe, 1989). One projectile point is similar to a Prairie side-notched type. Other tools present in the Upper Component include bifaces (n=4), biface fragments (n=5), end scrapers (n=5), flake tools (n=8), a side scraper (n=1) and a uniface (n=1). Stone tools were most frequently made of Swan River Chert (9/31, 29.0%), other cherts (7/31, 22.6%), or shale (6/31, 19.4%). Debitage was most frequently Swan River Chert (256/626, 40.9%), shale (240/626, 38.3%), or other chert (87/626, 13.9%). Nine core and core fragments were recovered at the site, most commonly made of Swan River Chert (n=5). Other materials used for cores were Top of the World Chert (n=1), chert (n=1) and shale (n=2). Although Swan River Chert is normally sourced to Central Manitoba, Clarke suggests that the Swan River Chert was derived from local pebble sources but this is unlikely to be of equivalent quality. Even if Swan River Chert were transported in glacial till by Laurentide ice it would not be obtainable except in extreme eastern Alberta near Medicine Hat. Shale, on the other hand, is readily available from bedrock sources in the adjacent mountains. The other materials were likely from non-local sources. X-ray fluorescence of the obsidian identified two sources for this material, one being Obsidian Cliff in Yellowstone National Park in northwestern Wyoming, and the other approximately 100 km west of Obsidian Cliff in eastern Idaho. Two multidirectional cores and seven core fragments were recovered. Five of these were Swan River Chert. Bipolar core techniques were not used.

The Lower Component at the site yielded a total of 87 stone tools and 5531 pieces of debitage. All of the projectile points have been assigned to the Besant series (Clarke *et al.*, 1998:100).

The faunal remains from the Upper Component were dominated by bison remains. Of these there were 896 identified specimens (NISP) which were derived from a minimum number of four individual animals (MNI). Bison formed at least 96% of the total assemblage by weight. Small numbers of other identified faunal remains were identified as wapiti/elk (*Cervus elephas*), moose (*Alces alces*), deer (*Odocoileus* sp.), large canid (*Canis* sp.), medium canid (*Canis* sp.), fox (*Vulpes* sp.), bear (*Ursus* sp.), beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), and hare (*Lepus* sp.) (Clarke *et al.*, 1998:134).

Clarke *et al.* (1998:260) interpret the Upper Component at Pigeon Mountain as a single cultural occupation. The tool assemblage indicates that the site functioned as a campsite, and that the animals represented may have been killed at some nearby location. The animal bones present at the site were highly fractured, probably to obtain bone grease and marrow. The large numbers of appendicular elements, that is, front and rear legs, suggest that portions containing large amounts of meat were brought preferentially to the site. Axial elements, such as vertebrae and ribs occurred less commonly and were likely left at the kill locations.

Two indicators of seasonality were identified based on the regularity of bison rutting and birthing periods. A single foetal bison element suggests an early spring occupation of the site. No small or medium rodents (e.g. ground squirrels, gophers, voles) were recovered at this site, which suggests that it may have been occupied while these animals were still in hibernation, that is, in winter. This site is distinctive

in its heavy reliance on Swan River Chert. Forty percent (40%) of debitage and 24% of tools were derived from this material.

Clarke *et al.* (1998) do not place the Pigeon Mountain Site within a larger settlement system nor do they offer a perspective on how this site might fit within a cultural system.

Vermilion Lakes Site (153R, 502R) (EhPv-8)

The Vermilion Lakes site is located within the Front Range of the Alberta Rocky Mountains (Figure 6.1, site 7). The two adjacent localities are situated on aeolian-capped debris-flow fans along the north shore of the Vermilion Lakes (Figure 6.9). These lakes are remnants of a larger Glacial Lake Vermilion which formed at the end of the Late Pleistocene in the Bow Valley. Recession of Glacial Lake Vermilion and subsequent alluvial filling subdivided the lake into three lobes and led to the ultimate stabilisation of the lake level at 1379 m (Fedje and White, 1988:243). The site lies within the Montane ecoregion with a vegetation cover comprised of mixed lodgepole pine and aspen closed forest.

Excavations at the Vermilion Lakes Site were undertaken in advance of twinning the Trans-Canada Highway through Banff National Park (Fedje and White, 1988, Fedje *et al.*, 1995). Archaeological testing utilised a variety of techniques from small shovel tests to larger excavation units, backhoe trenching and block excavations comprising approximately 95 square metres. The site was found to contain multiple occupation layers dating from *c.*10,700 BP to the historic period. The pre-8000 BP occupation layers are stratified and largely undisturbed. Post-8000 BP sediments have been subject to bioturbation and weathering so that secure separation of cultural assemblages was not possible (Fedje and White, 1988:115).



Figure 6.9 View north of Vermilion Lakes Site, located on a colluvial fan (circled). (Photo: Parks Canada, 9002R712t.)

Occupations 2 and 3 of Locality A were assigned to the Late Precontact Period based on diagnostic evidence. The historic period is indicated by a single lead musketball and is assigned to Occupation 1 of Locality A. Lithic materials from Occupations 2 and 3 were analysed as a single assemblage. Lithic material use was found to consist of 90% Banff Chert, a locally available material. The use of non-local lithics increased slightly over the preceding period. Unfortunately Fedje and White (1988) do not provide detailed descriptions of individual artifacts or artefact classes recovered at this site.

Echo Creek Site (515R; EhPv-78)

The Echo Creek Site is situated on a low, fluvial terrace at the eastern end of the Vermilion Lakes wetland (Figure 6.1, site 9; Figure 6.10). It is located in the Montane ecoregion and has a vegetation cover consisting primarily of white spruce forest.

Excavations were conducted here in response to road widening associated with the twinning of the Trans-Canada Highway (Greaves, 1994; Robinson, 1986)



Figure 6.10 View southeast of Echo Creek Site (circled) located at the east end of the Vermilion Lakes. Mount Rundle is the prominent peak beyond the town of Banff. (Photo: Parks Canada, 9002R716t)

A total of 48 square metres was excavated as 1 m x 1 m tests and in three larger block excavations. The site is well stratified and divided into five occupation layers. Occupation 1 is associated with the post 1890 historic Euro-Canadian period. Occupation 2 produced limited artifacts and no diagnostic materials. Occupation 3 yielded a large number of lithic artifacts (n=6708), faunal remains, and features. The lithic assemblage includes 38 small side-notched projectile points typical of the later portion of the Late Precontact Period. The faunal assemblage includes bison (*Bison bison*), elk (*Cervus elephas*), moose (*Alces alces*), mule deer (*Odocoileus hemionus*), mountain sheep (*Ovis canadensis*), beaver (*Castor canadensis*), porcupine (*Erethizon dorsatum*), a canid (*Canid sp.*), muskrat (*Ocantra zibethicus*), rabbit (*Lepus townsendii*), ground squirrel (*Spermophilus richardsonii*), coot (*Fulica americana*)(a

duck sized water bird), sucker (*Catostomus commersoni*), and a salmonid (trout or char). Activity areas suggest lithic heat treating/reduction focii and animal processing in association with hearths and large quantity of fire-broken rock. Charcoal from Occupation 3 yielded radiocarbon dates of 650±100 BP (BSG 1015), 710±100 BP (BSG 1011), and 770±100 BP (BSG 1014). A radiocarbon date on bone yielded a date of 620±100 (BSG 1018).

Occupation 4 contained limited cultural materials but was correlated with the Avonlea Phase based on stratigraphic position and a finely made side-notched projectile point. Occupation 5 produced a small assemblage of artifacts including four large side-notched projectile points assigned to the Late Middle Precontact Besant Phase. This interpretation is supported by radiocarbon dates on charcoal of 1325±125 BP (BSG 1012), and 1540±100 BP (BSG 1013) (Fedje and White, 1988:178).

Christensen Site (360R; EhPw-1)

The Christensen Site is located in the Bow Valley within the Front Range of the Alberta Rocky Mountains (Figure 6.1, site 8). The site is located on an aeolian-capped debris flow fan along the north side of the Bow River (Figure 6.11). The site is located in the Montane ecoregion and is vegetated in mixed open spruce-aspens forest. The elevation of the site is 1390 m asl.

Archaeological excavations were undertaken at the site in 1991 to enable construction of retaining walls to mitigate erosion along the Canadian Pacific Railway right-of-way and natural erosion caused by the Bow River. Twenty-two square metres were excavated in 1991 (Oetelaar *et al.*, n.d.) and some of the materials were analysed in a Master of Arts thesis (Gorham, 1993).



Figure 6.11 View west of the Christensen Site (360R). The Bow River borders the site to the south at the left of the photograph. (Photo: Parks Canada, 360R11t.)

The excavations revealed that the site has multiple occupations dating from the Early Middle Precontact I Period (*c.* 7000-6500 BP) to the Late Precontact Period. Stratigraphy is characterised by continuous gradual deposition with few clear depositional breaks. Erosional and cultural processes have caused some mixing of the deposits. The latest occupational zone, Cultural Material Unit 1 (CMU-1) is primarily associated with the Late Precontact Period characterised by Avonlea, Plains side-notched and Prairie side-notched projectile points. This cultural unit contained 1956 lithic artifacts including 35 projectile points, 65 bifaces or biface fragments, 21 scrapers, two perforators, 47 edge-modified flakes, 69 utilised flakes, 24 cores and almost 1700 pieces of debitage. Diagnostic projectile points included six Plains side-notched, one Prairie side-notched, two Avonlea, one Pelican Lake, two Samantha (?) and two Duncan style projectile points. The possible Samantha and Duncan style points indicate some mixing with the preceding Late Middle Precontact Period.

Mixing of occupational levels at the site may be due to the presence of pit features in upper deposits combined with episodes of limited soil deposition. Several projectile points were not characteristic of defined forms including five small notched points, four small corner-notched points, three small triangular points, one small side-notched point and one small concave based point.

Lithic debitage was dominated by flake fragments (37%) and shatter (10.3%). The most frequently identified flakes (18%) were thinning flakes indicative of middle stages of lithic reduction. Early and late stage debitage each accounted for less than 10% of the debitage, suggesting that rough tools and blanks may have been intended products manufactured at this site.

Locally available Banff Chert was the dominant lithic raw material utilised at the site forming 67% of the total assemblage. Other local materials utilised included Banded Banff Chert (3.3%), silicified sandstones (2.1%), and quartzites (1.9%). Non-local materials accounted for 18% of the lithic assemblage. Top of the World Chert was the most commonly used non-local material (5%), followed by Montana brown chalcedony (3.6%) and other Montana cherts (3.4%). Over 30% of the tools were made of non-local materials although tools formed only 12% of the lithic assemblage.

Faunal remains consisted of numerous bone and teeth fragments (n=19,923). Of these 388 specimens were identifiable elements, representing a minimum of nine taxa. Species identified were bison (*Bison bison*), elk (*Cervus elephas*), mountain sheep (*Ovis canadensis*), deer (*Odocoileus sp.*), coyote (*Canis latrans*), wolverine (*Gulo gulo*) and beaver (*Castor canadensis*), an unidentifiable bird, and bivalve shell fragments (cf. Pelecypoda). A minimum of four individual bison and two beaver is represented, whereas only one individual is represented for each of the remaining

species. Seasonality is indicated by the presence of bison foetal remains, which suggest a winter occupation.

A detailed analysis of cores and flakes from the Christensen Site was undertaken as a Master's thesis by Gorham (1993). This focussed on the lithic technology composed primarily of Banff Chert. This material was obtained from a nearby quarry and is characteristically a hard, often lustrous, black fine-grained material. Gorham found that core reduction used an expedient bifacial reduction strategy that resulted in cores that look like crude bifaces (1993:109). Examination of flakes removed from cores indicated that a wide range of reduction stages was present in Levels 2 and 4 and that early stage reduction was more common in Levels 1 (equivalent to CMU-1 discussed above) and 3 (Gorham 1993:88). Gorham also found there was a preferential use of non-local raw materials. He concluded:

The levels [Levels 1 and 3] that show high rejection rates [of Banff Chert] have assemblages that generally appear more like core reduction assemblages and have extremely high percentages of expedient tools made of the better [non-local] materials. When better quality materials are not available, the assemblages [Levels 2 and 4] appear more bifacially oriented and tools appear to be curated/exported while the expedient tools are largely of Banff Chert (Gorham, 1993:112).

Neither Oetelaar *et al.*(n.d.) nor Gorham (1993) place the Christensen Site within a larger settlement or adaptation pattern. Gorham, however, identifies that Levels 1 and 3 are typified by a lithic reduction pattern that "...occurs when non-local raw material is more abundant" (1993:106). In this pattern, the Banff Chert portion of the assemblages appears "more like a core reduction strategy". This is characterised by larger weight medial/distal flake fragments, relatively low percentages of complete flakes, relatively high percentages of non-orientable shatter, low percentages of ground platforms, higher percentages of crushed platforms and higher proportions of early stage debitage. The pattern also has lower percentages of utilised flakes made of

Banff Chert and lower debitage/tool ratio. The number of Banff Chert bifaces increases in the assemblage perhaps because they are "...undesirable as curated tools since better quality materials [were] available..." (Gorham, 1993:107). This pattern may be due to factors such as "...seasonal availability of raw materials or site usage by different ethnic groups" (Gorham, 1993:107).

Site EhPw-2

Site EhPw-2 is located in the Upper Bow Valley west of Banff (Figure 6.1, site 10). It is situated on the north side of the Bow River on a high terrace 20 to 25 m above the river at an elevation of 1407 m asl (Figure 6.12). Vegetation cover on the site is open mixed aspen and spruce forest. It is located within the Montane ecoregion. Excavation of 68 square metres of the site was undertaken in 1978 prior to Highway 1A road reconstruction (Damp *et al.*, 1980). Most of the excavations concentrated on the upper 20 cm of soil deposits with some areas excavated to sterile parent material at approximately 80 cm below surface. A basal cultural level was identified, estimated to date by geological position to 12,000 to 11,000 BP. The upper 20 cm of soil contains a mix of cultural material including diagnostic project points representative of the range of cultural phases from Scottsbluff (Early Precontact Period) to the Late Precontact Period. As a result of the apparent mixing, the artifacts recovered from this site were treated as a single analytical assemblage.

Diagnostic artifacts of the Late Precontact Period consist of two Plains side-notched and one Plains triangular projectile points. A total of 469 formed tools, 432 core and core fragments, 48 split pebbles and split pebble flakes, 174 retouched flakes, 370 utilised flakes, and 13,926 flakes and shatter, 131 bifacial resharpening flakes, and 9 unifacial resharpening flakes were recovered. The overwhelming majority of these materials was made of Banff Chert (95.7% of all debitage - see

comment under EhPw-4). Faunal remains consisted of “very tiny, extremely reduced and calcined, unidentifiable bone chips” (Damp *et al.*, 1980:114).



Figure 6.12 View south of the location of Site EhPw-2. The site is located along the edge of the parking lot overlooking the Bow River. (Photo: Heitzmann, 2007)

Muleshoe Lake Site (EhPw-4)

Muleshoe Lake Site is located in the Upper Bow Valley west of Banff (Figure 6.1, site 11). It is situated on the north side of the Bow River on a high terrace located at an elevation of 1395 m asl. The site overlooks Muleshoe Lake which formed following the damming of a Bow River meander during construction of Canadian Pacific Railway (Fig. 6.13). Vegetation cover on the site is open mixed aspen and spruce forest. The site is located within the Montane ecoregion. Excavation of 64 square metres were conducted in 1978 prior to Highway 1A road reconstruction (Damp *et al.*, 1980). All of the cultural materials were recovered from the upper 20 cm of the site.



Figure 6.13 View southwest of Muleshoe Lake Site, EhPw-4. Muleshoe Lake is an oxbow channel separated from the Bow River by the rail bed. (Photo: Heitzmann, 2007)

Cultural materials spanned a wide time range from the Middle Precontact Mummy Cave Complex (7500-3500 BP) through to the Late Precontact Period (1200-200 BP). However “...the great majority of artifacts from the site came from the surface to 10 cm b.s. and are Late Prehistoric [Precontact] in assignment” (Damp *et al.*, 1980:16). All of the artifacts recovered from this site were treated as a single analytical assemblage. Diagnostic artifacts of the Late Precontact Period consist of two Plains side-notched and three Plains triangular projectile points. A total of 368 formed tools, 393 cores and core fragments, six split pebble tools, 155 retouched flakes, 236 utilised flakes, and 8435 flakes and shatter, 64 bifacial resharpening flakes, and eleven unifacial resharpening flakes were recovered. Banff Chert was overwhelmingly preferred as a lithic material (90.6% of all debitage). A large percentage of a single

source debitage material indicates that it was abundant locally. However, because of the inability to distinguish separate components it was not possible to determine if lithic manufacturing patterns varied through time. Faunal remains consisted “...primarily of very reduced long bone fragments which are burned and/or tiny calcined bone chips. At least two individuals of *Bison bison* were represented by aged mandibular teeth of different maturity” (Damp *et al.*, 1980:115). One was estimated at 1.5 to 2.5 years, the other at full maturity (5.5 to 9.5 years). Deer or mountain sheep was identified from a second phalange, and a portion of a humerus with an upper lateral epicondyle. A distal metapodial was identified as elk (*Cervus elephas*).

Damp *et al.* (1980) view EhPw 2 and 4 as part of mountain-adapted human settlement. They conclude that humans, in this environmental system, would utilise the aggregate resources of game and edible plants conditioned by altitudes and specific periods in the season. “This scheduling of activities is a seasonally determined sub-system of a larger, generalised mountain adapted system (Damp *et al.*, 1980:31). Both sites (EhPw-2 and EhPw-4) seem to have been utilised as “...multiple activity sites of winter or spring the bulk of their respective occupations” (Damp *et al.*, 1980:33).

UPPER COLUMBIA AND KOOTENAY VALLEY SITES

Site 399T (EfPa-8)

Site 399T is located on a small terrace at the northwest corner of Kootenay Pond, a glacial outwash kettle just north of Kootenay River in Kootenay National Park (Figure 6.1, site 12; Figure 6.14). The terrace is covered in a lodgepole pine and Douglas fir forest. Located at an elevation of 1210 m asl it is situated in the Montane-Spruce biogeoclimatic zone.

In 1996 three 50 x 50 cm shovel tests were excavated (Heitzmann, 1999a). In one of these the basal portion of a crystal quartz projectile point was located. This small side-notched projectile point is similar to those of the Late Precontact Period. Blood protein extracted from this projectile point produced a positive reaction to bear antiserum (Neuman, 1997).

Although data from this site are very limited they are included here because of the use of crystal quartz to produce a Late Precontact projectile point and the identification of bear blood protein.

Site 494T (EdPx-N1)

Site 494T is located on a second terrace above the Kootenay River adjacent to an oxbow pond (Figure 6.1, site 13; Figure 6.15). The site is covered by a lodgepole pine forest located in the Montane-Spruce biogeoclimatic zone at an elevation of 1097 m asl.

In 1997 nine square metres were excavated at this site (Heitzmann, 1999a). Parts of a living floor were exposed consisting of debitage of Top of the World chert and grey quartzite flakes, 77.3 grams of small bone fragments, a core, grinding stone, cobble chopper, the base of a possible point preform and the base of a small side-notched projectile point (Figure 6.16). The projectile point base and most of the flake debitage are made from Top of the World chert, a lithic derived from Top of the World Plateau, approximately 90 km south of the site. A single radiocarbon date was obtained from a bone fragment which dated 380 +/- 50 years BP (CAMS #41242) or about 1570 AD.



Figure 6.14 View of Site 399T located on Kootenay Pond, visible through the trees on the left. (Photo: R. Heitzmann, Parks Canada, 399T1t)



Figure 6.15 View west of Site 494T located on the terrace on the right overlooking a small oxbow pond. (Photo: R. Heitzmann, Parks Canada, 494T27t)



Figure 6.16 Part of the living floor excavated at Site 494T showing fire broken rock, an anvil, and flaking debris. The scale is 50 cm. The view is to southeast. (Photo: R. Heitzmann, Parks Canada, 494T26t)

Seven stone tools from this site were analysed for blood traces. These included the grinding stone, hammerstone, and cobble chopper. The cobble chopper yielded residue that reacted positively to Bovine antiserum indicative of bison (Neuman, 1997).

This small test excavation is significant for the extensive use of Top of the World Chert in association with a Late Precontact projectile point, the identification of bison from blood protein, and a C14 date within the Late Precontact Period.

Salmon Beds Site (EdQa 121)

The Salmon Beds Site is located along the Columbia River at the outlet of Windermere Lake (Figure 6.1, site 14; Figure 6.17). The site is situated on the seasonally inundated flood plain at an altitude of 800 m asl. Vegetation at the site consists of sedges and bulrushes. This area is part of Kootenay Dry Mild Interior

Douglas Fir biogeoclimatic zone. Historic and ethnographic references indicate that the site was an important fishing station for the Ktunaxa (Kootenay) people. This was one of several locations where they speared anadromous Chinook salmon that spawned here.

Excavations were undertaken in 1999 to assess the impacts of river erosion (Heitzmann, 1999b). Multiple occupations were identified in the upper 70 cm of silt deposits. These spanned an approximate 1000 year period and all of the materials can be assigned to the Late Precontact and Historic periods. The stone tool assemblage (n=34) included small side-notched projectile points, scrapers, a grooved maul, hammerstones, discoidal tools, marginally retouched and utilised flake tools. Bone tools (n=8) included a flesher, antler wedge, elk antler tine, point tang, a bone bead and an incised deer incisor. Faunal remains included Chinook salmon (*Oncorhynchus tshawytscha*), burbot (*Lota lota*), sucker (*Catostomus sp.*), bison (*Bison bison*), white-tailed deer (*Odocoileus virginiana*), elk (*Cervus elephas*), black bear (*Ursus americanus*), beaver (*Castor canadensis*) and dog (*Canis familiaris*). Large amounts of fire broken rock were identified. Lithic debitage (n=477) was made of Top of the World chert (82.4%), black chert (5.5%), brown chalcedony (4.6%), and a variety of other minor lithic materials (7.5%) including other cherts, quartzites, siltstone, petrified wood and obsidian. Six radiocarbon dates were obtained on bone and charcoal. The uncalibrated dates were 400±40 BP (CAMS 60323), 610±40 BP (CAMS 60322), 710±40 BP (CAMS60324), 880±50 BP (BGS 2162), 988±50 BP (BGS 2163) and 989±50 BP (BGS 2161).

Although the sample size is small, the site was occupied repeatedly over the last 1000 years. Salmon fishing was undoubtedly the most important activity undertaken at the site, but other fishing and hunting were also undertaken there or

nearby. The lithic debitage is largely restricted to retouch and resharpening debris indicating that limited tool production occurred here.



Figure 6.17 View north of the Salmon Beds sites. The site is located in the grass covered terrace in the foreground left. (Photo : R. Heitzmann, Parks Canada, 9001T123t)

The Salmon Beds were primarily occupied in late summer or early fall when Chinook salmon spawn. When people came to the Salmon Beds they brought most of their tool kit with them as formed tools made out of Top of the World chert. Debitage indicates that most tool modifications required only finishing or resharpening. This suggests that the occupants came to the Salmon Beds almost directly from the quarry source some 100 km to the southeast or from an intermediate workshop site where tools were finished in advance of the trip to the Salmon Beds.

Columbia Lake Site (EbPw-1)

The Columbia Lake Site is situated on the southeast side of Columbia Lake on a high terrace overlooking the lake (Figure 6.1, site 15; Fig. 6.18). It is located at an altitude

of 820 m asl and is contained within the Kootenay Dry Mild Interior Douglas Fir biogeoclimatic zone. The site is large, estimated to be 1,100,000 square metres. The site was partially excavated in response to a proposed housing development. In 1980, 28 square metres were excavated (Mohs, 1981). Additional excavations of 16 square metres were undertaken in 1981 (Yip, 1982).



Figure 6.18 View east of the Columbia Lake Site. (Photo: Heitzmann, 2007)

The 1980 excavations tested Area 1 which included three cultural depressions. Area 1 was occupied over a 3000 year period between about 1200 BC and AD 1850, with the most intensive occupation occurring between AD 500 and AD 1800. The Middle Precontact (3000 BC – AD 500) occupation is found only in Area 3 whereas Late Precontact occupations are found in Areas 1 and 2. The Late Precontact occupation in Area 1 consists of a continuous vertical deposit from the surface to a depth of 30 cm. Lack of distinct breaks in the deposit suggests repeated occupation

of the site through the Late Precontact Period. Two cultural depressions in Area 1 were investigated. A smaller, shallow, circular depression is 3 m in diameter with a raised rim. It is interpreted as a roasting pit (Mohs, 1980:iii).

Charcoal samples from the rim and interior of the roasting pit span a 400 year period from 110 to 480 years BP (Mohs, 1980:iii). A larger, steep-walled, flat-bottomed, circular depression is interpreted as the remains of a semi-subterranean house (Mohs, 1980:iii). It had a diameter of 8 metres. The depression contained two stratified occupation layers with a hearth in the upper layer. A C14 date was obtained from this hearth and dated about 800 BP (1150 AD). Other structural features such as post holes or roof fill were not identified. This feature would most likely have been utilised in the winter (Mohs, 1981:162).

The 1980 excavations recovered 211 tools, 4115 flakes, 10,315 faunal remains, 3.74 kg of ochre and 456 kg of fire-broken rock from all layers and areas (Mohs, 1980). The tool assemblage included 53 projectile points, of which 73% are small side-notched varieties, while 15% are corner-notched and the remaining 12% are other varieties. Lithic materials utilised were predominately locally available basalt (55%) and chert (38%). The tool assemblage included projectile points, bifaces, unifacially and bifacially retouched stone tools, scrapers, net sinkers and abriders.

The 1981 excavations tested portions of Area 2 including two circular depressions. The Area 2 depressions were designated Features 4 and 5. Feature 4 was oval, 3.5 x 4 metres, with a depth of 45 cm. The excavations in Feature 4 uncovered a hearth layer, characterised by charcoal stained silt, charcoal and a concentration of fire broken rock. Feature 5 was also oval, 3.5 x 3 metres and had a depth of 40 cm. Excavation uncovered a circular layer of 30 kg of fire broken rock within a heavily charcoal stained matrix. Both these features yielded low amounts of

stone tools and faunal remains. The features were interpreted as roasting pits, probably used for processing vegetable foods during the spring (Yip, 1982:115).

The 1981 excavations recovered 114 tools, 5264 flakes, 7062 faunal remains, and 336.1 kg of fire broken rock. The tool assemblage included 21 projectile points, of which four (19.0%) were corner-notched, while 10 (47.6%) were unnotched triangular or lanceolate varieties. Lithic materials were predominately locally available siltstone (70.4%) and cherts (26.6%). The tool assemblage included projectile points, bifaces, unifacially and bifacially retouched stone tools, scrapers, graters, microblades and cortex spall tools. Bone tools included worked bone fragments and a bipoint.

Area 2, Section A, is interpreted as a food processing station most likely occupied during the summer/early fall when food resources (mammalian game, fish and birds) were most abundantly available to the site's inhabitants. Section B's roasting pits would have been used during spring months when roots and bulbs were gathered. In Section C the presence of postholes, highly charcoal-stained matrices and the dominance of land mammal fragments suggest this area "...was being utilised for an activity completely different from [that] present on Sections A and B" (Yip, 1982:138). Although Yip does not specify what that different activity was, it could be that Section C was utilised at a different season of the year (fall or winter) for land mammal hunting.

Mohs' 1980 excavations at EbPw-1 tested Areas 1, 2, and 3 whereas Yip's 1981 excavations focussed on Area 2. One of the depressions tested in 1980 was considered a house depression, while a second was interpreted as a roasting pit. Yip investigated two depression features, both considered roasting pits. The 1980 excavations recovered a wider temporal range of artefacts from Middle Precontact

through Late Precontact whereas the 1981 excavations yielded only Late Precontact materials.

From the 1980 excavation 55% of the lithic material was called 'basalt' whereas in 1981 70.4% of the lithic material was termed 'siltstone'. As both are commonly black in colour, often striated or banded, it is possible that these are similar materials.

Viewed together, the Columbia Lake Site has evidence for use in all seasons of the year.

Site EcPx-5

Site EcPx-5 is located in the Columbia Valley on the eastern shore of Windermere Lake south of the mouth of Windermere Creek (Figure 6.1, site 16). It is situated along an actively eroding high terrace overlooking the lake at an altitude of 805 m asl. This area is within the Undifferentiated Interior Douglas Fir biogeoclimatic zone. The site was test excavated in 1975 and 1976 by Kathleen McKenzie (McKenzie, 1976).

Two stratigraphically separated cultural horizons were identified at this site. In horizon Ahkb, a small flint knapping station on a living floor was located. This flint knapping station consisted of detritus, scrapers, projectile points, worked flakes, piercing tools, truncated blades and used flakes, most of which were made of a single type of chert. "The chert was distinguished by its variegations of light and dark blue-grey colors with the occasional spotty white inclusion" (McKenzie, 1976:6).

McKenzie interpreted the knapping station as a place where "...a lone flint worker fashion[ed] a number of tools according to the tradition of the society..." (1976:6). Thirty nine (n=39) tools from Horizon Ahkb included small side-notched projectile points, bifacial tools, scrapers, flaked graters and piercing tools, retouched flakes,

micro-tools and possibly micro-blades. Bone tools were also present including a ground rib bone, and cut and chipped bone tools.

Horizon Bmkb was located below Horizon Ahkb. Stone tools (n=33) consisted of corner-notched projectile points, projectile points with broad side-notches, scrapers, flaked graters and piercing tools, and retouched flake tools. A chipped bone awl and two incised bone tube fragments were also found.

Few of the faunal remains could be identified to species. A mandible of a mountain sheep (*Ovis canadensis*) was identified from Horizon Ahkb. A deer mandible, probably white-tailed deer (*Odocoileus virginianus*) was found in Horizon Bmkb.

A wide variety of lithic materials was identified at the site including the variegated chert described above, Top of the World chert, opaque chert, basalt, siltstone, quartz, crystal quartz, chalcedony, jasper, slate and obsidian.

No radiocarbon assays were undertaken for this site. Based on the artifact assemblages, Horizon Ahkb can be assigned to the Late Precontact Period, while Horizon Bmkb can be assigned to the Late Middle Precontact Period.

CONCLUSION

The seventeen excavated sites represent diverse activities and occupational characteristics (Table 6.1). Twelve of the sites discussed above are primarily base camps (n=12). The remaining five sites consist of two kill sites, one fishing station, one workshop, and one butchering site. Many of the sites seem to have been occupied only during a single event and, as such, are termed single occupations (399T, 494T, EcPx-5). Several sites have been occupied on multiple occasions during the Late Precontact Period but it is not possible to determine how often these were occupied (Hunter Valley, EdPp-21, Pigeon Mountain, Sibbald Creek, EfPq-5, Missinglink, Vermilion Lake, Echo Creek, Christensen, EhPw-2, Muleshoe Lake, Salmon Beds, Columbia Lake). One site, EfPq-6, may not have been occupied at all during the Late Precontact Period because solid dating or typological evidence is lacking.

Six of the sites (Sibbald Creek, Vermilion Lake, Echo Creek, Christensen, Salmon Beds, and Columbia Lake) have evidence of historic occupations in the nineteenth century, consisting of historic trade items such as musket balls or beads.

All of these sites were occupied by at least one archaeologically-defined culture from a time prior to the Late Precontact period except for 399T, 494T and Salmon Beds Site. Many of the sites have been occupied over a very long time span and have evidence for extensive repeated occupations (Sibbald Creek, EfPq5, EfPq-6, EdPp-21, Missinglink, Vermilion Lake, Chistensen, EhPw-2, Muleshoe Lake, and Columbia Lake). A few sites were occupied previously in the immediately preceding period (Hunter Valley, Pigeon Mountain, and Echo Creek). This suggests that the knowledge of these site locations was retained over a long period of time, or that their characteristics encouraged repeated occupations.

SITE	SITE TYPE	LATE PRECONTACT OCCUPATIONS	HISTORIC OCCUPATION	MULTI COMPONENT	MIXED COMPONENTS	ASSIGNED ETHNIC ASSOCIATION
Hunter Valley	Butchering	1		Yes	No	Stoney
Sibbald	Base Camp	Several	Yes	Yes	Yes	
EfPq-5	Base Camp	1+		Yes	Yes	
EfPq-6	Base Camp	?		Yes	Yes	Kootenai
EdPp-21	Base Camp	1		Yes	Yes	
Missinglink	Base Camp	?		Yes	Yes	
Pigeon	Base Camp	1		Yes	No	
Vermilion	Base Camp	multiple	Yes	Yes	Yes	
Echo Creek	Base Camp	multiple	Yes	Yes	No	
Christensen	Base Camp	?	Yes	Yes	Some	
EhPw-2	Base Camp	?		Yes	Yes	
Mulshoe Lake	Base Camp	?		Yes	Yes	
399T	Kill site	1		No	No	
494T	Kill site	1		No	No	
Salmon Beds	Fishing site	multiple	Yes	Yes	No	
EcPx-5	Workshop	1		Yes	No	
Columbia Lake	Base camp	multiple	Yes	Yes	Yes	

Table 6.1 Summary of site occupations

Because of the nature of soil deposition, tree uprooting, animal burrowing and human action, mixing of soil deposits is a relatively common occurrence at many of these sites. Disturbance was recorded at Sibbald Creek, EfPq-5, EfPq-6, EdPp-21, Missinglink, Vermilion Lakes, Christensen, EhPw-2, Mulshoe Lake and Columbia Lake sites. The remaining sites had occupation layers that seemed largely unmixed.

To conclude, excavated archaeological sites of Late Precontact age in the Central Canadian Rockies ecosystem provide a broad base for developing an understanding of the nature and range of occupational activities in the region. Most of these sites have been occupied for a longer time span, some dating back to the Early

Precontact Period that began shortly after the recession of glacial ice at the end of the last ice age. Most of the sites are base camps with considerable amounts of cultural materials. These sites provide a record of the stone materials used for tool manufacturing, remains of fauna hunted, and in some cases, evidence of habitation structures.

Excavated archaeological sites in the area are biased towards base camps as these have been most intensively occupied. There are, however, other sites that were more specialised such as a butchering site (Hunter Valley), kill sites (399T and 494T), a fishing station (Salmon Beds) and a tool workshop (EcPx-5). These provide a broad regional data base to explore the nature of the Late Precontact sites across the region.

CHAPTER 7
ANALYSIS OF ARCHAEOLOGICAL SITES IN THE CENTRAL
CANADIAN ROCKIES

INTRODUCTION

In this chapter, archaeological data from excavated archaeological sites in the Central Canadian Rockies are analysed to identify elements of commonality and difference to advance an understanding of the nature of hunter-gatherer utilisation of the region.

Faunal assemblages, artifact assemblage compositions, and lithic technology are used to develop a broader perspective of this utilisation. These regional patterns of cultural use in the past contribute to the modelling developed in Chapter 8.

METHODOLOGY

The assemblages of artefacts, lithic debitage and faunal remains were determined for each excavated site where these were provided in the reports. Complete analysed data on assemblages were only available for the few sites reported in detail here. Lithic (stone) material types for each excavated site were examined. The review of faunal assemblages recorded a number of species identified, number of identified specimens (NISP) and the minimum number of individuals (MNI). Determining the number of animal species present, minimum number of individuals (MNI) and other faunal related information is very much contingent on the recovery of specimen bones (NISP) that are sufficiently large to identify as to skeletal element and species. Because bone is more fragile than stone it is subject to more taphonomic degradation. Bone can be broken and degraded during site use and after abandonment through trampling by people and animals; corrosive action of air and water; and soil

conditions during burial that sometimes dissolve bones. During recovery excavations, bones can be further damaged or broken by poor techniques and carelessness. For the analysis undertaken here, these taphonomic factors cannot be considered and bone counts are accepted as reported.

The basic data sets were compiled into tables and graphs to identify patterns in the archaeological record. Topics examined were subsistence and diet breadth, seasonality of use, faunal processing, local lithic material use, lithic materials used for core production, stone tool lithic assemblages, tool type assemblages, tools reflective of occupation lengths, and stages of lithic technology.

SUBSISTENCE AND DIET BREADTH

Subsistence and diet breadth are indicated by the presence and quantification of faunal remains, and butchering patterns observable at archaeological sites. Sites located near resource concentrations may have faunal assemblages that reflect those resource concentrations. Sites located further away from resource concentrations may have faunal assemblages indicative of a wide range of faunal resources exploited.

Ranking prey resources

Some hunter-gatherer models are based on a system of ranked prey resources. In the Central Canadian Rockies the prey species can be ranked as shown in Table 7.1. This table is a composite based on ethnographic accounts of Blackfoot (Ewers, 1958; Kidd, 1986) and Ktunaxa peoples (Schaeffer, 1940; Smith, 1984; Turney-High, 1941). The large ungulates (bison, elk, moose) are considered highest-ranked resources because individual animals yield large quantities of food and were frequently hunting targets (Ewers, 1958; Kidd, 1986). Average live weights of

principal mammals hunted are presented in Table 7.2. Dressed weights, that is, portions that exclude heads, skins and inner organs, are commonly 50-65% of live weights (Jensen, 1996). However, hunter-gatherers often utilised the entire carcass, with skins being processed for leather for clothing and tents, and bones for marrow extraction and tool making. Antlers were also used for tools and inner organs could be eaten or used in other ways.

Bison formed larger herds which enabled several animals to be killed during collective hunts through the use of pounds, jumps or surrounds (Ewers, 1958). Elk and moose rank slightly lower because they formed smaller herds and needed to be hunted more selectively. All three species were highly prized for the diverse uses of these animals' carcasses. In the Central Rockies Ecosystem, modern winter wildlife population estimates are for approximately 12,000 elk and 8000 moose (Komex, 1995:20). There are no population estimates for the former number of bison in the CRE but bison remains are the most numerous faunal species found at most of the excavated sites east of the continental divide (see below), indicating that they must have been available in considerable numbers. It is not known to what extent the ecological niche formerly occupied by bison is now occupied by elk or other ungulates. Higher bison populations in the past probably would have lowered the numbers of elk and other ungulates.

Medium-ranked resources include smaller ungulates (deer, mountain sheep, mountain goats), plus salmon and beaver – all provided a supply of meat as well as other products. However, all of these provided smaller amounts of meat (deer and sheep yield dressed weights of 36-54 kg, and beaver and salmon are usually less than 14 kg). Deer and mountain sheep also form herds and were sometimes collectively hunted in drives and surrounds (Smith 1984:96). Current winter population estimates

SPECIES	BEHAVIOUR	HUNTING TECHNIQUES	EASE OF HUNTING	MEAT RETURN	OTHER PRODUCTS	RANKING AS PREY SPECIES
Bison	Solitary, herds, predictable	Stalked, surrounds, drives, jumps	Easy, preferred target species	High	Hides, bone, fat, grease	High
Elk	Solitary, herds, Predictable	Stalked	Moderate, small herds	High	Hides, bone, antler	
Moose	Solitary, predictable	Stalked	Moderate	High	Hides, bone, antler	
Deer	Solitary, herds Predictable	Stalked, surrounds, drives	Moderate	Medium	Hides, bone, antler	
Mountain Sheep/Goat	Solitary, herds Predictable	Stalked	Moderate	Medium	Hides, bone, horn	
Bear	Solitary, predictable hibernation	Speared in hibernation	Easy in winter	Medium	Fur, bone, fat, grease	
Salmon	Predictable	Nets, spears, weirs	Easy	Medium	Oil	
Beaver	Solitary, family groups, predictable	Traps, various	Easy	Medium-low	Fur, teeth	
Hare, rabbit	Solitary, predictable	Snares	Easy	Low	Fur	
Porcupine	Solitary, dispersed	Bludgeoned	Easy	Low	Quills	
Fox, coyote, wolverine, muskrat, mink, marten	Solitary, dispersed	Snares, traps	Easy	Low	furs	
Birds (geese, swans, ducks)	Flocks, nest in spring, migrations	Nets, stalked	Moderate	Moderate in numbers	Feathers, bone, grease	

Table 7.1 Ranking prey species in the Central Canadian Rockies. This is based on ethnographic accounts for the Blackfoot/Siksika (Ewers, 1958; Kidd, 1986) and Kootenay/Ktunaxa (Schaeffer, 1940; Smith, 1984; Turney-High, 1941).

Prey Species	Average live weight (kg) Female	Average live weight (kg) Male	Reference
Bison (<i>Bison bison</i>)	360-544	460-907	Smithsonian, 2009
Elk (<i>Cervus elephas</i>)	241	331	Smithsonian, 2009
Moose (<i>Alces alces</i>)	350	430	Smithsonian, 2009
Mule deer (<i>Odocoileus hemionus</i>)	63	74	Jensen, 2000
White-tailed deer (<i>Odocoileus virginianus</i>)	60	76	Jensen, 2000
Bighorn sheep (<i>Ovis canadensis</i>)	48-85	75-135	Smithsonian, 2009
Beaver (<i>Castor canadensis</i>)	16-30	16-30	Smithsonian, 2009

Table 7.2 Live weights of principal animal species hunted in the Central Canadian Rockies.

are 22,000 mule deer, 14,500 white-tailed deer and 5000 bighorn sheep in the CRE (Komex, 1995:20).

Lower ranked resources are those of small size. Low ranked species hunted primarily for food were hare and rabbit. Those that may have been hunted mainly for their fur are fox, wolverine, mink, weasel, marten, and muskrat. Coyote may also have been in this category. These animals were commonly hunted with snares or fall traps. Porcupine are slow moving and, when encountered, are easy human prey and may have been taken for their quills as well as a food source. Some birds, particularly geese, swans, and ducks were also hunted particularly during spring and fall migrations.

Table 7.3 shows a listing of identified species from excavated sites with fauna data. Most of the faunal assemblages are reported as minimum numbers of individuals (MNI) identified per layer or component. For Echo Creek and Columbia

Lake Sites only presence is indicated as it was not possible to determine MNI from the available data.

Table 7.3 also indicates the total number of species identified in each component or layer. Table 7.4 shows the rank order of sites based on the total number of species. Sites with the largest number of species represented are Echo Creek Site (n=14) and the Columbia Lake Site (n=12). Both Christensen and Pigeon Mountain sites have assemblages with nine species. Salmon Beds has eight levels containing from 1-5 different species.

At the Hunter Valley Site and the four sites in the Bow Valley, bison is represented most frequently of all species (Table 7.3). Deer is present at all of the sites, but not in all of the excavated layers. Elk was found in six assemblages, big horn sheep in four, moose in two and caribou only at Columbia Lake Site. Chinook salmon has only been identified at the Salmon Beds, although an unidentified salmon was identified at the Columbia Lake Site that could be Chinook salmon although other species of salmon are also possible. Beaver has been identified in five assemblages including three in the upper Bow Valley and two in the Columbia Valley.

Faunal remains from the Central Canadian Rockies Ecosystem area provide an incomplete view of diet breadth. In many sites, faunal remains are heavily fragmented and processed, making element and species identification difficult (eg. Christensen, Pigeon Mountain, Columbia Lake). In some excavated sites (Columbia Lake, Vermilion Lake) there is poor stratigraphic separation which has resulted in mixed assemblages of faunal remains that span several periods. Small-sized excavations have resulted in typically small sample sizes. In addition, there has been a lack of consistency in the analysis and reporting of faunal materials. In more recent excavations (Hunter Valley, Pigeon Mountain) faunal materials are analysed with a

<i>Lota lota</i>	Burbot																1
Salmonid	trout or char			X													
Total Number of Species		4	9	14	9	2	12	1	1	4	2	5	2	1	2	2	1
Seasonality Indicated		Late winter, early spring	spring, March – April			winter or spring	Spring, fall, winter			August - September	August - September	August - September		August - September	August - September		

Table 7.3: Identified species from excavated archaeological sites in the Central Canadian Rockies.

SITE NAME	TOTAL NUMBER OF SPECIES REPRESENTED
Echo Creek	14
Columbia Lake	12
Christensen	9
Pigeon Mountain	9
Salmon Beds (level 3)	5
Hunter Valley	4
Muleshoe Lake	2

Table 7.4 Rank order of sites based on total number of species represented by faunal remain.

higher level of detail. Some of the earlier reports provide little detailed information on faunal remains.

High frequencies of bison remains recovered from Hunter Valley and Pigeon Mountains sites suggest that these sites are located near areas where bison were concentrated. Similarly, the presence of salmon at the Salmon Beds and Columbia Lake indicate that salmon were obtainable close to these sites. At the Christensen and Echo Creek sites, a wider range of animal species suggests that these sites are located in areas where a wider range of animals was available.

SEASONALITY OF USE

Seasonality of use has been identified at five sites (Table 7.3). Seasonality is indicated by the presence of particular faunal elements (foetal elements) or species (salmon) that only occur during certain periods of the year. The presence of these indicators does not necessarily limit occupation at these sites to those particular times. These sites could have been occupied at other times of the year as well. At the Pigeon Mountain Site, a spring occupation from early March to early April is suggested based on foetal bison remains. Similarly, bison foetal remains at the Hunter Valley site

(Head 1999: 80) and at the Muleshoe Lake Site (Damp *et al.*, 1980:33) suggests that these sites were used in late winter or early spring. At the Salmon Beds and the Columbia Lakes sites a late summer - early fall occupation is indicated by the presence of Chinook salmon, which spawn at that time. At the Columbia Lakes sites other animal indicators suggest the site was also utilised in the winter and spring. The remaining sites indicate that a fairly wide variety of species was being hunted, but lack seasonal use indicators.

The Columbia Lake Site along with Echo Creek and Christensen Site display the greatest diversity of faunal species (Table 7.3). The high diversity of faunal species at the Columbia Lake Site may indicate its role as an over-wintering location. Echo Creek and Christensen Site are located in the upper Bow Valley where deeper snowfalls and colder temperatures may have discouraged over-wintering. The faunal diversity at these suggests summer occupations at these sites.

Although seasonality is only indicated at five sites, three sites on the east slopes with bison remains imply use in the late winter/early spring. This is consistent with bison behaviour where bison seek shelter from the severe winter cold of the plains in the protection of wooded foothills areas. The Salmon Beds and Columbia Lakes sites indicate use from late August to early October. In addition, the diverse faunal assemblage at Columbia Lakes Site suggests use in the winter and spring, as well as possible use of stored resources.

FAUNAL PROCESSING

Regardless of species hunted, all sites with faunal remains indicate high levels of faunal processing. In most cases, the degree of faunal processing is reported subjectively. As a result it difficult to determine if the quantity of bone fragments is

the result of grease extraction, or if the charred or calcined bone indicates “site clean-up” where bones are burned to reduce odors, insects or attractants for predators. For example at Muleshoe Lake, Damp *et al.* (1980) commented:

The bone consists primarily of very reduced long bone fragments which are burned and/or tiny calcined bone chips...Processing for bone grease is inferred from the extreme reduction, burning and calcination of long bone and lower limb elements...The non-bison fauna was similarly included in bone grease preparation from the presence of many tiny unidentifiable fragments with thin cortical tissue (Damp *et al.* 1980: 115-117).

Although Damp *et al.* (1980) interpret the burned and calcined bone as a result of marrow extraction, it is possible that these result from site clean-up, that is, these bones were burned to reduce odours.

At the Christensen Site (EhPw-1):

The majority of the mammal elements represented are from meat bearing portions of the long bones...The lack of cranial and axial skeletal elements suggests that the animals were killed elsewhere and transported to the site (Oetelaar *et al.* n.d.: 104).

Table 7.5 shows numbers and percentages of major classes of animal species reported from archaeological sites in the Central Canadian Rockies. In component 1 (CMU 1), the Late Precontact component at the Christensen Site, of the total 19,923 bone fragments only 1.9% were identifiable indicating a very high degree of bone reduction (Oetelaar *et al.* n.d.).

In the upper component at Pigeon Mountain Site there was a total of 7642 bone pieces, 986 (96.2%) of which were identifiable as bison while 35 (3.7%) were identified as other species: elk, moose, deer, small ungulate, large canid, medium canid, fox, bear, medium mammal, beaver, muskrat and rabbit/hare. In addition, at the Pigeon Mountain Site (EgPt-28):

Elements of high utility were found in large quantities while low utility elements were missing. This would be consistent with the hypothesis that the site represents a bison processing area. (Clarke *et al.* 1998: 170)

SITE	AREA	LAYER	LAND MAMMALS		FISH		BIRD		SHELL (mussel)		Total	REFERENCE	Notes
			N	%	N	%	N	%	N	%			
Columbia Lake EbPw-1	2A	A	173	73.9%	45	19.20%	4	1.70%	12	5.10%	234	Yip 1981	Frequency % excludes burned and calcined
		B	581	56.20%	444	42.90%	9	0.90%			1034		
		C	566	11.00%	4537	88.00%	46	0.90%	5	0.09%	5154		
		D	84	73.70%	30	26.30%					114		
	2C	A	466	98.70%	5	1.10%	1	0.20%			472		
		B	206	90.30%	7	3.10%	2	0.90%	12	5%	227		
		C	8	88.90%	1	11.10%					9		
		D	2	100%							2		
Christensen Site 360R	Ops 9, 10	CMU-1								19923	Oetelaar <i>et al.</i> n.d.	1.9% identifiable	
Pigeon Mountain EgPt-28		Upper	896 bison	96.2%							931	Clarke <i>et al.</i> 1998	12.2% identifiable
			35 other	3.7%									
			6621 unid										
Hunter Valley EiPp-16		Occupation 2	513 Bison								3158	Head 1999	18.3% identifiable
			342 Cervidae										thought recent
			scrap 2068										
			1 rodent										

Table 7.5 Percentages of identifiable fragments of major classes of animal species recovered from archaeological sites in the Central Canadian Rockies.

At Hunter Valley (EiPp-16):

The picture that emerges is one of extreme reduction of the faunal assemblage...stone boiling in conjunction with the preparation of bone grease was a primary activity with a possible focus on the preparation of pemmican (Head 1999: 106).

In Occupation 2 at Hunter Valley Site there was a total of 3158 bone pieces, of which 513 (18.3%) were identifiable as bison elements; 2068 were identified as bison scrap fragments with the remainder being 'other' (Head 1999).

Table 7.5 shows the percentages of mammals, fish, birds and shells from Area 2A and 2C at Columbia Lake Site (EbPw-1). These are shown for the four Late Precontact layers (A to D). The percentages are derived from a total of 6738 bone pieces. Data are not provided for how many identifiable elements are represented, but the number identifiable to species is small, again indicating extensive processing of faunal remains.

All sites indicate intensive faunal processing. This is supported by the highly fragmented nature of the faunal remains, which suggests that most of the faunal resources were utilised to maximise returns especially of bone grease and fat related to pemmican production. The two eastern-most sites, Hunter Valley and Pigeon Mountain, largely focussed on bison, which is consistent with the pattern of bison behaviour in which they are thought to have retreated from the plains into the foothills for winter and early spring (Peck, 2001). This is supported by seasonal indicators based on bison, which indicate a late winter or early spring occupation for both sites.

The wider variety of species hunted at the sites in the Columbia Trench and the Bow Valley sites suggests that people at these sites had a wider subsistence base that targeted an array of animal species. The variety of species acquired in the Bow Valley area suggests that human groups in the Late Precontact in the Central Canadian Rockies Ecosystem were not targeting exclusively high-return species, but did have

an emphasis on bison, elk and deer. Other sites in the Central Rockies indicate that a diverse range of species was being exploited. All animal prey obtained was heavily processed to maximise available resources. This pattern indicates that occupations in the Central Rockies were based on a diverse hunting strategy.

LITHIC MATERIAL USE

Lithic (stone) materials were examined to obtain an understanding of the extent of materials manufactured from local and more distant sources. Where identifiable, this can indicate the suitability of local materials for stone tool production. If precontact groups travelled or traded to obtain high quality stone tool materials, this should be indicated by exotic materials appearing in archaeological sites as finished tools or cores.

Lithic materials were also examined to determine requirements of specific functional tool types utilised at sites. Coarser grained materials may have been used in higher frequencies in sites that required butchering and smashing tools for faunal processing. Finer grained materials may have been selected to manufacture specialised tools that required specific forms or functions such as slicing or shaving.

Coarse-grained materials are lithic types where the stone is composed of observable grains or has clear fracture planes. Most of these materials are metamorphic or sedimentary in origin and include quartzite, shale, sandstone, siltstone, petrified wood, quartz and argillite. Fine-grained lithic materials have no observable grains or bedding planes. These include chert, chalcedony, obsidian, and porcellanite. Chert and chalcedony form by diagenesis, that is, they are usually formed by water dissolution of minerals and subsequent deposition within rock. Porcellanite, formed through metamorphism, is an impure variety of chert containing

clay and calcareous matter. Obsidian and basalt are igneous rocks formed during volcanic eruptions (extrusive) or from magma that flows and cools within the earth's surface (intrusive).

Fine-grained lithic materials were commonly used in the production of stone tools, such as arrowheads and knives, that required shaping and sharp edges. Coarse-grained materials were usually used for heavier tools that required less precision in production such as hammerstones, net weights and chopping tools. Expedient tools, often flakes that are used with little or no modification, can be made from either type of material, depending upon the intended use. The choice of materials used often varies with availability of raw materials. High quality materials with few impurities or fracture planes are often preferred because they work (flake) more easily. Such materials are available in only a few localities. As a result, they can be valued and are often traded or transported over considerable distances.

Only seven excavated Late Precontact sites or components have data on the total composition of lithic material assemblages including stone tools, cores and debitage (Figure 7.1, Table 7.6).

At the two sites in the Banff area (Vermilion Lakes Site and Christensen Site), a single material, Banff chert, dominates the total assemblages and comprises 91% and 68% of these two assemblages. Coarse-grained materials formed only 8% of the assemblage at Vermilion Lake Site while at Christensen Site CMU-1 these formed 7%. At Hunter Valley Site the lithic assemblage is dominated by coarser grained materials (74%) while only 24% are fine-grained materials. At Pigeon Mountain Site the assemblage is more evenly split between 59.2% fine-grained and 40.9% coarser grained materials. At Columbia Lake Site, the Area 1 assemblage was fairly evenly split between 57% coarse-grained materials and 43 % fine-grained materials. Area 2

	Site	Vermilion Lakes Fedje and White 1988	Christensen Oetelaar <i>et al.</i> n.d. :60	Hunter Valley EiPp-16 Head 1999	Salmon Beds Heitzmann 1999	Columbia Lake Mohs 1981	Columbia Lake Yip 1982	Pigeon Mountain Clark <i>et al.</i> 1998
	Level/ Layer	Group ¾	CMU - 1	Occ. 2	All	All	All	Upper
	Material							
Fine-Grained	ARG	0.1	0.3	0.3				
	BACH		3.0					
	BFC	91.0	68.0					
	BLC		3.0		6.0			
	CHAL	0.1		4.0	4.0	3.0	2.0	1.1
	CHRT			19.0		39.0	19.0	14.3
	GrCH	0.2	3.0		0.2			
	KRF		0.4					0.2
	MISC	0.2	2.0	2.0				
	MNC		7.0					
	NQC I	0.1	1.0					
	NQC II	0.2						
	OBS	0.4		1.0	1.0	1.0	0.3	2.0
	POR							0.2
	SPCH	0.1						
	SRC							40.3
	TWC		5.0			81.0		9.0
WCH	0.1				1.0			
Coarse-Grained	BAS					54.0		1.8
	BSS	1.0						
	PEW			5.0				0.5
	QCRY					1.0		0.6
	QUAR	2.0	2.0	30.0	5.0	2.0	1.0	0.3
	SDS	2.0	2.0	0.3	0.2			
	SHA		1.0		0.2			37.4
	SILT	2.0	2.0	38.0	2.0		69.0	0.3
	SPAR	1.0	1.0	0.5				

Table 7.6 Percentages of major lithic material categories, excavated components, Central Canadian Rockies.

Key to Lithic Materials Used in Table 7.6: ARG - Argillite; BACH - Banded chert; BSS - Banded siltstone; BFC - Banff chert; BLC - Black chert; CHAL - Chalcedony; CHRT - chert; GRCH - Grey chert; KRF - Knife River chert; MISC - Miscellaneous; MNC - Montana chert; NQC - Norquay chert; OBS - Obsidian; PEW - Petrified wood; POR - Porcellanite; QCRY - Quartz crystal; QUAR - quartzite; SDS - sandstone; SHA - shale; SILT - siltstone; SPAR - spar quartz; SPCH - speckled chert; SRC - Swan River chert; TWC - Top of World chert; WCH - white chert

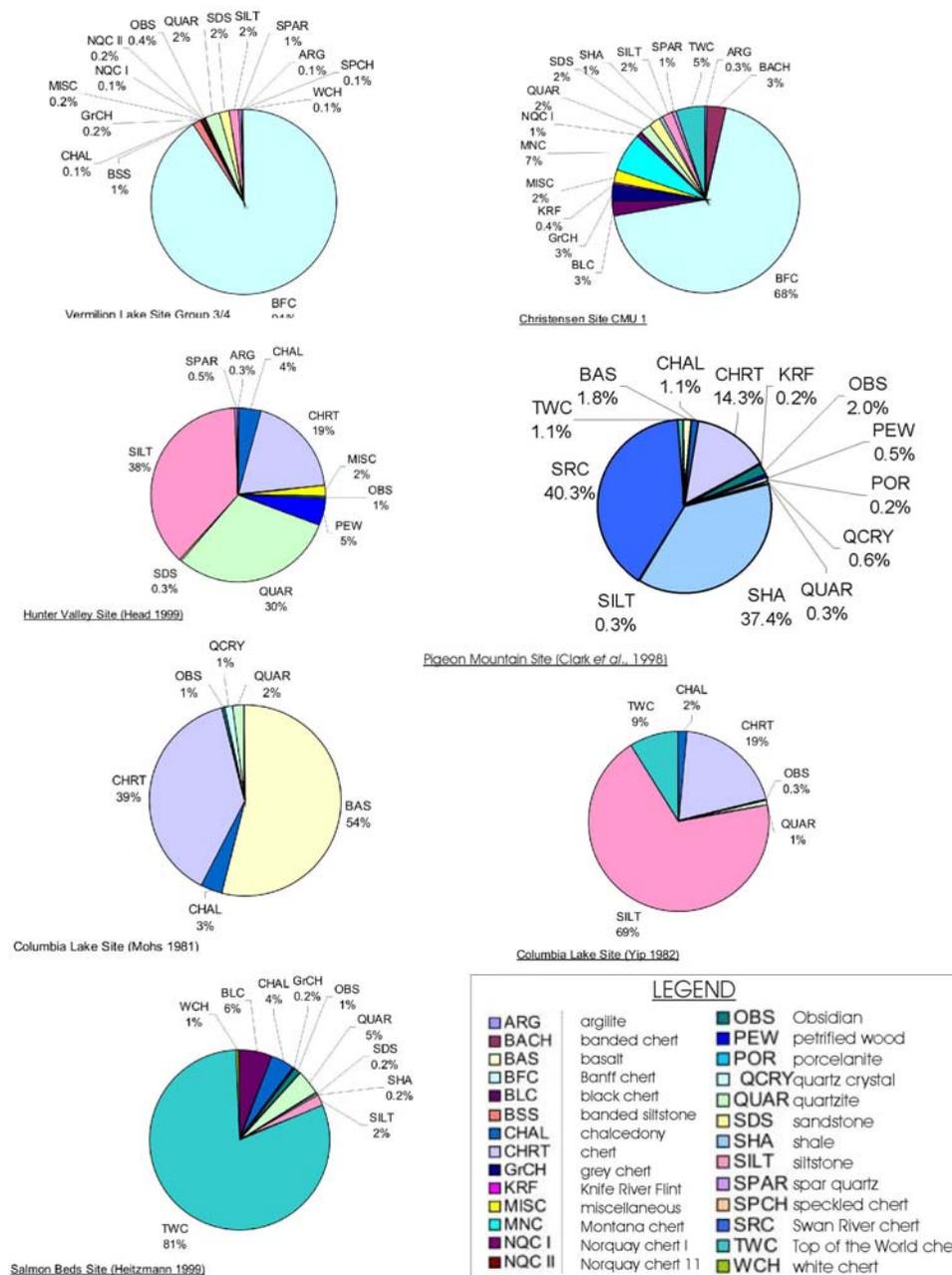


Figure 7.1 Percentages of lithic materials (including tools and debitage) utilized at excavated sites in the Central Canadian Rockies.

at Columbia Lake had a very different assemblage composition with 70% coarse-grained materials and 30% fine-grained materials. The lithic assemblage from the Salmon Beds Sites contained primarily fine-grained materials (93.2%) dominated by Top of the World chert (81%). Only a small percentage (7.4%) of coarse-grained

materials was present. At most sites there appears to be a preferential use of local source materials. Whilst this is true at most sites, there are some notable exceptions. At Pigeon Mountain Site non-local materials were preferred, comprising 59.2% fine-grained materials including a large amount of Swan River chert. Shales formed 37.4% of the assemblage and were the highest percentage local material used.

Coarse-grained materials appear to occur at higher frequencies in sites where there was a requirement for butchering and smashing faunal remains. This is the case at Hunter Valley Site, where 74% of the total lithic assemblage is coarse-grained materials. Coarse-grained lithic percentages are also high at Columbia Lake Area 2 (70%), Columbia Lake Area 1 (56%) and at Pigeon Mountain Site (39.9%). These sites all have faunal assemblages where butchering of large ungulates was an important site activity. Sites with high percentages of fine-grained materials include Salmon Beds (93.2%), Vermilion Lakes (91%), and Christensen Site (68%). The high percentage at Salmon Beds fits well with the assumed importance of fishing as a key activity, as fish butchery does not require heavy tools for bashing or chopping; instead it requires fine-grained tools with sharp edges for slicing. The high percentage of fine-grained lithics at Vermilion Lake site (91%) may be related to the site's proximity to quarry sources and may result from the manufacture or resharpening of finished tools. It is not likely related to fishing, because Vermilion Lake is not a good fish-bearing lake. Both Vermilion Lakes and Christensen Sites are close to Mount Norquay, which contains accessible exposed beds of Banff and Norquay cherts. Coarser grained materials were found in almost equal percentages at both sites (8% and 7% respectively).

EXOTIC QUARRY SOURCES

Five of the sites contain lithic materials derived from quarry sources outside of the study region (Figure 7.2, 7.3). At the Christensen Site two fine-grained materials are derived from more distant sources. Montana chert (7%) comes from a source more than 300 km to the south and Top of the World chert (5%) is derived from sources approximately 150 km to the southwest.

At Pigeon Mountain Site, 37% of the total lithic assemblage is shale derived from a local source. However, Swan River chert formed 40% of the assemblage. This material comes from a source far to the east in Manitoba or possibly from glacial tills deposited by continental (Laurentide) ice during the most recent glacial period. The Laurentide glacial tills boundary is located many kilometres to the east near Medicine Hat, Alberta. The occurrence of Swan River chert at the Pigeon Mountain Site suggests either that the people who occupied the Pigeon Mountain Site had recently arrived from the east or that they had strong trade contacts with groups to the east. Yet another alternative explanation might be that cultural factors determined this unusual choice of lithic materials, for example, the use of this material might be required at a particular time of year or for a particular ceremony. Also at Pigeon Mountain Site, there are small percentages of materials from mountain sources to the west (Top of the World chert 1.1%, quartz crystal 0.6%, obsidian 2%) indicating transport or trade from the west and/or south as well.

At the Hunter Valley Site, the lithic assemblage is dominated by coarse-grained materials, siltstone and quartzite, likely derived from local sources. Some finer grained materials come from a greater distance, in particular, the 1% obsidian which likely comes from a source near Yellowstone, Montana or adjacent Bear Gulch area more than 300 km to the south.

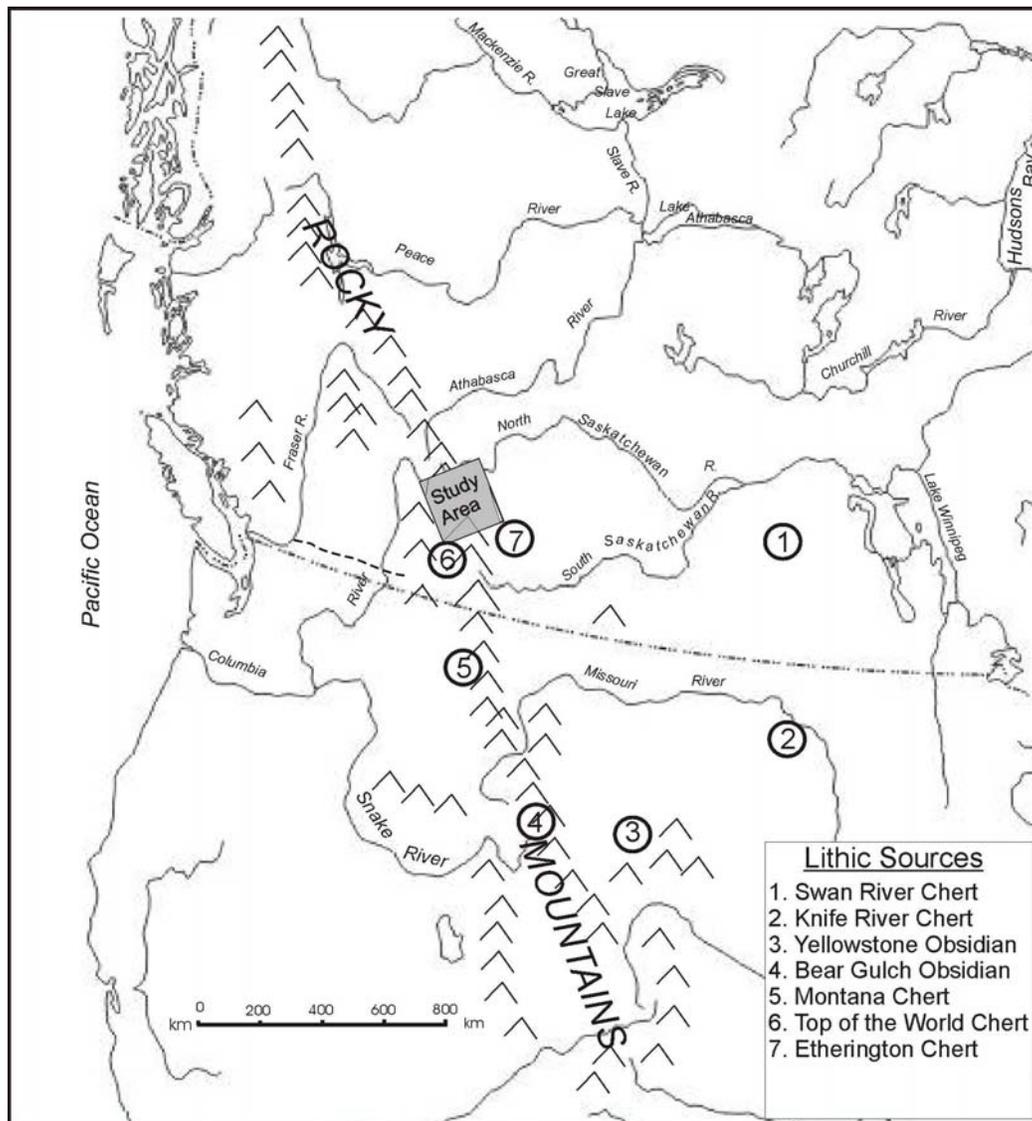


Figure 7.2 Originating locations of exotic stone materials found in the Central Canadian Rockies.

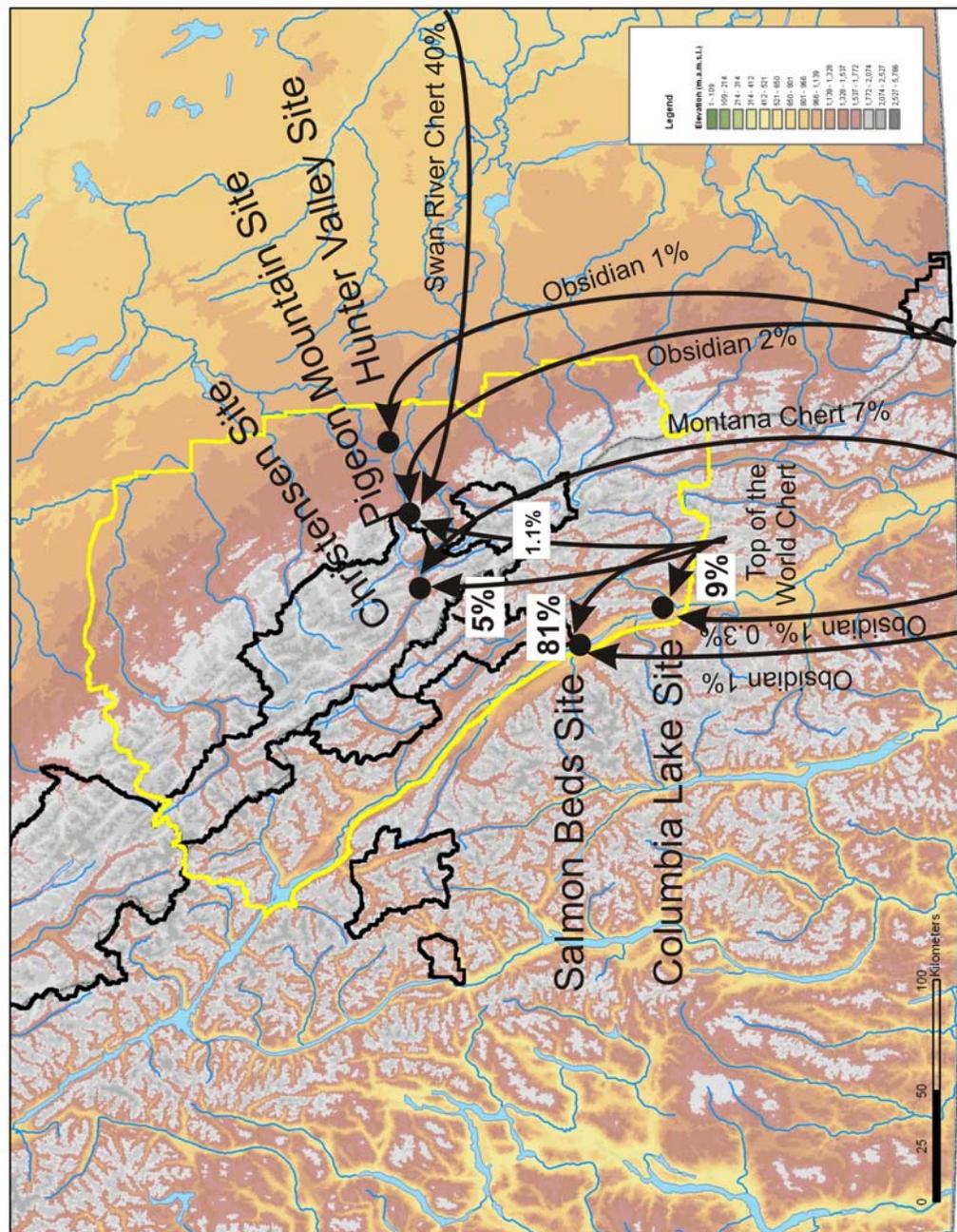


Figure 7.3 Exotic lithic materials in the total lithic assemblages for sites in the Central Canadian Rockies.

Assemblages from Columbia Lake Site have significant percentages of coarse-grained materials that likely come from local sources (basalt at Area 1 and siltstone at Area 2). Fine-grained materials include 9% Top of the World chert at Area 2 as well

as 19% other cherts. At Columbia Lake Area 1, the 39% cherts likely include a significant amount of Top of the World chert as this quarry is nearby but this chert type was not separated in the analysis. The assemblage from the Salmon Beds is dominated by fine-grained materials especially Top of the World chert. This may indicate that the occupiers of this site recently came from the quarry source of this material and were using it intensively.

To summarise, lithic assemblages are primarily composed of locally derived materials. Where high quality lithic materials were required for specific functions and specialised tool manufacture, these were likely obtained through trade or direct transport. Differences in lithic materials may reflect some of the primary functions carried out at these sites. Four assemblages have higher percentages of coarse-grained materials (Hunter Valley, Pigeon Mountain, Columbia Lake Area 1, and Columbia Lake Area 2) indicating the use of larger tools for processing large game. Those sites with higher percentages of fine-grained materials may have been used for specialised functions (such as fish processing at Salmon Beds) or more specialised tool manufacturing (such as at Vermilion Lakes Site and Christensen Site).

LITHIC MATERIALS USED FOR CORE PRODUCTION

Cores are blocks of stone material used to produce smaller pieces (flakes) that can be used without further modification or could be further modified into tools. Cores can be rough unmodified blocks or can be shaped (prepared) in advance of tool production. Occasionally entire cores can be made into tools (called core tools). Larger cores are more likely to be made of local materials if available. Cores of high quality lithic materials may be transported over longer distances if the material is highly desired.

Percentages of cores recovered from five sites are illustrated as Figure 7.4. These show that cores from three sites (Vermilion Lakes, Echo Creek and Christensen) were primarily made from local materials dominated by Banff chert and Norquay chert. No cores of non-local materials were recovered from Vermilion Lakes, whereas 1% of the cores from Echo Creek were Top of the World chert, a non-local material. At Christensen Site local materials were most commonly used (Banff chert 47%, black chert 4%, Norquay chert 6%, quartz crystal 3%). Non-local chert cores were surprisingly frequent with Montana chert (10%), Top of the World chert (6%) and argillite (1.4%) being present.

At Pigeon Mountain Site, cores are predominantly non-local materials with a single material, Swan River chert, forming 63% of all cores. Top of the World chert also formed a significant percentage of cores at 13%. Only 13% of the cores were from a local shale, while the remaining 13% were not identified as to specific sources.

At the Hunter Valley Site, 24 of 26 cores were produced by the bipolar technique with the remaining two being multi-directional cores. Out of the 26 cores, 27% were either red or grey cherts while the remaining 64% of the core assemblage were local siltstones, quartzites or petrified wood.

Cores of local materials predominated at four of the five sites that have data on cores. The sole exception is the Pigeon Mountain Site, where Swan River chert forms 63% of the assemblage. The use of local lithic materials indicates that hunter-gatherer groups in the Central Canadian Rockies did not carry stone tool materials in core form for most purposes. At the same time, however, the presence of high quality fine-grained materials from distant sources (Swan River, Manitoba; Montana; Top of the World) indicates that these materials were transported or traded for the purpose of making specific formed tools. It could have been useful to analyse the cores based on

size as smaller sized cores would be more likely to have been transported.

Unfortunately not enough basic data (weight, dimensions) was originally reported.

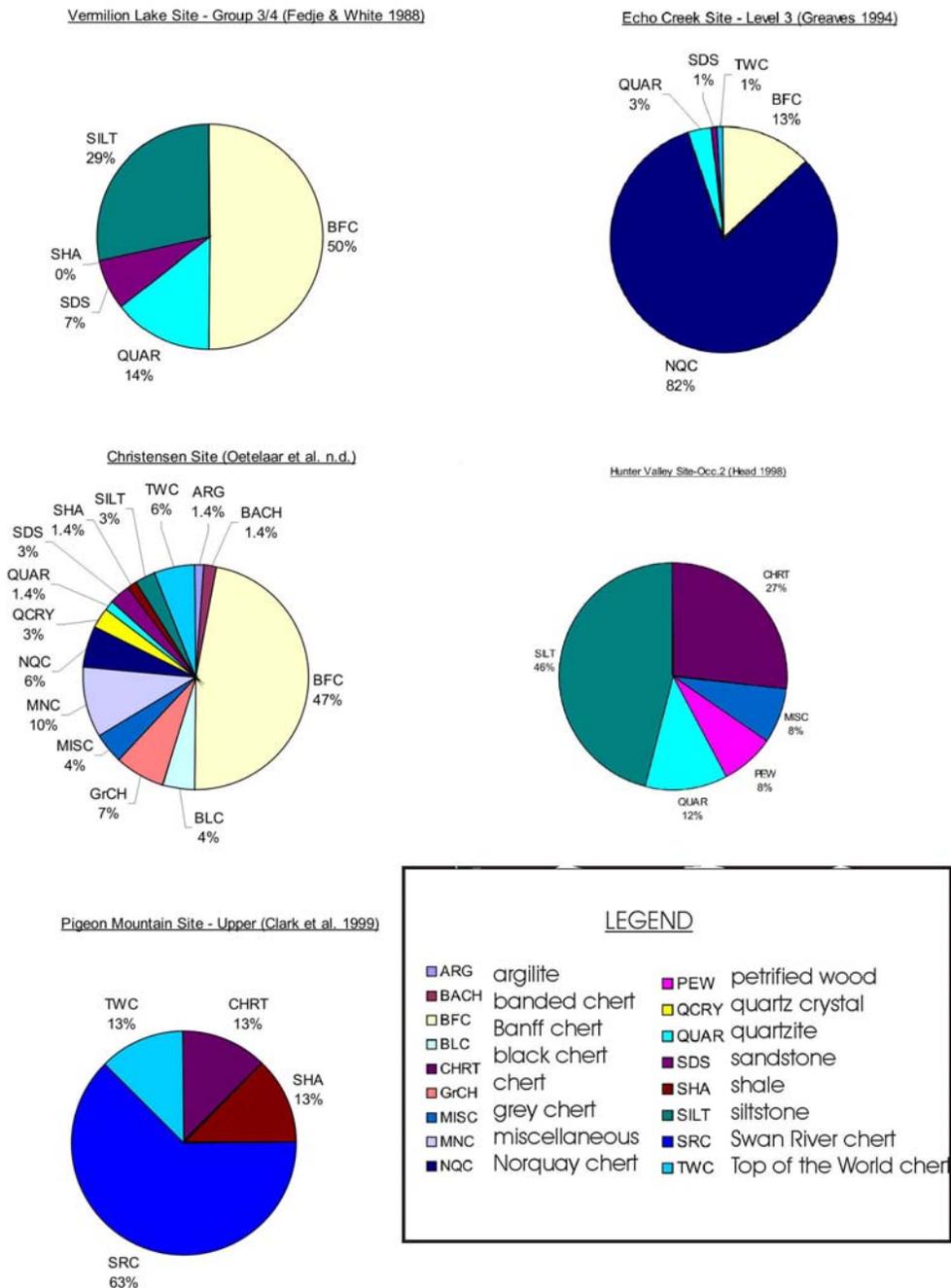


Figure 7.4 Percentages of cores made from different lithic materials as found at excavated sites in the Central Canadian Rockies.

STONE TOOL LITHIC ASSEMBLAGES

Nine excavated Late Precontact sites or components had data on the total composition of the stone tool assemblages. These assemblages included all stone tools, but excluded cores and debitage (Figure 7.5, Table 7.6). Three of these sites (Vermilion Lakes Site Group 3 / 4, Christensen Site CMU-1, and Echo Creek Site Level 3) are located in the Banff area. One site (Hunter Valley Site Occ. 2) is located on the eastern edge of the study area in the foothills region. The Pigeon Mountain Site, (Upper component) is located just within the front range of the Canadian Rockies. Three sites (Salmon Beds, Columbia Lake and EcPx 5 Upper) are located at the western edge of the study area in the Columbia Trench. The data for Columbia Lake Site represent two spatially separate areas for the Late Precontact Period.

LITHIC MATERIALS USED FOR TOOL PRODUCTION

This section examines the range of lithic materials used for stone tool production and whether specific materials were preferentially selected for stone tool production. Data on the lithic materials used for stone tool production are provided in Figure 7.5 and Table 7.7. The tool assemblages from the three Banff area sites are dominated by local chert materials (either Banff chert or Norquay chert). These two materials account for 68% of the assemblage at Vermilion Lakes Site, 53% at the Christensen Site, and 78% at Echo Creek Level 3. Top of the World chert was absent at Vermilion Lakes Site, but formed 13% of the assemblage at Christensen Site, and 7% at Echo Creek Site. Tools made of coarser grained materials (siltstone, sandstone, and slate) formed only 14%, 6%, and 7% at these sites. Quartzite tools formed 5%, 1% and 3% respectively at these sites. Materials occurring in minor frequencies at Vermilion Lake site were quartz crystal (5%), chalcedony (1%), argillite (1%), and

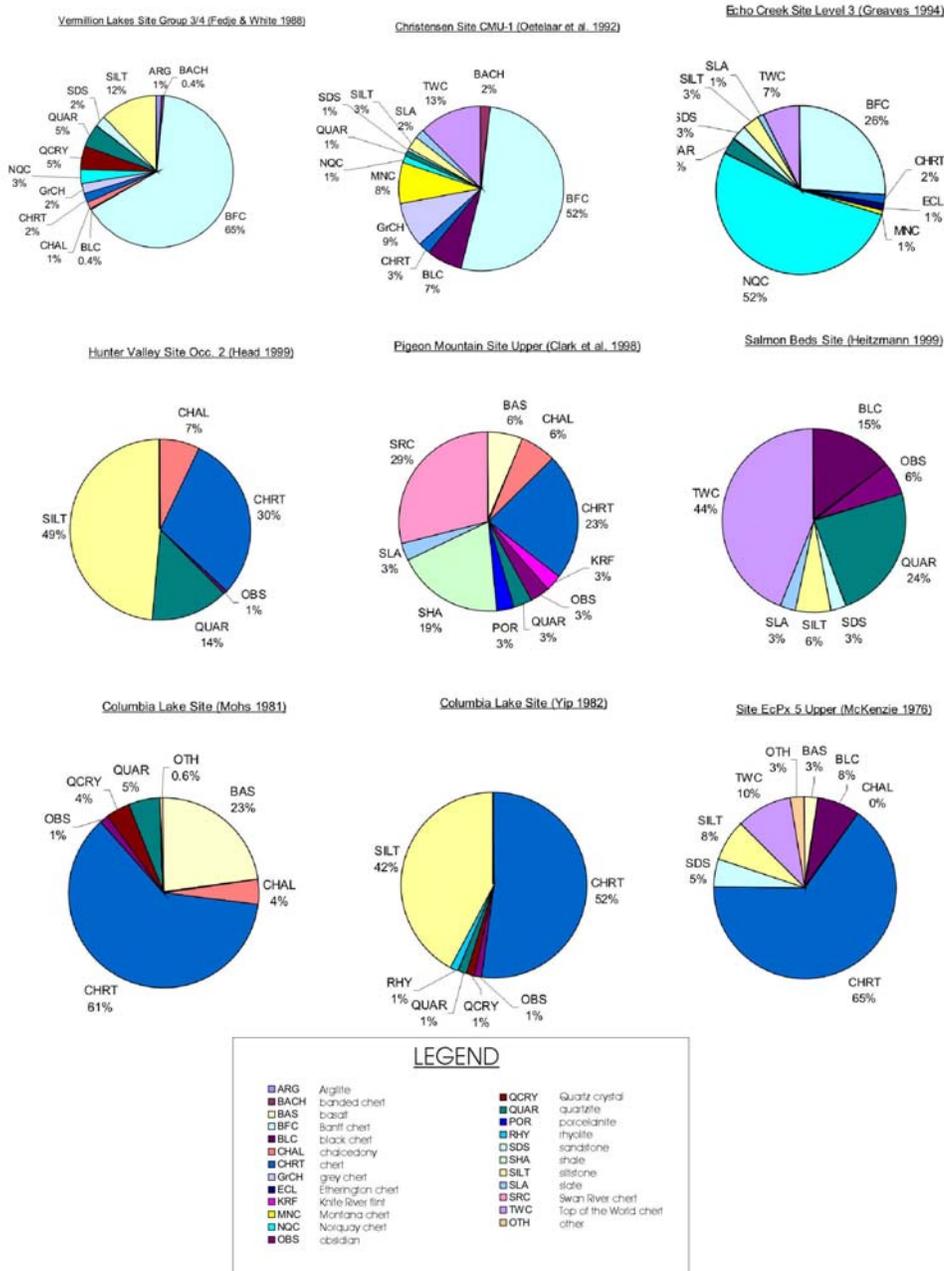


Figure 7.5 Percentage distribution of the lithic materials used for making stone tools as found at excavated sites in the Central Canadian Rockies.

	Site	Vermilion Lakes Fedje and White 1988	Christensen Oetelaar <i>et al.</i> n.d. :60	Echo Creek Greaves 1994	Hunter Valley EiPp-16 Head 1999	Salmon Beds Heitzmann 1999	Columbia Lake Mohs 1981	Columbia Lake Yip 1982	Pigeon Mountain Clark <i>et al.</i> 1998	EcPx 5, McKenzie 1976
	Level/ Layer	Group 3/4	CMU - 1		Occ. 2	All	All	All	Upper	Upper
	Material									
Fine-Grained	ARG	3								
	BACH	1	3							
	BFC	168	83	50						
	BLC	1	11			5				3
	CHAL	3			13		7		2	
	CHRT	5	4	3	54		97	38	7	26
	ECL			2						
	GrCH	6	14							
	KRF								1	
	MNC		13	2						
	NQC	8	2	100						
	OBS					1	2	2	1	1
	OTH							1		1
	POR								1	
SRC								9		
TWC			20	14		15				4
Coarse-Grained	BAS						36		2	1
	QCRY	13					7	1		
	QUAR	13	2	6	25	8	8	1	1	
	RHY							1		
	SDS	6	1	6		1				2
	SHA								6	
	SILT	32	4	6	88	2		31		3
SLA			3	2		1		1		

Table 7.7 Total number of tools made from different lithic materials.

Key: ARG - Argillite; BACH - Banded chert; BFC - Banff chert; BLC - Black chert; CHAL - Chalcedony; CHRT - chert; ECL - Etherington chert; GRCH - Grey chert; KRF - Knife River chert; MNC - Montana chert; NQC - Norquay chert; OBS - Obsidian; OTH - other; POR - Porcellanite; QCRY - Quartz crystal; QUAR - quartzite; RHY - rhyolite; SDS - sandstone; SHA - shale; SILT - siltstone; SLA - slate; SRC - Swan River chert; TWC - Top of World chert;

other cherts (banded 0.4%, black 0.4%, and grey 2%). At Christensen Site CMU-1 tools made of minor frequency lithic materials were Montana (8%), Norquay (1%), grey (9%), black (7%), and other (3%) cherts. At Echo Creek materials found at low frequencies were Etherington (1%), Montana (1%) and other (2%) cherts.

At the Hunter Valley Site Occ. 2 the lithic assemblage used for tools was dominated by siltstone 49% and quartzite 14%. Cherts formed 30% of the sample, together with chalcedony 7% and obsidian 1%. At Pigeon Mountain Site, fine-grained materials composed 67% of materials used to make stone tools. Swan River chert was used for almost one-third of all tools (29%). Other fine-grained materials were chert (23%), chalcedony (6%), Knife River Flint (3%), obsidian (3%), and porcellanite (3%). Coarser grained materials formed the other 33% composed of shale 19%, slate 3%, basalt 6%, and quartzite 3%. At the four components from the Columbia Trench, fine-grained materials also dominated the tool assemblages. These formed 65% at the Salmon Beds, 70% at Columbia Lake Area 1, 54% at Columbia Lake Area 2, and 78% at EcPx 5 Upper. Coarser grained materials formed 36%, 28%, 44%, and 16% at each of these respectively.

The percentages of tools made from exotic materials found outside the study area are indicated on Figure 7.6. This shows that obsidian was the most widely distributed exotic material found at four sites, two on the eastern slopes and two on the western slopes, but it typically occurs in low percentages. Top of the World chert, a high quality material from just outside the study area, was utilised frequently in the Columbia Trench but it was also used at Christensen and Echo Creek Sites in the upper Bow Valley. The Pigeon Mountain Site stands out in its unique use of Swan River chert and Knife River flint. Echo Creek and Christensen Sites are the only sites

where Montana chert was utilised. Etherington chert was only identified at Echo Creek Site.

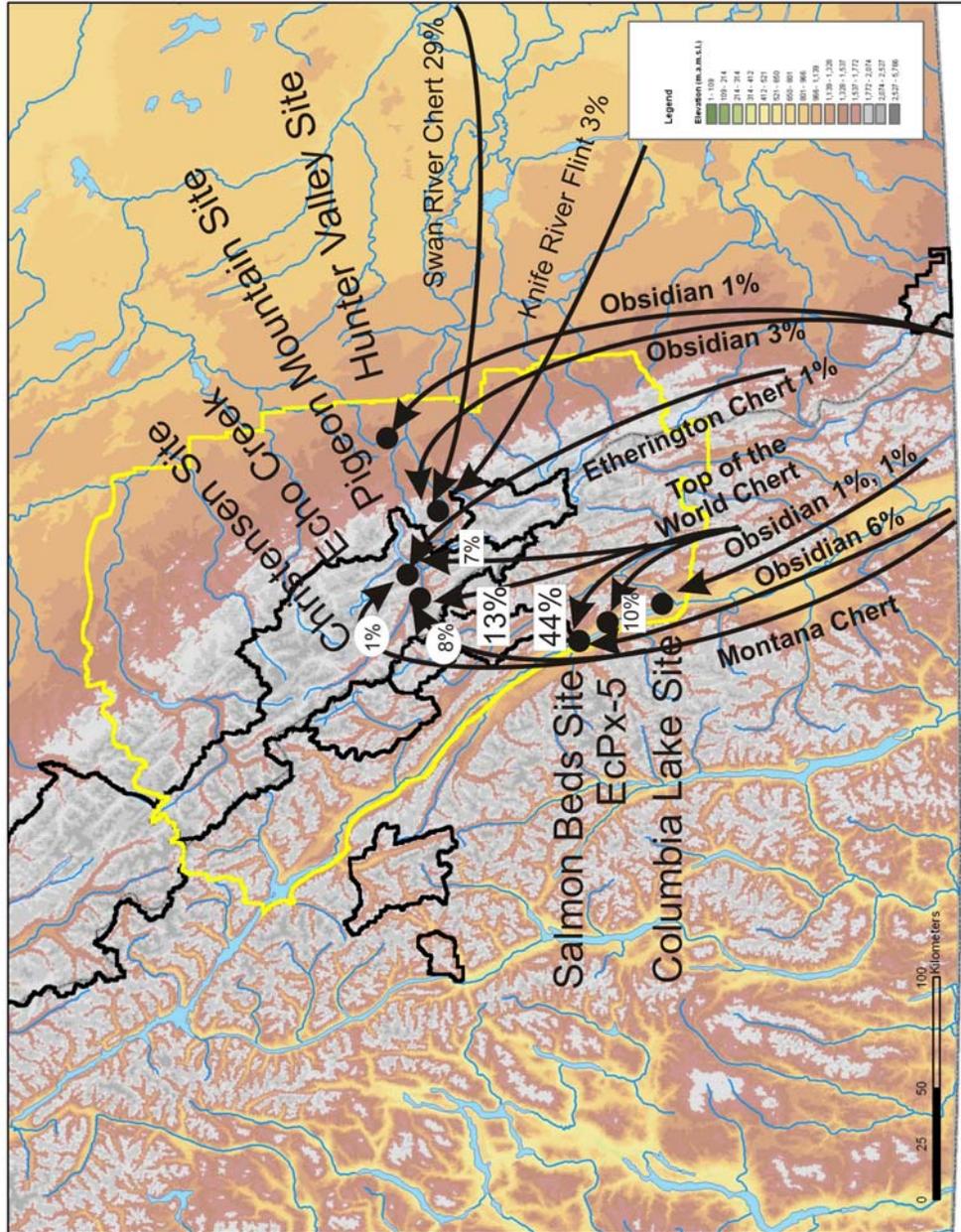


Figure 7.6 Percentage of tools made from exotic materials derived from outside the study area.

To summarise, the tool assemblages at most of these sites were made from a range of fine-grained cryptocrystalline materials. Most small tools made of these materials were more easily shaped or have sharper edges. Tools made of coarse-grained materials tend to be larger and were used for tasks requiring greater force or weight, such as netsinkers, hammerstones and cobble choppers. In almost all sites fine-grained lithic materials were preferentially selected for stone tool production. The percentage of tools made of fine-grained materials were: Christensen Site 94%, Echo Creek 93%, Vermilion Lakes Site 86%, EcPx 5 Upper – 78%, Columbia Lake Area 1 – 70%, Pigeon Mountain 67%, Salmon Beds 65%, Columbia Lake Area 2 – 54 %, and Hunter Valley 38%. The only exception to majority use of fine-grained materials for tools was at the Hunter Valley site where fine-grained materials made up only 38% of the tool assemblage. This may reflect the type of tools utilised at this site (see below). Stone materials derived from outside the area typically occur in low frequencies. Two notable exceptions to this are the Pigeon Mountain Site, where 29% of tools were made of Swan River chert, and the Salmon Beds, where 44% of tools were made of Top of the World chert.

TOOL TYPE ASSEMBLAGES

It is commonly assumed in hunter-gatherer archaeology that the range of tool types (tool kit) is, broadly, likely to be a reflection of the variety of activities that occurred at these sites. If a site has a generalised subsistence base, it is more likely to have a wider range of tool types that reflect multiple uses. The tool types used in this analysis are described in Appendix II.

Some studies of stone tools have been associated with site types or the length of site residence. For example, “bifacial tools or cores are generally associated with frequent and/or lengthy residential or logistical movements (Boldurian, 1991; Kelly, 1988; Kelly and Todd, 1988), while expedient flake tools and bipolar reduction are associated with infrequent residential moves (Parry and Kelly, 1987)” (Kelly, 1992:53). There has been some attempt to correlate assemblage size and diversity with foragers or collectors (Shott, 1986; 1990), but many other explanations for both size and diversity are possible (Magne, 1989; Thomas, 1989). There has also been the suggestion that the abundance and diversity of cultural remains, site size and number of storage features have been associated with decreased residential mobility (Bar-Yosef and Belfer-Cohen, 1989; Hitchcock, 1987; Rafferty, 1985).

From the analysis above it can be seen that for most excavated sites fine-grained stone was utilised to manufacture most of the stone tools. Are there differences in the types of stone tools excavated at these sites? Do some sites have a wider variety of tool types and does this reflect a greater variety of functions occurring at these sites and/or length of occupation?

The composition of stone tool assemblages is shown in Figure 7.7 and Table 7.8. The number of overall categories of tool types ranged from four at Pigeon Mountain to eleven at Columbia Lake Site (Area 2). Sites on the eastern side of the divide of the Rockies had lower numbers of categories than those in the Columbia Trench. This may be partly due to the higher occurrence of fishing requiring additional tool types such as netsinkers, discoidal tools, macroblades, microblades and

Site and reference	Hunter Valley Site Occ. 2 (Head 1999)	Pigeon Mountain Site – Upper (Clark <i>et al.</i> 1998)	Echo Creek Site Occ. 3 (Greaves 1994)	Christensen Site CMU-1 (Oetelaar <i>et</i> <i>al.</i> n.d.)	Salmon Beds Site (Heitzmann 1999)	EcPx 5 - Upper (McKenzie 1976)	Columbia Lake Site Area 1 (Mohs 1981)	Columbia Lake Site Area 2 (Yip 1982)
Tool Types								
ABR						2	5	
BIF	45	8	36	65	1	2	23	6
DISC					2		8	2
HAMM					3			
MABL						3		4
MIBL							2	3
MICL						8		2
MRST	70	8	56	41	10	3	34	8
NETS					2		3	
PERF	1			2		5	6	1
PIE	15		1					
PRE								1
PRP	31	8	24	35	8	7	53	21
SCR	42	7	18	21	7	5	15	14
UCF			7					
UCN			6				1	1
UTF			73	69	2	5	37	11
TOTAL	204	31	93	233	30	40	182	74

KEY

ABR	Abrader	PERF	perforator/drill/graver
BIF	Biface/knives	PIE	Piece esquille/wedge
DISC	discoidal tool/spall tool	PRE	Perform
HAMM	Hammerstone	PRP	projectile point
MABL	Macroblade	SCR	Scraper
MIBL	Microblade	UCF	utilised core fragment
MICL	Microlith	UCN	utilised cobble/nodule
	marginally retouched stone		
MRST	tool	UTF	utilised flake
NETS	Netsinker		

Table 7.8 Numbers of tools by tool types in excavated assemblages.

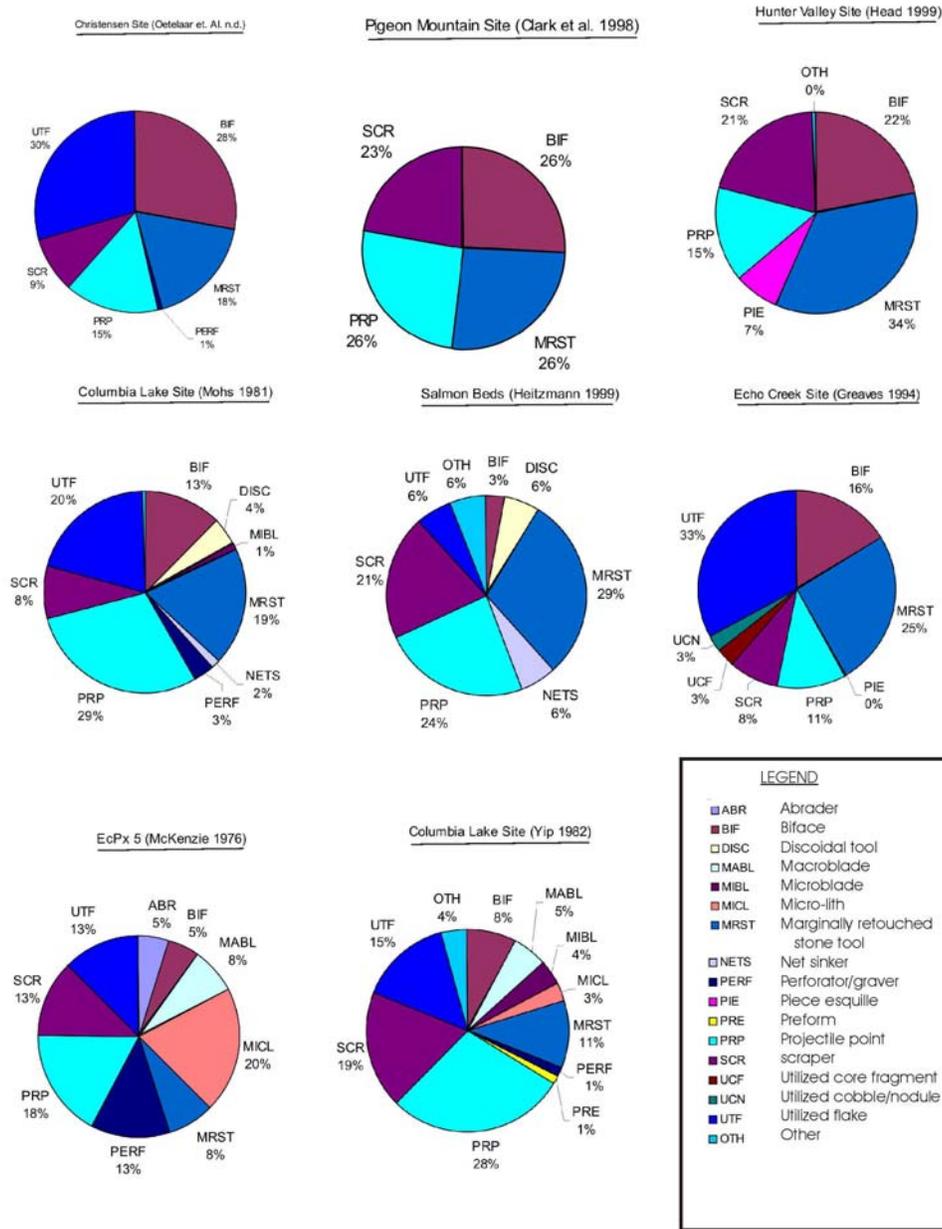


Figure 7.7 Percentages of tool assemblages as found at excavated sites in the Central Canadian Rockies.

microliths. On the eastern side of the divide the presence of *pièces esquillées* (wedges) at Hunter Valley and Echo Creek sites may be related to bone processing. Projectile points, bifaces, marginally retouched stone tools, and scrapers or unifacial tools are present at all the sites. Projectile points are present in all of the tool assemblages, ranging from a low of 11% at Echo Creek to a high of 29% at Columbia Lake Site Area 1. Formed bifaces ranged from a low of 3% at Salmon Beds to a high of 29% at Christensen Site. High percentages of bifaces at Christensen (29%), Pigeon Mountain (26%), Hunter Valley (22%), and Echo Creek (16%) sites may be associated with an emphasis on hunting at these sites and/or be related to the closer proximity of lithic source materials if bifaces were an intermediary stage of lithic reduction. The Hunter Valley Site had the highest coarse-grained and lowest exotic materials assemblage even though it seems that local materials were not high quality. All the Columbia Trench sites have lower percentages of bifaces (Columbia Lake Site Area 1 -13%, Columbia Lake Site Area 2 - 8%, EcPx 5 -5%, and Salmon Beds - 3%), suggesting that these sites may have been more distant from good lithic sources or that tools were brought to these sites in finished form.

Marginally retouched stone tools (MRST) are expedient tools that were often produced on site and seem to have served generalised cutting or scraping functions. Larger percentages of MRSTs are associated with butchering and processing sites including Hunter Valley (34%), Pigeon Mountain (26%), Salmon Beds (29%), Echo Creek (25%), Christensen (18%) and Columbia Lake Area 1 (19%). They occur at low percentages at EcPx-5 (8%) and Columbia Lake Area 2 (11%).

Scrapers or unifacial tools were commonly used for working hides and/or wood. These formed higher percentages at Pigeon Mountain (23%), Hunter Valley (21%), Salmon Beds (21%) and Columbia Lake Site Area 2 (19%). At the remaining

sites these constituted smaller parts of the assemblage: EcPx 5(13%), Christensen (9%), Echo Creek (8%), and Columbia Lake Site Area 1 (8%).

Utilised flakes exhibit use wear such as striations and smoothing. Small numbers were identified at most of these sites except at Pigeon Mountain and Hunter Valley Sites. There, they may have been mis-identified (possibly as marginally or unifacially retouched stone tools), due to the difficulty of identifying these on coarse-grained lithics, or they may be truly absent.

As the above figures show, the sites on the western side of the Rocky Mountain divide have a wider range of tool types than those on the eastern side. My interpretation is that this is a product of a more diverse subsistence on the west primarily related to fishing and perhaps plant collecting that required different tool types. The smaller number of tool types on the east supports the interpretation that at these sites there was focussed activity on bison hunting.

TOOLS REFLECTIVE OF OCCUPATION LENGTHS

Hayden *et al.* (1996), and Prentiss and Kuijt (2004) have suggested that sorting lithic tool types into strategy groups is useful in identifying sites related to mobile and more sedentary people. I have adapted the categories used by Prentiss and Kuijt (2004:53) to conform to categories of tools identified at the excavated sites in the Central Canadian Rockies. The categories used were expedient tools (modified or utilised flake tools) and abraders to indicate longer term occupation; and bifaces (including projectile points), portable long-use tools (formed tools) and blades as indicative of more mobile foragers. I followed Prentiss and Kuijt in including projectile points in the biface category "...because their organisational role and function are often equivalent to those of other more generalised bifaces" (2004:53). I excluded the

category of ground-stone cutting tools because they are rarely encountered in the study area.

The number of tools clustered in these 'strategy groups' is presented in Table 7.9 and presented as percentage data in Table 7.10. These are illustrated in Figure 7.8. The "long-term" occupation tool assemblage is highest at Hunter Valley, Pigeon Mountain, EcPx-5 and Columbia Lake Area 2. These assemblages are characterised by higher use of expedient tools. The mobile (foraging) group of tools is highest at Echo Creek and Salmon Beds. These assemblages have higher use of formed tools. The Hunter Valley, Pigeon Mountain, EcPx-5 and Columbia Lake Area 2 sites are characterised by high frequencies of expedient tools, which Prentiss and Kuijt suggest are indicative of a higher degree of sedentism. In contrast, Echo Creek and Salmon Beds have lower frequencies of expedient tools and higher frequencies of finished tools indicative of high mobility. The greater foraging behaviour indicated at the Salmon Beds may be because the targeted activity of salmon fishing excluded most other activities. Site EcPx 5 does not correspond well with Prentiss and Kuijt's categories because it has high percentages of tool types characteristic of long-term occupation but the low artefact density indicates a brief occupation. The Christensen and Columbia Lake Area 1 sites have ratios of long-term to mobile tool types of 55:45 and 54:46. These are mid range percentage figures, suggesting that these sites were occupied for shorter periods than Hunter and Pigeon Mountain sites but longer than Echo Creek and Salmon Beds.

The logic of the categories proposed by Hayden *et al.* (1996), and Prentiss and Kuijt (2004) is clear to some extent but it is also problematic. It is based on the assumption that transporting cores to make flakes that are soon discarded requires a lot of effort for a mobile group. However, if there is an acceptable lithic source

nearby (outcrops, river cobbles, etc.) the smart mobile person will just make expedient tools on the spot. So, in considering what are long-term versus short-term occupations archaeologists should also consider what materials are locally available. Alternatively, more sedentary people may have more available time that could be used to make formed tools. Once made, these might be easily refurbished many times which could result in minimising effort overtime. In addition, there is a need to consider a more overall view of any particular site, including the variety of tool types. It could be argued that the longer a group of people are at a particular site, the more likely they will perform a variety of activities, some of which might be “unusual” activities (eg. using a drill, making ornaments), that might result a larger variety of artifacts.

Based on the volume and variety of cultural materials, it is unlikely that the Hunter Valley, Pigeon Mountain and EcPx-5 sites were long-term occupations and that at these sites the higher frequencies of expedient tools are likely due to their proximity of readily available lower-quality lithic materials. Also based on the quantity and variety of materials, I suggest that the Columbia Lake Area 1, Columbia Lake Area 2, Echo Creek, and Christensen sites were occupied for longer periods of time than the other sites considered here.

Overall, Prentiss and Kujit’s (2004) characterisation of strategy groups does not seem to apply to the sites of the Central Canadian Rockies. In fact, the sites differentiated are almost completely opposite to their characterisations.

Tool Types	Hunter	Pigeon	Echo	Christensen	Salmon	EcPx 5	Columbia1	Columbia2
Total Long-term	134	23	79	133	16	30	99	52
Total Mobile	70	8	142	110	17	10	85	22
	204	31	221	243	33	40	184	74

Table 7.9 Functional lithic assemblage by strategy groups - raw data; see text for explanation of strategy groups.

Tool Types	Total Long-term	Total Mobile
Hunter	66	34
Pigeon	74	26
Echo	36	64
Christensen	55	45
Salmon	48	52
EcPx 5	75	25
Columbia1	54	46
Columbia2	70	30

Table 7.10 Percentages of stone tools by 'strategy groups'.

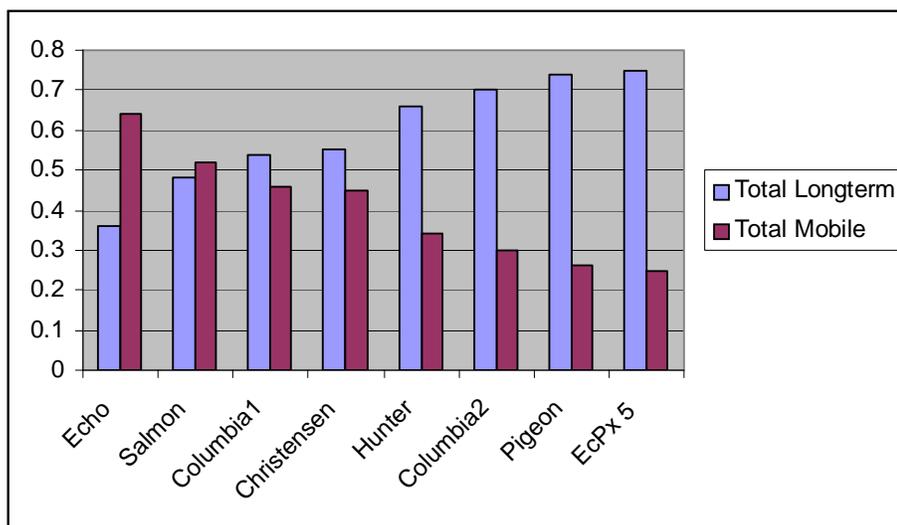


Figure 7.8 Percentages of stone tools by 'strategy groups' (see text for explanation of these.)

STAGES OF LITHIC TECHNOLOGY

Several aspects of stone tool manufacturing technology were examined for the sites in the Central Canadian Rockies. The process of stone tool manufacturing proceeds through a series of stages from the initial raw material “core” through to finished tools. The relative percentages of various classes of lithic materials can provide an indication of the emphasis of the residents at any particular site. Initially I examined the percentages of major classes of lithic manufacturing including tools, debitage, cores and shatter. To refine these results further, debitage was then examined in more detail, based on manufacturing stages.

The organisation of lithic technology

Analysis of lithic stone technology has long been a major interest in archaeology. Traditionally this has focussed on the quantification and description of stone tools as tools. Recently there has been more interest in looking at the organisation of lithic technology (Collins, 1975; Flenniken, 1981; Kelly, 1994; Simek, 1994), in effect, following the steps employed in the production of stone tools to establish a sequence from the initial acquisition of a stone nodule through reduction steps to the production of stone tools to the final disposition or loss of these (the chaîne opératoire).

Magne (1985) adopted a general model of lithic reduction, maintenance and disposal proposed by Collins (1975). This model begins with the acquisition of the raw material. This can be a nodule of rock acquired from a primary source such as a quarry, or a secondary source such as rocks exposed in river banks or glacial till. It can be acquired directly by the worker or indirectly through trade with others. If the stone worker is selecting materials from a quarry or a secondary source, the worker

may test the quality and flake-ability at the source. This can be done by initially striking the source material to remove one or more flakes or to split the nodule. Quarry locations are frequently characterised by such materials that have been sampled and discarded (Ball, 1987; Quigg, 1976). Once acquired, the next step is to begin stone reduction. Initial reduction commonly begins with cortex removal (the weathered exterior of a stone if present). Some production sequences prepare cores with distinct features: “the cores themselves may be desired products, or flakes removed from them can be used as tools, or as blanks for further reduction” (Magne, 1985: 23). Magne terms this step the Early stage of stone tool production. Further reduction (termed Middle stage) results in primary trimming that may produce useful tools and/or preforms. Secondary trimming (Late stage) produces “complex tools, hafting provisions, serations, aesthetic flake scar patterns, and so on” (Magne, 1985: 23).

According to Collins’ model actual tool use is a distinct step. This can result in modifications through use, resharpening and refurbishing. Occasionally tools are reworked for an alternative function. Finally artifacts can be disposed of either through discard, abandonment or intentional deposition.

Larson and Kornfeld (1997:6) advocate a three-stage approach to analysis of chipped stone assemblages. “These stages include: 1) morphological and metric analyses of stone tools, cores and debitage; 2) the combination of debitage, tools and cores into minimum analytical nodules; and 3) the characterisation of nodules based on refitting studies and nodule constituents.”

Magne (1985: 94) conducted experiments “to devise an efficient debitage classification of manufacturing stages that can be applied to archaeological collections”. Magne (1985; 1989: 17) identifies six major variables “which appear to

be useful and non-redundant in reconstructing manufacturing stages of chipped stone tools. These are: 1) platform presence or absence; 2) dorsal scar count; 3) platform scar count; 4) cortex presence or absence; 5) presence of bifacial platform; and 6) presence of bipolar indicators.”

The composition of lithic assemblages also provides an indication of patterns of replacement and curation. In a single occupation, “a high obsidian tool to debitage ratio is evidence of obsidian tools being replaced by another material” (Magne, 1989: 22). Similarly, high chert debitage but low chert tool representation can lead to the inference that chert tools are replacing tools of other material types. In this example, chert debitage should be predominantly early and middle stages. The chert tools are being made and taken elsewhere because of their tool value rather than being discarded.

Examination of assemblage composition can also reflect availability of raw materials. “If raw materials are difficult to obtain, we can expect fewer ‘situational’ tools, few large, single platform cores, more bipolar flaking, and more evidence of materials such as utilised biface reduction flakes...Debitage in such assemblages should reflect later reduction stages more commonly” (Magne, 1989: 22).

Shott (1986) contends that assemblage diversity will decline as mobility frequency or mobility magnitude increases. There are, however, at least two strategies for carry tools transported by mobile groups: (1) carrying a few large tools with different functional edges (like a “Swiss Army” knife) that can also be refurbished many times (few tools that do many things and last a long time), or (2) carrying many light small tools, each with specific functions and each more easily replaced. These mobility decisions might also be affected by the availability of lithic materials. “If access to raw materials is poor, we can expect that at logistical sites,

late stage debitage will increase proportionately” (Magne, 1989: 22). This would be because there might be more refurbishing of valued tools.

Results

Data on the relative percentages of tools, cores, debitage and shatter are shown on Figure 7.9 and on Table 7.11. There are significant differences between the sites. Debitage forms the largest category at all sites except for Christensen Site where 55% shatter is an indication of lithic reduction close to a lithic quarry source (Gorham 1993). The percentage of tools in the assemblages varies from a high of 12% at Hunter Valley to a low of 1% at Columbia Lake Area 1. Cores also vary in percentages of lithic assemblages from a high at Christensen Site of 8% to 0.1% at Columbia Lake Area 1. Tools vary from 2% at Vermilion Lake to 4 - 6% at the other sites. At Vermilion Lakes Site, the percentage of shatter is also high (34%), but cores occur in very much lower numbers (0.1%), suggesting that this site was focussed on intermediate stages of lithic reduction.

At the sites from the Columbia Trench, shatter forms very small percentages of the assemblages, with debitage forming high percentages of the components. Tools form varying percentages of the assemblages from a high of 12% at Hunter Valley Occ. 2, to a low of 1% at Columbia Lake Site Area 2.

In order to develop an enhanced understanding of the lithic manufacturing activities at these sites, data on debitage were examined further. Only five sites in the study area had completed debitage analyses suitable for this study. Because different analysts used slightly different categories, these were generalised following the system formulated by Magne (1985: 106-107) and shown on Figure 7.11. Magne defined a three part system: early, middle and late reduction stages. Early reduction

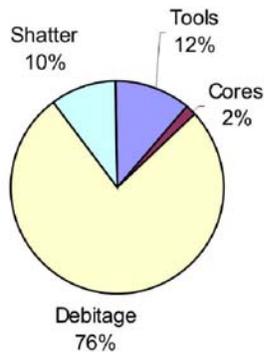
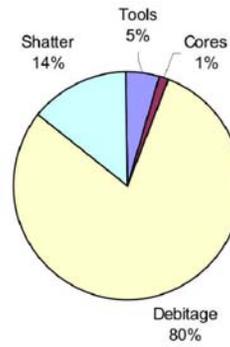
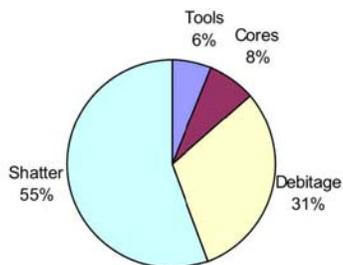
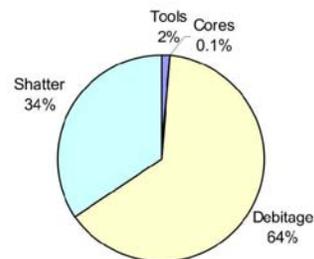
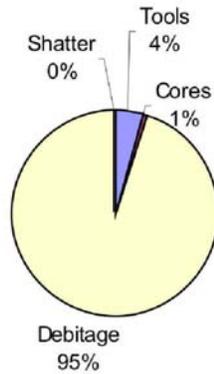
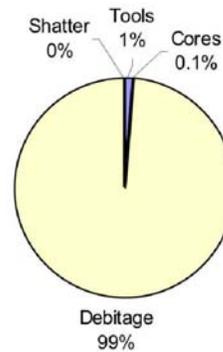
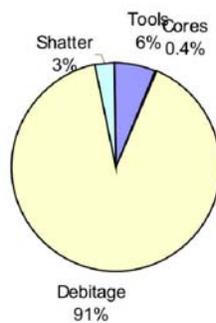
Hunter Valley Site Occupation 2 (Head 1999)Pigeon Mountain Site -- Upper (Clark et al. 1998)Christensen Site Level 1 (Gorham 1993)Vermilion Lakes Site (Fedje & White 1988)Columbia Lake Site (Mohs 1981)Columbia Lake Site (Yip 1982)Salmon Beds Site (Heitzmann 1999)

Figure 7.9 Percentages of major classes of lithic manufacturing as found at excavated sites in the Central Canadian Rockies.

Site And Reference	Layer	Tools	Cores	Debitage	Shatter	Total
Vermilion Lakes 153R (Fedje and White 1988)	Group ¾ (Post Mazama)	263	17	10,335	5,579	16,194
Christensen Site (Gorham 1993)	Level 1	57	72	290	526	945
Hunter Valley EiPp-16 (Head 1999)	Occ 2	204	29	1349	180	1762
Salmon Beds (Heitzmann 1999)	all	32	2	461	16	512
Columbia Lake (Mohs 1981)	Area 1	188	23	4115		4326
Columbia Lake (Yip 1982)	Area 2	73	2	5264		5339
Pigeon Mountain Site (Clark <i>et al.</i> 1998)	upper	31	9	522	95	657

Table 7.11 Major classes of lithic materials, excavated sites, Central Canadian Rockies.

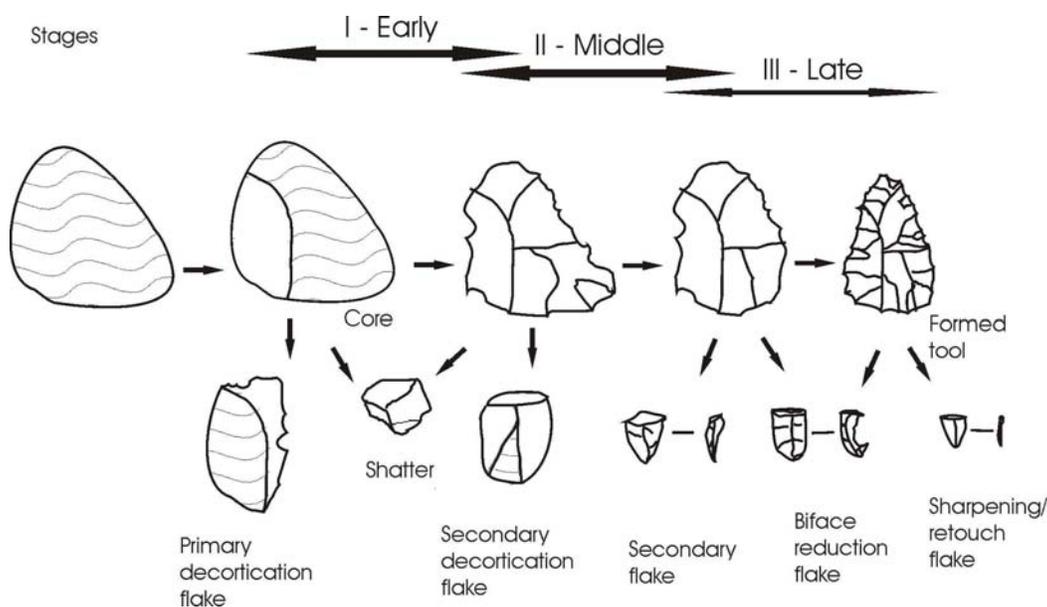


Figure 7.10 Stages of lithic reduction.

stages are defined as “all events of core reduction”. Middle stages are “the primary trimming stages of tools, measured as all the reduction events of marginal retouch tools, and the first half of the reduction events of all other tools.” Late stage reduction is defined as “the latter half of the reduction events of unifacial and bifacial

implements” (Magne 1985:107 his underlining). In his analysis, he also distinguished biface reduction flakes and bipolar flakes as distinct flake types and those distinctions are retained here.

Data on the lithic reduction stages are shown in Table 7.12 and illustrated on Figure 7.11. These show that considerable variations exist between the sites. Early stage lithic reduction as indicated by primary and secondary decortication was most extensive at the Hunter Valley Site Occ. 2, represented by 24% of the total assemblage. This may reflect the use of cobbles (especially quartzite) derived from secondary deposits. Large percentages of shatter also suggest extensive early stage lithic reduction. Shatter formed 65% of the assemblage at Christensen Site, 15% at Pigeon Mountain Site and 12% at Hunter Valley Site. The high percentage at Christensen Site is probably due to the site’s proximity to a lithic quarry. Other high frequencies from Pigeon and Hunter Valley Sites are likely a result of using poorer quality lithic materials with numerous fracture planes (shale at Pigeon Mountain and quartzite at Hunter Valley).

Middle stage tool manufacturing is directed at the production of formed tools and utilisable flakes. This is indicated by secondary flaking, biface reduction, thinning/ reduction and sharpening flakes. Biface reduction flakes were identified at Hunter Valley (13%), Salmon Beds (10%) and Christensen Site (5%). Secondary flakes were particularly common at Pigeon Mountain Site (65%) and Columbia Lake Site Area 2 (27%), but were also identified at Christensen Site (16%). This indicates that middle stage manufacture was an important activity at Pigeon Mountain and less so at Columbia Lake Area 2 and Christensen sites.

Reduction Stage	Sites	Hunter Valley – Occ. 2	Pigeon Mountain – Upper	Christensen Site – Level 1	Salmon Beds	Columbia Lake Site – Area 2
	Debitage Type					
I - Early	Primary decortication	117	17	3	2	1
	Secondary decortication	253	21	10	4	
	Shatter	180	95	526	16	
II – Middle	Secondary flake		400	130		1411
	Bipolar	26		1		
Middle to Late	Thinning/reduction		23	109		23
	Biface reduction	193		37	47	
III - Late	Sharpening/retouch		59		408	59
	Other	760				
	Totals	1529	617	816	477	5264

Table 7.12 Reduction stages ofdebitage from excavated sites in the Central Canadian Rockies. Reduction stages after Magne (1985): see Figure 7.10 for explanation of stages.

In contrast to the above, decortication flakes and shatter are almost non-existent at Salmon Beds and Columbia Lake Site Area 2. At Columbia Lake Site Area 2, thinning/reduction flakes form 73% of thedebitage, indicating an emphasis on middle to late stage reduction. Similarly at Salmon Beds 86% of thedebitage is sharpening and retouch flakes, indicating that resharpening of existing tools was the primary lithic activity at that site.

Figure 7.12 shows a cumulative percentage graph ofdebitage reduction stages from the five sites. This illustrates that Early Stage lithic reduction is represented most strongly at Hunter Valley Occ. 2 and Christensen Site Level 1. Middle stage lithic reduction was a major activity at Pigeon Mountain and Columbia Lake Site Area 2. Late stage lithic activities are most strongly represented at the Salmon Beds

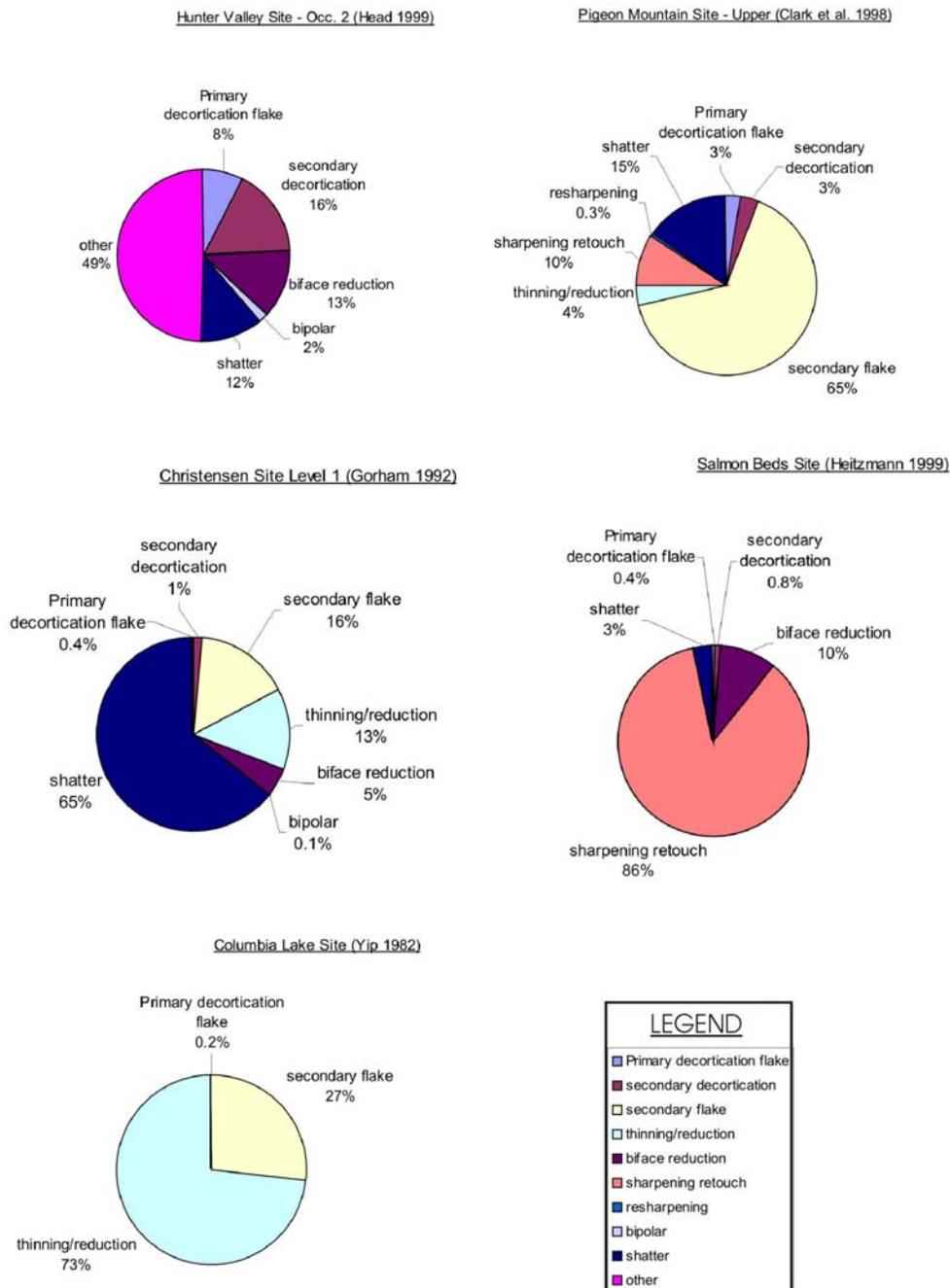


Figure 7.11 Percentages of stages of lithic reduction as found at excavated sites, Central Canadian Rockies.

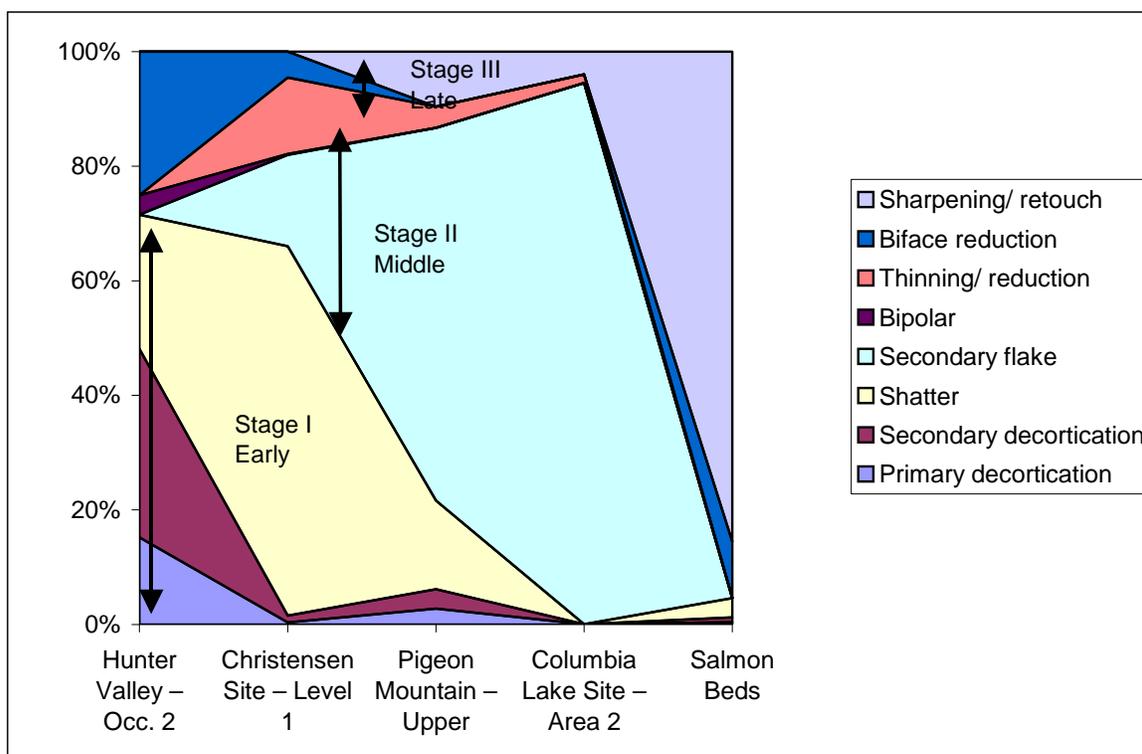


Figure 7.12 Cumulative percentage graph of debitage reduction stages from excavated sites.

Site. Based on the data above it could be concluded that Salmon Beds is a base campsite as indicated by high frequencies of late stage debitage. However, it would be more appropriate to term Salmon Beds a special activity (fishing) site as there is little evidence of habitation at the site. The reduction data suggest that Columbia Lake Site Area 2 and Pigeon Mountain upper component probably functioned more as longer term sites because of their high frequencies of middle stage debitage; and that Hunter Valley Occupation 2 and Christensen Site Level 1 have high frequencies of early and middle reduction stages because of their proximity to lithic material sources.

CONCLUSIONS

Excavated sites in the Central Canadian Rockies present a disparate assemblage of artefacts, artefact types, debitage and faunal remains. Each site has embedded within it small pieces of larger patterns. These patterns are evidence of the utilisation of the

hunter-gatherers who ventured into this region. Can we extract or extrapolate from these sketchy fragments a larger pattern of use of the region?

The faunal evidence indicates that at sites on the edge of the plains and foothills, at Hunter Valley and Pigeon Mountain, there was a definite emphasis on bison hunting, mainly in late winter and early spring. Moving westward, at Christensen and Echo Creek sites, hunting was based on a wider range of animals found in the forest and open valleys of the Rocky Mountains. In this area, the Muleshoe Lake area was likely occupied in winter or early spring. In the Columbia Valley further west, the rivers and lakes enabled higher levels of fishing along with hunting of a variety of animals. Salmon fishing could only be conducted in the late summer or early fall, but at Columbia Lakes Site a wide range of animals suggests that winter and spring hunting was also important at this site. At all sites a pattern of intensive bone reduction into small pieces is the norm. This indicates that whatever species were hunted there was an attempt to extract as much food value as possible, suggesting that surplus resources were normally uncommon.

Stone tools and debitage compose the major artefact class from all the sites. An examination of preferred lithic materials (Figure 7.1) shows unique patterns for almost every site. Only Vermilion Lake and Christensen sites show strong similarities in their overwhelming use of Banff chert. Hunter Valley and Columbia Lake (Area 2) sites also show a similarity in high percentage use of siltstones. However, perhaps it wasn't the particular material type that was the primary selection criterion but rather how effectively any selected material could be used for the purpose in mind. As pointed out earlier, coarse-grained materials occurred at higher frequencies in sites where butchering and smashing of faunal remains were important activities, as was the case at Hunter Valley (74% coarse-grained), Columbia Lake

Area 2 (70%), Columbia Lake Area 1 (56%) and Pigeon Mountains (39.9%). In contrast, at sites with high percentages of fine-grained lithics, the Salmon Beds (93.2%), Vermilion Lakes (91%), and Christensen (68%) sites, butchering of larger portions of animals may not have been as important an activity. This was certainly the case for Salmon Beds where the emphasis on fishing required slicing tools. For Vermilion Lakes and Christensen the high percentage of fine-grained lithics may be related to an emphasis on working nearby quarry sources of fine-grained material (Banff chert). Alternatively, given the small sample size of sites, it may be that each site possesses a unique assemblage because each site assemblage resulted from strategies specific to that site either in space, time or both.

The acquisition or retention of exotic (non-local) materials is often viewed as an important factor that can reveal possible avenues of trade or transport. It can be useful because unique stone materials can sometimes be traced to precise sources. Non-local materials are also an indication of the importance of these materials because throughout the Late Precontact Period all of these were transported exclusively by humans or dogs (there were no horses or other beasts of burden). All of the exotic sources are located to the south or east. Obsidian may be an exception but the majority of obsidian recovered from adjacent regions has been sourced to Yellowstone, Montana; or Bear Gulch, Idaho.

The relatively high percentages of Top of the World chert in lithic assemblages at Salmon Beds (81%) and Columbia Lake (9%) site were not too surprising given the proximity of these sites to the quarry. The very high percentage at Salmon Beds is probably related to the requirement for fine-grained cutting tools at that site. The use of this chert at Christensen Site (5%) and Pigeon Mountain (1.1%) is significant because it indicates that there were no cultural barriers to the movement

of this material. In fact, the 5% contribution at Christensen Site suggests that this material was more valued than the locally available Banff chert. It is also significant that 7% of the lithic assemblage at Christensen Site was Montana chert, derived from considerably further south and therefore with a higher transport cost. The high percentage of Swan River chert (40% of the lithic assemblage) suggests that the occupants of Pigeon Mountain Site probably came almost directly from that source area. The low but steady percentage of obsidian at most of the sites suggests that this material was likely conserved for use in specific situations.

Examination of non-local lithic cores from these sites is also revealing. At Christensen site, Montana chert made up 10% of the cores, and Top of the World chert made up 6% of all cores. These cores must have been transported in block form and were only made into tools on these sites. In block or core form these materials would have allowed for greater flexibility in end use because they could be manufactured into tools to suit the end user. However, transporting blocks or cores would have been a heavier burden than just transporting finished tools, and the cores or tools made from these might fail – potentially a wasted effort compared to producing blanks, performs or finished tools at the quarry first. At Pigeon Mountain the high percentage of Swan River chert cores (63%) is consistent with the high percentage of that material in the total lithic assemblages. However, also at Pigeon Mountain, Top of the World chert cores form 13% of all cores. This is in sharp contrast to the 1.1% it formed of the total lithic assemblage.

When only the tools are examined, some interesting patterns become apparent. Tools made of Top of the World chert were found at Salmon Beds (44%), EcPx5 (10%), Christensen Site (13%) and Echo Creek (7%). Significantly, even though 13% of the cores from Pigeon Mountain were Top of the World chert, no finished tools

were made of this material. On the other hand nine (29%) tools were made of Swan River chert. At several of the sites, non-local materials were found almost exclusively as finished tools (Christensen Site – Montana chert 8%; Echo Creek – Etherington chert 1%, Montana chert 1%; Pigeon Mountain – Obsidian 3%, Knife River Flint 3%; Salmon Beds – Obsidian 6%; Columbia Lake, Area 1 – Obsidian 1%; Columbia Lake, Area 2 – Obsidian 1%). This indicates that valued tools made elsewhere were transported to these sites for on-going use or replacement.

The assemblage of tool types at these sites reveals more about the activities that occurred at these sites. Assemblages with a higher number of tool types seem to be associated with sites where fishing was a significant activity and include netsinkers, discoidal tools, macroblade, microblades and microliths. *Pièces esquillées* (wedges) [Hunter Valley (7%), Echo Creek (1%)] and higher numbers of bifaces [Christensen (29%), Pigeon Mountain (26%), Hunter Valley (22%), and Echo Creek (16%) sites] are found at sites where hunting was a significant activity.

Examination of the major classes of lithic manufacturing at the excavated sites indicated that debitage forms the largest percentage of lithic manufacturing at most sites except for the Christensen Site, where 55% of the assemblage was shatter. Shatter was also fairly high (34%) at the Vermilion Lakes Site. Tools formed between 4 and 12% of the assemblages except at Vermilion Lake (2%) and Columbia Lake Area 2 (1%).

Detailed debitage analyses were only available for five sites. Of these, Hunter Valley and Christensen Site experienced the largest proportion of Stage 1 (Early reduction) (Figure 7.12). This is almost certainly a result of the utilisation of local materials that were available close to these sites. Middle (Stage II) reduction was most common at the Pigeon Mountain and Columbia Lake Sites. As discussed

earlier, the inhabitants of Pigeon Mountain appear to have arrived with a significant amount of block or core materials of Swan River chert, which they subsequently reduced using Stage II reduction. A similar process may have occurred at Columbia Lake Site but we do not know where the most commonly used materials were obtained. Late Stage (Stage III) reduction occurs at all five sites, with biface reduction occurring at Hunter Valley, Christensen, and Salmon Beds Sites; thinning/reduction occurring at Christensen, Pigeon Mountains, and Columbia Lake (Area 2) sites; and sharpening/retouch occurring at Pigeon Mountain, Columbia Lake (Area 2), and Salmon Beds sites.

In general, as summarised here, the artefacts and faunal remains recovered from the excavated sites in the Central Canadian Rockies indicate that each site has a set of distinctive properties that reflect its season of use, the availability of stone tool materials and the specific activities that occur there. In the next chapter, these data will be combined with the site distribution data in order to develop hypotheses regarding the hunting-gathering strategies utilised by the Late Precontact populations in the Central Canadian Rockies.

CHAPTER 8

MODELS OF SETTLEMENT SUBSISTENCE

INTRODUCTION

In this chapter, four models of seasonal settlement dynamics are formulated for the Central Canadian Rockies based on the environmental, ethnographic, historic, and archaeological data reviewed in Chapters 2, 3, and 4. These are then evaluated utilising the specific archaeological data provided in Chapters 5, 6, and 7. Additional analysis is provided utilising two simple distance tests applied to the archaeological site distribution to examine if the recorded sites distribution might have resulted from a forager or collector subsistence pattern. The model or models best supported by the archaeological evidence are discussed below. The implications of this analysis are discussed to better understand hunter-gatherer adaptation within this mountain environment.

The chapter is divided into three sections. The first section reviews basic assumptions that underlie the models based on hunter-gatherer settlement/subsistence studies, social organisation, technology and economic strategies. The second section describes the models of adaptation developed. The third section evaluates the relative merits of the adaptation models.

CONCEPTS OF HUNTER-GATHERER BEHAVIOUR

Numerous concepts of hunter-gatherer settlement/subsistence have been proposed in the anthropological and archaeological literature (Bettinger, 1991; Binford, 2001; Crothers, 2004; Kelly, 1995; Panter-Brick *et al.*, 2001). The concepts applied in the proposed models are described below. Most focus on the relationship of human groups to the environment and how people structure themselves to exploit the

resources found within that environment. Because there is great variability in hunter-gatherers and how they are organised through societal structures, no one model applies in all situations. It should be borne in mind that environments do not determine societal responses, and any particular environment does not force any one strategic pattern in response (Binford, 1980, 2001; Lee and Daly, 1999; Sheehan, 2004; Yellen, 1977).

Optimal foraging

Optimal foraging theory (OFT), a concept borrowed from biology, proposes that hunters and gatherers will seek to maximise caloric return for the amount of time and effort devoted to that activity (Bettinger, 1987; Foley, 1985; Martin, 1983; Smith, 1983; Winterhalder and Smith, 1981). In some studies of optimal foraging, subsistence activities are subdivided into components such as travel time, search time, extraction (eg. pursuit or gathering) time and processing time (eg. Winterhalder, 1981). Resources are ranked from high to low based on their caloric output per unit of time spent in their acquisition or extraction (MacArthur and Pianka, 1966; Pyke *et al.*, 1977; Schoener, 1971). Changes in availability of high ranked resources can cause societies to alter their diets. If search time for high ranked resources increases, societies may respond by switching to lower ranked resources (patch choices). The range of resources normally exploited can be termed “diet breadth” (Bettinger and Baumhoff, 1982:486). Some of the factors that influence subsistence strategies are population size, distance to and distribution of resources, and technology. Jochim (1998:20) has suggested that optimal foraging approaches may need to be broadened to include food nutrients such as proteins and fats. Other categories of non-food

constituents of food resources such as hides, sinew, teeth, antler, and shells might also have affected hunting decisions of certain groups (Jochim 1998:21).

Optimal foraging proposes that foragers adapt to variations in availability and distribution of resources in predictable ways. Where there is a broad spread of habitats, foragers will become patch-type generalists, obtaining a variety of resource types. Conversely, where there are relatively few habitats, foragers will become more specialised on a few resource types (Winterhalder, 1981:69). Hunting decisions can also be affected by information about where and when significant resources are located (scheduling). In many situations, hunter-gatherers cannot be assumed to have a sufficient store of information to make the most optimal decisions about their hunting choices (Jochim 1998:22).

Concepts of optimal foraging apply to the models formulated here, in that they propose varying levels of intensity of use as a result of the differentially available resources. In some situation, hunter-gatherers make decisions for “good adaptations” that can be effective without being “optimal” in the sense that they are the best fit.

Movement Between Habitats

That hunter-gatherers moved between differing habitats or at least between different parts of habitats is generally considered a fundamental characteristic. One of the relevant models is the ‘marginal value theorem’ developed by Charnov (1976). This model proposes that foragers’ exploitation of selected patches adversely affects resource returns. When resource returns from a patch are depressed or depleted, foragers respond by searching for others not depleted. Resource returns become depleted through a) progressive depletion by foragers; b) depletion of more accessible resources initially with shifts to more difficult items; and c) through the foragers

inadvertently alerting the prey leading the latter to emigrate or conceal themselves (Winterhalder, 1981: 69).

Landscape models attempt “to model the prehistoric use of entire landscapes through consideration of the full set of subsistence resources that were, or that might have been, incorporated into the diet” (Grayson and Cannon, 1999:143). Two key environmental variables, the distribution of food resources in space and time, affect the location of most forager activities. Landscape models commonly assume that foragers will maximise energy returns in relation to the expended time and/or effort.

Risk and Uncertainty

Cultures have different responses to risk and uncertainty (Halstead and O’Shea, 1989). Minc and Smith (1989) define four basic categories of risk responses: diversification, mobility, storage and exchange. Diversification is a technique where groups broaden their base system by exploiting a wider range of plants and animals or exploiting broader and more diverse areas. This may involve gathering information over a large area to monitor environmental conditions and to guide decision choices. Mobility is moving away from scarcity. Storage is a way to stabilise food supplies by physically preparing and storing foods for later use. However, storage can also be more passive, such as the designation of certain foods as reserve or emergency foods – food that is only eaten in times of extreme hunger. Exchange through sharing and reciprocity is also an important behaviour that can minimise risk and uncertainty (Halstead and O’Shea, 1989:4). Normally exchange can be a positive action through trading, but occasionally societies also engage in ‘negative reciprocity’, such as raiding, theft and appropriation. Some of these responses may be mutually incompatible. For example, storage may not always be compatible with mobility.

How people respond to risk underlies the models proposed below. The implications of risk are considered in the discussions of the models.

HUNTER – GATHERER ORGANISATIONAL MODELS

Several models of hunter-gatherers developed by archaeologists are based on examining the organisation of hunters and gatherers as social groups. Group size, structure and sub-groupings affect most aspects of their activities. Most models of hunter-gatherer societies constructed by archaeologists are based on a composite sketch of ethnographic groups. These societies are viewed as small exogamous local bands “whose composition and territory vary seasonally and who form part of a larger endogamous linguistic community” (Burke, 2004). These larger communities can be composed of hierarchical sub components: (1) the regional band, or “macroband”; (2) a number of smaller local bands, microbands, or hunting groups; and (3) short-lived task groups (Burke, 2004:193). Where seasonal variations occur, hunter-gatherer bands can be expected to move through cycles of aggregations and dispersals, depending upon subsistence and social goals (Burke, 2004; Ingold, 1980; Lee and DeVore, 1968).

Foragers and collectors

A highly influential study of hunter-gatherers is Louis Binford’s (1980) article “Willow Smoke and Dogs’ Tails: Hunter—Gatherer Settlement Systems and Archaeological Site Formation”. This now classic article on hunter-gatherers defined ‘collector’ and ‘forager’ systems. Foragers “typically do not store foods but gather foods daily. They range out, gathering food on an ‘encounter’ basis and return to their residential bases each afternoon or evening” (Binford, 1980:5). A second

characteristic is that “there may be considerable variability among foragers in the size of the mobile group as well as in the number of residential moves that are made during an annual cycle” (Binford, 1980:5). This is largely resource dependent.

Where resources are more concentrated, the number of moves may increase but the distances between them decrease. Where resources are scarce and dispersed, the group size may be reduced and sub-units may be scattered over a large area. Binford defined a minimal forager group as one consisting of 5 -10 persons. Groups of this size frequently result in “a collapse of the division of labor” and can consist “of male and female members involved in procuring identical resources” (Binford, 1980: 7). A variation of this pattern occurs when several men conduct an extended hunting trip away from the residential camp. Because of short time spans of site occupation and the frequent moves “[These] residential sites would be extremely ephemeral; one could expect little accumulation of debris and very low archaeological ‘visibility’” (Binford, 1980:7). In groups that are highly mobile, “camps are not relocated relative to locations of previous use” (Binford, 1980:7). In other words, highly mobile groups do not consistently return to previously used locations.

Where the resources are clumped or critical resources are limited, as in the case of waterholes in the desert, a unique pattern has been called tethered nomadism (Taylor, 1964). This results in the repeated return to identical places over long periods of time. This pattern could result in a typical foraging pattern of land use that might look “like a daisy” (Binford, 1980:7).

A foraging strategy should leave a distinctive archaeological pattern (Binford, 1980:7). This pattern would be indicated by two basic types of archaeological sites. The first is a residential base where most processing, manufacturing, and maintenance activities take place. Sites of this type would result in numerous artifacts and other

remains. The quantity of remains will vary with group size, length of duration and frequency of repeated use. The second type of archaeological site is a location “where extractive tasks are exclusively carried out” (Binford, 1980:7). In general sites of this type will be characterised by low artifact discard rates and densities: “the content of residential sites will generally reflect the different seasonal scheduling of activities (if any) and the different duration of occupation” (Binford, 1980:7-8). Functionally specific sites will be relatively few.

The second category of hunters and gatherers defined by Binford is termed ‘collectors’. This is “characterized by (1) the storage of food for at least part of the year and (2) logistically organized food procurement parties” (1980:10). Among collectors there are specially constituted labour units or task groups that move some distance from key residential locations to obtain specific resources. These “task groups are generally small and composed of skilled and knowledgeable individuals” (Binford, 1980:10). They seek specific resources in specific contexts. As a result, in addition to the residential base and location type sites identified for foragers, collectors generate at least three additional types of sites: field camps, stations, and caches. “A field camp is a temporary operational center for a task group” (Binford, 1980:10). They can be of a variety of types based on the target resources such as sheep hunting field camp, fishing field camp etc. Such sites can be expected to have much higher archaeological visibility due to the extensive processing that occurs at them. Such sites frequently result from attempts to store produce for a long period of time. ‘Stations’ are sites where special-purpose task groups engage in information gathering such as observing game movements or other humans (Binford, 1980:12). ‘Caches’ are temporary storage facilities where bulk produce can be stored either until transported to the larger group or until the larger group can move to the cache locality.

For collectors these site types are organised into a logically organised system. These are also characterised by seasonal variability and resource targets. These types are not seen as mutually exclusive but can have multiple functions and combinations. Of course, Binford's collector and forager models are idealised types. Many societies today, and probably in the past, do not fit easily within these idealised types (Hayden 1992; Prentiss *et al.* 2005; Walde, 2006).

Site types found within this study areas are considered as part of the proposed models below. Consideration of which adaptation is most appropriate for the Central Canadian Rockies and the implications of a settlement/subsistence pattern of that type are discussed below in this chapter.

Opportunistic versus controlled exploitation

Bailey (1981) divided hunter-gatherer activities into two types: opportunistic and controlled exploitation. These terms are somewhat akin to Binford's foragers and collectors. The distinction developed by Bailey may be useful in understanding how foragers and collectors developed their approaches.

“Opportunistic exploitation refers to the exploitation of resources as the need for food arises, regardless of the effect on the future supplies” (Bailey, 1981:5). In forests, “the relative difficulty of human movement and of maintaining contact with animals in these environmental conditions may have favoured opportunistic exploitation as an effective long-term strategy” (1981:6). As sections of the forest become depleted of game after a period of sustained hunting these groups would have moved on to a different section of the forest. In this way opportunistic exploitation operates through the laws of diminishing return to act as an economic regulator.

In some societies there is a “controlled exploitation”, which requires some form of supply management. A variety of practices can be “employed with the objective of monitoring more carefully the relationship between rates of exploitation and available food supply” (Bailey, 1981:6). Techniques widely recorded among hunter-gatherer populations include “conservation of animal resources by the regulation of cropping pressure, deliberate propagation of favoured plant species, control of animal movement by drives and corrals, and simple environmental management through the use of fire and the control of water” (Bailey, 1981:6).

In some societies, control of hunting was regulated by societal rules and by religious prescriptions or taboos. The techniques can act to stabilise the supply of favoured resources and reduce risk. Krech (1999) concludes that the evidence for Western-style conservation among native people is mixed. On one hand “they knowingly promoted the perpetuation of plant and animal species favored in the diet” (Krech, 1999:212). On the other hand, intensive hunting has been known to have severe adverse environmental effects. For example, native people hunting for beaver pelts and deer skins seriously reduced populations of beaver and deer in eastern North America in the seventeenth and eighteenth centuries. However, this over-hunting was conducted for economic reasons (trade with Europeans) and not strictly for subsistence.

Bailey’s concept of “opportunistic exploitation” is similar to the “overkill hypothesis” discussed by Kay (1994; 1995). Indicators of this pattern might be periodic over-hunting causing cycles of population to increase and collapse. In contrast, evidence of “controlled exploitation” might include the use of fire to enhance animal forage and propagation of favoured plant species.

Effective temperature and mobility patterns

Are there environmental situations that are better suited to foragers and others to collectors? Binford tabulated 168 societies against a measure of environmental variability called “effective temperature”. This is a measure of length of the growing season and the intensity of solar energy during the growing season (Binford, 1980: 11; Binford, 2001). He classified societies into four settlement patterns: fully nomadic; semi-nomadic; semi-sedentary; and sedentary. Binford found that the greatest concentration of sedentary and semi-sedentary hunters and gatherers occurred in temperate and boreal environmental regions and the least in equatorial and semi-equatorial settings. Sedentary peoples occupy permanent villages year round, while semi-sedentary groups seasonally return to a central village. Fully nomadic peoples wander freely without territorial boundaries. Semi-nomadic groups wander but are constrained by territorial limits. Settlement patterns correspond with estimates formulated by Murdock and Morrow (1970) for degrees of storage dependence. Societies with low effective temperatures have a much higher utilisation of storage (although there are some notable exceptions).

Binford (1980:17) briefly qualifies his discussion by pointing out that there are other possible factors that can restrain mobility. He also stresses that “with any condition that restricts residential mobility of either foragers or collectors we can expect (among other things) a responsive increase in the degree of logistically organized habitation”.

Travellers and processors

Bettinger and Baumhoff (1982:488) identified two strategies which they called ‘travellers’ and ‘processors’. The ‘travellers’ strategy is a low cost strategy relying on

high ranked resources through “greater costs in travel time and lesser costs in extraction and processing time”. In other words, travellers travel further for resources that require less effort to acquire or process. A ‘processors’ strategy is a higher cost strategy more reliant on low quality (ranked) resources acquired with “lesser travel time but greater costs in extraction and processing time”. Processors are willing to put more effort into acquisition and/or processing resources in order to travel less distance.

Bettinger (1991:101) argued that the ‘processors’ strategy could lead to a strategic advantage over that of ‘travellers’ through selectively encouraging the increase of females as they typically have responsibility for processing. In turn more females increase population growth. Groups with larger sedentary or semi-sedentary populations are more likely to infringe on the territory of lower population ‘traveller’ groups. This is because populations are greater, whilst traveller groups, with small populations, are frequently absent from parts of their traditional territory.

Adaptive peaks

Bettinger and Baumhoff (1991:489) developed the concept of “Adaptive Peaks”. This concept is based on the assertion that “however strongly influenced by subsistence, adaptive strategies incorporate systems not directly concerned with subsistence, e.g. settlement, sociopolitical organisation, demography, and ideology which have, to varying degrees, subsistence effects” (Bettinger and Baumhoff 1991:489). Adaptive peaks occur when a variety of systems, including subsistence, adjusts to produce a locally optimal solution. Minor adjustments may continue because some actions themselves may have further repercussions. However, having reached an adaptive

peak, groups are unlikely to risk abrupt changes in subsistence and will likely persist in the pattern unless it proves unadaptive.

Population and group size

Some hunter-gatherer concepts explore the relationship between population and subsistence adaptation. Bettinger (1980:227) identifies two differing approaches to population size. One holds that population “is more or less dependent on other elements in the adaptive system” (e.g. Cowgill, 1975a, b; Hassan, 1978, 1981; Jochim, 1976). The second approach views population as “essentially an independent variable” (Bettinger, 1980:227; Boserup, 1965; Cohen, 1975, 1977; Dumond, 1972).

Wobst (1974, 1976) studied populations of hunter-gatherers in space and suggested minimum numbers for reproduction units over long time spans. He suggests that a minimum band size was about 25 members operating within a mating pool of between 175 and 474 members (Bettinger, 1980:229). However, there are numerous situations where band populations vary outside this range (Kelly 1995:209).

Non-energetic variables

Foragers' mobility is not always tied to the subsistence quest. “People often respond to religious, kinship, trade, artistic, and personal obligations...People also move to gain access to firewood or raw materials for tools, or because insects have become intolerable” (Kelly, 1992:48). Although difficult to identify archaeologically, some groups may have made decisions that were based on non-energetic variables. Some of these are unlikely to have left an archaeological signature, but some of these variables may be identified in the presence of sacred sites, rock art, traditional place names and through analyses of lithic source materials.

Settlement location and territoriality

The concepts of settlement location and territoriality have been developed as tools for regional analysis in archaeology. Bettinger (1980:222) identifies three of these: the gravity model (Jochim, 1976), which draws a correlation between site location and subsistence resources; the optimal location model (Wood, 1978), where site locations vary with the types of subsistence resources being sought; and the polythetic-satisficer model (Thomas and Bettinger, 1976; Williams, Thomas, and Bettinger, 1973), where the effects of distance do not act continuously on site location but come into effect at certain critical threshold values.

All of these models are difficult to apply to field situations because they assume that there is a good understanding of where resources are (or were). They also assume that known or identified sites represent a fairly complete inventory of all sites. Although these assumptions are difficult to prove, site distribution data are examined in this chapter to assess whether there is a “best fit” with the proposed models.

Stone tool technology and territoriality

Archaeologists have attempted to correlate prehistoric foraging territories with stone tools relative to the geological sources of raw materials (e.g. Hughes, 1984; Shackley, 1990). Such studies have examined the distribution of lithic materials in archaeological sites and have develop models how these materials are transported throughout a certain area. Sites with specific raw materials are used to model the movement of peoples within a specific landscape. Similarly, other studies have attempted to reconstruct mobility patterns based on stone tool technologies (e.g. Andrefsky, 1991; Bamforth, 1986, 1990, 1991; Binford, 1979; Bleed, 1986; Johnson

and Morrow, 1987; Kelly, 1988; Nelson, 1991; Parry and Kelly, 1987; Torrence, 1983, 1989). These studies examine the distribution of specific tool types or lithic technologies to develop models of landscape use in particular areas.

FRAMEWORK OF THE MODELS

The models developed here are intended to apply to the last 1000 to 1200 years. This is the period identified as the Late Precontact Period both on the Northwestern Plains to the east and Interior Plateau to the west. This period is characterised by slightly cooler temperatures than the preceding period and is also marked by a gradual change in hunting technology from the atlatl (spear thrower) of earlier times to the widespread use of the bow and arrow. On the Northwestern Plains there is also an increased use of ceramics which may be indicative of increased sedentary habitation there (Walde, 2006).

Whilst it can be much easier to describe archaeological materials and sites as objects in and of themselves, this study seeks to integrate these as part of a larger social and economic system. As Veth (1993:80) states, “the strategies adopted for stone procurement, use and discard ...are more the *outcomes* of broadly based social and economic systems operating within certain ecological parameters” [his emphasis]. A second assumption is that the distribution of archaeological sites and the nature of the technologies utilised are *primarily* related to the settlement subsistence pattern (Binford, 1978, 1979, 1980).

A variety of functions may well have occurred at each site. Activities may have included processing vegetable foods, preparation of hearths to cook game, manufacture and maintenance of wood items (handles, arrowshafts), manufacture and/or use of ritual/ceremonial objects, personal adornments and accessories, manufacture of stone implements and a host of social interactions that would leave

little or no tangible evidence. However, each site “represents a site where activities conducted are ‘embedded’ in another more basic schedule. None of the activities can be considered ‘primary’ to the mission of the occupants” (Binford, 1978:360). The role of each site within a settlement/subsistence system is likely to have affected strategies of stone material procurement, reduction and disposal (Binford, 1979). No specific implement/implements necessarily reflects/reflect site function; instead, the entire assemblage will more accurately represent site function (Hiscock, 1983).

The range of tasks undertaken at a site, the size of the group, the frequency of use, and the length of time a site is occupied either within a single year or over multiple years can result in a high density of artefacts and features such as hearths, and storage pits. This high density is a reflection of the intensity of site use.

Although there are numerous possible explanations for a high density of artefacts resulting from stone reduction, it is assumed that the nature of use of lithic materials is related to the larger subsistence/settlement system. Types and proportions of stone tools and reduction materials are a result of intensity of use at any particular site.

Those sites with greater intensity of use (higher density of artefacts) will generally contain a wider range of tool types and higher frequencies of later reduction stages.

Conversely, sites with a limited range of tool types and low frequencies of later stage reduction are generally the result of low intensity of use.

Each cultural group is characterised by unique cultural signatures. These are embedded in the archaeological record in multiple ways. Groups can be distinguished through the choices of each group. Some of the possible distinctive elements that may be identified in the archaeological record are settlement patterns, tool styles and types, and use of lithic materials.

INFLUENCING FACTORS

Several factors influenced the occupation of the Central Canadian Rockies by past hunter-gatherers. Uncontrollable factors included climate and landforms. Partially controllable factors included vegetation and biota. Socially controllable factors, that is, those factors which hunter-gatherers could directly control, or attempt to control, were establishing and maintaining group size, and limiting the intensity of occupation. The effects of these factors are described briefly below.

Climate

The Central Canadian Rockies are characterised by a fluctuating seasonal climate that varies with altitude and solar exposures. Winters are most severe from November to February, with considerable snow and sub-zero temperatures. The mean minima temperatures in January are -16.4°C at Banff and -12.0°C at the West Gate of Kootenay National Park. July and August are the warmest months of the year with mean maximum temperatures reaching 22.3°C at Banff in July and 25.9°C at the Kootenay National Park West Gate (Achuff *et al.*, 1984:9). Snow depths vary considerably throughout the region, dependant upon elevation, wind exposure, and landscape. Some areas are snow covered up to ten months of the year, whereas some lower elevations may be snow-free up to six or seven months (Janz and Storr, 1977:90). Average annual (August 1 to July 31) snowfalls vary each year from 173 cm at Radium to 432 cm at Lake Louise (Janz and Storr, 1977:93). Snowfalls peak from November through February.

For the hunter-gatherers who occupied the Central Canadian Rockies, snow depth and cold temperatures must have influenced how they moved around on the landscape and which areas they could have used. Deep snows (and the risk of snow storms) must have restricted movement throughout the winter months. Most of the

historic occupants of the region were familiar with snowshoes, but the extreme cold weather from December to February would have discouraged travel.

Conversely, warmest yearly temperatures occurred in July and August. It is during these months that ungulates would have moved upwards to utilise higher altitude areas. Hunters likely followed, whereas gatherers might have preferred to stay at lower elevations to gather berries and other plants.

Landforms

Much of the area is mountainous, with steeply sloping terrain varying from a low of 790 m at the floor of the Columbia Valley to 3611 m at the summit of Mount Assiniboine. The western half of the area is characterised by a few major valleys that trend northwest to southeast. On the eastern side of the mountain divide, several major river valleys drain eastwards to the plains. Easily traversable mountain passes are few in number and are often at high elevations. Valley bottoms contain major lakes and rivers, as well as significant open grasslands. Landforms were a major influence on where and when people moved about the landscape.

Vegetation

Large parts of the region are densely forested, with small portions of the area consisting of open or partly open grasslands typically along major river valley bottoms and in smaller isolated patches. Extensive areas of rock and ice are unvegetated and occur at high elevations. We can reasonably hypothesise that hunter-gatherers would have preferred the open valley bottoms, both for ease of movement, and for their ability to support higher populations of ungulates. With the use of fire to burn selected portions of the landscape, hunter-gatherers could create more open areas for trails, enhance grasslands for wildlife and encourage berry production.

Biota

Large ungulates were favoured by Aboriginal people in the past and would have provided the single largest source of protein. Elk, moose, deer, mountain sheep, mountain goats and mountain caribou are found as isolated individuals and form small herds at certain times of the year. Bison were formerly found in the region but are now extirpated. It is not possible to estimate past bison densities in the region. Ethnographic accounts also note that bear, rabbits and a variety of other fur-bearing mammals were hunted. Migratory game birds such as geese, swans and ducks are seasonally abundant during spring and fall but only at a few specific localities (lakes and ponds). Fish, including trout and whitefish, were available from streams and lakes, but did not occur in large numbers. Anadromous salmon are known to have spawned in the Columbia River system in the fall, but available data suggest that they would have occurred in variable numbers year to year.

A variety of plant species was probably also exploited in the region. Corms of avalanche lily and spring beauty could be collected from alpine areas in the spring. Berries were available from late spring through to fall, including wild strawberries, raspberries, huckleberries, saskatoons, sopallie (soap berries) and others. Black arboreal tree lichen could be collected and made into an edible bread. Numerous other plants could have been utilised for their medicinal properties.

Both animals and plants could be processed to permit storage and facilitate easier transport. Meat from game animals and fish could be filleted into thin slices and dried on open stands or smoked over fires. This would have created dried meat with reduced moisture contents (jerky) that was lighter to carry and lasted several months. Fats could be extracted through boiling and then mixed with pounded dried meat and berries to make pemmican that also lasted several months. Plant roots and

corns could also be dried and could last several months in this state. Processing foods near their source would have enabled foods to be concentrated in more easily carried packages and ensured that they could be transported longer distances (Lupo, 2006).

Group size

The size of groups utilizing the Central Canadian Rockies can be hypothesised based on a few ethnographic references and on analogy with hunter-gatherers in other areas. Land-using groups or “minimum bands” were likely to have comprised about 25 individuals who periodically came together in larger groupings, with a population of the “maximum band” consisting of about 500 individuals (Birdsell, 1968; Steward, 1969; Wobst, 1974). However, in some circumstances, tribal groups in historic times regularly formed camps of 1600 to 3000 peoples on the Northwestern Plains (Walde 2006:303).

Intensity of occupation

Periods of aggregations would only have been possible when sufficiently large supplies of food were available to sustain the larger group. In historic times, one group aggregation reportedly occurred in late spring(?) when the Ktunaxa gathered at White Swan Lake. A second aggregation may have occurred in early fall along the Columbia river or lakes when anadromous salmon spawned. One other period of aggregation may have occurred in late fall to early spring on the eastern slopes/foothills when bison retreated from the plains to overwinter in sheltered areas.

THE MODELS

The models developed below are based on three variables: environment, biota, and human behaviour. Consideration of landforms, plant and animal distribution, settlement patterns, groups composition and the flow of durable items between sites form their basis. In this approach, I follow Jochim (1998), who states:

I am very much in favour of developing numerous, simple models rather than one complex one...I imagine that general rankings of resources and locations, according to different goals and criteria, will provide us with useful and rather robust tools for analysis. With such an approach we can profitably examine, not only subsistence, technology, and settlement but also exchange, social differentiation, the division of labour, and even some aspects of the codification of knowledge...They must be adapted to an archaeological record of hunter-gatherers that typically contains fragmentary and biased remains from long, undifferentiated temporal blocks distributed across a large region (Jochim, 1998: 28-29).

Model A: trans-mountain model

Model A, a trans-mountain occupation, proposes a settlement/subsistence system in the Central Canadian Rockies characterised by yearly cyclical seasonal movements that maximised subsistence resources in a resource limited area, and is the simplest of the proposed models of settlement/subsistence (Figure 8.1). It is similar to some other models for the archaeological study of adaptation to fluctuating environment (Kirch, 1980; Veth, 1993: 81).

The system is anchored by two seasonal concentrations of significant subsistence resources. These are wintering bison on the eastern slopes and late summer/early fall spawning salmon on the upper Columbia River (late August to early October). However, even these resource clusters were not consistently available, as there was considerable year-to-year variation. Model A suggests that hunter-gatherers in the area developed a system of periodic short-term aggregations during periods of maximum resource availability, followed by fragmentation into

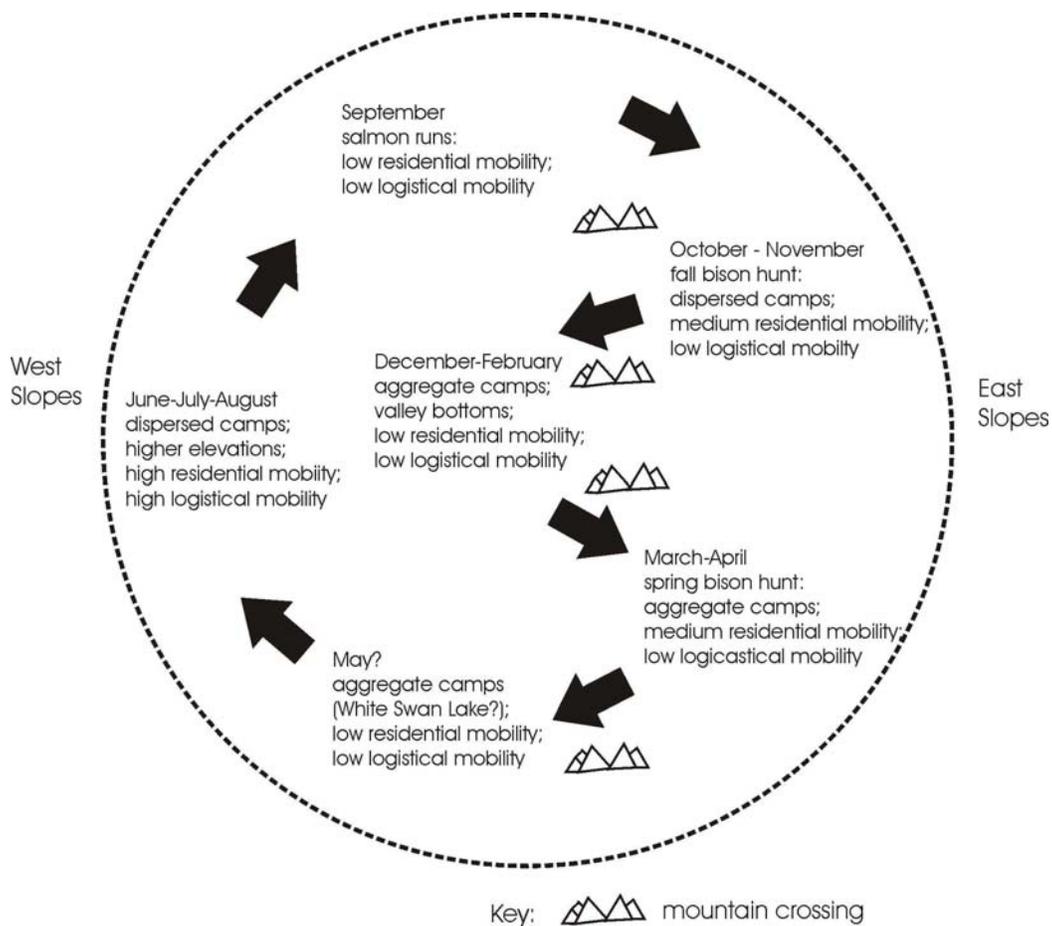


Figure 8.1 Model A: trans-mountain utilisation, seasonal settlement dynamics, Central Canadian Rockies.

small bands throughout the remaining portions of the year. Larger aggregations may have occurred at low elevations and in periods of mild weather (spring). A second period of aggregation may have occurred in the winter months from December through February, when cold temperatures and deep snow would have forced low residential mobility and required the use of some stored resources. Deep winter snows at higher elevations would also have forced concentration of ungulates (elk, deer, moose) in lower elevations, enabling hunting close to valley bottom camps. At other times of the year, dispersal into smaller band or family units would have allowed exploitation of a wider and more diverse food supply in areas of low density

resources. Dispersals into minimal sized groups would have occurred during the summer from June through August when ungulates dispersed throughout upland regions.

Sites occupied at times of aggregation would have been large and possessed tool and faunal assemblages oriented towards the exploitation of locally available subsistence resources. Sites that represent dispersal periods would possess more limited artifacts but have a more varied resource assemblage. In this model, there is limited opportunity for exchange of goods, unless adjacent groups were encountered during this settlement round. However, there would have been opportunities to transport goods, such as lithic materials (Top of the World chert, Banff chert) and dried foods (fish, bison, berries), within the subsistence area from one side of the Rocky Mountains to the other.

Model B territorial exclusion model

Model B assumes that the Rocky Mountains formed a significant barrier to movements, with the Rocky Mountain Main Range (the Continental Divide) forming a natural boundary for hunter-gatherer groups (Figure 8.2). In this model, the region is divided into three sub-areas. On the eastern slope, the resident group(s) would have primarily occupied the plains area to the east. It was only in the fall and spring that small groups (hunting parties) would have entered the eastern slopes following the bison as the latter moved into the protected valleys. However, during the coldest and snowiest months from December through February, most of the group would have occupied valley bottoms located along the eastern boundary of the foothills, living in large aggregate camps that had access to trees for firewood and to grasslands where longer grasses would have provided a more reliable food supply for large bison herds.

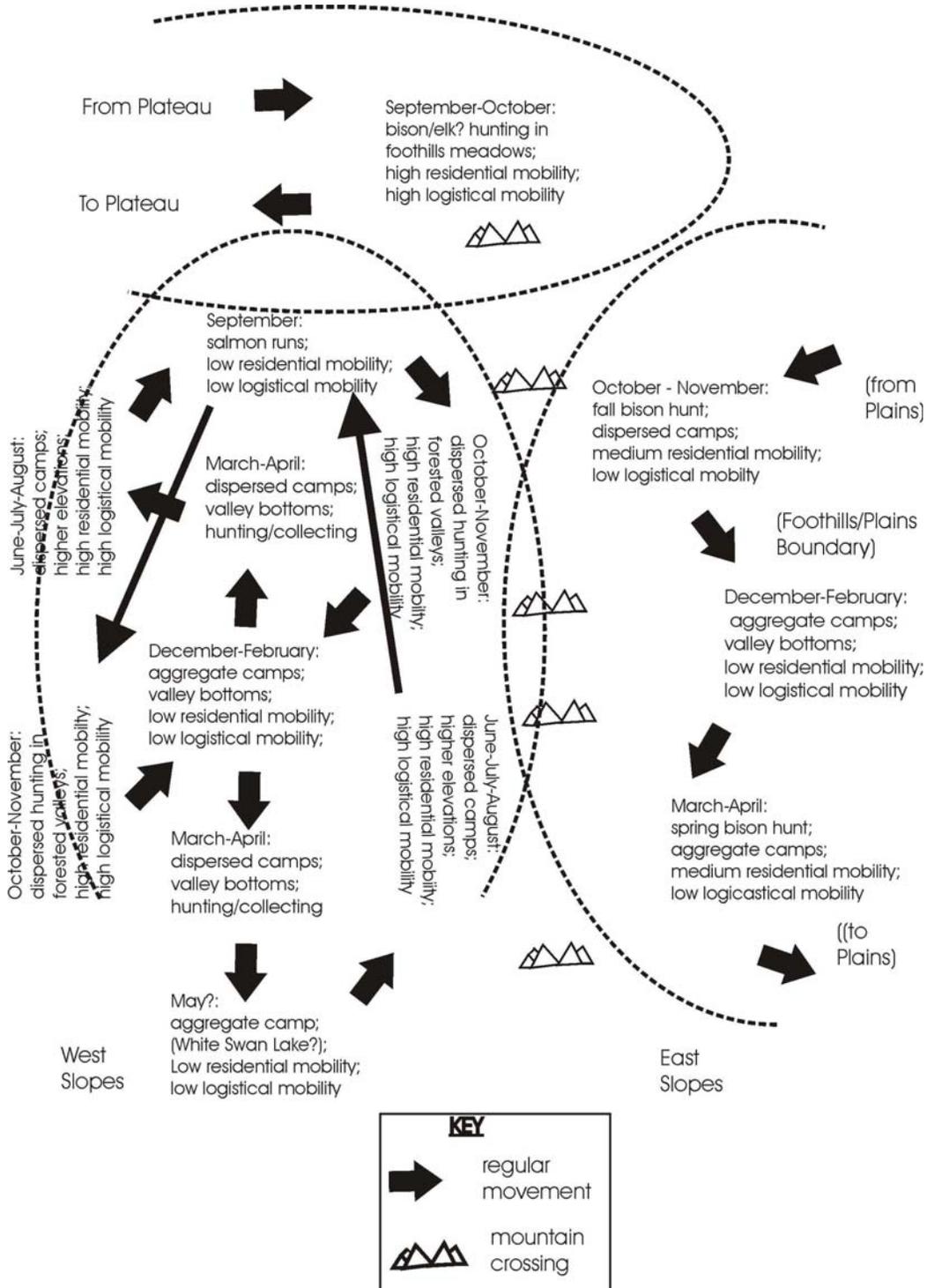


Figure 8.2 Model B: territorial exclusion model, seasonal settlement dynamics, Central Canadian Rockies.

On the western side of the Rocky Mountains, the hunter-gatherers would have followed a seasonal round tied largely to altitude or verticality. Here the hunter-gatherers would have spent much of the winter dispersed along the low altitude valleys perhaps in small extended family groups. In spring, hunters would have followed ungulates as they dispersed to higher altitude areas made accessible by the melting snows. In the summer, an increased variety of animal, plant and fish resources would have allowed aggregations into larger groups, perhaps at the time of the late summer fishery. In the fall, small hunting parties would have again dispersed to hunt the ungulate herds formed during the rutting season.

To the north, a third group may have hunted bison and elk in the grassland meadows along the Red Deer and North Saskatchewan Rivers. This would have occurred in the fall when elk and bison would have formed larger herds during the rutting season. For the remainder of the year, this northern group would likely have lived north or west of the study area, in the larger valleys of the Thompson, Fraser, and/or Athabasca rivers.

In this model, there would have been little opportunity for exchange of goods or for intergroup conflict (war), as these groups would have rarely encountered one another. There would also have been little opportunity to transport goods from one side of the Rocky Mountains to the other, except for the northern group from the Plateau. Most of the area would have been utilised by small hunter-gatherer sub-groups. Aggregations into larger groups would have occurred primarily outside of the Central Canadian Rockies, to the east or west, where the food resource bases were larger. To the west, aggregations could have been based on larger salmon runs. To the east, aggregations could have occurred during bison herd drives.

Model C: shared use model

Model C can be termed a shared use model (Figure 8.3). In this model, hunter-gatherers from the Plains to the east, the Columbia Trench to the west, and the Plateau to the northwest, would all have travelled to the Eastern Slopes in the fall to take advantage of the higher numbers of bison sheltering there. At this time of year, bison were moving off the Plains, heavily grazed during the summer months, to the Eastern Slope to take advantage of the longer grasses that had grown there over the summer and cured in the early fall. The groups surrounding the Eastern Slopes would have come together (although not necessarily to exactly the same locations) to obtain and process bison meat that could be dried and used throughout the upcoming winter. They may even have co-operated in collective bison jumps east of the study area, along the outer edge of the foothills, such as Old Womans Buffalo Jump (Forbis 1962) or Head Smashed In Buffalo Jump (Brink and Dawe, 1989; Peck 2001). Once adequate supplies of dried meat had been obtained, all the groups would have dispersed to areas of lower altitude, within their traditional territories, where the effects of full winter were less severe. Eastern groups may have stayed close by but groups from the western slopes may have returned to the Columbia to provide food for parts of the group that found the mountain crossing difficult (eg. The aged and some children).

Following the months of most extreme cold, the groups may have again penetrated into the Eastern Slopes to obtain a second supply of dried bison meat, prior to the bison's return to the high plains in the spring. This late winter/early spring hunting expedition may have been more important for the groups from the western side of the mountains, because they could not, or would not, follow the bison eastward on their spring migration, unlike the eastern groups.

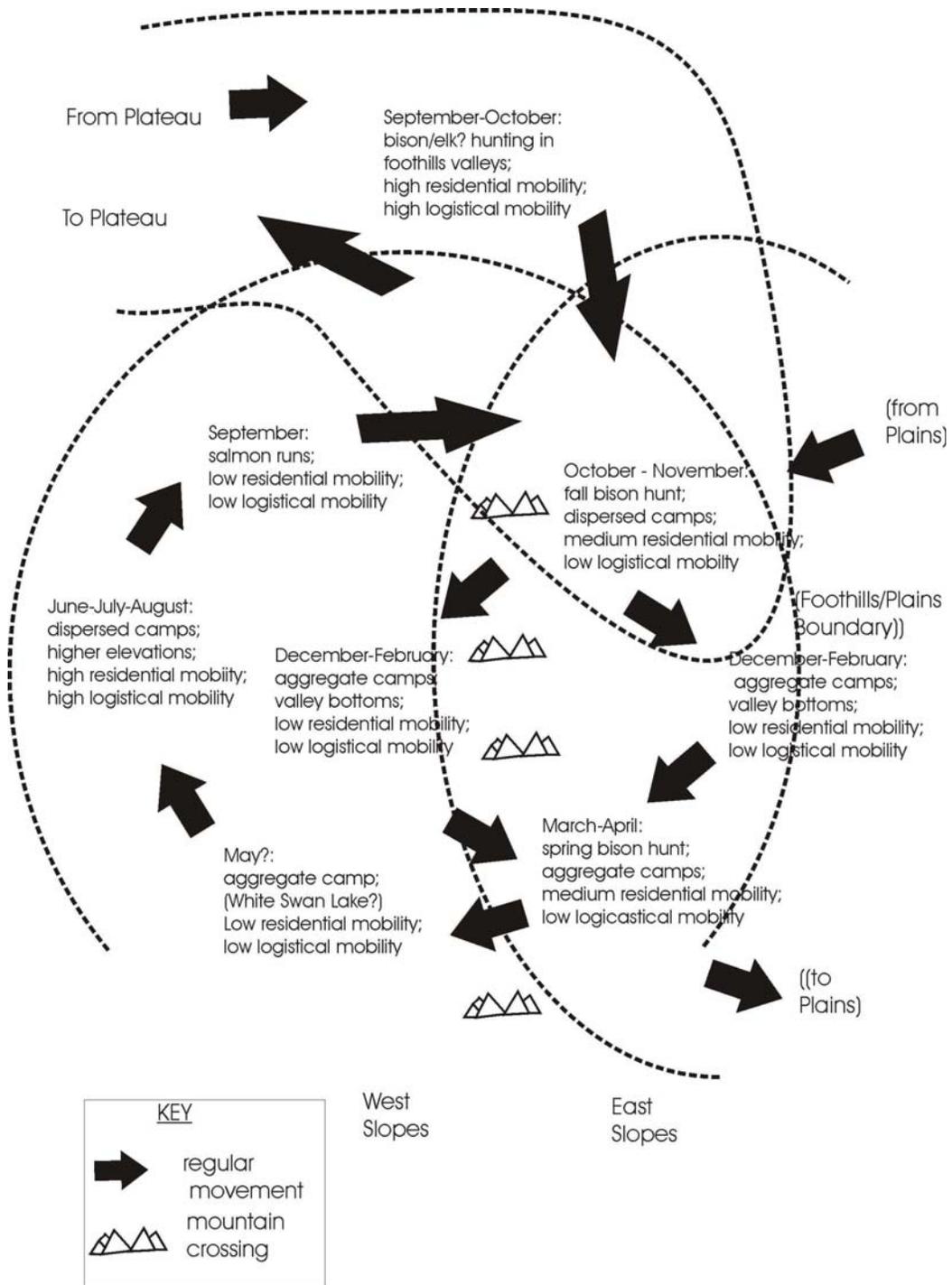


Figure 8.3 Model C: shared use model, season settlement dynamics, Central Canadian Rockies.

In this model there would have been more opportunities for exchange of goods, or alternatively, for inter-group conflict, because the different groups would have had a higher probability of encountering one another. In this model, there would have been opportunities to transport and spread lithic materials throughout a larger region, as well as dried salmon or bison. This model might result in a greater variety of trade items being distributed across the area because the groups could be confident of regular trade opportunities.

Model D: infrequent use model

The infrequent use model, Model D (Figure 8.4), is a variation on Model C, the shared use model. However, in Model D the surrounding groups from the east, west and north would not have regularly entered the eastern slopes on a yearly or even frequent basis. Rather, these groups might have hunted for bison in the Eastern Slopes, in the fall and then again in early spring on a very irregular basis, perhaps when more local resources became depleted. They might have entered the Eastern Slopes when resources that were normally hunted or collected in their “home” areas either failed or fell below sustaining levels. At these times, the ungulate resources of the Eastern Slopes might have been viewed as important alternative, but more distant, resources. It may have been that Eastern Slope resources were more subject to climatic variability, such that in some years there would have been less snow cover in the fall or winter, allowing increased populations of bison and other ungulates; while in other years, increased snows may have forced ungulates to lower altitudes, or discouraged bison entering the region.

For the groups using the high plains, they certainly used the large bison jumps in the outer foothills such Old Women’s and Head-Smashed-In Buffalo Jump (Peck

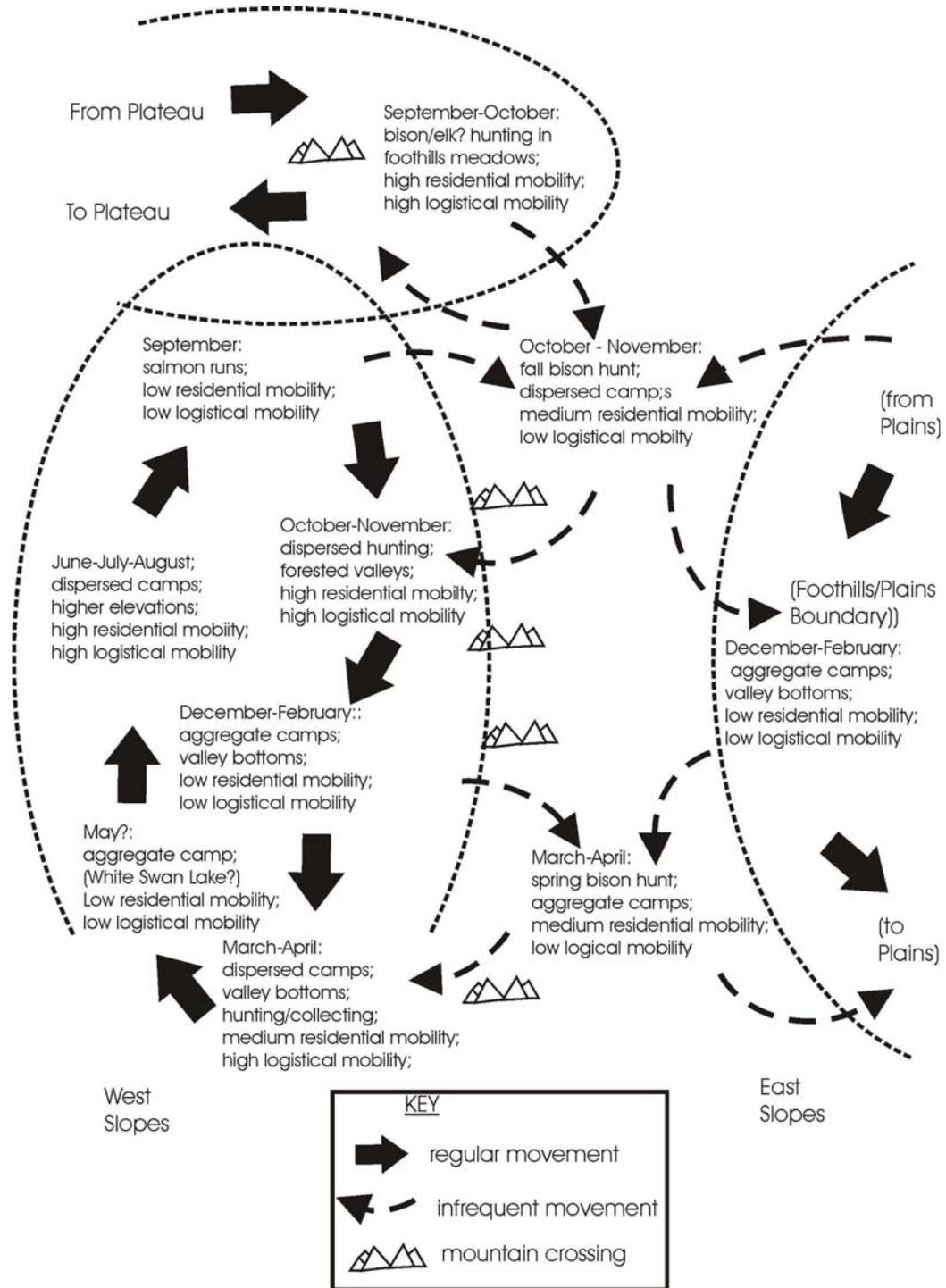


Figure 8.4 Model D: infrequent use model, seasonal settlement dynamics, Central Canadian Rockies.

2001). They may have used the upper foothills and mountain valleys on a more sporadic basis due to snow depths and temperature fluctuations.

Groups utilising the Columbia Trench on the western edge of the study area would have had a subsistence pattern based on north-south movements following the valley, with supplemental dispersal of small hunting groups into uplands surrounding the principal valley. Groups from the Plateau would have spent most of their time in the Plateau region, with small groups occasionally crossing the Rocky Mountains to trade and hunt bison.

In this model, the surrounding groups of hunter-gatherers would have utilised resources primarily from their own territories. The decision to utilise the Eastern Slopes would have been determined by each group based on the returns within their own regular subsistence area. As each group made this decision separately, their chance of encountering other groups for trade or in inter-group conflict on a regular basis would have been low. As a result exotic goods (such as lithic materials) would have been exchanged only rarely and sporadically.

EVALUATING THE MODELS

The archaeological data from Chapters 5, 6 and 7 are now reviewed to identify aspects that support or negate the various models outlined above. They are discussed under the categories of regional site patterning, faunal assemblages, assemblage composition, strategy groups and lithic technology.

Regional site patterning

The mobility patterns of hunter-gatherers in the recent past, as represented by habitation sites in the Central Canadian Rockies, suggest that there were periods of aggregation that focussed on resource concentrations followed by periods of dispersal

when smaller groups pursued a diverse foraging strategy. Trans-mountain travel would have been essential in Model A, to reach the concentrated bison herds on the eastern slopes and to return to base localities in the Columbia Valley where salmon runs occurred from late August to early October. These trans-mountain movements would have been characterised by rapid movements through higher altitude zones of low resource carrying capacity and adverse climatic conditions.

As the discussion on site types in Chapter 5 showed, base camps were mostly found in the Montane (42.2%) or Interior Douglas Fir (31%) ecoregions (Chapter 5). Both of these are located in valley bottoms. Transitory camps were more dispersed across the landscape (Montane - 18.3%, Interior Douglas Fir - 18.1%, Subalpine - 28.7%). Base camps were located near sources of resource concentrations, such as bison on the east slopes (Hunter Valley, Echo Creek, Sibbald Creek, EcPp21, Missinglink sites) or fish in the Columbia Trench (Salmon Beds, Columbia Lake, EcPx5 sites; Chapter 6).

This site distribution supports Model A, because base camps are found at low altitude valley bottoms on both sides of the Rockies. In Models B, C, and D, base camps would be more likely located outside of the study area and only small transitory hunting sites would be located in the study area.

Faunal assemblage composition

Models A, C, and D propose trans-mountain movements that focussed on concentrations of faunal resources. These would have resulted in characteristic faunal assemblages and patterns of utilisation at specific times of the year. Examination of the faunal assemblages in Chapter 7 indicated that the Hunter Valley, Pigeon Mountain and Muleshoe Lake sites were occupied in the late winter – early spring;

that Salmon Beds was occupied in August-September; and that Columbia Lake Site was occupied in the spring, fall and winter.

At the Hunter Valley Site, the high percentage of bison in the faunal assemblage and the high numbers of some bone types, skulls and vertebrae, suggest that prey species were killed on or close to the sites (Chapter 7). At other sites, where faunal assemblages included a wider range of prey species, these were likely obtained at greater distances, such as at Pigeon Mountain, Echo Creek, and Christensen sites (Chapter 7).

Winter sites along the upper Columbia River were characterised by the use of stored resources and a diverse faunal assemblage indicative of winter occupation, as in the case at the Columbia Lake Site (Chapter 7).

Sites on the east slopes of the Rocky Mountains indicate intensive faunal processing of bison (Hunter Valley Site). Other sites throughout the Central Canadian Rockies, such as Echo Creek (14 species), Christensen Site (9 species), and Pigeon Mountain (9 species) indicate intensive faunal processing of a diverse variety of species resulting from their use as foraging sites utilised by dispersed groups.

The faunal remains from most of the Central Canadian Rockies sites suggest that the inhabitants were hunting a diverse variety of species, and were not targeting bison. Models A, B and C are supported by western fishing along the Columbia River and eastern bison hunting at Hunter Valley and Pigeon Mountain. Models C and D are possible because of the presence of non-intensively used mountain valley sites. Hunting primarily bison at Hunter Valley and Pigeon Mountain sites suggests support for a modified Model B, with the boundary between Eastern and Western groups perhaps drawn further east along the front ranges of the Rocky Mountains.

Stone tool assemblage composition

Stone tool assemblages are viewed as a product of group size, complexity and length of occupation (Veth 1993:84). The range of selected lithic materials is likely to be a product of the distance to available lithic materials and the quality of the lithic materials available and required. For tools that require only limited shaping and forming, it is hypothesised that coarse-grained lithic materials would have been selected from local sources. This was the case at the Hunter Valley site (74% coarse-grained materials). However, for tools that require a high degree of shaping and forming, there was a preference for fine-grained lithic materials. For example, fine-grained locally available Banff and Norquay Chert formed 68% of the tool assemblage at the Vermilion Lakes Site, 53% at the Christensen Site and 78% at the Echo Creek site (Level 3) (Chapter 7). If fine-grained materials were not available locally, they needed to be carried from a source either directly by the user or transferred through a trading network. The best example of this in the study area was at the Pigeon Mountain Site, which has a lithic assemblage composed of 40% Swan River Chert derived from outside the study area. Top of the World Chert, also from a source outside the study area, formed 13% of the tool assemblage at the Christensen Site and 7% at the Echo Creek Site. In addition, high-quality lithic materials most commonly occur as finished tools or as small cores or preforms. The percentages of tools made of fine-grained lithic materials were 94% at the Christensen Site, 93% at Echo Creek, 86% at Vermilion Lake, 78% at EcPx5 Upper, 70% at Columbia Lake Area 1, 67% at Pigeon Mountain, 65% at Salmon Beds, 54% at Columbia Lake Area 2, and 38% at Hunter Valley. At Hunter Valley, the low percentage of fine-grained

lithic materials may also indicate that the occupants did not have the same access to fine-grained materials as those at other sites in the region.

Formal tool types normally found at sites in this area are largely the result of a reduction process based on random (amorphous) cores. Most tools are produced through bifacial and unifacial reduction, usually made on cores or flakes. Preforms occasionally occur as an intermediary step consisting of ovate bifacial forms.

Formalised core/flake technology such as microblade cores/flakes was rarely used.

The high percentage of Swan River Chert at Pigeon Mountain makes this site distinctive. It suggests that its occupants came from the east, outside of the study area, probably as a one time event or on an occasional use basis (If they were more familiar with this area they would probably have used more lithic materials local to the area). This supports Model D, the occasional use model. The more consistent use of Top of World Chert at Christensen and Echo Creek sites support Model A, the trans-mountain model.

Lithic assemblage composition

Lithic material assemblages were composed primarily of materials derived from local sources. This was the case at the Vermilion Lakes and Christensen sites, where Banff Chert was the most commonly found material (91% and 68% respectively). At the Hunter Valley Site, 74% of the materials were coarse-grained (mainly local materials – siltstone 38%, quartzite 30%). At Columbia Lake Area 1, 57% coarse-grained materials are presumed to be locally derived (mainly basalt 54%). At Columbia Lake Area 2, 69% was siltstone, also a coarse-grained (local?) material.

Two sites were exceptional in having large parts of their assemblages from distant sources. At Pigeon Mountain, 40% of the assemblage was Swan River Chert, a non-local material, followed by locally available shale (37%). At Salmon Beds,

81% of the lithic assemblage was Top of the World Chert, derived from a source less than two days' journey away on foot (Chapter 7).

Lithic materials were also selected according to the functional requirements of tools types utilised at sites. Coarser grained materials occurred at higher frequencies in sites that required larger tools for butchering and smashing up faunal remains (Hunter Valley: 62% coarse-grained). Finer grained materials occurred at higher frequencies in sites where specialised tool manufacturing was a significant site activity: Christensen 94%; Echo Creek 93%; Vermilion Lakes 86%; EcPx 5 Upper 78%; Pigeon Mountain 67%; Salmon Beds 65%; Columbia Lake Area 1 - 54%.

Cores were primarily local materials at the Vermilion Lake, Echo Creek, and Christensen sites. Only cores of high-quality lithic materials were transported over longer distances. For example, at the Christensen site, Montana Chert comprised 10% of all cores and Top of the World Chert comprised 6%.

Fine-grained lithic materials were preferentially selected for stone tool production. This was the case at Echo Creek (78%), Columbia Lake Area 1 (70%), Vermilion Lakes (68%), Pigeon Mountain (67%), Salmon Beds (65%), Columbia Lake Area 2 (54%), Christensen (53%), and Hunter Valley (49%).

A wider range of tool types was present at sites with a more general subsistence base or foraging pattern. The lowest numbers of tool types occurred at sites on the Eastern Slopes: Pigeon Mountain – 4; and Hunter Valley – 6. Upper Banff/Bow Valley sites also low numbers of tool types (Christensen – 6; and Echo Creek – 8). Higher numbers of tool types occurred in the Columbia Valley: Columbia Lakes Area 1 – 9; Columbia Lakes Area 2 – 11; EcPx 5 – 9; and Salmon Beds - 8.

Local materials were most commonly used at most sites, but all sites required fine-grained materials for special tool manufacture. Sites with the highest percentages

of tools made of fine-grained materials were located in the Upper Bow Valley, for example, at Christensen, Echo Creek and Vermilion Lakes. This patterning supports Model A, trans-mountain utilisation, because people seem to have regularly transported fine-grained materials to these sites. The transport of cores of high-quality materials to the Christensen site also supports a Model A type occupation. Ten percent of cores at this site were of Montana Chert, indicating extended links southward as well. The sites with wider ranges of tool types probably had a more diverse subsistence base. Sites with higher numbers of tool type categories were mainly in the Columbia Valley, while sites with lower numbers of tool types were located in the Eastern Slopes. These data once again support Model A, because specialised bison hunting would have required a lower number of tool types than would have been required by a more diverse subsistence range.

Strategy groups

A system of sorting lithic tool types into strategy groups to examine inter-assembly variability was developed by Hayden *et al.* (1996) and modified by Prentiss and Kuijt (2004:53). This system quantifies tools into a number of categories. As Prentiss and Kuijt (2004:53) explain:

More sedentary hunter-gatherers of the Pacific Northwest region, who processed large quantities of specialised resources, will tend to have had more expedient tools, ground-stone cutting tools, and abraders, whereas the more mobile foragers will tend to have had more bifaces, portable long-use tools, and blades.

Although the system utilised above has been used to separate more sedentary hunter-gatherers from foragers, this system might also test whether some sites can be placed on a continuum between sedentary and forager.

As analysed in Chapter 7, sites with longer-term occupations tend to have more expedient tools and abraders (e.g. Hunter Valley, Pigeon Mountain, EcPx-5, Columbia Lakes Area 2). Sites characteristic of more mobile foragers had higher frequencies of bifaces, portable long-use tools, and blades (e.g. Echo Creek, Salmon Beds).

The use of Echo Creek and Salmon Beds by more mobile foragers suggests some support for Model A, trans-mountain utilisation, because these sites might have been used as part of a regular subsistence round. However, longer term occupations at Hunter Valley and Pigeon Mountain might support Model B, the territorial exclusion model. The two together might support a modified Model B, with a boundary close to the front ranges.

Lithic technology

The role that individual sites played in lithic technology should be reflected in debitage assemblages composed of different stages of the reduction sequence used to manufacture stone tools. Figure 7.11 shows a generalised reduction sequence from a cortex-covered nodule through to a formed tool (after Magne, 1985; Veth, 1993).

Base campsites should contain lithic assemblages with higher frequencies of middle and late reduction stages. This was indeed the case at Columbia Lake Area 2, where 73% of the lithic debitage consisted of thinning or reduction flakes. At Pigeon Mountain, 65% of the debitage consisted of secondary flakes suggesting that this may have been a base camp, and that cores reduction was important here. At the Salmon Beds 86% of the debitage assemblage consisted of sharpening/retouch flakes, but this appears to have resulted from the specialised fish processing at this site, rather than from generalised base camp activities.

Sites closer to lithic materials sources should contain higher frequencies of early and middle reduction stages. At the Christensen site, the 65% shatter may result from this site's proximity to a primary lithic source. At Hunter Valley, the 8% primary decortication flakes, and 16% secondary decortication flakes, plus 12% shatter, are likely to have resulted from working quartzite cobbles.

Although detailed lithic reduction data were only available for five sites, those sites demonstrating high percentages of early lithic reduction - Hunter Valley and Christensen - support Models A, B, and C because early stage reduction indicates a knowledge and use of local materials. The sites with high percentages of later lithic reduction (Columbia Lake Site Area 2, Pigeon Mountain and Salmon Beds) also support Models A and C, because they are consistent with the base camps located at key resource extraction localities, and Salmon Beds being a special resource exploitation (fishing) site.

Discussion

The above review provides considerable support for Models A, B and C. Models A, B and C are also supported, in a general way, by base camps being most commonly found at lower altitudes in river valleys throughout the region and by transitory camps being more widely distributed across different ecoregions.

Bison hunting camps were located in the Eastern Slopes and were occupied in late winter-early spring. The location of these supports all four models. There is no evidence for fall bison hunting, although this might be due to small sample size. Without fall bison hunting sites, Model A becomes a less likely scenario.

Salmon fishing in the fall is indicated at Salmon Beds and probably at the Columbia Lake Site. At the latter, occupations extended into the winter and spring as

well, supporting all four models, because these sites are located in a core occupation area for all four models.

A wider range of hunted prey is indicated at the mountain Bow Valley sites (Pigeon Mountain, Echo Creek and Chistensen), suggesting that the occupants of these sites were not focussed exclusively on any specific species. This supports Model A, trans-mountain utilisation, because these sites correspond to the hypothesised generalist pattern, and not to the other models, which postulate a more targeted emphasis on bison on the Eastern Slopes.

Stone material assemblages present a somewhat ambiguous view of stone materials use. Local materials were generally used at most sites for expedient and rough tools. Tools that required forming and reworking were usually made of fine-grained materials. Local fine-grained materials were generally used wherever possible, but transport or trade of non-local materials was conducted frequently. For example, Top of the World Chert formed 13% of all tools at Christensen Site and 7% at Echo Creek. This suggests that a regular supply of Top of the World Chert was available. At the Christensen site, local chert/siltstone materials were being made into cores (Gorham 1993). These might have been traded for Top of the World Chert. Alternatively, the inhabitants, when travelling from the Columbia Trench, could have carried tools made of Top of the World Chert and replaced them with chert/siltstone at Christensen and Echo Creek sites. This siltstone might have been taken back to Columbia Lake, where a siltstone formed 69% of the lithic assemblage and 42% of the tool assemblage in Area 2 (Yip 1982). Unfortunately no lithographic comparison or analysis has been done to determine if these materials are the same. This is suggestive of a two-way cross-mountain transport/exchange and supports Model A, the transmountain utilisation; and Model C, the shared use model.

The lithic assemblage at the Pigeon Mountain site is more difficult to interpret. There, Swan River Chert formed 40% of the lithic assemblage, 29% of the tool assemblage and included five core/core fragments. Top of the World Chert formed 1.1% of the total lithic assemblage, but only one core fragment was recovered and no tools were found of this material. It is possible that Swan River Chert from a source far to the east was brought to trade, or that the occupants of Pigeon Mountain had just been to the source area and brought a quantity of Swan River Chert back to the foothills of the Rocky Mountains. However, Swan River Chert is not found at most other sites in the region. This suggests that the Pigeon Mountain site best fits with Model C, the shared use model or Model D, the infrequent use model.

The Hunter Valley site is also anomalous in many ways. It contains a significantly different lithic assemblage and also distinctive ceramics. The site has been identified as being occupied by ancestral Stoney (Assiniboine) people (Head, 1999). Its proximity to the eastern edge of the study is consistent with that interpretation. The site also fits well with Model C, the shared use model, and with Model D, the infrequent use model.

Little can be said about the other non-local lithic materials. Most occur in small percentages at most sites, with obsidian being the most widely encountered material. Its low occurrence at most sites suggests that it was likely traded in small quantities rather than being obtained directly in larger amounts. This would also apply to small numbers of other non-local materials except perhaps for Montana Chert, that formed 7% of the lithic assemblage at the Christensen site. This relatively large percentage of Montana Chert at Christensen Site suggests that it may have been brought to the site by direct transport rather than through trade. The general occurrence of low frequencies of non-local lithic materials supports Model A, the

trans-mountain model, because in this scenario, non-local lithic materials should be fairly consistent across the region except where close to the source. Under Model C, it could be anticipated that non-local lithic materials would be found in inconsistent quantities and types.

From this summary it appears that Model A is generally supported by the data. The lack of intensive bison hunting in the upper Bow Valley suggests that a modified Model B, the territorial exclusion model, may have functioned with a boundary drawn not at the height of the Main Range but rather along the Rocky Mountain Front Range. This might also be combined with Model D, the infrequent use model, which postulates small groups from the Plains to the east spending short periods of time in the study area. This is supported at the Hunter Valley and perhaps Pigeon Mountain sites by distinctive lithic assemblages at both sites and also, in the case of the Hunter Valley site, by the presence of ceramics.

Models C and D have some applicability in regards to a number of sites identified as containing house pits, but excavation data on these sites are not available.

LOGISTIC VERSUS COLLECTOR SUBSISTENCE BEHAVIOR IN THE CENTRAL CANADIAN ROCKIES ECOSYSTEM

Does the distribution of sites indicate a particular and persistent hunter-gatherer utilisation pattern? As described earlier, two common categories of utilisation patterns have been termed forager and collector (Binford, 1980). Sites indicative of a forager pattern should be spaced roughly one day's journey apart. On level ground, family groups that included women and children are unlikely to have travelled more than 10 km a day. On Figure 8.5, a 10 km radius 'catchment area' is illustrated. This shows that for sites along the Columbia River, the upper Red Deer River, the upper

Bow Valley near Banff, and the Bow Valley near the Rocky Mountain Front Range, base camps are spaced generally less than 10 km apart,

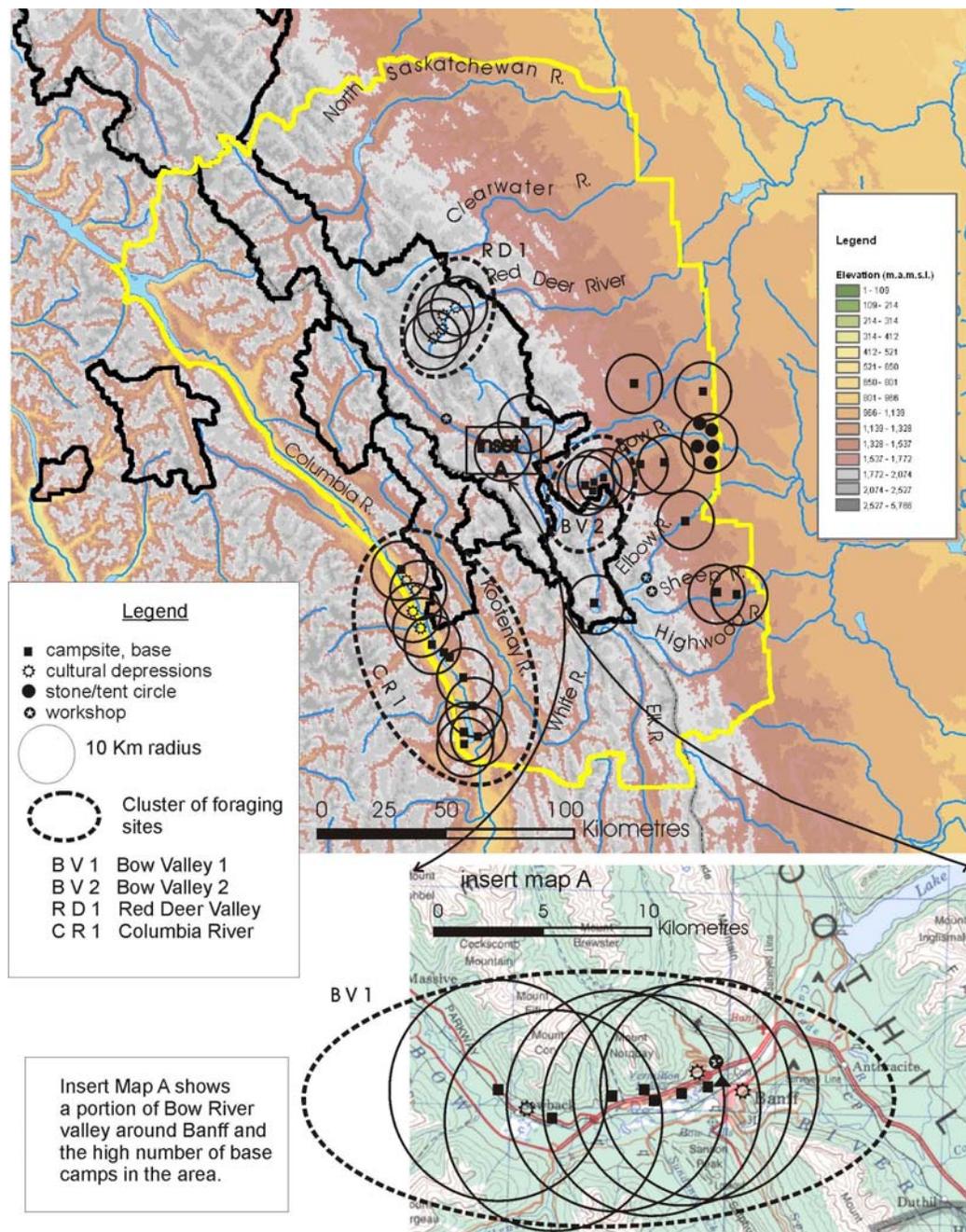


Figure 8.5 Map of the distribution of base camps, cultural depressions, stone circles and workshops in the Central Canadian Rockies. The circles indicate 10 km radius catchment areas.

indicating that in these areas, larger multi-family units may have moved to take advantage of the higher density resources in these areas. These base/residential camps would have allowed a more intensive foraging pattern. An intensive foraging pattern implies a gender-based division of labour, in which women usually collected close to the base camp whilst men's groups travelled more widely to hunt game.

On Figures 5.1 and 8.6, it can be observed that transitory campsites, hunting/kill sites, and isolated finds are more widely dispersed than base/residential sites. These dispersed sites have lower densities of artefact and are usually smaller in size. These are assumed to represent the activities of smaller special activity groups. For example, they might represent the activities of small male-dominated hunting expeditions. On Figure 8.6, an arbitrarily selected 25 km radius was used to define 'catchment areas' where small special activity groups might travel beyond a single day's journey from base camps. From the figure it can be seen that using catchment areas of this size, large portions of the study area are included within 25 km of one or more base camps. The two notable exceptions are the cluster of transitory sites on the North Saskatchewan River near Kootenay Plains and a cluster of transitory sites south of the upper Highwood River. Because the site data from the Kootenay Plains are incomplete and many of the sites are now flooded due to a hydro dam, it can be hypothesised that at least one of these, but probably more, may have been base camps. The cluster of transitory sites on the Highwood River suggests that a base camp may be located in that area but has not yet been located.

Not all of the study area is included in the 25 km catchment areas indicated on Figure 8.6. Major areas not included within these regions are located in the area northwest of the continental divide along the Columbia River and in the northeast part

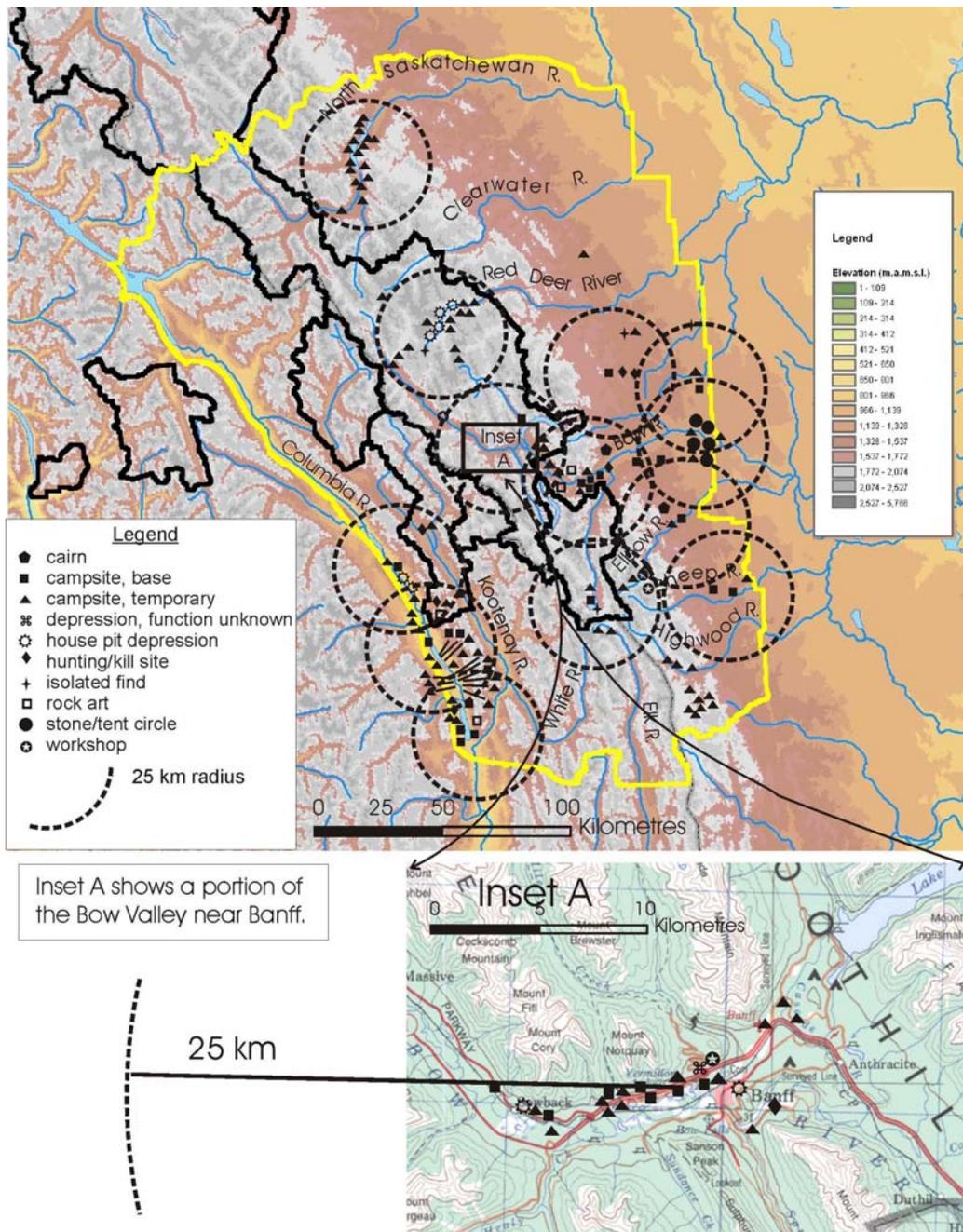


Figure 8.6 Map of the distribution of all site types in the Central Canadian Rockies. The circles indicate 25 km radius catchment areas from base camps or clusters of base camps.

of the study area along the Red Deer and Clearwater rivers. The northwest portion has some of the steepest slopes in the region and is vegetated in dense stands of hemlock-dominated forest, both factors that would have discouraged Aboriginal use.

Portions of the northeast part of the study area may also have been unattractive for Aboriginal peoples in the Late Precontact Period due to dense forest conditions. A third area in which base camps are absent is along the Rocky Mountain main range from Yoho and Kootenay National Parks down to the upper reaches of White and Elk rivers. Archaeological surveys in Yoho and Kootenay National Parks have been quite extensive, so that base camps should have been identified if they exist. Further south, a major base camp has been reported at White Swan Lake on the White River but has not been confirmed.

This pattern of base camps surrounded by transitory camps suggests that, where necessary or desirable, Late Precontact Period people adopted a collector-type system. Smaller special activity groups travelled outward from base camps primarily in search of game but perhaps also for other special resources as well, such as lithic materials for stone tool production. These special group journeys likely lasted two or more days. When resources were depleted or reduced in the catchment area, the larger base camp group probably moved to extend the resource quest into new catchment areas.

Plotting of catchment areas with 10 km radii and 25 km radii from base camps suggests that Late Precontact Period people adopted a flexible pattern of area utilisation. In areas where resources were concentrated, they followed a forager pattern where base camps were located close to exploited resources. When these became depleted, the entire group moved on to another base camp. This was the typical pattern along the upper Columbia River, in the Bow Valley near Banff, the

Bow Valley at the entrance to the Front Range, and in the upper Red Deer River. In areas where exploited resources were more dispersed, the groups seem to have utilised a collector pattern where smaller special activity groups (hunters) travelled greater distances to search for food resources, which were then transported back to the base camp. When resources became reduced, the group moved on to exploit another area. Hence, base camps are most commonly located within the clusters of foraging pattern areas noted above.

The model of trans-mountain utilisation (Model A) hypothesized that sites on the eastern slopes would be characterised by short term occupations focussed on obtaining transportable dried bison. This model is indeed supported by the data.

CONCLUSION

The above analysis suggests that a collector pattern was utilised throughout the Central Canadian Rockies. From base camps, smaller special activity groups (hunters) travelled outward to search for food resources. Once resources were encountered these were returned to the base camp. If resources in the local area became reduced, the group moved on to exploit another area. Base camps were most commonly located in clusters in a few special areas (upper Bow Valley, Columbia Valley), where a foraging pattern is suggested by closely-spaced based camps. It is possible that a combination of a male collector (hunter) pattern was paired with a female foraging (gathering) pattern to maximise available resources in these special areas.

Model A, the trans-mountain utilisation model, is supported by the available data, but it does not encompass all of the representative data. Model A should be

combined with aspects of Model C, the shared use model, and Model D, the infrequent use model. These are combined together in Model E termed the Integrated Use model, which is illustrated on Figure 8.7. In Model E the majority of the Central Canadian Rockies was occupied by a group that followed a trans-mountain subsistence round. This almost certainly can be identified with the early historic Ktunaxa. This group regularly travelled to include portions of the foothills and the Rocky Mountain Front Ranges but probably rarely travelled further eastward than the Foothills/Plains boundary. This may have been because of the presence of larger tribally organised Plains groups that formed at larger buffalo jumps in the fall through spring on the Foothills/Plains boundary (Walde 2006: 303), who can be identified with the Siksika, Piikani and Kainai. Other groups who may have seasonally entered the area included the Secwepemc from the Plateau to the northwest and towards the end of the Late Precontact Period, the Nakota and Tsuu T'ina from the Plains to the east. Plains groups probably entered the Central Canadian Rockies only infrequently because the resource base (bison) was significantly greater on the plains. When they did enter the Central Canadian Rockies, they travelled primarily to the eastern slopes to hunt bison during the fall or early spring.

This scenario, Model E, might also be seen as best corresponding to the issues of dating within the Late Precontact period. At some sites on the eastern slope, (EdPp-21, Missinglink, EfPq-5 and EfPq-6), the Late Precontact is only weakly represented in relation to the preceding Middle Precontact period occupations (Figure 5.2). This might be because groups on the plains to the east were concentrating on higher levels of bison hunting utilising drives and pounds, as suggested by Walde (2006), rather than venturing into the eastern foothills. At Echo Creek Site, the upper

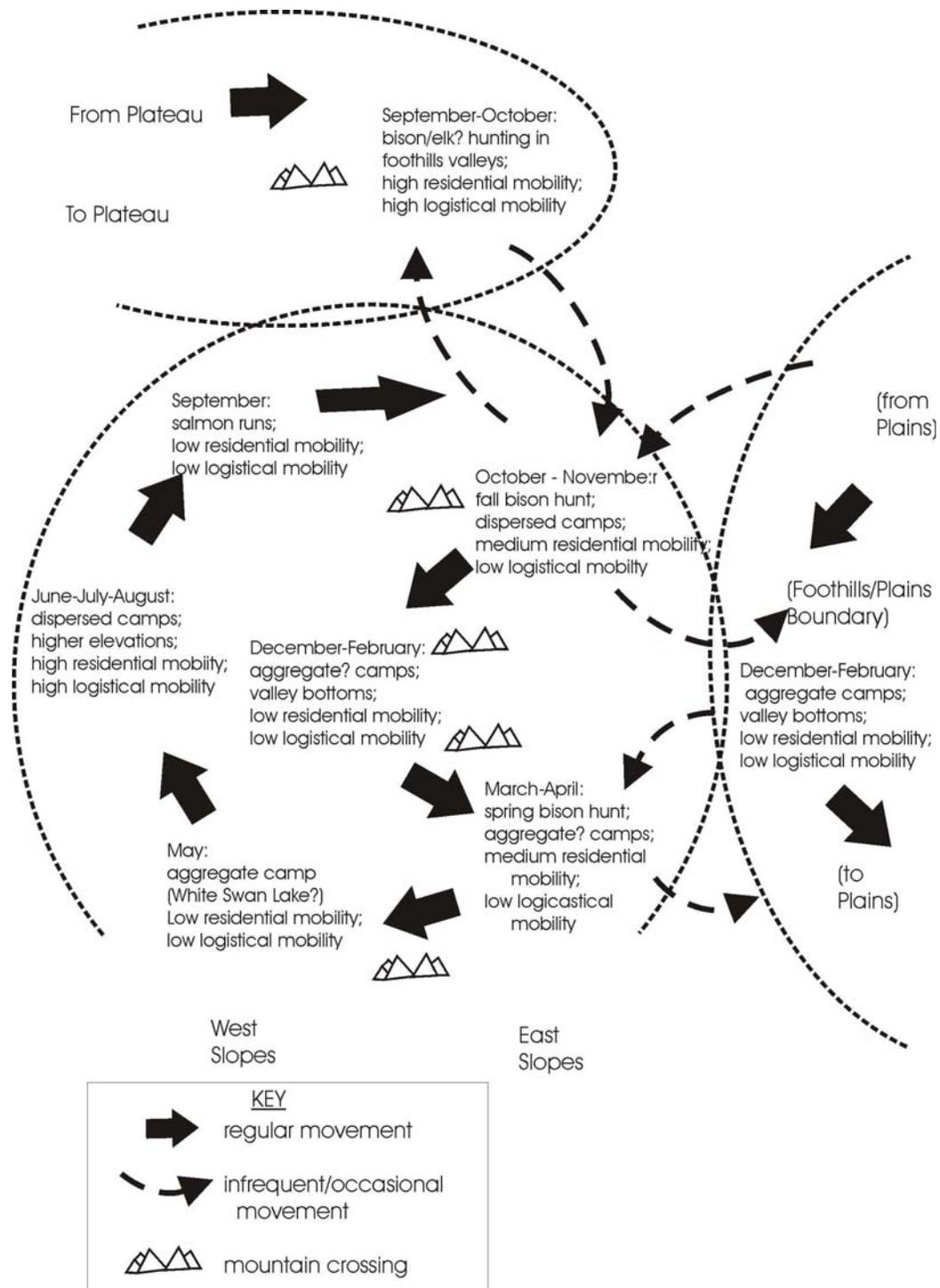


Figure 8.7 Model E: integrated use model showing seasonal settlement dynamics in the Central Canadian Rockies.

levels have lower artefact densities than those of the first half of the Late Precontact Period. This suggests that plains groups entered the mountains less often during the later part of the Late Precontact. If the eastern slopes were only infrequently occupied at this time, they might have been available to other tribal groups. This may in part explain the occupation of the Stoney (Assiniboine) at the Hunter Valley site.

CHAPTER 9

PAST HUMAN INTERACTIONS WITH THE ENVIRONMENT

INTRODUCTION

Chapter 9 examines how hunter-gatherers in the past might have interacted with the environment in the Central Canadian Rockies. Human use might have affected the fire cycle, animal populations through the hunter-prey relationship, and plant ecology through selective collection or disturbance of specific species. This chapter also examines human perceptions of the environment as sacred and ceremonial space. The juxtaposition of burning and ecological modification, and sacred landscapes, may seem to some unusual, but both of these elements relate to how the Central Canadian Rockies was perceived as a place.

Human-environmental interactions can be viewed as processes acting on the ecosystem. Three key characteristics in evaluating human interactions with ecosystems are *predictability*, *resistance* and *resilience* (Redman, 1999: 39). Predictability is the extent to which forces acting on the system can be anticipated. Based on past experience, human actions might be predicted to have specific results. Resistance in a system "...is the ability to resist or accommodate to actions without seriously transforming itself" (Redman, 1999: 39). "The resilience of a system is its ability to return to close to its predisturbance state" (Redman, 1999: 39). Human dominated ecosystems differ from other biological systems because information, technology, economics, and social organization play inordinately greater roles (Butzer, 1982: 32). Humans have the ability to consciously consider the implications of any actions that they might take. However, in many other situations the consequences of human actions may have unintended consequences.

ENVIRONMENTAL SHAPING BY FIRE

Fire has long been recognised as an important process in ecosystems. Fire is recognised as one of the most powerful tools available to hunter-gatherers. With fire, hunter-gatherers could shape the landscape to make it easier for human use and more attractive for desired plants and animals (Barrett and Arno, 1982; Kay *et al.*, 1999; Lewis, 1980, 1982; Stewart, 1956). In northern Alberta, ethnographic studies conducted by Lewis (1977), and Lewis and Ferguson (1988) recorded that Cree, Beaver, Slavey, Chipewyan, and Metis people regularly and systematically fired selected habitats to influence the distribution and relative abundance of plant and animal resources until shortly after World War II. Areas usually burned were intentionally selected and had specific characteristics. Lewis and Ferguson (1988) use the terms “fire yards” and “fire corridors” to describe these areas. Fire yards are openings or clearings such as meadows, swales and lakeshores within forest areas. Fire corridors are similar areas maintained to facilitate movement and included grassy fringes of streams, sloughs, ridges and trails. Characteristically the places burned were selected to enhance grazing for horses, and to create green shoots for muskrats and moose. Burning such areas occurred in the springtime when grasses were sufficiently dry but the surrounding forests were still too wet to burn. Firing occurred before bird nesting began and was done repeatedly, spring after spring at the same location whenever conditions required it. The characteristics of such fires are low temperature burning, small size, low intensity and high frequency. These Indigenous fires would have had relatively little direct effect on most forested areas other than “to limit the encroachment of trees into grasslands” (Lewis and Ferguson, 1988). The effects on meadows themselves were significant. Burning these areas ensured the continued presence of grasses, and burning off shrubs and accumulated forest debris

along the meadow margins acted to enlarge some meadows. Burning also fostered humus accumulation and reduced soil acid levels beneficial to grassland maintenance. Fire corridors, in particular, created strips of low fuels thereby creating fire breaks.

Lewis and Ferguson (1988) record that the dangers of large area high intensity fires were recognised and these were never started intentionally. Natural fires are characterised by being primarily ignited during summer, when fuel supplies are abundant, moisture levels are low and temperatures are high. Usually started by lightning, natural fires are high intensity, and result in large to very large “patches” of varying aged forests.

Turner (1991) reviewed and recorded occurrences for Aboriginal landscape burning in British Columbia. Specific records exist for at least fifteen Aboriginal traditional territories across the southern half of British Columbia from the Pacific Coast to the Rocky Mountains. In the past, Indigenous peoples of British Columbia frequently burned areas to enhance habitats for selected plant species and to enhance abundance (Turner, 1991). Burning enhanced growth of seventeen documented plant species, in particular, berries and edible roots. Areas burned and the time of burning varied with local conditions and the type of plant production being enhanced. One Lillooet elder noted that areas for berries were burned over every four to five years. Another elder remembered they burned in the fall just before a rain so the fires were not spread too much (Turner 1991).

Barrett (1981) examined the evidence for Aboriginal burning in northwestern Montana. He used historic journals plus interviews with Native people to identify areas of significant use by Native peoples, reasons for burning and areas burned. Many of the Kootenai and Salish people interviewed were familiar with purposeful fires. These were set to “burn out the old, dense underbrush” (Barrett, 1981) and

stimulate new growth of big game browse. They also enhanced berry production, aided food gathering, improved forage for horses and facilitated ease of travel. In the winter of 1858 Father Pierre DeSmet recorded the use of fires to drive deer into a lake in northern Idaho. Once in the lake, animals were killed easily from light bark canoes “without trouble or danger” (Chittenden and Richardson, 1969:1021-22).

For the Northern Great Plains, Arthur (1975) and Nelson and England (1971) document several occurrences of intentionally ignited fires. “Lewis and Clark observed that the Gros Ventre had set all the neighbouring grass afire in order to obtain an early ‘crop’ for their horses and also to induce the buffalo and other wildlife to come to the area”. In the later part of the nineteenth century, North-West Mounted Police Colonel S.B. Steele observed that “the Indians and the half-breed hunters willfully set the prairies on fire so that the bison would come to their part of the country to get the rich green grass which would follow in the spring”. Nelson and England (1971) also record instances where fires in summer were used to remove the grass and cause the buffalo to go elsewhere.

In general, then, the characteristics of Aboriginal ignited fires are relatively clear: they were frequent, low intensity, usually of small area, and most commonly in areas of meadows and prairies. They had the overall effect of enlarging grasslands, clearing underbrush and preventing encroachment of trees and forest.

Fire frequencies in the Central Canadian Rockies

Masters (1990) determined fire frequencies for Kootenay National Park based on tree ring growth. Three periods of fire frequencies were identified (Figure 9.1). In the most recent period AD 1928 to 1988 very little of the area burned giving a fire cycle of >2700 years. Between AD 1788 and 1928 fire cycles were 130 years while

between AD 1508 and 1788 fires occurred at a 60 year cycle. Masters attributes the change from a 60 to 130 year fire cycle about AD 1780 “to change in climate associated with the cooler, wetter weather during the Little Ice Age” (Masters, 1990:1766).

Johnson *et al.* (1990) studied fire frequencies in Glacier National Park, in the Interior Wet Belt Forest of British Columbia. They found a bimodal distribution of fire cycles. From AD 1520 to 1760 fires occurred on an 80 year fire cycle, while from AD 1760 to 1988 the fire cycle extended to 110 years. This change was also attributed to changes in climate in the mid-1700s from a warm, dry interval to the start of the Little Ice Age.

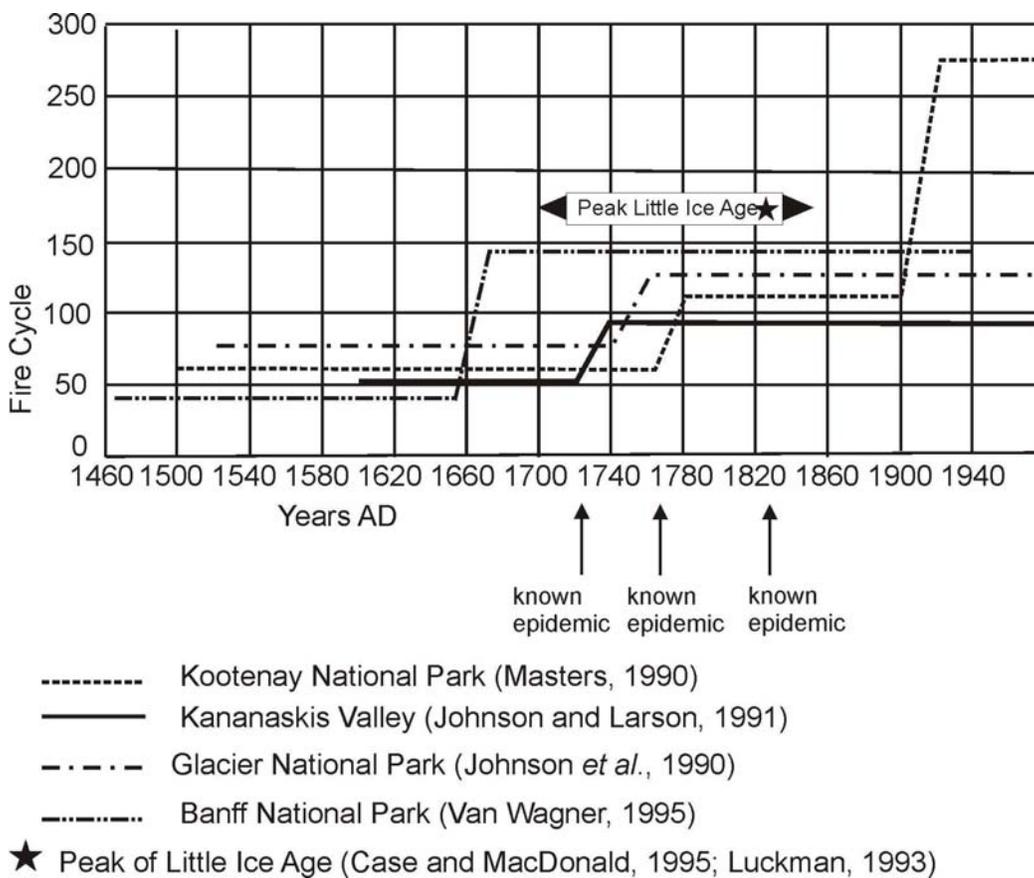


Figure 9.1 Fire return cycles in the Central Canadian Rockies and adjacent areas.

Johnson and Larsen (1991) in their study of fire frequencies in the Kananaskis Valley found a similar bimodal distribution of fire cycles. From AD 1600 to 1730 the fire cycle was 50 years, from AD 1730 through 1980 the fire cycle lengthened to a 90 year cycle. This change is attributed by Johnson and Larsen to a climatic shift towards a cooler and wetter interval.

Fire histories and climate change

Many fire researchers in the Central Canadian Rockies have attributed decreasing fire frequencies over the last 500 years to climate change often associated with the Little Ice Age. Tande (1981:34) concludes that “climate may have been the principal factor which controlled the extent of past fires”. This was based on the correlation of the largest fires that occurred in AD 1758, 1847 and 1889, years of pronounced droughts that experienced large burn areas. However, all of these largest fires occurred in subalpine areas which were areas where Aboriginal people had probably little interest in burning. These are very likely to have been naturally ignited fires.

A review of recent climate studies in the Interior Plateau (Chatters, 1995; 1998; Prentiss *et al.*, 2005) indicates that cool and moist conditions at *c.*1100-1200 cal. BP gave way to a round of droughts between 900 and 600 cal. BP, with more frequent fires (Chatters and Leavell, 1995; Hallett *et al.*, 2003), and glacial recession (Reyes and Clague, 2004). After 500 cal. BP cool and moist climates became dominant, peaking in the Little Ice Age in the eighteenth century and first half of the nineteenth century (Case and MacDonald, 1995; Luckman, 1993). However the effects of these periodic warmer and cooler periods are not observable in the fire histories of the Kootenay, Jasper, or Kananaskis areas (Figure 9.1).

Luckman (1986) combined documentary sources, dendrochronology, lichenometry and radiocarbon dating to identify variations of glacial moraines in the

Canadian Rocky Mountains. From *c.* AD 700 to 1100 the treeline was higher than present at the Columbia Icefield, probably associated with warmer climatic conditions. Mature forests were growing in locations that were subsequently overridden by glaciers and have only recently become re-exposed within the last 50-60 years at Robson and probably Kiwa glaciers. The climate then cooled and glaciers advanced during the twelfth and thirteenth centuries (AD 1100-1300). Then during the fourteenth to sixteenth centuries (AD 1300-1600) a more favourable climate allowed recolonisation of slopes at the Columbia Icefield and other locations. Weak glacial advances in the sixteenth and seventeenth centuries (AD 1500-1700) are poorly dated. The most extensive Little Ice Age glacial advances occurred in the early eighteenth and mid-late nineteenth centuries. These advances suggest periods of cooler climates. Further tree ring studies (Luckman 1993) confirm multiple periods of slowed tree growth near several Rocky Mountain glaciers. Many of these periods correlate well with varve sedimentation rates at Hector Lake (Leonard 1986a, 1986b). There is also good correspondence with studies of glacial advances at Peter Lougheed Park, Alberta (Smith and McCarthy, 1991; Luckman, 1993). Luckman (1993) correlates overall cooling throughout the Holocene to gradually reduced summer solar radiation (Kutzbach, 1987), with the coolest periods within the last millennium.

Examination of tree ring data (Luckman, 1990:191) showed no significant reduction in tree ring widths between AD 1760 and 1800, which might correlate with reduced fire rates documented in the fire histories, although tree ring widths do reduce in size after AD 1800 when reduced fire frequencies had already occurred. In addition the cooling after AD 1800 did not further lengthen the rate of fire frequency returns. From about AD 1500 it appears that fire frequencies are not strongly correlated with climate change.

Forest fires and animal productivity

Van Egmond (1990), utilising air photo coverages from 1945 and 1978, recorded changes in vegetation in montane areas of Kootenay National Park. In 1945, 44.6% of the montane ecoregion of Kootenay National Park was considered open or meadows. By 1978, 95% of this montane area was classed as closed forest and meadow areas made up less than one and one half percent of the total montane ecosystem (Van Egmond 1990:102). This change in montane areas of Kootenay National Park is indicative of advanced successional forests becoming climax vegetation stages. This indicates that major fires in the montane region have not occurred in the range of 100 to 300 years. One of the effects of the reduction of open areas is that browse standing stock (grasses and shrubs) for elk in 1978 was approximately 20% of that available in 1945. Not surprisingly, elk populations in Kootenay National Park have declined from approximately 1000 animals to fewer than 200 since the 1920s (A. Dibb, *pers. comm.*). This provides an indication of the effect that burning montane regions in the upper Kootenay Valley could have had on the potential of ungulate availability for prehistoric peoples. By ensuring open forest or meadows in Kootenay National Park, Aboriginal peoples could have increased ungulate populations by at least a factor of five, a strong incentive to burn less productive forests.

Locations of Aboriginally ignited fires

In addition to the fire yards and fire corridors identified by Lewis and Ferguson (1988), Barrett (1981) conducted a two year study examining the pattern of Indian fires in western Montana's lower elevation forests. He compared fire histories in ten pairs of old-growth stands in areas of Ponderosa pine (*Pinus ponderosa*) and Douglas-

fir (*Pseudotsuga menziesii*) forests. One of each pair was located in an area of past Salish or Kootenai habitation termed “heavy-use” stands. These typically bordered large intermountain valleys. These were compared to areas with similar vegetation potential, elevation and aspect, usually in adjacent secondary canyons.

Barrett found that for pre-1860s fires there was a significant difference between “heavy use” and “remote” stands. The mean fire return interval for heavy use areas was more than double that for remote stands. From 1861 to 1910, fires continued to be more frequent in heavy use areas than in remote areas. Following the introduction of widespread fire suppression, the fire free intervals increased substantially in both areas but the mean intervals became almost identical for the two categories. Barrett (1981:40) concluded that “the data suggest that the Salish and Kootenai Indians were largely responsible for causing the high frequencies characteristic of stands in habitation zones”. Barrett’s data indicate that major intermountain valleys were preferred locations to burn.

Fires in the Athabasca Valley around Jasper were studied by Tande (1979). Between 1669 and 1913 fires created a mosaic of age classes in the lodge-pole pine dominated forests. These fires were a combination of frequently recurring, low-intensity fires and less common medium to high intensity ones. At higher elevations even-aged stands were created by high intensity fires. At lower elevations, more frequent, low intensity, fires created patchworks of several age-classes over short distances. Because of fire control, no significant new age-classes had been established since 1913. Major fires covering more than 50% of the valleys had a Mean Fire Return Interval (MFRI) of 65.5, ranging from 42 to 89 years. However, the mean fire return interval for certain vegetation communities occurred at higher frequencies: Douglas-fir forest 17.6 years, grassland-savanna 20.6 years, and

lodgepole pine forest 26.8 years. This contrasts with low return frequencies for subalpine forests at 74.0 years. This pattern of fires for the Athabasca Valley corresponds to the characteristics expected of Aboriginal peoples manipulating the environment utilizing burning. Fires occurred at high frequencies in Douglas fir, grassland-savanna and lodgepole pine forest and were typically of small area and low intensity. Fires at higher elevation occurred at much greater intervals and greater intensity, more characteristic of a natural ignition cycle.

Grasslands and open montane forests are concentrated in valley bottoms in Canadian Rocky Mountain National Parks. These have the greatest significance for ungulate populations and in turn, were of greatest importance for Aboriginal peoples in the past. Higher distribution of prehistoric sites of all types are closely correlated with montane valley bottoms (Chapter 6).

Fires and grassland maintenance

The interrelationship between fire, grasslands and ungulates has not been thoroughly studied for Rocky Mountain regions. However, some studies of burning effects exist for grassland areas. In Kansas, studies by Gibson and Hulbert (1987) demonstrate that burning affects plant species composition, favouring grasses over forbs. Burning also enhances the available nitrogen (Knapp, 1985) and can influence phosphorus (P), potassium (K) and calcium (Ca) levels as well.

In chalk grasslands in Europe, Grubb (1986) notes the importance of grassland maintenance. For many European grasslands, grazing, cutting or burning are essential. Grubb notes that “if management ceases, it quickly develops into a tussocky sward some 30 to 50 cm high, in which fewer species survive and which shrubs and trees invade” (1986:209). As shrubs invade, available direct light

decreases, which in turn favours shrubs and trees. This also increases water retention, which further reduces suitability for grasses. This description is equally appropriate to many Rocky Mountain grasslands.

Reducing grasses in turn reduces suitability for ungulates. In Kansas, Vinton *et al.* (1993) conducted studies on the interactive effects of fire, bison grazing and plant community composition in grasslands. In areas subject to prescribed spring burns, bison were observed up to three times more frequently than expected. Bison consistently grazed on patches with: (1) higher dominance of the warm season grass *Andropogon gerardii*; (2) lower forb species richness, diversity and cover; (3) lower plants species diversity; and (4) higher grass/forbs ratios. In spring, bison preferentially grazed recently burned watersheds, whereas in the autumn and winter their grazing was more evenly distributed.

Although I could find no studies on the effects of burned pasture on the growth rates of wild ungulates, studies of cattle growth performance have been conducted. Like bison, cattle prefer pasture that has been burned. Studies in Kansas show that late spring burning resulted in significantly increased weight gains in cattle in twelve of sixteen summer seasons, perhaps due to increased nutritive value of plants (Smith and Owensby, 1972). It is likely that similar growth performance would occur for wild ungulates. Access to burned grasslands in mountain areas would likely enhance the health, reproductivity and overwintering ability of ungulates, all additional incentives for Aboriginal people to ignite spring fires.

White (2001) formulated and tested several predictions about Aboriginal burning of meadows in the Canadian Rocky Mountains. He suggested that meadow edges should have fire scars that would indicate higher fire frequencies (<10 year intervals) and nearby forest much lower fire frequencies (>50 year intervals). In

addition he predicted that, due to prevailing winds, eastern edges of meadows should demonstrate higher fire frequencies. Thirdly he predicted that fires should have burned more frequently on warm aspects of meadows (south-facing slopes). This would be a significant factor in spring but less so in summer when lightning fires predominate in the fire regime. Lastly, if humans burned meadows in the spring, fire scars should be located mostly in the dormant (fall or early spring), or early wood (spring and early summer) section of the annual growth rings (White, 2001:50).

White examined eight meadows, six of which were in the Central Canadian Rockies and two are to the north in Jasper National Park. Historic logging had removed many fire-scarred trees in three meadows. He found that “downwind ends of meadows had significantly shorter time-since-fire than upper wind ends (66 years versus 88 years, $P=0.026$)” (White, 2001:58). Warm aspects had slightly shorter time-since-fire than cool aspects (67 years versus 89 years). No meadows had mean fire intervals indicative of frequent burning (<10 years), but all meadows had more frequent fires than surrounding areas.

White concluded that “fire history patterns around meadows did not strongly support the hypothesis that meadows were a focus for frequent cultural burning” (White, 2001:67). This was mainly because meadow edges did not meet the prediction of a <10 year fire interval predicted. He also concluded that “the position of the majority of fire scars in the earlywood sections of tree rings...strongly suggests cultural burning as a cause of fires.” He proposed a revised hypothesis for Aboriginal burning:

In the past, humans periodically burned large areas of the Rocky Mountains in the spring season. These burns were relatively more frequent in more heavily human-used lower elevation valleys (mean fire interval <40 years) than in more remote upper elevation valleys (mean fire interval >40 years). Fires often paralleled terrains on south aspects of valleys. (White, 2001:69)

He suggests that Aboriginal people utilised this pattern to manipulate habitat and control herds of bison. By burning on the floors of mountain valleys Aboriginal people might have created laneways that would attract bison. In some situations bison might also have been herded into the valleys where they could be more easily hunted (White, 2001:71).

Conclusions

Traditional burning of selected areas by Native peoples typically occurred in the early spring, was of low intensity, and targeted grassland, savannas and open forests as is documented in the ethnographic and historic literature. Fires were set by Aboriginal peoples to enhance these areas to encourage ungulate productivity and certain plant species. That Aboriginal people burned in the past in areas of Canadian Rocky Mountains is indicated by changes in fire histories, fire frequency rates, vegetation succession, lack of grassland maintenance, incongruity with the climate change record and the distribution of archaeological sites.

Luckman (1986) identified glacial advances within the last millennium. The maximum extent of the Little Ice Age, based on tree ring dates, occurred about AD 1807-1811 (Heusser 1956). Weak glacial advances also occurred in the sixteenth and seventeenth centuries (AD 1500-1700). Figure 9.1 suggests that Aboriginal burning occurred regularly throughout the Little Ice Age largely independent of climate.

Masters (1990) used the date AD 1788 as a temporal division between an earlier 60 year fire cycle (AD 1508-1788) and a later 130 year fire cycle (AD 1788-1928), citing cooler climate associated with the Little Ice Age as the cause for the doubling the length of the fire cycle. Examination of climatic change as reflected by tree ring dates reported by Luckman (1993) does not indicate cooling until after AD

1800. However, the 1780s marked a period of extensive epidemics, especially smallpox, in the Pacific Northwest, which resulted in drastic reductions of Aboriginal populations (Boyd, 1994; Campbell, 1990). If Aboriginal populations utilizing the Central Rockies were drastically reduced at this time, this could also explain the reduction in fire cycles. Intentional Aboriginal burning was a significant factor contributing to the 60-year fire cycle prior to AD 1788; with reduced human ignitions between AD 1788 and 1928, the fire cycle lengthened to 130 years; and with virtually no human ignition after park establishment (e.g. Kootenay National Park 1919), the fire return cycle had been almost totally suppressed. This correlation between intentional Aboriginal burning and fire cycles indicates that climatic cooling in the seventeenth to nineteenth centuries has had very little effect on fire cycles and that, in fact, fires were more frequent during the maximum of the Little Ice Age than during the warmer drier period after 1850.

Masters concluded that “in Kootenay National Park, however, intensive use by European man after 1919 and numerous man-caused fires due to road construction, careless smoking, and cooking fires were not sufficient to overcome the overall effect of cool, moist conditions in impeding the spread of forest fires” (Masters, 1990:1766). It is not surprising that, despite numerous recent accidental fire starts, modern fire suppression ensures that these are extinguished quickly with minimal impact. In fact, “no large fires (>500 ha) occurred in the park between 1927 and 1968” (Masters, 1990:1766).

Johnson and Larsen (1991:199) discuss the possibility that this reduction could be due to a period of reduced Aboriginal utilisation of the valley due to population declines, but note that information about Aboriginal burning effects is incomplete and lacks objective and systematic evidence. In particular, they note that “it is hard to find

well-documented evidence about why Indians would have caused fires as a part of their life style” (Johnson and Larsen, 1991:199). However, as discussed above, the many and varied reasons why Aboriginal peoples burned are well documented (Lewis, 1977,1982; Lewis and Ferguson, 1988; Turner, 1991).

Johnson and Larsen (1991:199) make an important conclusion about what areas in the Kananaskis Valley did burn. They concluded that “whether an area burns is due to chance alone, not to its age or, as is often assumed, to its changing fuel loading with age...If there was an aging process operating that affected the pattern of burn, one should see a pattern of ages in the contiguous mosaics of the stand origin map”. They argue that there is a lack of evidence to support correlation between fire frequency and stand age or topographic differences. Because of this apparent randomness, could human ignition provide a better explanation rather than chance alone?

HUNTER-PREY RELATIONSHIPS

The data from the Central Canadian Rockies are unclear about the intensity of hunting conducted within the region. There are no indications that there were times over the last 1000 years that overall numbers of animals were hunted sufficiently to create periods of reduced numbers. This subject could be investigated further if sample sizes of sites and distinct cultural layers were present in archaeological sites.

GATHERER-PLANT RELATIONSHIPS

It can be assumed that plant gathering occurred within the Central Canadian Rockies. Likely species targeted would have included berries (saskatoons, wild strawberries, huckleberries and raspberries), roots and corms (eg. glacier lilies) (Lowen, 1998;

Peacock 1998). A study of root processing by Secwepemc peoples suggests that at least twenty different root species were used (Peacock, 1998). Of these, two of the most important, blue camas (*Camassia quamash*) and bitterroot (*Lewisia rediviva*), are not found in the study area. Unlike in the Kamloops area studied by Peacock (1998), there are no known root processing pits from the Central Canadian Rockies area and it is unlikely that roots were exploited in any great numbers. There are a number of other plants that could have been utilised for medicinal properties but these are dispersed and were also used in small quantities that would not significantly affect human use of the region.

SACRED AND ASSOCIATIONAL LANDSCAPE IN THE ROCKY MOUNTAINS

Hunter-gatherer cultures often integrate their spiritual ties to the land through direct oral histories, stories and myths. Such accounts often feature landscape elements that are distinctive. These features are often viewed as being created by nature, gods or humans (Keyser and Klassen, 2001:38). The Central Canadian Rockies have several of these features (Figure 9.2). These can be grouped into two main categories: natural features and man-made features. Natural features include eroded spires ‘hoodoos’, hot water and red ochre springs, and distinctively shaped mountains. The only man-made spiritual features identified for the study area are rock art (pictographs) that consist of images painted on rock faces, often under ledges or in small caves.

The Ktunaxa creation account

For the Ktunaxa people there is a significant account of the origin of their land and of all people (Barbeau, 1960:183-188). This story begins at a time in the past when the

land is only occupied by spirits “great and small, parent souls of all things that breathe and grow today” (Barbeau, 1960:183). One of these spirits, Ya-woo-a-nik was “the mightiest of all the great evil spirits”. He lived in Kootenay Lake. He was largely water dwelling and had caused great evil to the other spirits in the land. “So all the spirits good and bad, weak and strong, appealed to the highest medicine, Nach-l-mook-chin, the chief of all the great good spirits for help.”

The great spirit Nach-l-mook-chin, with all the other spirits, began to chase the evil spirit Ya-woo-a-nik up the Columbia River. Hoping to fool his pursuers, Ya-woo-a-nik went up a small creek near Briscoe (possibly Templeton River or Dunbar Creek). Nach-l-mook-chin forced Ya-woo-a-nik up the creek to its source where Nach-l-mook-chin was able to throw a spear into the Evil One’s foot. Ya-woo-a-nik was able to escape but the blood continues to tint the water reddish in this creek. Ya-woo-a-nik continued southward to Windermere Lake and turned up at Morigeau Creek. The great spirit Nach-l-mook-chin sent Coyote after Ya-woo-a-nik. At the headwaters of the creek Ya-woo-a-nik dug an enormous hole to bury himself to hide from his pursuers. The hole is there today and the Kootenays call the hole “Akakuchmitteook”. When Ya-woo-a-nik encountered solid rock he turned and confronted Coyote. Ya-woo-a-nik threatened Coyote so that he ran away. In the meantime the great spirit Nach-l-mook-chin went to the southern end of Columbia Lake where he piled dirt to block the end of lake to prevent Ya-woo-a-nik from escaping down the Kootenay River. At Columbia Lake Ya-woo-a-nik was trapped by all the spirits. A battle ensued and Ya-woo-a-nik died. The great spirit Nach-l-mook-chin took a handful of Ya-woo-a-nik’s blood and threw it, scattering it to all four points of the compass. He said “that will be the beginning of a people with red skin”.

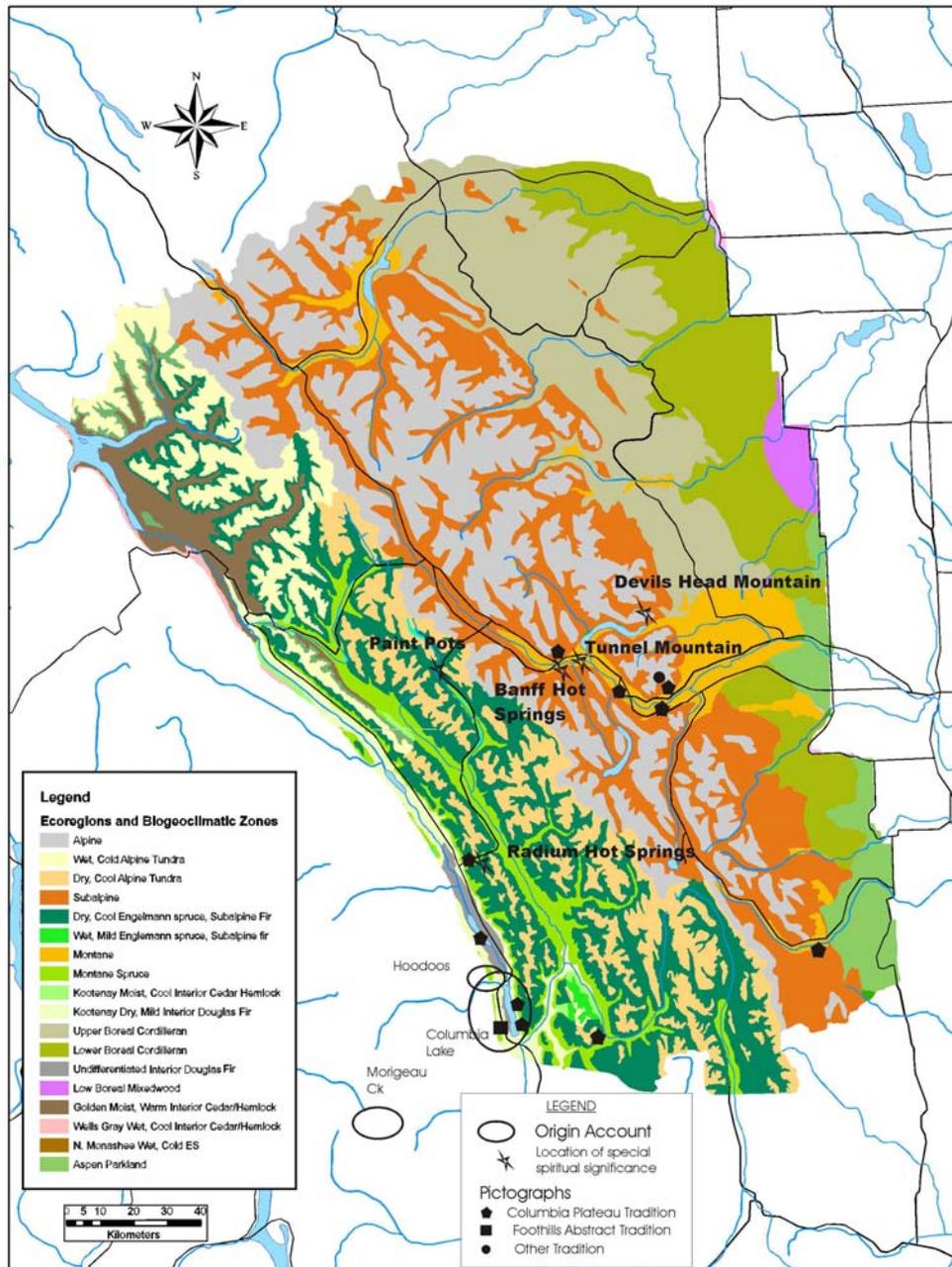


Figure 9.2 Sacred and associational landscape locations.

He also scattered some white fat of the defeated spirit and said “that will be a race of people that will be white”. Then taking the ribs he threw some to the south which became the hoodoos (erosional spires) near Fort Steele. Other ribs were thrown to the north and became the hoodoos at Dutch Creek (Figure 9.3). It is said that at the

bottom of Columbia Lake today is a large red spot that marks the scene of the battle. This account was recorded by W. Langdon Kihn among the Upper Kootenays in 1922 (Barbeau, 1960).

This origin account provides a record of some landscape elements held sacred to the Ktunaxa people. The account specifically refers to the Kootenay River, the Columbia River, a creek opposite Brisco and Morigeau Creek. The site of the great battle, Columbia Lake, is specially marked, not only as the location where the evil spirit died but also as the origin of the red people (First Nations) and white people (Europeans).



Figure 9.3 Hoodoos at Dutch Creek. In Ktunaxa belief, these eroded spires are the ribs of a great evil spirit Ya-woo-a-nik. (Photo: R. Heitzmann 2007).

This account indicates that the land along the Kootenay and Columbia Rivers is considered the homeland of the Ktunaxa people, with a special focus on Columbia Lake. Not surprisingly, then, there are high numbers of archaeological sites, including rock art, around Columbia and Windermere Lakes, as well as the hoodoos overlooking Dutch Creek.

White Swan Lake

A traditional account of inter-tribal warfare among the Ktunaxa was recorded by Olga Johnson (1969:192). A Lower Kutenai warrior “ventured to violate the subterranean cave at White Swan Lake, which was sacred to the Upper Kutenais.” The warrior began to steal food and other property from the Lower Kutenais who were camped at the lake. He was followed by a chief’s son who “struck him, cut off his head, and took the trophy back to the display in the village”. When the warrior did not return to his home near Kootenay Lake his father travelled among the Upper Kootenais listening for what happened to his son. Upon learning what had occurred he followed the villain who was meditating on an island in a high mountain lake. He murdered him there and a battle ensued between the Upper and Lower Kootenais. After three days of fighting, neither side could claim victory. After many years the bitterness subsided and the two groups were reconciled (Johnson 1969:193).

Paint Pots

The Paint Pots are a naturally occurring source for red ochre which is deposited on the surface by cold water springs (Figure 9.2). Red ochre is a material of great power for many people. It is used as a pigment for painting people, objects and rock art at appropriate times. Both the Ktunaxa and the Stoney have a specific place name for

the Paint Pots. These are located near the centre of the study area on the Vermilion River.

Hot Springs

Several hot water springs occur throughout the Central Canadian Rockies (Figure 9.2). Those with large volumes of water have been developed into commercial hot springs. Modern development at both Radium Hot Springs and the Banff Cave and Basin Hot Springs have removed any indications of these being used in the past. However near Radium Hot Springs there were five panels of pictographs that suggest that the hot springs were part of the sacred landscape.

Distinctive Mountains

Distinctively shaped mountains are certainly part of the sacred landscape for the peoples who lived and hunted in or near the mountains (Figure 9.2). Most significant of these were:

Devil's Head – this mountain is visible from the plains to the east of the Rocky Mountains as a thumb shaped silhouette. It was first recorded by Peter Fidler in 1792 and is a translation of the Stoney (Nakota) name based on the mountain's shape (Birell, 2009).

Tunnel Mountain – this a low mountain near the town of Banff. The name Tunnel Mountain was applied in the nineteenth century during railway construction. The Stoney (Nakota) people named the mountain for its distinctive shape, which looks like a sleeping buffalo (www.peakfinder.com). The association of this shape with the bison would have made this an important landmark. Nearby are the Vermilion Lakes with numerous recorded archaeological sites along their shores. On the south side of

Vermilion Lakes are Banff Cave and Basin Hot Springs, which would have added to the sacred importance of this area.

ROCK ART

Art images painted with red ochre or engraved on rock faces are found in only a few locations in the Central Canadian Rockies (Figure 9.2). These have been assigned to a few “traditions” based on similarities of themes and style. None of these has been firmly dated using radiocarbon techniques.

Columbia Plateau Tradition

Keyser and Klassen (2001: 93) reported that this tradition is best known from the interior plateau region of British Columbia, Washington, and western Montana, but that it is also found on the eastern slopes of the Rocky Mountains of southwestern Alberta. Pictographs (painted) and more rarely petroglyphs (incised) were often drawn during vision questing – a personal religious experience where the individual encountered sacred dreams and spirit visions. Themes usually “consist of humans, animals, tally marks and occasional geometric designs” (Keyser and Klassen, 2001:93). At Grassi Lakes site a human figure is painted holding a circular hoop or drum, a probable caribou and two mountain sheep with swept-back horns. At Grotto Canyon a small herd of elk includes two bulls with large sweeping antlers and several cows (2001:96). A hunter is shown hunting this herd. The scene has an implied ground line.

The Columbia Plateau rock art style is considered distinct from that of the North Western Plains (Keyser and Klassen, 2001: 101). The Columbia Plateau style is associated with Interior Salish groups, especially with the Salishan speaking

Flathead and Pend d'Oreille, along with the Kutenai people. This association is based on the self-identification of these groups and their ancestors with some of these sites.

Foothills Abstract Tradition

This stylistic tradition consists of “highly stylised pictographs of humans, animals, masks and mazes [that] symbolise the transformations of shamans on spirit journeys” (Keyser and Klassen, 2001:163). These are also associated with walls of smeared red paint or clusters of human handprints. Representations of bears and zigzag “power



Figure 9.4 Some pictographs of the Foothills Abstract Tradition from Pekisko Cave, just east of the study area. (Photo courtesy of Mike Ents)

lines” sometimes occur. These cluster in central Montana but extend northward along the foothills of Alberta (Figure 9.3). One site on Columbia Lake is also associated.

This tradition is suggested to date from the Late Middle Precontact through the Late

Precontact Period. The absence of horse or gun representations indicates that it was discontinued before approximately AD 1700 (Keyser and Klassen, 2001:163).

The Flute Player of Grotto Canyon

An unusual representation in the Central Canadian Rockies is a pictograph at Grotto Canyon just north of the Bow Valley. Several pictographs are painted on the narrow walls of this canyon including animals, human figures and zigzag lines (Figure 9.4). One is a unique painting of a flute player -- a bent figure playing a flute (Magne and Klassen, 2002). This is reminiscent of the flute player motif well known from the American Southwest. "In Hopi Traditions, this hunched-back trickster has special powers and acts as both a fertility symbol and a rain priest. He can call the rain by

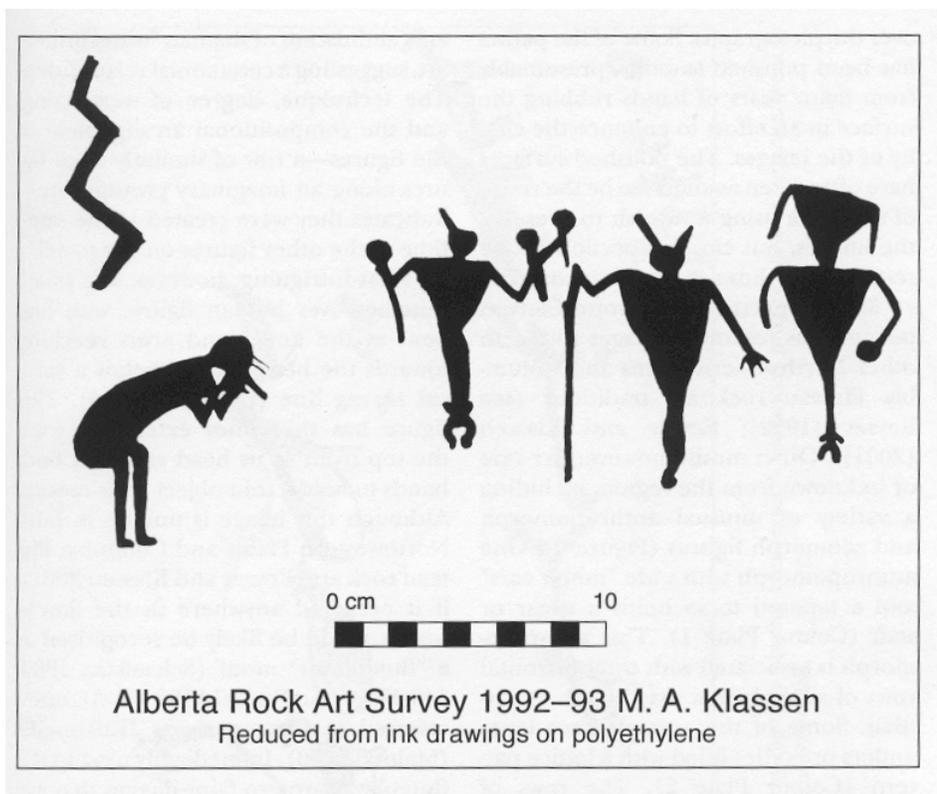


Figure 9.5 Some pictographs from Grotto Canyon (Magne and Klassen, 2002:7).

playing his sacred flute, and he carries seeds, blankets and special gifts with which he seduces young women” (Keyser and Klassen, 2001:106). Magne and Klassen (2002) review several possible explanations as to how this motif may have been brought to the Alberta foothills. They also report Stoney and Hopi accounts that might relate to this painting. Based on stylistic grounds they suggest that this pictograph dates between AD 500 and AD 1300 (Magne and Klassen, 2002:20).

Discussion

Rock art representations in the study area are predominately associated with the Columbia Plateau Tradition that show human, animal, geometric and tally marks. They are primarily associated with personal vision quests. This tradition is associated with the Interior Salish, Salishan and Kootenay-speaking groups of the Interior Plateau. Only two sites in the study area are associated with other traditions. At Grotto Canyon the flute player figure (Figure 9.5) seems to be related to the American southwest tradition, although other paintings at this site are considered part of the Columbia Plateau Tradition. At a site near Columbia Lake a small rock shelter seems associated with the Foothills Abstract Tradition. Significantly there are no representations of the Ceremonial Tradition of the Northwestern Plains, which is found just to the east of the study area (Keyser and Klassen; 2001). Characteristic themes of that tradition show medicine powers that protected warriors in battle. In the study area there are no representations of shield-bearing warriors, V-necked warriors, elaborate humans, conventionalised animals, boat-form zoomorphs, ritual objects, weapons, and mature style horses. These motifs are found widely and extend from the Alberta plains southward to New Mexico and Colorado. Keyser and Klassen (2001:211) indicate that this tradition has a wide distribution but may have derived in part from the Fremont culture (AD 400 to 1300) which may be ancestral to the

historic Shoshone. This rock art tradition seems to have been adopted widely throughout the plains. In particular “the shield-bearing warrior shield designs [have been identified] as Crow, Cheyenne, Sioux, and probably Blackfeet (Chowdrey, 1995; Keyser and Chowdrey, 2000; Nagy, 1994; Sundstrom and Keyser, 1998)” (cited in Keyser and Klassen, 2001:211). The absence of the Northwestern Plains Ceremonial Tradition in the Central Canadian Rockies study area is significant, and suggests that these groups did not commonly frequent the higher elevation foothills or the Central Canadian Rocky Mountains.

CONCLUSIONS

Multiple lines of evidence suggest that burning was an important tool used by the occupants of the Central Canadian Rockies. These targeted grasslands and open meadows typically found on the valley floors. This was a powerful tool that could be used in a variety of ways to attract and control movement of ungulates, which formed a basic component of their largely hunting economy. Although the evidence is still open to debate, I think it highly likely that humans were utilizing fire to manipulate and improve the environment to their benefit.

The creation story of the Ktunaxa and associations of other important aspects of the landscape suggest that this group has a strong association with the Central Canadian Rockies. The presence of Columbia Plateau Tradition and, to a lesser extent, the Foothills Abstract Tradition, at several sites within the Central Canadian Rockies and the absence of the Northwestern Plains Ceremonial Tradition suggest that Northwestern Plains groups did not regularly use the higher foothills or Rocky Mountains of the study area. In the Central Canadian Rockies ecosystem, the Columbia Plateau Tradition can be primarily identified with the precontact Ktunaxa

and possibly precontact Secwepemc, as well. The Foothills Abstract Tradition may be identified with the precontact Nakota and/or Tsuu T'ina. The Northwestern Plains Ceremonial Tradition can likely be identified with Siksika, Piikuni, and Kainai.

The distribution and patterning of the rock art traditions outlined above lends support and confirmation to Model E developed in Chapter 8 and supports the Ktunaxa as the most probable principal occupants of the Central Canadian Rockies in Late Precontact times. The Secwepemc may have entered the area on a more seasonal basis, especially the upper Red Deer and Bow valleys, most likely late summer. The Siksika, Piikuni and Kainai were likely irregular seasonal users. When the Nakota arrived sometime after about AD 1600, they probably found the Eastern slopes only irregularly occupied by other groups and took advantage of the infrequently occupied area to develop an Eastern slopes and foothills cultural adaptation.

CHAPTER 10

IMPACTS OF EURO-CANADIAN CONTACT

INTRODUCTION

The impacts of Euro-Canadian contact are discussed in this chapter. The arrival of European and Canadian colonists from Eastern Canada brought many changes. This chapter considers how the introduction of diseases, horses and guns affected the cultural dynamics of the native people of the Central Canadian Rockies ecosystem. The principal effects were population displacement through warfare and depopulation.

CHANGING POPULATION LEVELS

Aboriginal Populations prior to AD 1800

Most of the Rocky Mountains area was not seen first hand by Europeans until after 1800. By that time, reductions to Native populations due to epidemic diseases were widespread. David Thompson, one of the earliest explorers recorded that “[a]ll these Plains, which are now the hunting grounds of the [Blackfoot] Indians, were formerly in full possession of the Kootenaes, northward; the next the Saleesh [ie Flathead] and their allies; and the most southern, the Snake Indians [Shoshoni] and their tribes, now driven across the mountains”(Tyrrell, 1916:204). Schaeffer (1982) documented one Kootenay band decimated by smallpox epidemics, either in the 1730s or the 1780s. Only fourteen survived the epidemic and they retreated over the Rocky Mountains to join other Kootenay along the Kootenay River.

Campbell (1990) found that for the Northern Columbia Plateau (Washington and Idaho) there is “evidence of a drastic decline in archaeological population estimators sometime between AD 1500 and AD 1750” (Campbell, 1990: 186). Additional epidemics followed which resulted in population totals that show “at least

a 50% decrease occurred from before AD 1775 to AD 1850” (Campbell, 1990:186). This later set of epidemics is likely a result of European contacts along the Northwest Coast of western North America, which had dramatic effects there as well (Boyd, 1994).

That these epidemics spread widely beyond direct coastal zone contacts is recorded by ethnographic accounts of smallpox among Columbia Plateau tribes. For example, John Work in 1829 reported from the Hudson’s Bay Company’s Fort Colville that:

Immense numbers of them were swept off by a dreadful visitation of the smallpox, that from the appearance of some individuals that bear marks of the disease, may have happened fifty or sixty years ago [1769-1779]. The same disease committed a second ravage, but less destruction than the first about ten years afterwards. (Work cited in Chance, 1973).

It seems likely that groups using the Central Canadian Rockies would have experienced declines as well. This is described by Thompson (Tyrrell, 1916:204) and Schaeffer (1982).

About this time a small tribe called Tunaha, camping east of the Rocky Mountains, was nearly exterminated by smallpox. Fleeing from the strange evil, the remnants hurried eastward, but before they had gone far, eight young men left the party and turned their faces to the south. The larger party was never heard from, but the smaller found refuge among the Flathead in a valley near the site of Butte, Montana (Curtis 1911:119).

The Tunaha were a band of the Kootenay (Turney High, 1941). A story collected by Boas, “The Great Epidemic”, may also refer to this event (Boas, 1918: 268-71). Schaeffer (1982) believes that one epidemic that affected the Kootenay occurred around 1736, before the Kootenay had horses, and a second in 1781-82.

Population Movements after AD 1800

As described above, Aboriginal populations over much of the Central Rockies Regions were drastically reduced and many of the remaining populations combined into bands in key strategic environmental areas. The Upper Kootenay, for example, combined into the bands at Tobacco Plains and near Cranbrook. The cultural vacuum on the west side of the mountains in the northern Rocky Mountain Trench was filled by a small group of Shuswap Indians under Chief Kenpesket, who settled there about 1840 (Teit, 1909). The cultural vacuum on the east slopes was filled by the Blackfoot, Stoney, and Sarcee, who utilised the Rocky Mountains area periodically in the nineteenth century (Andersen, 1970; Dempsey, 1998; Jenness, 1939).

The area between the Athabasca and North Saskatchewan Rivers was of key importance to the Wood Stoney bands in the nineteenth century. These groups gradually moved southward along the foothills in the later half of the nineteenth century. The estimated total population of the three bands of Stoney in the Bow Valley was about 7000 in 1874 when a mission was established (Andersen, 1970).

THE HORSE AND GUN REVOLUTION IN THE CENTRAL CANADIAN ROCKIES

Binnema (2001:87) declares that “the arrival of the horse and gun revolutionised patterns of human interaction on the northwestern plains between 1700 and 1770”.

Did guns and horses also have effects on the Central Canadian Rockies?

Horses entered North America primarily through the Spanish colonies of the south. By 1598, the Spanish had established a small settlement at Santa Fe, New Mexico. This isolated community survived mainly on stock raising and a small amount of fur trading with the natives. The surrounding Pueblo and Ute likely

learned horsemanship from the Spanish and, when some horses escaped, these were acquired by Indian groups. In 1680 the Pueblo conducted a successful revolt against the Spanish and captured many Spanish horses (Binnema, 2001:88). By the 1730s horses spread northward through the Great Basin and the Shoshoni were trading them with the Crow, Nez Perce, and Flathead bands. The Kutenais acquired them shortly after.

Horses gave a great military and logistical advantage to Indian groups who possessed them. Not only could mounted horsemen travel further and faster than those on foot, but they could also carry more supplies with them. Horses also made “finding and transporting game...much easier, and successful hunting by means of the mounted chase was conducted with comparative ease” (Landals, 2004:244). Another significant factor was the size of horses, which must also have been a surprise factor to those unfamiliar with them. But horses also have significant care requirements that could be a challenge for their owners (Landals, 2004: 246-247). For example, the average grazing horse in Western Canada requires between 20 and 43 litres of water per day, but a working horse can require much more. Horses also required significant areas of grazing, which in winter could be difficult to access because of snow cover.

Binnema (2001) suggests that horses gave the Shoshoni and Crow a military advantage on the Northwestern Plains for a short time after 1730. They forced the Blackfoot and Gros Ventre to retreat to the North Saskatchewan River region. Because of their friendship with the Shoshonis, the Flathead and Kutenai bands were able to occupy the western margins of the plains at this time. By the middle of the eighteenth century, however, fortunes were turning. The Blackfoot and Gros Ventre acquired horses possibly from the Kootenai or Flatheads. Equally important, after 1730 the British and French expanded their trade for furs along the North

Saskatchewan River. By the 1750s and 1760s, guns and ammunition were being traded to the Cree and Assiniboine, who in turn traded some of these to their Blackfoot allies. The Blackfoot and their allies became the dominant military force on the Northwestern Plains between 1740s and 1780s (Binnema, 2001:103).

The smallpox epidemic of 1781 was particularly virulent, causing major population reductions throughout the Northwestern Plains (Smyth, 2001:166). It also brought the end of the Plains Kutenais. In 1811 Alexander Henry the Younger recorded that the Kutenais

...being driven into the Mountains by the different tribes who inhabited the Country to the Eastward of them, and with whom they were perpetually at War, they in their turn waged War upon their harmless neighbours to the Westward, the Snare Indians, and soon drove them away from off the Lands the Kootonaes now inhabit, which is the upper part of the Kootonaes or Columbia River. (Gough, 1992:522).

In 1799 the Hudson's Bay and North West Company established trading posts at Rocky Mountain House in the extreme northeast corner of the study area. They were hoping that the Kootenay would come to these posts to trade. However, when the Kootenay tried to reach the post in the fall of 1800 they were harassed along the way by the Piegan, who stole most of their horses (Arima, 1995:37-40). "A few handfuls of Kootenay reached Rocky Mountain House over the years [1800-1806], but no real Kootenay trade ever developed east of the Rockies" (Smyth, 2001:255). In the spring of 1807 David Thompson crossed the Rocky Mountains by way of Howse Pass and established Kootenae House, the first trading post on the Columbia River located just north of Windermere Lake (Belyea, 1994; Heitzmann, 2006). One of the activities that the fur traders engaged in over the subsequent two winters was capturing wild horses from the grasslands around Kootenae House. Some of these were trained and used as pack animals on the crossing of Howse Pass to Rocky Mountain House (Heitzmann, 2006; Tyrrell, 1916:377-378).

Soon after construction of Kootenae House began, Thompson was visited by the Peigan. Thompson noted that “I had expected them long ago, & it must be their Policy to be highly displeased with us for being here, as we thus render all these Indians independent of them over whom from time almost immemorial they have held in dependence or as enemies, & destroyed them” (Belyea, 1994:62). The Peigan objected to Thompson trading guns to the Kootenay because they had previously been in a middleman role where the Peigan could sell trade items to them at a considerable markup. As middlemen the Peigan could also control the flow of guns and ammunition to the Kootenay. With the fur traders trading directly, the Peigan were cut off from this role. In response they harassed the fur traders attempting to supply the Kootenay trade from Rocky Mountain House. In 1810, the Peigan established a blockade on the North Saskatchewan River and forced Thompson to establish a new northern route following Athabasca Pass. Thereafter, “neither the North West Company nor the Hudson’s Bay Company ever again used the Howse Pass as a transportation route” (Smyth, 2001:260). However, the traders continued to trade guns to the Kootenay, Salish, Flathead and other groups on the west side of the Rocky Mountains. “In the second decade of the 19th century with the acquisition of guns by all principal foes [of the Blackfoot Confederacy], territories appear to have become relatively stable even if border lands remained subject to dispute” (Arima, 1995:106).

Much of the eastern slopes and foothills of the Rocky Mountains was occupied by the Nakoda, Sarcee, and Peigan through the nineteenth century. But in the spring of 1832 the Hudson’s Bay Company constructed a new post, Peigan Post, on the Bow River. While returning to Fort Edmonton somewhere along the foothills front, fur trader John Rowand traded with thirty-three Kootenay. Soon after the Kootenay were attacked by a group of Kainai and Siksika but were “...able to defend themselves

thanks to ammunition obtained from Rowand (Arima, 1995:148). This is the last reference to the Kootenay on the eastern slopes in the historic period.

CONCLUSIONS

Contact with the European and Canadian fur traders dramatically affected native populations throughout Western Canada. In the Rocky Mountains, the effect of introduced diseases reduced overall population levels and in some cases created areas with little or no resident populations. The introduction of horses from the south and guns from the northeast further changed cultural dynamics by upsetting traditional alliances between some groups, and by enhancing intertribal raiding and warfare. In the Central Canadian Rockies, the net effect was that by the 1880s the eastern slopes of the Rockies were occupied primarily by Nakoda and Sarcee people and the western slopes were occupied by Kootenay and Shuswap groups.

CHAPTER 11

CONCLUSIONS

INTRODUCTION

In this final Chapter, I discuss conclusions about how the data from the Central Canadian Rockies Ecosystem relate to models of hunter-gatherer behaviour. In discussing these, I consider the significance of the application of hunter-gatherer models to archaeology and ecology. I also make recommendations on ways to enhance similar studies to further advance the application of theories of hunter-gatherer behaviour to cultural and natural landscapes.

HUNTER-GATHERER DYNAMICS

It is now time to return to some basic ecological principles and to examine how these relate to how hunter-gatherers utilised the Central Canadian Rockies Ecosystem. Winterhalder states that one has “to come to an understanding of what constitutes an analytically sufficient environmental description, one more cognizant of history” (Winterhalder, 1994:32). Key to applying hunter-gatherer approaches to environmental studies is the concept of patch and patchiness (Pickett and White, 1985; Wiens, 1976). Increased variability of the number of patch types and their size, quality, turnover and developmental dynamics (e.g. succession), and distribution, (Winterhalder, 1994:33) affects the overall availability of prey species. It is, however, difficult to model patchiness through archaeology because of the difficulties inherent in palaeo-climatic reconstructions (Sheehan 2004). For the Central Canadian Rockies the percentage of high quality Montane (7.8%) or Interior Douglas fir (2.4%) ecozone areas is limited and the size of specific modern patches is restricted to several linear valleys. Their distribution is dispersed and separated by patches of ecozones of

low value to ungulates and therefore to their human predators. Most of these ecozones, including Sub-alpine (32%), Upper Boreal-Cordilleran (12%), Lower Boreal-Cordilleran (11.6%) or Alpine (25%) ecozones (collectively 80.6% of the total area), have generally poor carrying capacity for ungulates, and in turn for humans. Edible plants, while present in most areas, are only available during brief seasonal periods and do not occur in sufficient numbers to sustain human populations. Low suitability habitats were correlated in Chapter 5 with low site densities in these ecozones. Sites located in these zones were small and transitory.

Variations over time and long-term trends are also important in considering ecological functioning. The analysis of C14 dates in Chapter 5 suggests that there has been long-term use of the Central Canadian Rockies over the last millennium. From this we can assume that the resources available to humans persisted at a continuing level despite possible periodic variations over short periods. That certain key sites or localities were returned to repeatedly was identified in Chapter 6, a finding that implies that there was a degree of persistence in the pattern of resource availability and that resources were predictable over the long-term. The above, however, does not exclude the possibility of unique events or cultural dynamics outside of the postulated models.

Chapter 7 identified that the subsistence basis varied with the location of sites. In the foothills, bison hunting in the late winter and early spring was emphasised at Hunter Valley and Pigeon Mountain sites. In the upper Bow Valley, a wider range of animals were exploited at Christensen and Echo Creek sites. Muleshoe Lake Site which is also in this area, was likely occupied in late winter or early spring. In the Columbia Valley, salmon fishing was important in late summer or early fall, but at the

Columbia Lake Site a wide range of animals indicates winter and spring hunting as well.

Stone tool and debitage analyses in Chapter 7 also revealed some interesting patterns. Coarse-grained lithic materials were more commonly used on sites where butchering and smashing of faunal remains was important. In contrast, fine-grained lithic materials formed larger percentages at sites where slicing and processing was more important.

Non-local materials lithic materials occurred at most sites which provides an indication of importance of these materials. There was a cost to obtaining these materials, either through trade or direct transport. Some of these materials were brought hundreds of kilometres from Montana (chert and obsidian), North Dakota (Knife River Flint) and Manitoba (Swan River Chert). These materials were preferred for making stone tools, particularly projectile points.

The definition of forager and collector catchment areas based on the distance that could be reasonably reached within one or two days is significant, as described in Chapter 8. These catchment areas indicate that hunter-gatherers could and did exploit much of the region in a structured approach that systematically maximised use. It is, however, unlikely that this approach was structured intentionally. It was, more likely, unconsciously followed by the groups using the area to maximise returns.

EVALUATION OF THE APPLICATION OF HUNTER-GATHERER MODELS TO A MOUNTAIN ECOSYSTEM

Throughout this thesis several commonly applied concepts and approaches utilised in hunter-gatherer studies have been employed. These are woven throughout the analyses undertaken in this study. Those that apply are considered below in the rest of this section.

Diversity and stability

Bettinger (1980:205) identified that “narrow spectrum (specialised) adaptations occur in specialised environments”. It seems clear from the evidence presented here that the Central Canadian Rockies are a specialised environment with limited resources confined to small key areas. Ungulates were concentrated along the few valley bottoms and comprised a limited number of prey species and a restricted prey population. Salmon were found only in the Columbia Valley and only during a very short season. Even bison when they sought shelter in the eastern foothills in the winter likely occurred in small dispersed groups rather than the large herds typical of the High Plains. Available and exploited plants were also confined to short seasonal periods and occurred in low quantities that would have required intensive collecting to obtain adequate amounts to dry for surpluses. As a result, human adaptations to this environment appear to have exploited a very narrow resource spectrum.

In a related concept, Wilmsen (1973) proposed that highly unstable resources promoted the development of large and more centralised settlements. This is supported partially in this study by the distribution of major campsites. Most of the base camps were relatively large and located along major valley bottoms. It is likely that small parties travelled outwards from these, seeking to exploit the dispersed highly unstable ungulate resources. Similarly, another hunter-gatherer concept

proposes that, when the cost of resource procurement is high, the subsistence territory becomes large (Dyson-Hudson and Smith, 1978; Harpending and Davis, 1978; MacArthur and Pianka, 1966; Weins, 1976). It can be speculated that because of the generally low density of animal resources, the subsistence territory utilised would have been very large in the Central Canadian Rockies Ecosystem.

Optimal foraging

Optimal foraging, when applied to hunter-gatherers, suggests that they will seek to maximise caloric return for the amount of time and effort devoted to that activity (Binford, 2001; MacArthur and Pianka, 1966; Pyke *et al.*, 1977; Schoener, 1971; Sheehan 2004). This assumes that one can determine the caloric output of hunter-gatherers on any activity and the caloric return of resources obtained. Unfortunately this is virtually impossible in an archaeological context because so much data are missing about factors such as size of groups, length of time spent on the activity, and the representativeness of archaeological materials recovered (Jochim, 1998). Even so, ranking available food resources in Chapter 7 suggests that hunter-gatherers in the Central Canadian Rockies Ecosystem focussed generally on high ranking ungulate resources, or on large quantities of fish (salmon) when available.

Movements among habitats

Winterhalder (1981:68) suggested that foragers react to variations of uneven distribution of resources in predictable ways. Where there are relatively few habitats, foragers become specialised on a few habitat types. The sites analysed in Chapters 5 and 6 indicate that relatively few high value habitat types existed and as a result the

Central Canadian Rockies foragers specialised in utilising a few habitat types such as grasslands and open forests on valley floors.

Little can be said about what triggered precontact foragers to move or not to move from one habitat type to another. As Bailey points out, “[a]rchaeological data...more often represent aggregates of behaviour indicating average tendencies over long time spans” (1981:4). Grayson and Cannon (1999:143) advocate utilising landscape models to model use of entire landscapes. It is this type of landscape modeling which was explored in Chapter 8. The models developed could benefit by the consideration of “substantial palaeo-environmental knowledge and precise control over the archaeological record” (Grayson and Cannon, 1999:144). My study could certainly have been strengthened if more of this type of data was available.

Risk and uncertainty

Although there is considerable anthropological theory and literature concerning risk and uncertainty, there are no data available in this study to consider responses to starvation, raiding, theft, or appropriation. Minc and Smith (1989) identify four basic categories of risk response: diversification, mobility, storage and exchange. Of these only storage is likely to leave an archaeological signature in this study area. There are very few sites in the study area where storage was used and no indications of what materials were stored, nor what might have motivated storage, although speculation is possible. Exchange might have been operative in the Central Canadian Rockies if lithic (stone) materials were exchanged for foodstuffs such as dried berries, fish or bison. Unfortunately the archaeological record is not sufficiently refined to determine if exchanges of this type were operative.

Organisational-based approaches

Organisational-based approaches to hunter-gatherers seem to have the most applicability in this study. The basic division between foragers and collectors as proposed by Binford (1980:5) has some applicability to this study (Chapter 8). The analyses in Chapter 8 suggest that the groups in the Central Canadian Rockies may have used an approach similar to Binford's forager strategy. Base groups would have moved from base camp to base camp along the valley floors in search of locally available resources. At the same time small hunting groups seem to have ranged out further (perhaps in approximately 25 km radius areas) to cover larger areas.

Effective temperature and mobility patterns

Binford (1980:11) correlated effective annual temperature with four settlement patterns. Temperate and boreal environments commonly correlated with semi-sedentary and sedentary hunter-gatherers. The Central Canadian Rockies are similar to some boreal environments. The evidence suggests, however, that the occupants of this region could be considered somewhere between semi-sedentary and semi-nomadic, having to move frequently but constrained by territorial limits. If they occupied villages, it was probably only in a few semi-permanent localities within the Columbia Trench.

Travellers and processors

Bettinger and Baumhoff (1982:488) identified two strategies. Travellers rely on high ranked resources and are willing to invest in greater travel time to obtain these.

Processors are willing to invest greater processing time on lower ranked resources rather than travel to higher ranked resources. In the case of the Central Canadian Rockies, it appears that the hunter-gatherers were willing to travel great distances, perhaps crossing high altitude mountains at least once, if not more times, throughout the year, to obtain high ranked resources such as bison on the eastern slopes or salmon in the Columbia Valley. Being processors was probably not an option for the occupants of the Central Canadian Rockies; there simply were insufficient amounts of low ranked resources to support a processors' strategy.

Adaptive peaks

Adaptive peaks may be achieved when all systems (subsistence, settlement, socio-political demographic and ideological) adjust to produce a locally optimal solution (Bettinger and Baumhoff, 1991:489). While we cannot definitively say what a locally-optimal solution was for the hunter-gatherers who utilised the Central Canadian Rockies, it is tempting to suggest that the Model E suggested in Chapter 8 was the adaptive peak solution achieved in the Late Precontact Period.

Population and group size

Wobst's (1974, 1976) study of populations of hunter-gatherers suggested minimum numbers for functionally reproductive groups over long time spans. He proposed a minimum band size of about 25 members operating within a mating pool of between 175 and 474 members. It seems likely that only a small number of such bands could

have operated within the Central Canadian Rockies Ecosystem. It is more probable that several bands utilised portions of the ecosystem for portions of the year. I would suggest that no more than four or five bands could have utilised portions of the ecosystem over the year. This would mean that fewer than 125 people could have been in the ecosystem throughout the year. Each of these bands may have interacted with some or all of the bands within the Central Canadian Rockies, but it is likely that they also interacted with some other bands outside of the area.

Stone tool technology and territoriality

There have been attempts to correlate prehistoric foraging territories with stone tools based on their geological sources of raw materials (Hughes, 1984; Shackley, 1990). In my study, these questions were examined in Chapter 7. Although there is evidence that some lithic materials were widely distributed, only obsidian, Top of the World Chert and a few other chert types seem to have been of sufficient quality to be transported throughout much of the ecosystem.

FURTHER APPROACHES TO RESEARCH

This study highlights a number of approaches to explore the nature of hunter-gatherer utilisation of the Central Canadian Rockies. Several aspects to further research are suggested by this study. On a very basic level, archaeologists in the region should seek to develop much more fine-scaled data. More sites of all types should be investigated to determine where, when and how these fit within the larger ecosystem pattern. Larger base camps should be carefully excavated to obtain multi-component identifications of materials within the time span of the Late Precontact Period (and

any other periods as well). More C-14 dating should be undertaken of more archaeological layers wherever possible to tie materials with absolute dates.

Lithic materials and tools should be carefully compared to type specimens so that similarities and differences are more easily explored. Detailed measurements and descriptions would greatly facilitate further analyses and comparisons. Where possible DNA identifications of bone fragments might assist to define the range of species hunted. Identification of seasonal usage would greatly enhance our overall regional perspective.

Further environmental research would also be of great assistance. New techniques and approaches to the question of Aboriginal burning might refine, confirm or negate the extent of such activities. Additional palaeo-environmental studies such as palynological studies might be useful in identifying fire frequencies as well as changing vegetational distributions.

CONCLUSIONS ABOUT THE LATE PRECONTACT PERIOD

A review of the Late Precontact Period is presented in Chapter 4. The questions generated from that review are some fairly basic ones. Who utilised this area, how was it used and what kinds of impacts did they have? Three lines of evidence suggest that the occupants of the Central Canadian Rockies were different from those who occupied the plains to the east. Firstly, the Old Women's Phase groups to the east manufactured and used low-fired ceramics that are found widely throughout the plains. Only a few pieces of these ceramics have been found along the eastern margin of the study area. Remains of several vessels were recovered from the Hunter Valley Site that has been interpreted as resulting from a Stoney/Assiniboine occupation here. However, the absence of ceramics at all of the major campsites contained within the

upper Bow Valley and west of the continental divide suggests that the majority of the occupation of the Central Canadian Rockies was likely by a different group.

Alternatively, when eastern groups moved into mountainous or foothills terrain they may not have brought or used ceramics there, possibly replacing them with baskets or wooden vessels.

The second line of evidence that indicates that the Central Canadian Rockies were occupied by a separate group is the distribution of the Columbia Plateau Pictograph Tradition (Chapter 9), which is distinct from the Northwestern Ceremonial Tradition found to the east and southeast of the study area. This suggests that occupants of the adjacent plains rarely entered the Central Canadian Rockies and that they did not feel a spiritual connection with it.

A third line of evidence is the distribution of exotic lithic materials. This is discussed in more detail in Chapter 7. The widespread distribution of Top of the World Chert suggests that it was transported directly throughout the study area. Most other lithic materials derived from sources outside the area were used in small quantities and likely for specialised uses. It is uncertain whether these materials were obtained through trade or direct transport. Either or both mechanisms could have been utilised.

Calibrated C14 dates are illustrated in Figure 5.4 showing dates from the Eastern and Western Slopes. While there is a continuous series of dates for both areas, the data for eastern slopes may be significant for the later part of the study period. In the period from AD 1000 to 1600 there are 30 radiocarbon dates, whilst only two sites have dates after approximately AD 1600. One is from the Drummond Pithouse site along the Red Deer River. The second is from the Pigeon Mountain Site, which has several unique characteristics (see Chapters 6 and 7). C14 dates have

sometimes been used as a proxy for population (eg. Goodale *et al.*, 2004). The small number of sites with radiocarbon dates after AD 1600 may be a result of reduced population. This might also provide additional support for the hypothesis of reduced aboriginal burning after 1730 discussed in Chapter 9.

CONCLUSIONS ON THE HISTORIC PERIOD

Contact with European and Canadian fur traders dramatically affected native populations throughout Western Canada. In the Rocky Mountains, the effect of introduced diseases reduced overall population levels and created areas with small or no resident populations. The introduction of horses from the south and guns from the northeast further changed cultural dynamics by upsetting traditional alliances between some groups, and by enhancing intertribal raiding and warfare. In the Central Canadian Rockies, the net effect was that by the 1880s, when the settlement period began, the eastern slopes of the Rockies were occupied primarily by Nakoda/Assiniboine and Sarcee people and the western slopes were occupied by Kootenay and Shuswap groups. There was, however, little understanding by the Europeans of the role that the mountain habitats had in the lives of Aboriginal people. Lands perceived as vacant and under-utilised were set aside for parks, forestry and mining. Aboriginal people were assigned reserves where they could be enculturated with Western ideals.

CONCLUSIONS

This study has utilised archaeological and environmental data and archaeological theory and approaches to develop an understanding of how, where and when hunter-gatherers utilised the Central Canadian Rockies ecosystem during the Late Precontact

Period. Although there is a great deal of data, some of it is of dubious quality and utility. Some previous research was not conducted to high standards and some is poorly reported and inconsistent. Nonetheless, the data, when viewed as a whole, can be used to support a model of hunter-gatherer use that provides a broad perspective of human use of the region in the past. This model indicates that a small number of bands of foragers crossed the Rockies on a fairly regular cycle, moving from nodes or localities of seasonal productivity to others. In particular, wintering bison along the eastern slopes of the Rockies probably provided a key resource that was essential to the basic economy of bands. With periodic bison hunting in the fall and late winter/spring, it was possible to support a more dispersed hunting and gathering economy throughout the remaining portions of the year. Late summer and early fall was likely spent at the salmon fisheries along the Columbia River and at Columbia Lake. The coldest part of the winter was also likely spent at regular winter localities along the Columbia. Spring and summer were likely spent at more dispersed localities in the higher mountain valleys where forest and mountain ungulates like elk, moose, deer and mountain sheep could be taken.

This study indicates that several theoretical concepts about hunter-gatherers have applicability to a relatively remote area with a low population density in the past. Theories about hunter-gatherers found to be applicable include diversity and stability, optimal foraging, movements among habitats, risk and uncertainty, organisational based approaches, effective temperature and mobility patterns, travellers and processors, adaptive peaks, population and group size, and stone tool technology and territoriality. Each of these has contributed to the understanding of the groups who occupied the Central Canadian Rockies ecosystem in the Late Precontact Period.

IMPLICATIONS FOR PROTECTED AREAS MANAGEMENT

I began this study asking the question: “can anthropological models of hunter-gatherer societies be applied to provide an understanding of ecosystem dynamics in the Central Canadian Rockies and the role of humans in that ecosystem?” In exploring this question, I have sought out anthropological concepts of hunter-gatherer adaptations and attempted to apply these to this region. The archaeological data are clear that human occupation has been of subtle influence in the region. The small populations of hunter-gatherers and their low intensity utilisation suggest that humans had little long-term impact. Only Aboriginally-ignited fires could have had consequential impacts on an ecosystem scale. Alterations of grassland/forest composition could have affected ungulate populations and behaviour. However, as discussed in Chapter 9, aboriginal burning can be inferred but conclusive proof has yet to be identified. Whether anthropogenic burning was intentional or inadvertent, burning seems to have played an important role in shaping this ecosystem. This study has contributed to the discussion of what constitutes the Central Canadian Rockies ecosystem by examining the nature and extent of human use and influence.

This study also demonstrated that there was a relatively sustained occupation of the region over time by hunter-gatherers. They focussed primarily on hunting larger ungulates but took smaller game when the opportunity presented itself. These people were travellers, seemingly quite willing to travel long distances over difficult terrain to obtain higher value resources. By following these strategies the hunter-gatherers of the Central Canadian Rockies did not actively follow ecological conservation practices designed to prevent or mitigate species depletion or perhaps even to enhance habitat (Smith and Wishnie, 2000). Instead, members of this society likely pursued “enhancement of the resources needed for livelihood, safeguarding of

homelands from exploitation by outsiders, and allocation of subsistence effort to the most rewarding areas and resources currently available” (Smith and Wishnie, 2000:516). These choices may have had an effect on conserving habitats and biodiversity, but were probably not designed to do so.

Model E, the integrated model formulated here Figure 8.7, has better defined the relationship of the nineteenth century users of the area, the Ktunaxa, focussed on the Columbia Trench to the west; the Nakoda and possibly other plains groups (Siksika) to the east; and the Secwepmc, travellers from the north and west. This model and the archaeological data on which it is based suggest that this pattern has a time depth of at least a thousand year throughout the Late Precontact Period. During that time, hunter-gatherers seem to have been part of the ecosystem, subtly influencing its structure and composition.

APPENDIX 1**RECORDED ARCHAEOLOGICAL SITES**

The following are listed in alphabetical order using the Borden Number the system used for designating archaeological sites in Canada. These follow a grid from east to west and south to north. Ordinal numbers (eg. Site 1) are referred to on Figures 5.9 and 5.10.

EbPp-19 (Site 1) UTM 11U E670800 N5572500 Map 82J07

Site type: transitory camp site

Location: Site is located on an open terrace or alluvial fan adjacent to a small stream which joins Cataract Creek.

Major Drainage: Bow River

Site size: 90 x30 m (2700m²)

Materials: 1 small chert side-notched point base, endscraper, 3 siltstone flakes, 30 chert pressure flakes, obsidian flake, retouched chalcedony flake, white chert pressure flake, tooth and 2 bone fragments from large mammal

Recorder: Gryba 1981

EbPp 23 (Site 2) UTM 11U E 669900 N 5572100 Map 82J/7

Site type: transitory camp site

Location: The site is located on a high terrace along the north side of Cataract Creek.

Major Drainage: Bow River

Site size: approximately 75 x 50 m (3750m²)

Materials: 2 side notched chert projectile points, siltstone biface, 23 chert flakes, 1 chalcedony flake, 2 obsidian flakes, 64 siltstone flakes

Recorder:Gryba 1981

EbPp-29 (Site 3) UTM 11U E 668600 N 5571900 Map 82J/7

Site type: transitory camp site

Location: The site is located on an alluvial terrace above Cataract Creek.

Major Drainage: Bow River

Site size: 30 x 25 m (750 m²)

Materials: assigned to Late Plains (A.D. 500 –A.D. 1200) (Avonlea Phase?)

Recorder: Rogers 1973

EbPp-31 (Site 4) UTM 11U E668400 N5571800 Map 82J/7

Site type: transitory camp site

Location: The site is located on an alluvial terrace adjacent to Cataract Creek.

Major Drainage: Bow River

Site size: unknown

Materials: Late Plains A.D. 1250 – A.D. 1800

Recorder: Rogers 1973

EbPp-42 (Site 5) UTM 11U E668700 N5577900 Map 82J/7

Site type: transitory camp site

Location: The site is located on an alluvial terrace adjacent to Etherington Creek.

Major Drainage: Bow River

Site size: unknown

Materials: Flake point (probably Late Plains?)

Recorder: Rogers 1973

EbPp-65 (Site 6) UTM 11U E670000 N5572100 Map 82J/7

Site type: transitory camp site

Location: Site is located on a low terrace near Cataract Creek.

Major Drainage: Bow River

Site size: unknown

Materials: 1 chert side-notched point, 12 siltstone flakes

Recorder: Gryba 1981

EbPp-66 (Site 7) UTM 11U E671000 N5572000 Map 82J/7

Site type: transitory camp site

Location: Site is located on a small terrace at the junction of small creek and Cataract Creek.

Major Drainage: Bow River

Site size: 50 x 50 m (2500m²)

Materials: 1 small chert side-notched point, 1 chalcedony pressure flake, 5 obsidian pressure flakes, 1 split siltstone cobble, 37 burnt bone scraps.

Recorder: Gryba 1981

EbPw-1 (Columbia Lake Site/Spirit Trail) (Site 119) UTM 11U E584397 N5559741
MAP 82J01

Site type: base camp

Location: site is located on the east side of Columbia Lake.

Major Drainage: Columbia River

Site Size: 2200 x 500 m (1,100,000 m²)

Materials: Pictographs on rock face, thousands of items (see Chapter 6)

Recorder: Mohs 1980, Yip 1981

EbPx-5 (Site 120) UTM 11U E581749 N5568269 Map 82J04

Site type: base camp

Location: Site is located on a low terrace on the east side of Columbia Lake.

Major Drainage: Columbia River

Site Size: 170 x 75 m (12750 m²)

Materials: 1 small chert side notched projectile point, chert, obsidian and quartz flakes observed.

Recorder: Sneed 1977

EbPx-10 (Site 121) UTM: 11U E581622 N5561352 Map 82J/04

Site type: base camp

Location: Site is located on the west shore of Columbia Lake near the mouth of Marion Creek.

Major Drainage: Columbia River

Site size: 82 x 76 m (6232 m²)

Materials: 1 triangular, 1 side notched and 1 corner notched projectile point, 2 scrapers and 1 marginally retouched stone tool (RBCPM)

Recorder: Borden 1954; Sneed 1977

EbPx-16 (Site 122) UTM: 11U E581854 N5558159 Map 82J/04

Site type: base camp

Location: Site is located on the southwest side of Columbia Lake, on a terrace.
Major Drainage: Columbia River
Site size: 80 x 70 m (5600 m²)
Materials: 1 side notched projectile point, 2 marginally retouch stone tools (RBCPM)
Recorder: Borden 1956; Keddie 1971; Choquette 1974

EbPx-57 (Site 123) UTM E581877 N5559296 Map 82J/04

Site type: transitory camp site
Location: Site located on a low knolls and terrace on the west side of Columbia Lake.
Major Drainage: Columbia River
Site Size: 80 x 30 m (2400 m²)
Materials: 1 small chert side notched projectile point, flakes, bone, fire cracked rock observed.
Recorder: Sneed 1977

EbPx-66 (Site 124) UTM 11U E580972 N5564809 Map 82J/04

Site type: transitory camp site
Location: Site is located on the west side of Columbia Lake between Hardie Lake and Marion Creek on a long narrow high terrace.
Major Drainage: Columbia River
Site size: 100 x 20 m (2000 m²).
Materials: 1 side notched projectile point (RBCPM)
Recorder: Sneed 1977

EbPx-78 (Site 125) UTM 11U E579611 N5566871 Map 82J/04

Site type: hunting/kill site
Location: Site is located on on a high ridge east of Hardie Creek on the west side of Columbia Lake.
Major Drainage: Columbia River
Site size: 1 m²
Materials: 1 side notched projectile point (RBCPM)
Recorder: Choquette 1987, Handly and Lackowicz 2000

EbPx-79 (Site 126) UTM 11U E579729 N5566693 Map 82J/04

Site type: transitory camp site
Location: Site is located on on a high ridge east of Hardie Creek on the west side of Columbia Lake.
Major Drainage: Columbia River
Site size: unknown
Materials: 1 side notched projectile point (RBCPM)
Recorder: Handly and Lackowicz 2000

EcPp-24 (Site 8) UTM11U E668300 N5584200 Map 82J/7

Site type: transitory camp site
Location: Site is located on a small terrace above the Highwood River
Major Drainage: Bow River
Site size: unknown
Materials: Late Prehistoric projectile points
Recorder: Quigg 1981

EcPq-1 (Site 9) UTM 11U E664600 N5584500 Map 82J/7

Site type: transitory camp site

Location: Site is located on the valley rim overlooking the Highwood River.

Major Drainage: Bow River

Site size: unknown

Materials: 1 side notched projectile point, lithic debris, burnt bone

Recorder: Gryba 1979

EcPq-23 (Site 10) UTM 11U E663800 N5585400 Map 82J/7

Site type: transitory camp site

Location: The site is located along the valley rim on the east side of the Highwood River.

Major Drainage: Bow River

Site size: 100 x 30 m (3000m²)

Materials: notched projectile point, lithic debitage (chert, quartz, obsidian), burnt bone

Recorder: Gryba 1979

EcPx-4 (Site 127) UTM E571435 N5590979 Map 82J/05

Site type: base camp

Location: Site is located on a long gravel spit extending from the east shore of Windermere Lake.

Major Drainage: Columbia River

Site size: 150 x 20 m (3000 m²)

Materials: n/a

Recorder: Borden 1954, Sneed 1977

EcPx-5 (Site 128) UTM 11U E572144 N5589327 Map 82J/05

Site type: transitory camp site

Location: Site is located on a high terrace overlooking the east shore of Windermere Lake.

Major Drainage: Columbia River

Site size: unknown

Materials: See Chapter 6 for details

Recorder: McKenzie, 1975

EcPx-15 (Site 129) UTM 11U E571191 N5590592 Map 82J/41

Site type: base camp

Location: Site is located on an island on the east side of Windermere Lake near the town of Windermere..

Major Drainage: Columbia River

Site size: unknown

Materials: multiple items known from private collections representing a wide time span. Recorder: Pike 1974, Sneed 1977

EcPx-19 (Site 130) UTM 11U E573821 N5586282 Map 82J/41

Site type: transitory camp site

Location: Site is located on the west shore of Windermere Lake on the north shore of a small pond.

Major Drainage: Columbia River

Site size: 108 x 36 m (3888 m²)

Materials: 1 side-notched projectile point (RBCPM).

Recorder: Kenny 1976, Sneed 1977

EcPx-25 (Site 131) UTM 11U E578686 N5579282 Map 82J/13

Site type: transitory camp site

Location: Site is located on the west side of the Columbia River between Columbia Lake and Windermere Lake. The site is situated on a series of knolls.

Major Drainage: Columbia River

Site size: 25 x 15 m (375 m²).

Materials: 4 side-notched project points (RBCPM)

Recorder: Sneed 1977

EcPx-40 (Site 132) UTM 11U E575515 N5584397 Map 82J/05

Site type: transitory camp site

Location: The site is located on a ridge at the south west end of Windermere Lake.

Major Drainage: Columbia River

Site size: (1 m²).

Materials: 1 side-notched project points (RBCPM)

Recorder: Sneed 1977

EcPx-47 (Site 133) UTM 11U E577571 N5581107 Map 82J/13

Site type: transitory camp site

Location: Site is located on the west side of the Columbia River between Columbia Lake and Windermere Lake. The site is situated on a low terrace.

Major Drainage: Columbia River

Site size: 15 x 3 m (45 m²).

Materials: 1 side-notched project points (RBCPM)

Recorder: Sneed 1977

EcPx-48 (Site 134) UTM 11U E578297 N5579767 Map 82J/13

Site type: transitory camp site

Location: Site is located on the west side of the Columbia River between Columbia Lake and Windermere Lake. The site is situated on a high (20m) terrace.

Major Drainage: Columbia River

Site size: 80 x 40 m (3200m²).

Materials: 2 side-notched project points (RBCPM)

Recorder: Sneed 1977

EcPx-49 (Site 135) UTM 11U E579524 N5579896 Map 82J/05

Site type: transitory camp site

Location: Site is located on the east side of the Columbia River between Columbia Lake and Windermere Lake. The site is situated on a low terrace and island feature at the base of high terrace.

Major Drainage: Columbia River

Site size: 35 x 20 m (700 m²).

Materials: 1 side-notched project points (RBCPM)

Recorder: Sneed 1977

EcPx-50 (Site 136) UTM 11U E579426 N5580505 Map 82J/13

Site type: transitory camp site

Location: Site is located on the east side of the Columbia River between Columbia Lake and Windermere Lake. The site is situated on a low (4m) terrace spur along Tatley Slough.

Major Drainage: Columbia River

Site size: 25 x 10 m (250 m²).

Materials: 1 side-notched project points (RBCPM)

Recorder: Sneed 1977

EcPx-52 (Site 137) UTM 11U E578620 N5581693 Map 82J/05

Site type: transitory camp site

Location: Site is located on the west side of the Columbia River between Columbia Lake and Windermere Lake. The site is situated on two terraces adjacent to the Columbia River.

Major Drainage: Columbia River

Site size: 200 x 200 m (40,000 m²).

Materials: 1 side-notched project points (RBCPM)

Recorder: Sneed 1977

EcPx-53 (Site 138) UTM 11U E578602 N5582003 Map 82J/05

Site type: transitory camp site

Location: Site is located on the west side of the Columbia River between Columbia Lake and Windermere Lake. The site is situated on a low 6m high terrace above the Columbia River.

Major Drainage: Columbia River

Site size: 50 x 30 m (1500 m²).

Materials: 1 side-notched project points (RBCPM)

Recorder: Sneed 1977

EcPx-54 (Site 139) UTM 11U E578441 N5582336 Map 82J/05

Site type: transitory camp site

Location: Site located on a high terrace on the east side of Columbia River.

Major Drainage: Columbia River

Site Size: 20 x 10 m (200 m²)

Materials: 1 small triangular projectile point, chert flakes and fire cracked rock observed. 2 bifaces (RBCPM).

Recorder: Sneed 1977

EcPx-60 (Site 140) UTM 11U E577929 N5583517 Map 82J/13

Site type: transitory camp site

Location: Site is located on the west side of the Columbia River between Columbia Lake and Windermere Lake. The site is situated on a large low terrace adjacent to a ravine.

Major Drainage: Columbia River

Site size: 60 x 40 m (2400m²).

Materials: 1 side-notched project points (RBCPM)

Recorder: Sneed 1977

EcPx-69 (Site 141) UTM 11U E579399 N5584386 Map 82J/05

Site type: transitory camp site

Location: Site is located on the west side of the Columbia Valley on ridge overlooking Lyttle Lake.

Major Drainage: Columbia River

Site size: 10 x 15 m (150 m²).

Materials: 2 side-notched project points (RBCPM)

Recorder: Handly 1999

EdPp-21 (Site 11) UTM 11U E670800 N5613700 Map 82J/10

Site type: base camp

Location: Site is located on a high terrace east of Canyon Creek and north of Sheep River.

Major Drainage: Bow River

Site size: 300 x 50 m (15000m²)

Materials: see Chapter 6 for details.

Recorder: Heitzmann 1980

EdPq-16, Missing Link Site, (Site 12) UTM 11U E664100 N5614900 Map 82J/10

Site type: base camp

Location: The site is on a high terrace overlooking the confluence of tributary and Gorge Creek.

Major Drainage: Bow River

Site size: unknown

Materials: Projectile point styles include lanceolate, Bitterroot, Duncan(?), Pelican Lake, Besant, Prairie Side-notched; total of 1894 tools and debitage

Recorder: Fedirchuk 1986

EdPr-25 (Site 13) UTM 11U E647900 N56120 Map 82J/10

Site type: workshop

Location: The site is located on a glacial moraine above the Sheep River.

Major Drainage: Bow River

Site size: 125 x 100 m (12,500m²)

Materials: Bifaces, unifaces, cores, scrapers, flakes, blades (suggested age A.D. 1000-1400)

Recorder: Rogers 1972

EdPs-4 (Site 14) UTM 11U E641300 N56128 Map 82J/11

Site type: transitory camp site

Location: The site is located on a glacial terrace west of the Elbow River.

Major Drainage: Bow River

Site size: 5 x 5 (25m²)

Materials: 1 projectile point, 1 flake point, flakes (suggested age 3500 B.C. – A.D. 1500)

Recorder: McIntyre 1972

EdPs-27 (Site 143) UTM 11U E635812 N5601869 Map 82J/11

Site type: transitory camp site

Location: The site located on a moraine on the east side of Lower Elk Lake and north of the outlet of the Elk River.

Major Drainage: Columbia River

Site size: 100 x 30 m (3000m²)
Materials: artifacts and detritus
Recorder: Choquette 1974

EdPs-28 (Site 144) UTM 11U E636484 N5601738 Map 82J/11

Site type: transitory camp site

Location: The site is located on a moraine east of Elkan Creek, near its confluence with the Elk River.

Major Drainage: Columbia River

Site size: 20 x 20 (400m²)

Materials: chipping detritus

Recorder: Choquette 1974

EdPs-31 (Site 15) UTM 11U E632900 N5610800 Map 82J/11

Site type: transitory camp site

Location: The site is located on a glacial ridge north of Boulton Creek near Lower Kananaskis Lake.

Major Drainage: Bow River

Site size: unknown

Materials: suggested Late Prehistoric

Recorder: Head 1977

EdPs-46 (Site 16) UTM 11U E633200 N5608800 Map 82J/11

Site type: isolated find

Location: The site is located on a ridge on east shore of Lower Kananaskis Lake.

Major Drainage: Bow River

Site size: 1 x 1m (1m²)

Materials: Late Prehistoric projectile point

Recorder: Head 1976

EdPs-51 (Site 17) UTM 11U E632300 N5609900 Map 82J/11

Site type: base camp

Location: Site is located on a ridge that separates Upper and Lower Kananaskis Lakes.

Major Drainage: Bow River

Site size: 10 x 5 m (50m²)

Materials: large numbers of tools and lithic fragments, projectile point styles span Middle and Late Prehistoric Periods; lithic materials include siliceous siltstone, chert, argillite, mudstone, obsidian

Recorder: Head 1976

EdPx-N1 (494T) (Site 144) UTM E581980 N5613200 Map 82J/12

Site type: transitory camp site

Location: Site located on a middle terrace on the east side of Kootenay River.

Major Drainage: Kootenay River

Site Size: 50 x 30 m (1500 m²)

Materials: 1 side notched projectile point, chert flakes, stone tools and fire cracked rock observed.

Recorder: Heitzmann 1997

EdQa-4 (357T, Iron Gates Pictographs) (Site 145) UTM 11U E568700 N5609600
Map 82K/09

Site type: pictographs

Location: Site is located on a cliff face on the east side of Sinclair Creek.

Major Drainage: Columbia River

Site size: 50 x 2 m (100 m²)

Materials: pictographs on cliff face

Recorder: Wilson 1984

Site EdQa-13 (Site 146) UTM 11U E562477 N5608076 Map 82K/07

Site type: transitory camp site

Location: Site is located on the west side of the Columbia River in a drainage channel leading to the river.

Major Drainage: Columbia River

Site size: 10 x 10 m (100 m²).

Materials: 1 side-notched project points (RBCPM)

Recorder: Sneed 1977

EdQa-17 (Site 147) UTM 11U E566737 N5600286 Map 82K/06

Site type: transitory camp site

Location: Site is located on the west side of Columbia River.

Major Drainage: Columbia River

Site size: 30 x 30 m (900 m²)

Materials: 1 side notched projectile point

Recorder: Sneed 1977

EdQa-25, Kootenae House NHSC, (Site 148) UTM E56593 N5597848, Map 82K/06

Site type: transitory camp site

Location: Site is located on high terrace overlooking the junction of Toby Creek with Columbia River.

Major Drainage: Columbia River

Site size 40 x 30 m (1200 m²)

Materials: early nineteenth century fur trade items, side notched projectile points,debitage

Recorder: Bernick 1977, Heitzmann 2005

EdQa-121, Salmon Beds, (Site 149) UTM 11U E569340 N5596698 Map 82K06

Site type: base camp

Location: Site is located on a low terrace on the west side of the Columbia River.

Major Drainage: Columbia River

Site size: 400 x 20 m (8000 m²)

Materials: see chapter 6.

Recorder: Heitzmann 1999.

EdQa-N1 (425T) (Site 150) UTM 11 U E567200 N5609400 Map 82K/09

Site type: hunting/kill site

Location: Site is located on a high terrace overlooking the northwest side of Sinclair Creek.

Major Drainage: Columbia River

Site size: 8 x 5 m (40 m²)

Materials: Late precontact projectile point
Recorder: Choquette 1987

EdQa-N2 (423T) (Site 151) UTM 11 U E568800 N55609600 Map 82K/09
Site type: transitory camp site
Location: Site is located on a ridge overlooking the northwest side of Sinclair Creek.
Major Drainage: Columbia River
Site size: 30 x 20 m (600 m²)
Materials: Late precontact projectile point
Recorder: Choquette 1987

EePo-16 (Site 18) UTM 11U E688100 N5623900 Map 82J/10
Site type: transitory camp site
Location: The site is located on a glacial outwash valley plain adjacent to an intermittent stream.
Major Drainage: Bow River
Site size:
Materials: 1 Late Plains projectile point, 1 quartzite flake
Recorder: Murdock 1972

EePr-9 (Site 19) UTM 11U E642000 N5614900 Map 82J/10
Site type: transitory camp site
Location: The site is located in a glacial valley adjacent to the Elbow River.
Major Drainage: Bow River
Site size: 200 x 10 m (2000m²)
Materials: 1 projectile point, flakes, tooth, bone tool
Recorder: Fromhold 1972

EePr-18 (Site 20) UTM 11U E643200 N5615700 Map 82J/10
Site type: workshop
Location: The site is located on a river terrace north east of the Elbow River.
Major Drainage: Bow River
Site size: 175 x 75 m (13125m²)
Materials: gun flint, scapers, 6 trade beads, 2 projectile points, flakes
Recorder: Rogers 1972

EePr-23 (Site 21) UTM 11U E643150 N5615500 Map 82J/10
Site type: transitory camp site
Location: The site is located on a low terrace adjacent to the Elbow River.
Major Drainage: Bow River
Site size: 100 x 50 m (5000m²)
Materials: lithic debitage (cherts – Banff, Montana, fine light brown, light grey, Top of the World)
Recorder: Lalonde 1993

EeQa-1 (Site 152) UTM 11U E560604 N5616501 Map 82K/09
Site type: cultural depressions
Location: The site is located on a high terrace overlooking Columbia River.
Major drainage: Columbia River.
Materials: n/a

Recorder: Sneed, 1977

EeQa- 4 (Site 153) UTM 11U E561996 N5614609 Map 82K09

Site type: transitory camp site

Location: Site is located on a medium terrace at the confluence of Macauley Creek with the Columbia River.

Major Drainage: Columbia River

Site size: 140 x 40 (5600 m²)

Materials: n/a

Recorder: Sneed 1977

Site EeQb-1, Luxor Creek Site, (Site 154) UTM 11U E555830 N5622606, Map 82K/07

Site type: base camp

Location: Site is on the east side of Columbia River between Brisco and Edgewater. It is on a 10 metre high terrace, southeast of Luxor Creek where it enters an valley bottom oxbow lake.

Major Drainage: Columbia River

Site size: 180 x 150 m (27000 m²)

Materials: 4 side-notched projectile points (RBCPM)

Recorder: Sneed 1977

EeQb-3 (Site 155) 11 U E550016 N5630697 Map 82K/08

Site type: transitory camp site

Location: The site is located on low terrace adjacent to the Columbia River.

Major drainage: Columbia River

Site size: (17000m²)

Materials: n/a

Recorder: Sneed, 1977

EeQb-13 (Site 156) 11U E557613 N5620478 Map 82K08

Site type: cultural depressions

Location: Site is located on a low terrace south of Kindersley Creek and the confluence with the Columbia River.

Major Drainage: Columbia River

Site size: 40 x 35 (1400 m²)

Materials: 1 projectile point, 1 stone tool (RBCM)

Recorder: Sneed 1977

EfPq-5 (Site 22) UTM 11U E658500 N5637300 Map 82J/15

Site type: base camp

Location: The site is located on a high terrace overlooking the confluence of Canyon Creek and Elbow River.

Major Drainage: Bow River

Site size: 30 x 25 m (750m²)

Materials: 1117 items (Projectile points include Bitterroot, Pelican Lake, Besant, Lewis, Nanton, Washita), C-14 date 1600±140 (Beta-6322)

Recorder: Heitzmann 1982

EfPq-6 (Site 23) UTM 11U E658379 N5637212 Map 82J/15

Site type: transitory camp site

Location: The site is located on a middle terrace on the east side of Canyon Creek just north of its confluence with the Elbow River.

Major Drainage: Bow River

Site Size: 30 x 30 m (900m²)

Materials: see Chapter 6 for details.

Recorder: McCullough & Fedirchuk 1983

EfPq-12 (Site 24) UTM 11U E652400 N5645100 Map 82J/15

Site type: cairns

Location: The site is located on a alpine mountain bench east and below the summit of Moose Mountain.

Major Drainage: Bow River

Site size: 800 x 50 m (40,000 m²)

Materials: 2 stone circles, 4 cairns

Recorder: Reeves 1994

EfQa-1 (359T) (Site 157) UTM 11U E567700 N5639300 Map 82K/16

Site type: transitory camp site

Location: The site is located on a low ridge on the northwest side of Sora Pond.

Major Drainage: Columbia River.

Site Size: 70 x 20 m (1400 m²)

Materials: late precontact projectile point

Recorder: Heitzmann 1997

EfQa-8 (399T) (Site 158) UTM 11U E567300 N5638150 Map 82K/16

Site type: hunting/kill site

Location: The site is located on a middle terrace on the west side of Kootenay Pond.

Major Drainage: Columbia River.

Site Size: 20 x 10 m (200 m²)

Materials: late precontact projectile point

Recorder: Heitzmann 1997

EgPp-12 (Site 25) UTM 11U E673500 N5670300 Map 82O/2

Site type: transitory camp site

Location: The site is located on a low terrace of Jumpingpound Creek.

Major Drainage: Bow River

Site size: 200 x 100 m (20000 m²)

Materials: bison bones (suggested AD 1000 – 1500)

Recorder: Graspointner 1970

EgPq-11 (Site 26) UTM 11U E659600 N 5656100 Map 82O/2

Site type: base camp

Location: The site is located on a low terrace adjacent to Jumpingpound Creek.

Major Drainage: Bow River

Site size: 300 x 50 m (15,000 m²)

Materials: 6 projectile points (Duncan, McKean, Besant, Late Plains), 42 stone tools, 589 lithic debitage, 189 faunal remains. The context appears mixed.

Recorder: Unfreed 1998

EgPr-2 (Site 27) UTM 11U E649500 N5656300 Map 82O/2
 Site type: base camp
 Location: The site is located on a high terrace overlooking Sibbald Flat, a valley containing Sibbald Creek.
 Major Drainage: Bow River
 Site size: 100 x 25 m (2500m²)
 Materials: considerable materials ranging in age from Early Prehistoric to the Contact Period. See Chapter 6 for more details.
 Recorder: Gryba 1983

EgPs-3 Seebe Cairn Site (Site 28) UTM 11U E633700 N5661700
 Map 82O/3
 Site type: cairn
 Location: The site is located on a high terrace overlooking the Bow River.
 Major Drainage: Bow River
 Site size: 80 x 30 m (2400 m²)
 Materials: projectile point, bone whistle, pottery
 Recorder: Fedirchuk 1990

EgPs-48 (Site 29) UTM 11U E630800 N5658400 Map 82O/3
 Site type: Base campsite
 Location: The site is located along a high terrace on the south side of the Bow River.
 Major Drainage: Bow River
 Site size: unknown
 Materials: C-14 dates 9320±390 to 1230±90, Early Precontact to Late Precontact
 Recorder: Newton 1989

EgPs-51 (Site 30) UTM 11U E631200 N5658700 Map 82O/3
 Site type: hunting/kill site
 Location: The site is located in a small in-filled spring fed bog or pond on the south side of the Bow River.
 Major Drainage: Bow River
 Site size: unknown
 Materials: 4 C-14 dates 7110±160 to 300±90, 7 tools, 48 lithic debitage, bone
 Recorder: Newton 1989

EgPt-1 (Grotto Canyon Pictographs) (Site 31) UTM E624000 N5659200 Map 82O03 Canmore
 Site type: pictographs
 Location: Site is located on a cliff wall above Grotto Creek.
 Major Drainage: Bow River
 Site Size: 40 x 2 m (80 m²)
 Materials: pictographs on rock faces.
 Recorder: Magne, Klassen 2002

EgPt-3 (Site 32) UTM 11U E626500 N5657400 Map 82O/3
 Site type: base camp
 Location: Site is located on a bedrock promontory on the shore of Lac Des Arcs.
 Major Drainage: Bow River
 Site size: unknown

Materials: side-notched projectile point, bone flakes

Recorder: Christensen 1969

EgPt-6 (Site 33) UTM 11U E627100 N5658600 Map 82O/3

Site type: transitory camp site

Location: Site is located on a bedrock ridge overlooking Bow River.

Major Drainage: Bow River

Site size: unknown

Materials: flakes, bone, bifaces, cores; 6 C-14 dates 7810±120 to 370±75 (Early

Middle Precontact to Late Precontact.

Recorder: Newton 1989

EgPt-22 (Site 34) UTM 11U E622550 N5654300 Map 82O/3

Site type: transitory camp site

Location: The site is located on a higher creek terrace of Pigeon Creek. The site area is relatively open mixed forest.

Major Drainage: Bow River

Site size: 120 x 40 m (4800m²)

Materials: Late Prehistoric Projectile Point, 55 chert flakes, 35 siltstone flakes, 1 quartzite flake, 1 triangular cutting/scraping tool, 1 chert biface fragment, 1 utilized flake, bone fragments, fire broken rock

Recorder: McCullough 1990

EgPt-27 (Site 35) UTM 11U E622700 N5653500 Map 82O/3

Site type: transitory camp site

Location: The site is located on a cutbank above Pigeon Creek on an open bench above the creek.

Major Drainage: Bow River

Site size: 240 x 60 m (14400 m²)

Materials: 1 Late Prehistoric Projectile point, 1 chert flake, 15 siltstone flake, 22 chert retouch flakes, quartzite core fragment, 1 siltstone core fragment, bone fragments, fire broken rock

Recorder: McCullough 1990

Site EgPt-28, Pigeon Mountain Site (Site 36) 11U E623300 N5655600 Map 82O/03

Site type: base camp

Location: The site is located on a low terrace adjacent to an oxbow channel of the Bow River.

Major Drainage: Bow River

Site size: 80 x 30 m (2400 m²)

Materials: See Chapter 6 for details.

Recorder: Balcom 1995

Site EgPu-2 (45R), (Site 37) UTM 11U E608500 N5669000, Map 82O/3

Site type: transitory camp site

Location: Site is location on a medium terrace overlooking Carrot Creek.

Major Drainage: Bow River

Site size: (15,000 m²)

Elevation: 1370 m asl.

Materials: 1 Plains side notched projectile point (PC)

Recorder: Langemann 2002

EgPu-4 (Grassi Lake Pictographs) (Site 38) UTM E611500 N5658600 Map 82O03
Canmore

Site type: pictographs

Location: Site is located on a cliff wall above Grassi Lake.

Major Drainage: Bow River

Site Size: 20 x 2 m (40 m²)

Materials: pictographs on rock faces.

Recorder: Magne, Klassen 2002

EgPu-26 (Site 39) UTM 11U E613700 N5664100 Map 82O/3

Site type: transitory camp site

Location: The site is located along the edge of a high terrace overlooking the Bow River Valley. The site is open grass cover with isolated Douglas Fir, spruce and lodgepole pine.

Major Drainage: Bow River

Site size: 200 x 10 m (2000 m²)

Materials: 1 Late Prehistoric projectile point, 36 lithic debitage (Banff chert, grey-blue chert, white chalky chert) fire broken rock

Recorder: Langemann 1997

Site EgPv-14 (1207R), (Site 40) UTM 11U E600893 N5668899 Map 82O/04

Site type: transitory camp site

Location: Site is location on a terrace overlooking Spray River.

Major Drainage: Bow River

Site size: (300 m²)

Elevation: 1365 m asl.

Materials: 1 side notched projectile point (PC)

Recorder Langemann 2002

Site EgPw-3 (952R), (Site 41) UTM11U E591500 N5668200, Map 82O/04

Site type: transitory camp site

Location: Site is located on a low terrace overlooking Bow River.

Major Drainage: Bow River

Site size: (m²)

Elevation: 1395 m asl.

Materials: (PC)

Recorder Langemann 2002

EhPo-36 (Site 42) UTM 11U E675440 N5673000 Map 82O/1

Site type: stone circles/tipi rings

Location: The site is located on a low terrace on the south side of Bow River.

Major Drainage: Bow River

Site size: 120 x 100 m (12000 m²)

Materials: n/a

Recorder: Van Dyke 1992

EhPo-40 (Site 43) UTM 11U E747746 N7567430 Map:82O/01

Site type: stone circles/tipi rings

Location: The site is located along terrace edges

Major Drainage: Bow River

Site size: unknown

Materials: 22 artifacts

Recorder: Van Dyke 1984

EhPo-44 (Site 44) UTM 11U E675100 N5673100 Map 82O/1

Site type: transitory camp site

Location: The site is located on a high terrace overlooking the Bow River.

Major Drainage: Bow River

Site size: 200 x 300 (60000 m²)

Materials: 1 projectile point, 6 tools, 54 lithic debitage, fire broken rock

Recorder: Van Dyke 1992

EhPo-54 (Site 45) UTM 11U E675180 N5673280 Map 82O/1

Site type: transitory camp site

Location: The site is located on a low terrace overlooking the Bow River.

Major Drainage: Bow River

Site size: 130 x 120 m (15600 m²)

Materials: 1 Late Prehistoric (High River) projectile point, 8 stone tools, 113 lithic debitage, fire broken rock.

Recorder: Van Dyke 1993

EhPp-1 (Site 46) UTM 11U E669700 N5677300 Map 82O/1

Site type: stone circles/tipi rings

Location: The site is located on a high terrace overlooking Grand Valley Creek.

Major Drainage: Bow River

Site size: 200 x 100 m (20000 m²)

Materials: n/a

Recorder: Forbis 1958, McIntyre (occ. Paper 7)

EhPp-61 (Site 47) UTM 11U E673800 N 5675200 Map 82O/2

Site type: stone circles/tipi rings

Location: The site is located on the edge of a high terrace overlooking Horse Creek.

Major Drainage: Bow River

Site size: unknown

Materials: none

Recorder: Landals, 1993

EhPp-62 (Site 48) UTM 11U E673800 N 5674600 Map 82O/2

Site type: stone circles/tipi rings

Location: The site is located on the edge of a high terrace overlooking the Bow River.

Major Drainage: Bow River

Site size: unknown

Materials: none

Recorder: Humen, 1993

Site EhPu-1 (349R), Lake Minnewanka Site, (Site 49) UTM 11U E605500
N5678900, Map 82O/06

Site type: base camp

Location: Site is located on a high terrace overlooking the north shore of Lake Minnewanka just east of the confluence with the Cascade River.

Major Drainage: Bow River

Site size: (250,000 m²)

Elevation: 1493 m asl.

Materials: Plains side-notched projectile point, Late Plains triangular (PC)

Recorder Langemann 2002

Site EhPu-5 (43R), (Site 50) UTM 11U E607200 N5669900, Map

Site type: transitory camp site

Location: Site is located on a ridge.

Major Drainage: Bow River

Site size: (24 m²)

Elevation: 1375 m asl.

Materials: (PC)

Recorder Langemann 2002

Site EhPu-6 (20R), Johnson Lake Campsite, (Site 51) UTM 11U E605600 N5672800, Map 82O/03

Site type: transitory camp site

Location: Site is located on a moraine ridge overlooking the western shore of Johnson Lake.

Major Drainage: Bow River

Site size: unknown (m²)

Elevation: 1403 m asl.

Materials: 1 Plains side notched projectile point(PC)

Recorder Langemann 2002

Site EhPv-5 (150R), Edith Trail Site, (Site 52) UTM 11U E595200 N5670100, Map 82O/04

Site type: transitory camp site

Location: Site is located on a colluvial fan near the base of Mount Edith overlooking the Bow River.

Major Drainage: Bow River

Site size: (5000 m²)

Elevation: 1430 m asl.

Materials: 1 Plains side notched projectile point(PC)

Recorder Langemann 2002

Site EhPv-7 (152R), Five Mile Creek Site, (Site 53) UTM 11U E594500 N5669600, Map 82O/04

Site type: transitory camp site

Location: Site is located on an alluvial fan overlooking the north side of Vermilion Lake and the Bow River.

Major Drainage: Bow River

Site size: (8500 m²)

Elevation: 1405 m asl.

Materials: 1 Plains side notched projectile point(PC)

Recorder Langemann 2002

Site EhPv-8 (153R), Vermilion Lake Site, (Site 54) UTM 11U E594700 N5670000, Map 82O/04

Site type: base camp

Location: Site is located on an alluvial fan overlooking the north side of Vermilion Lake and the Bow River..

Major Drainage: Bow River

Site size: (25,000 m2)

Elevation: 1405 m asl.

Materials: several Plains side notched projectile point(PC). See Chapter 6 for more details.

Recorder Langemann 2002

Site EhPv-9 (154R), Fireside Creek Picnic Site, (Site 55) UTM 11U E594200 N5669800, Map 82O/04

Site type: transitory camp site

Location: Site is located on a terrace overlooking the north side of Vermilion Lake..

Major Drainage: Bow River

Site size: (1600 m2)

Elevation: 1425 m asl.

Materials: 1 Plains side notched projectile point, 1 Prairie side notched projectile point(PC)

Recorder Langemann 2002

Site EhPv-10 (163R), (Site 56) UTM E601900 N5673850, Map 82O/04

Site type: transitory camp site

Location: Site is located on a ridge.

Major Drainage: Bow River

Site size: (4 m2)

Elevation: 1395 m asl.

Materials: 1 Plains side notched projectile point(PC)

Recorder Langemann 2002

Site EhPv-15 (156R), Norquay Site, (Site 57) UTM 11U E599200 N5671600, Map 82O/04

Site type: workshop

Location: Site is located on a ridge overlooking the Bow Valley.

Major Drainage: Bow River

Site size: (7500 m2)

Elevation: 1400 m asl.

Materials: 1 Plains side notched projectile point(PC)

Recorder Langemann 2002

Site EhPv-16 (357R), (Site 58) UTM 11U E602200 N5682700, Map 82O/04

Site type: transitory camp site

Location: Site is located on a terrace overlooking Cascade River.

Major Drainage: Bow River

Site size: (m2)

Elevation: 1530 m asl.

Materials: 1 Plains side notched projectile point(PC)

Recorder Langemann 2002

Site EhPv-20 (64R), (Site 59) UTM 11U E602200 N5682700, Map 82O/04

Site type: transitory camp site

Location: Site is located on a high terrace overlooking Cascade River.

Major Drainage: Bow River

Site size: (100 m²)

Elevation: 1430 m asl.

Materials: 1 Plains side notched projectile point(PC)

Recorder Langemann 2002

Site EhPv-24 (68R), Whiskey Creek Site, (Site 60) UTM 11U E599500 N5671000, Map 82O/04

Site type: transitory camp site

Location: Site is located on stabilized dune adjacent to Whiskey Creek.

Major Drainage: Bow River

Site size: (4 m²)

Elevation: 1400 m asl.

Materials: 1 Avonlea side notched projectile point(PC)

Recorder Langemann 2002

Site EhPv-38 (98R), Timber Ridge Housepit site, (Site 61) UTM 11U E598800 N5671400, Map 82O/04

Site type: cultural depression

Location: Site is located on a terrace overlooking the Bow River.

Major Drainage: Bow River

Site size: (20,000 m²)

Elevation: 1405 m asl.

Materials: no diagnostics (PC)

Recorder Langemann 2002

Site EhPv-43 (103R), Timberline Site, (Site 62) UTM 11U E598500 N5671250, Map 82O/04

Site type: transitory camp site

Location: Site is located on a ridge overlooking the east end of the Vermilion Lakes.

Major Drainage: Bow River

Site size: (8500 m²)

Elevation: 1450 m asl.

Materials: 1 Plains side notched projectile point(PC)

Recorder Langemann 2002

Site EhPv-51 (502R), Vermilion Lakes Site, Locality 2, (Site 63) UTM 11U E594850 N5669950, Map 82O/04

Site type: base camp

Location: Site is located on a ridge on the north west side of the Vermilion wetlands.

Major Drainage: Bow River

Site size: (75 m²)

Elevation: 1400 m asl.

Materials: 1 Plains side notched projectile point(PC)

Recorder Langemann 2002

Site EhPv-58 (162R), Second Lake Site East, (Site 64) UTM 11U E596900
N5670200, Map 82O/04

Site type: base camp

Location: Site is located on an alluvial fan overlooking the second Vermilion Lake.

Major Drainage: Bow River

Site size: (100,000 m²)

Elevation: 1400 m asl.

Materials: 1 Avonlea side notched projectile point(PC)

Recorder Langemann 2002

Site EhPv-71 (501R), Vermilion Bone Scatter, (Site 65) UTM 11U E594750
N5669400, Map 82O/04

Site type: transitory camp site

Location: Site is located on a terrace overlooking the Bow River.

Major Drainage: Bow River

Site size: (100 m²)

Elevation: 1400 m asl.

Materials: no diagnostics (PC)

Recorder Langemann 2002

Site EhPv-78 (515R), Echo Creek Site, (Site 66) UTM 11U E599050 N5671200, Map
82O/04

Site type: base camp

Location: Site is located on a terrace adjacent to Echo Creek at the east of Vermilion Lake.

Major Drainage: Bow River

Site size: (5000 m²)

Elevation: 1390 m asl.

Materials: several Besant, Avonlea and Plains side notched projectile point(PC). See Chapter 6 for more details.

Recorder Langemann 2002

EhPv-81 (546R), Vermilion Viewpoint, (Site 67) UTM 11U E597650 N5670750,
Map 82O/04

Site type: base camp

Location: Site is located on an alluvial fan overlooking Vermilion Lake.

Major Drainage: Bow River

Site size: (3600 m²)

Elevation: 1400 m asl.

Materials: 1 Plains side notched projectile point(PC)

Recorder Langemann 2002

EhPv-126 (1210R), (Site 68) UTM 11U E601837 N5669576, Map 82O/04

Site type: hunting/kill site

Location: Site is located on a terrace near the junction of the Spray and Bow Rivers..

Major Drainage: Bow River

Site size: (500 m²)

Elevation: 1400 m asl.

Materials: bone, C14 date 720+/-40 BP (BGS 2147) (PC)

Recorder Langemann 2002

EhPv-N1 (1946R), Deer Street House Pit Site, (Site 69) UTM 11U E600600 N5670800, Map 82O/04
Site type: cultural depression
Location: Site is located on a colluvial fan overlooking Whiskey Creek.
Major Drainage: Bow River
Site size: (1000 m2)
Elevation: 1372 m asl.
Materials: no diagnostics (PC)
Recorder Langemann 2002

EhPw-1 (360R), Christensen Site, (Site 70) UTM 11U E592100 N5669100, Map 82O/04
Site type: base camp
Location: Site is located on an alluvial fan adjacent to the Bow River.
Major Drainage: Bow River
Site size: (10,000 m2)
Elevation: 1390 m asl.
Materials: many artefacts, bone, C14 date 880+/-150 yrs B.P., 1220+/-200 yrs B.P., 1025 +/-80 yrs B.P. (PC). See Chapter 6 for more details.
Recorder Langemann 2002

EhPw-2 (361R), (Site 71) UTM 11U E591300 N5669100, Map 82O/04
Site type: transitory camp site
Location: Site is located on a high terrace overlooking the Bow River.
Major Drainage: Bow River
Site size: (m2)
Elevation: 1405 m asl.
Materials: 1 Plains side-notched projectile point (PC). See Chapter 6 for more details.
Recorder Langemann 2002

EhPw-3 (362R), Spring Housepit Site, (Site 72) UTM 11U E591000 N5669250, Map 82O/04
Site type: cultural depressions
Location: Site is located on a high terrace overlooking the Bow River. A natural spring is located adjacent to the site.
Major Drainage: Bow River
Site size: unknown
Elevation: m asl.
Materials: no diagnostics (PC)
Recorder Langemann 2002

EhPw-4 (25R), Mule Shoe Lake Site, (Site 73) UTM 11U E589600 N5670200, Map 82O/04
Site type: base camp
Location: Site is located on a terrace overlooking the Bow River.
Major Drainage: Bow River
Site size: (150m2)
Elevation: 1395 m asl.

Materials: 1 Plains side-notched projectile point (PC). See Chapter 6 for more details.

Recorder Langemann 2002

EhPx-8 (72R), (Site 74) UTM 11U E576000 N5679500, Map 82O/05

Site type: workshop

Location: Site is located on a terrace overlooking the Bow River.

Major Drainage: Bow River

Site size: (15 m²)

Elevation: 1430 m asl.

Materials: 1 Plains side-notched projectile point (PC)

Recorder Langemann 2002

EiPp3 (Site 78) UTM 11U E671400 N5704400 Map 82O/7

Site type: transitory camp site

Location: The site is located on a hill top overlooking Dogpound Valley.

Major Drainage: Red Deer River

Site size: 30 x 30 m (900 m²)

Materials: Late Prehistoric projectile point, flakes, core, bone fragments.

Recorder: Fromhold 1971

EiPp-16 (Hunter Valley) (Site 79) UTM 11U E673399 N5693508 Map 82O07

Site type: base camp

Location: Site is located on a low terrace-like landform on the south side of small streams which joins Beaverdam Creek.

Major Drainage: Red Deer River

Site size: 150 x 40 m (6000m²)

Materials: 66 projectile points, 308 lithic tools, 2385 lithic debitage, 1 bone tool, 311 prehistoric ceramics, 12519 firecracked rocks, 4557 bone fragments

Recorder: Head 1995

EiPr-5 (Site 80) UTM 11U E647424 N5704400 Map 82O/7

Site type: hunting/kill site

Location: The site is located on a low knoll overlooking Harold Creek.

Major Drainage: Red Deer River

Site size: unknown

Materials: 11 projectile points 18 scaping tools, 6 bifaces, 5 other tools, 1345 debitage, 686 charred and calcined bone, Middle Prehistoric to Late Prehistoric

Recorder: Lovseth 1986

EiPr-9 (Site 81) UTM 11U E647400 N5704400 Map 82O/7

Site type: hunting/kill site

Location: The site is located on the west valley edge overlooking Harold Creek.

Major Drainage: Red Deer River

Site size: unknown

Materials: 1 Late Prehistoric small side notched projectile point (grey quartzite), siltstone core, 5 chert pebble fragments, 3 petrified wood flakes, 13 siltstone flakes, tan quartzite flake, grey quartzite bipolar core spall, bone fragments

Recorder: Gryba 1985

EiPs-6 (Site 82) UTM 11U E634100 N5706100 Map 82O/6
 Site type: base camp
 Location: The site is located on a raised sandstone ridge bench overlooking Fallentimber Creek.
 Major Drainage: Red Deer River
 Site size: 200 x 50 m (10000 m²)
 Materials: Middle and Late Prehistoric, projectile points, bifaces, scrapers, other tools, flakes, bone, fire broken rock
 Recorder: Brink 1979

EiPs-13 (Site 83) UTM 11U E637300 N5701800 Map 82O/6
 Site type: transitory campsite
 Location: The site is located on a low ridge overlooking Harold Creek.
 Major Drainage: Red Deer River
 Site size: 15 x 8 m (120 m²)
 Materials: Middle and Late Prehistoric, 14 projectile points, 16 other tools, 506 debitage, bone perforator, 123 charred and calcined bone, fire broken rock
 Recorder: Loveseth 1986

Site EiQa-2 (115R), (Site 75) UTM 11U E562700 N5702700, Map 82N/08
 Site type: transitory camp site
 Location: Site is located on a terrace adjacent to Corral Creek north of the Bow River.
 Major Drainage: Bow River
 Site size: (100 m²)
 Elevation: 2194 m asl.
 Materials: 1 Avonlea side-notched projectile point (PC)
 Recorder Langemann 2002

Site EiQa-N1 (950R) Baker Lake Site, (Site 76) UTM 11U E567250 N5704850, Map 82N/08
 Site type: transitory camp site
 Location: Site is located on a ridge at the east end of Baker Lake.
 Major Drainage: Bow River
 Site size: unknown
 Elevation: 2210 m asl.
 Materials: 1 Plains side-notched projectile point(PC)
 Recorder Langemann 2002

Site EiQb-1 (35R), (Site 77) UTM 11U E557000 N5697100, Map 82N/08
 Site type: transitory camp site
 Location: Site is located on a terrace adjacent to the Pipestone River north of the Bow River.
 Major Drainage: Bow River
 Site size: (100 m²)
 Elevation: 1550 m asl.
 Materials: 1 Plains side-notched projectile point (PC)
 Recorder Langemann 2002

EjPq-1 (Site 84) UTM 11U E657400 N5709800 Map 82O/10

Site type: transitory camp site
Location: Located on a terrace overlooking Silver Creek
Major Drainage: Red Deer River
Site size: 20 x 20 m (400 m²)
Materials: Late Plains projectile point, core, lithic knife, flakes
Recorder: Heitzmann 1971

EjPq-4 (Site 85) IJU E653600 N5712800 Map 82O10 Fallentimber
Site type: isolate find
Location: Site is located on a low terrace overlooking Silver Creek.
Major Drainage: Red Deer River
Site size: 1 x 1 m (2m²)
Materials: 1 Late Plains projectile point
Recorder: Duncan 1971

Site EjPw-9 (377R), (Site 86) UTM 11U E581100 N5724300, Map 82O/12
Site type: transitory camp site
Location: Site is located on a ridge overlooking the Red Deer River.
Major Drainage: Red Deer River
Site size: (0 m²)
Elevation: 1770 m asl.
Materials: 1 Prairie side-notched, Plains side-notched, 1 Late Plains triangular projectile point, (PC)
Recorder Langemann 2002

Site EjPw-10 (378R), (Site 87) UTM 11U E581200 N5724000, Map 82O/12
Site type: transitory camp site
Location: Site is located on a ridge overlooking the Red Deer River.
Major Drainage: Red Deer River
Site size: (4 m²)
Elevation: 1770 m asl.
Materials: 1 Prairie side-notched projectile point, 1 Late Plains triangular (PC)
Recorder Langemann 2002

Site EjPw-11 (379R), (Site 88) UTM 11U E588100 N5710400, Map 82O/12
Site type: transitory camp site
Location: Site is located on a terrace adjacent to the Panther River.
Major Drainage: Red Deer River
Site size: (m²)
Elevation: 1880 m asl.
Materials: 1 Late Plains triangular projectile point, (PC)
Recorder Langemann 2002

Site EjPw-22 (390R), (Site 89) UTM 11U E588000 N5710550, Map 82O/12
Site type: transitory camp site
Location: Site is located on terrace adjacent to the Panther River.
Major Drainage: Red Deer River
Site size: unknown
Elevation: 1885 m asl.
Materials: 1 Snake River projectile point, (PC)

Recorder Langemann 2002

Site EjPx-3 (400R), (Site 90) UTM 11U E580700 N5724200, Map 82O/12

Site type: transitory camp site

Location: Site is located on a ridge overlooking the Red Deer River.

Major Drainage: Red Deer River

Site size: unknown

Elevation: 1780 m asl.

Materials: 1 Avonlea side-notched projectile point, (PC)

Recorder Langemann 2002

Site EjPx-4 (401R), Scotch Camp Warden Cabin Site, (Site 91) UTM 11U E580400

N5724400, Map 82O/12

Site type: transitory camp site

Location: Site is located on a terrace adjacent to Divide Creek on the north side of the Red Deer River.

Major Drainage: Red Deer River

Site size: unknown

Elevation: 1600 m asl.

Materials: 1 Plains side-notched projectile point, (PC)

Recorder Langemann 2002

Site EjPx-30 (1367R), McConnell Creek Housepit Site, (Site 92) UTM 11U E574481

N5722304, Map 82O/12

Site type: cultural depressions

Location: Site is located on a terrace adjacent to McConnell Creek on the north side the Red Deer River.

Major Drainage: Red Deer River

Site size: (1000 m²)

Elevation: 1830 m asl.

Materials: no diagnostics(PC)

Recorder Langemann 2002

Site EjPx-N1 (1465R), Drummond Pithouse Site (Site 93) UTM 11U E569400

N5711900, Map 82O/12

Site type: cultural depressions

Location: Site is located on a terrace near the junction of the unnamed creek and the Red Deer River at the south end of Mount Drummond.

Major Drainage: Red Deer River

Site size: (15000 m²)

Elevation: 1981 m asl.

Materials: (PC)

Recorder Langemann 2002

Site EjQa-8 (1343R), (Site 94) UTM 11U E566750 N5710100, Map 82N/09

Site type: transitory camp site

Location: Site is located in an open meadow east of the largest Red Deer Lake near the headwaters of the Red Deer River.

Major Drainage: Red Deer River

Site size: (200 m²)

Elevation: 2090 m asl.
Materials: no diagnostics (PC)
Recorder Langemann 2002

EkPp-14 (Site 95) UTM 11U E672000 N5738000 82O/15
Site type: isolated find
Location: Site is located on a knoll overlooking Little Red Deer River.
Major Drainage: Red Deer River
Site size: unknown
Materials: Late Plains side-notched projectile point
Recorder: Hoffert 1989

EkPt-3 (Site 96) UTM 11U E616500 N5741800 Map 82O/14
Site type: transitory camp site
Location: The site is located on a terrace on the south side of Willson Creek.
Major Drainage: Red Deer River
Site size: unknown
Materials: 1 Plains side-notched projectile point; 1 Late Plains triangular projectile point.
Recorder: Reeves 1978

Site EkPw-4 (411R), (Site 97) UTM 11U E582300 N5724900, Map 82O/12
Site type: transitory camp site
Location: Site is located on a high terrace overlooking the Red Deer River.
Major Drainage: Red Deer River
Site size: (0 m²)
Elevation: 1770 m asl.
Materials: 1 Plains side-notched projectile point, (PC)
Recorder Langemann 2002

Site EkPw-13 (1395R), (Site 98) UTM 11U E583650 N5725350, Map 82O/12
Site type: transitory camp site
Location: Site is located on a terrace adjacent to Tyrell Creek on the north side the Red Deer River.
Major Drainage: Red Deer River
Site size: (100 m²)
Elevation: 1740 m asl.
Materials: 1 Plains side-notched projectile point, (PC)
Recorder Langemann 2002

Site EkPw-15 (1397R), Tyrell Creek Site, (Site 99) UTM 11U E585800 N5725600, Map 82O/12
Site type: transitory camp site
Location: Site is located on a terrace adjacent to Tyrell Creek on the north side of the Red Deer River.
Major Drainage: Red Deer River
Site size: (3500 m²)
Elevation: 1707 m asl.
Materials: ? (PC)
Recorder Langemann 2002

EkPw-N1 (1679R), (Site 100) UTM 11U E587105 N5725906, Map 82O/12

Site type: transitory camp site

Location: Site is located on a middle terrace overlooking the confluence of an unnamed creek and the Red Deer River.

Major Drainage: Red Deer River

Site size: 30 x 10 m (300 m²)

Elevation: 1646 m asl.

Materials: n/a

Recorder Langemann 2002

EkPx-4 (418R), Divide Creek Site (Site 101) UTM 11U E580400 N5725000, Map 82O/12

Site type: cultural depressions

Location: Site is located on a terrace adjacent to Divide Creek on the north side of the Red Deer River.

Major Drainage: Red Deer River

Site size: (0 m²)

Elevation: 1770 m asl.

Materials: ? (PC)

Recorder Langemann 2002

EkPx-7 (421R), (Site 102) UTM 11U E579900 N5724800, Map 82O/12

Site type: transitory camp site

Location: Site is located on a high terrace overlooking the Red Deer River.

Major Drainage: Red Deer River

Site size: (0 m²)

Elevation: m asl.

Materials: 1 Plains side-notched projectile point, (PC)

Recorder Langemann 2002

EkQa-N1 (1430R), (Site 103) UTM 11U E561200 N5738960, Map 82N/16

Site type: isolated find

Location: Site is located on a terrace near the outlet of Trident Lake where it joins the Clearwater River.

Major Drainage: North Saskatchewan River

Site size: (1 m²)

Elevation: 1860 m asl.

Materials: 1 Avonlea side-notched projectile point (PC)

Recorder Langemann 2002

Site ElQe-10 (1085R), (Site 104) UTM 11U E522600 N5760500, Map 82N/15

Site type: transitory camp site

Location: Site is located on a terrace adjacent to Owen Creek on the north side of the North Saskatchewan River.

Major Drainage: North Saskatchewan River

Site size: (m²)

Elevation: 1385 m asl.

Materials: 1 Avonlea side-notched projectile point, (PC)

Recorder Langemann 2002

FaQc-1(Site 105) UTM 11U E541200 N5771100 Map 83C/1

Site type: transitory camp site

Location: The site is located on an alluvial terrace on the east side of the North Saskatchewan River above the junction with Wilson Creek.

Major Drainage: North Saskatchewan River

Site size: unknown

Materials: Late Prehistoric projectile point, flakes

Recorder: Reeves 1966

FaQc-4(Site 106) UTM 11U E537900 N5779000 Map 83C/1

Site type: transitory camp site

Location: The site is located on a terrace overlooking the Cline River.

Major Drainage: North Saskatchewan River

Site size: unknown

Materials: bifaces, flakes, fire broken rock

Recorder: Reeves 1966

FaQc-11 (Site 107) UTM 11U E540500 N5766400 Map 83C/1

Site type: transitory camp site

Location: The site is located on an alluvial terrace west of the North Saskatchewan River, near the south end of Kootenai Plains

Major Drainage: North Saskatchewan River

Site size: unknown

Materials: Late Prehistoric ?

Recorder: Reeves 1971

FaQc-12 (Site 108) 11U E540500 N5768000 Map 83C/1

Site type: transitory camp site

Location: The site is located on a large fan terrace west of Two O'clock Creek, on the west side of the North Saskatchewan River, near the centre of Kootenay Plains.

Major Drainage: North Saskatchewan River

Site size: unknown

Materials: Late Prehistoric ?

Recorder: Reeves 1971

FaQc-14 (Site 109) UTM 11U E539900 N5767800 Map 83C/1

Site type: transitory camp site

Location: The site is located on an alluvial fan south of Two O'clock Creek, on the west side of the North Saskatchewan River.

Major Drainage: North Saskatchewan River

Site size: unknown

Materials: fire broken rock, bone fragments (Historic ?)

Recorder: Reeves 1971

FaQc-22 (Site 110) UTM 11U E541500 N5766900 Map 83C/1

Site type: transitory camp site

Location: The site is located on a terrace on the north side of Siffleur River.

Major Drainage: North Saskatchewan River

Site size: unknown

Materials: Late Prehistoric ?

Recorder: Reeves 1966

FbQc-1 (Site 111) UTM 11U E538300 N5781300 Map 83C/1

Site type: transitory camp site

Location: The site is located on the south side of the Cline River, above the junction with the North Saskatchewan River.

Major Drainage: North Saskatchewan River

Site size: unknown

Materials: Late Prehistoric

Recorder: Reeves 1966

FbQc-8 (Site 112) UTM 11U E544100 N5795500 Map 83C/8

Site type: transitory camp site

Location: The site is located on a high terrace on the north side of the North Saskatchewan River, west of Tershishner Creek.

Major Drainage: North Saskatchewan River

Site size: unknown

Materials: Late Prehistoric? Biface, flakes

Recorder: Reeves 1971

FbQc-9 (Site 113) UTM 11U E544200 N5795900 Map 83C/8

Site type: transitory camp site

Location: The site is located in a small open grassland meadow on the west side of Tershishner Creek.

Major Drainage: North Saskatchewan River

Site size: unknown

Materials: Late Prehistoric

Recorder: Reeves 1971

FbQc-10 (Site 114) UTM 11U E544400 N5796300 Map 83C/8

Site type: transitory camp site

Location: The site is located on the east side of Tershishner Creek.

Major Drainage: North Saskatchewan River

Site size: unknown

Materials: Late Prehistoric, flakes

Recorder: Reeves 1971

FbQc-12 (Site 115) UTM 11U E541800 N5789500 Map 83C/8

Site type: transitory camp site

Location: The site is located adjacent to a small creek on the east side of a bedrock ridge called Windy Point.

Major Drainage: North Saskatchewan River

Site size: unknown

Materials: Late Prehistoric, fire cracked rock

Recorder: Reeves 1971

FbQc-13 (Site 116) UTM 11U E536800 N5781700 Map 83C/1

Site type: transitory camp site

Location: The site is located in a grassy meadow on the north side of Cline River.

Major Drainage: North Saskatchewan River

Site size: unknown

Materials: Late Prehistoric

Recorder: Reeves 1971

FbQc-14 (Site 117) UTM 11U E537100 N 5783500 Map 83C/1

Site type: transitory camp site

Location: The site is located on an alluvial fan on the north side of Cline River near the junction with the North Saskatchewan River.

Major Drainage: North Saskatchewan River

Site size: unknown

Materials: Late Prehistoric, fire broken rock, bone

Recorder: Reeves 1971

FbQc-15 (Site 118) UTM 11U E537400 N5784600 Map 83C/1

Site type: transitory camp site

Location: The site is located on the edge of an alluvial fan on the west side of White Goat Creek.

Major Drainage: North Saskatchewan River

Site size: unknown

Materials: Late Prehistoric, Fire broken rock, bone

Recorder: Reeves 1971

APPENDIX II

TOOL CATEGORIES

The following tool types were used in this analysis. Most of these tool categories follow the classifications utilized by the authors who reported on each of the investigations. However, because of differing classification systems it was necessary to generalize or reclassify some of the items from some sites.

Abraders – these are grinding stones usually made of a coarse grained material used to grind or polish other objects made of stone or wood

Biface – this is a tool that is flaked over all or most of both dorsal and ventral surfaces. They usually have flaked marginal edges. Shapes vary from oval, triangular, or rectangular. Some of these are believed to be cutting tools (knives) or preforms, a preliminary step to the production of smaller tools.

Discoidal Tools – these tools have an oval outline. They usually have marginally bifacially worked edges. They are commonly made on a large flake removed from a large cobble. The original (cortex) surface is often present on one side.

Macroblade – this is a large blade flake usually rectangular in outline with the length longer than the width. Widths were defined as greater than 10 mm. They have triangular or prismatic cross sections. They demonstrate use wear along one or both lateral edges.

Microblades – these are small blades with the width less than 10 mm. They are defined using the classification following Sanger (1970:60). They demonstrate use wear along one or both lateral edges.

Microliths – these are small flakes with wear on one or both lateral edges. These are smaller than microblades.

Marginally retouched stone tools (MRST) – These are tools made on flakes of no specific shape. One or more edges have been bifacially retouched to make a working edge.

Netsinkers (NETS) – These are larger cobbles or cores that have been worked near their mid lines to form a groove or notches to allow the attachment of a line or string. They are believed to have held the lower margin of fish nets or lines.

Perforators/gravers (PERF) – These are tools which have been flaked to form a point that could be used to puncture holes in leather or mark lines in wood, leather or other materials. These are usually flaked rather than produced by “burin” technology.

Piece esquillé (PIE)– These are small tabular stone tools that demonstrate bipolar technology – that is they have crushed opposite edges. They have linear flaking that extends along the length of the object. These tools are believed to be wedges for splitting bone or wood.

Preforms (PRE) -- These are flaked objects that appear to be an intermediate stage in the projection of formed stone tools. They often have an oval outline and a biconvex cross section. The edges do not show any use wear.

Projectile Points – these are generally considered to be arrowheads that tipped arrows as part of bow and arrow technology. They are typically triangular in shape. Most have small side or corner notches near the base. Most are bifacially flaked over the entire surfaces but some are bifacially flaked only along the margins.

Scrapers (SCR) – these are tools characterized by one or more steep angled working edges. They are commonly flaked only on the dorsal surface, while the ventral surface is often flat. The “thumb nail” scraper is a type that has the general shape and size of a human thumb nail. There are a number of other types.

Utilized Core Fragment (UCF) – These are parts of cores that have been used as tools resulting in use wear or battering along some edges.

Utilized cobble/nodule (UCN) – These are cobbles or smaller nodules or pebbles that have been used for hammering or battering indicated by pitted or flaked ends.

Utilized flake (UTF) - A utilized flake is a flake that has shows evidence of use wear or flaking along one or more margins.

Appendix III

Glossary One. Synonymy of Current First Nations/Tribal Names.

English Exonym	Ethnonym (Smyth 2001)	Language Family (Goddard 1996:map)
Blackfoot	Siksika	Algic (Algonkian)
Blood	Kainai	Algic (Algonkian)
Peigan	Piikani	Algic (Algonkian)
Assiniboine	Nakoda	Siouan-Catawba
Cree	Nahiwak	Algic Algonkian)
Flathead	Séliš	Salishan
Kootenay	Ktunaxa	Kootenai
Lakes	Snaitcekst	Salishan
Sarcee	Tsuu T'ina	Nadene (Athabaskan)
Shoshone	Nimi	Uto-Aztecan
Shuswap	Secwepemc	Salishan
Sioux		
-Western or Teton Sioux	Lakota	Siouan-Catawba
-Eastern or Santee Sioux	Dakota	Siouan-Catawba
-Northern or Yankton Sioux	Nakota	Siouan-Catawba
Stoney	Nakota	Siouan-Catawba

REFERENCES

- ACHUFF, P. L., W. D. HOLLAND, G. M. COEN, AND K. VAN TICHEM. 1984. *Ecological Land Classification of Kootenay National Park, British Columbia*. Edmonton: Alberta Institute of Pedology, University of Alberta and Environment Canada.
- ADAMS, G. 1977. *The Estuary Bison Pound Site in Southwestern Saskatchewan*. (National Museum of Man Mercury Series No. 68). Ottawa: National Museums of Canada.
- ANDERSEN, R. R. 1970. Alberta Stoney (Assiniboin) origins and adaptations: a case for reappraisal. *Ethnohistory* 17:49-61.
- ANDREFSKY, W. 1991. Inferring trends in prehistoric settlement behaviour from lithic production technology in the southern Plains. *North American Archaeologist* 12:129-44.
- ARESCO LTD. 1977. Archaeological and historical resources inventory 1976, Kananaskis Provincial Park. Unpublished report on file, Edmonton: Archaeological Survey of Alberta.
- ARIMA, E. 1995. *Blackfeet and Paleofaces, the Pikani and Rocky Mountain House*. Ottawa: The Golden Dog Press.
- ARTHUR, G. W. 1975 . *An Introduction to the Ecology of Early Historic Communal Bison Hunting Among the Northern Plains Indians*. (National Museum of Man Mercury Series No. 37). Ottawa: National Museums of Canada.
- ASCH, N. B., R. I. FORD, AND D. L. ASCH. 1972. *Paleoethnobotany of the Koster Site: the Archaic Horizons*. (Illinois State Museum, Reports of Investigations 24, and Illinois Valley Archaeological Program, Research Papers 6).
- BAILEY, G. 1981. Concepts of resources exploitation: continuity and discontinuity in palaeoeconomy. *World Archaeology* 13:1-15.
- BALL, B. F. 1987. Eating rocks: pebble cherts, fall-off curves and optimal diet theory. In Martin Magne (ed.) *Archaeology in Alberta 1986* (Archaeological Survey of Alberta, Occasional Paper No. 31): 140-149. Edmonton: Alberta Culture.
- BAMFORTH, D. B. 1986. Technological efficiency and tool curation. *American Antiquity* 51: 38-50.
- 1990. Settlement, raw material, and lithic procurement in the central Mojave Desert. *Journal of Anthropological Research* 9:70-104.
- 1991. Technological organization and hunter-gatherer land use. *American Antiquity* 56: 216-35.

- BARBEAU, M. 1960. *Indian Days on the Western Prairies* (National Museum of Canada, Bulletin No. 163, Anthropological Series No. 46). Ottawa: National Museum of Canada.
- BARKER, G. 1995. *Land Use and Environmental Degradation in Biferno Valley (Central Southern Italy) from Prehistoric Times to the Present Day*. (L'Homme et la Dègradation de l'Environment, XV^e Rencontres Internationales d'Archéologie d'Histoire d'Antibes). Juan-les-Pins : Editions APCDA.
- BARNETT, D. A. 1983. The faunal remains from the Sibbald Creek Site, in Eugene M. Gryba, *Sibbald Creek: a Record of Human Utilization of the Southern Alberta Foothills* (Occasional Paper No. 22, Archaeological Survey of Alberta): 182-211. Edmonton : Alberta Culture.
- BARRETT, S. W. 1981. Indian fires in the pre-settlement forests of Western Montana, in *Proceedings of the Fire History Workshop, October 20-24, 1980, Tucson, Arizona* (General Technical Report RM-81, Rocky Mountain Forest and Range Experiment Station): 35-41. Fort Collins (Colorado): US Department of Agriculture, Forest Service.
- BARRETT, S. W. AND S. F. ARNO. 1982. Indian fires as an ecological influence in the Northern Rockies. *Journal of Forestry* 80(10): 647-651.
- BAR-YOSEF, O. AND A. BELFER-COHEN. 1991. From sedentary hunter-gatherers to territorial farmers in the Levant, in S.A. Gregg (ed.) *Between Bands and States* (Center for Archaeological Investigations Occasional Paper No. 9):181-202. Carbondale: Southern Illinois University Press.
- BAUMHOFF, M. A. 1963. Ecological determinants of Aboriginal California population. *University of California Publications in American Archaeology and Ethnology* 49(2): 155-236. Berkeley: University of California Press.
- BELYEA, B. (ed.). 1994. *Columbia Journals, David Thompson*. Montreal and Kingston: McGill-Queen's University Press.
- BETTINGER, R. 1980. Explanatory/predictive models of hunter-gatherer adaptations, in M. Schiffer (ed.) *Advances in Archaeological Method and Theory*: 189-255. New York: Academic Press.
- 1987. Archaeological approaches to hunter-gatherers. *Annual Review of Anthropology* 16:121-42.
- 1991. *Hunter-gatherers, Archaeological and Evolutionary Theory*. New York and London: Plenum Press.
- BETTINGER, R. L. AND M. A. BAUMHOFF. 1982. The Numic spread: Great Basin cultures in competition. *American Antiquity* 47:485-503.
- BINFORD, L. B. 1978. *Nunamiut Ethnoarchaeology*. New York: Academic Press.

- 1979. Organization and formation processes: looking at curated technologies. *Journal of Anthropological Research* 35: 255-273.
- 1980. Willow smoke and dogs' tails: hunter—gatherer settlement systems and archaeological site formation. *American Antiquity* 45: 4-20.
- 2001. *Constructing Frames of Reference, an Analytical Method of Archaeological Theory Building Using Hunter-gatherer and Environmental Data Sets*. Berkeley: University of California Press.
- BINNEMA, T. 2001. *Common and Contested Ground, a Human and Environmental History of the Northwestern Plains*. Norman: University of Oklahoma Press.
- BIRDSELL, J. 1968. Some predictions for the Pleistocene based on equilibrium systems among recent hunter-gatherers, in R.B. Lee and I. DeVore(eds.) *Man the Hunter*: 229-240. Chicago: Aldine.
- BIRELL, D. 2009. Devil's Head. In *Peakfinder*. www.peakfinder.com. Accessed 02 March 2009.
- BLACKBURN, T. C. AND K. ANDERSON. 1993. *Before the Wilderness, Environmental Management by Native Californians*. Menlo Park (Ca.): Ballena Press.
- BLEED, P. 1986. The optimal design of hunting weapons: maintainability or reliability. *American Antiquity* 51:737-47.
- BOAS, F. 1918. *Kutenai Tales* (Bureau of American Ethnology, Bulletin 59). Washington (D.C.): Bureau of American Ethnology.
- BORDEN, C. E. 1952 A uniform site designation scheme for Canada. *Anthropology in British Columbia*, No. 3: 44-48.
- BOSERUP, E. 1965. *The Conditions for Agricultural Growth*. Chicago: Aldine.
- BOYD, R. 1994. Smallpox in the Pacific Northwest. *BC Studies*, 101:5 – 40.
- BRAUDEL, F. 1972. *The Mediterranean and the Mediterranean World in the Age of Phillip II*, Vol. 1. Translated by Siân Reynolds. New York: Harper & Row.
- BRAUMANDL, T. F. AND M. P. CURRAN (eds.) 1992. *A Field Guide for Site Identification and Interpretation for the Nelson Forest Region*. Nelson (BC): BC Ministry of Forests.
- BRINK, J. 1986. *Dog days in Southern Alberta* (Archaeological Survey of Alberta, Occasional Paper No. 28). Edmonton, Alberta Culture.
- BRINK, J. W., AND B. DAWE. 1989. *Final Report of the 1985 and 1986 Field Season at Head-Smashed-In Buffalo Jump, Alberta* (Archaeological Survey of Alberta, Manuscript Series No. 16). Edmonton, Alberta Culture.

BRINK, J. W., M. WRIGHT, B. DAWE AND D. GLAUM. 1985. *Final Report of the 1983 Season at Head-Smashed-In Buffalo Jump, Alberta* (Archaeological Survey of Alberta, Manuscript Series No. 1). Edmonton, Alberta Culture.

BRINK, J. W., K. WRIGHT-FEDYNIK, AND D. WETZEL. 2003. A review of certain stone alignments and rock cairns in Alberta archaeology, in J. W. Brink and J. F. Dormaar (eds.) *Archaeology in Alberta: a View from the New Millennium*: 208-241. Medicine Hat: Archaeological Society of Alberta.

BRUMLEY, L. M. 1971. The Narrows site: a fishing station-campsite on the eastern flanks of the Rocky Mountains, in A.H. Strydom and R.A. Smith (eds.) *Aboriginal Man and Environments on the Plateau of Northwest America*: 75-125. Calgary: University of Calgary Archaeological Association.

BRUMLEY, J. H. 1975. *The Cactus Flower Site in Southeastern Alberta: 1972-1974 Excavations*. (National Museum of Man Mercury Series, No. 46. Ottawa: National Museums of Canada.

--1976. *Ramillies: a Late Prehistoric Bison Kill and Campsite Located in Southeastern Alberta, Canada* (National Museum of Man Mercury Series, No. 55). Ottawa: National Museums of Canada.

BURKE, A. M. 2004. Alternative models of spatial organization for Pleistocene hunter-gatherers, in G. M. Crothers (ed.) *Hunters and Gatherers in Theory and Archaeology* (Centre for Archaeological Investigations, Occasional Paper No. 31): 192-210. Carbondale: Southern Illinois University.

BUTZER, K. W. 1982. *Archaeology as Human Ecology: Method and Theory for a Contextual Approach*. Cambridge: Cambridge University Press.

BYRNE, W. J. 1973. *The Archaeology and Prehistory of Southern Alberta as Reflected by Ceramics* (National Museum of Man Mercury Series, Archaeological Survey of Canada Paper 14). Ottawa: National Museums of Canada.

CAMPBELL, S. K. 1990. *Post Columbian Cultural History in the Northern Columbia Plateau A.D. 1500-1900*. New York: Garland Publishing, Inc.

CANADIAN ARCHAEOLOGICAL RADIOCARBON DATABASE (CARD) n.d. compiled by R. Morlan. Canadian Archaeological Association: <http://www.canadianarchaeology.ca/radiocarbon/card.htm> accessed 2007.

CASE, R. A. AND G. M. MACDONALD. 1995. A dendroclimatic reconstruction of annual precipitation on the Western Canadian Prairies since A.D. 1505 from *Pinus flexilis* James. *Quaternary Research* 44:267-275.

CHANCE, D. H. 1973. Influences of the Hudson's Bay Company on the Native cultures of the Colville District. *Northwest Anthropological Research Notes* Vol. 7, No. 1, Part 2 (Memorandum No. 2). Moscow (Idaho).

CHARNOV, E. L. 1976. Optimal foraging, the marginal value theorem. *Theoretical Population Biology* 9:129-136.

CHATTERS, J. C. 1995. Population growth, climatic cooling, and the development of collector strategies on the Southern Plateau, Western North America. *Journal of World Prehistory* 9: 341-400.

-- 1998 Environment in D. E. Walker Jr. (ed.) *Handbook of North American Indians. Vol. 12: Plateau*: 29-48. Washington (DC): Smithsonian Institution Press.

CHATTERS, J. C., AND D. LEAVELL. 1995. *Harding Lake: a Study of Fire, Succession, and Sedimentation since 350AD in the Subalpine Fir Forests of the Yaak River, Northwestern Montana* (Applied Paleoscience Research Report P-4). Richland (WA).

CHILDE, V. G. 1951. *Social Evolution*. New York: Henry Schulman.

CHITTENDON, H. M. AND A. T. RICHARDSON. 1969. *Life, Letters and Travels of Father Pierre Jean de Smet, 1801-1873* (Originally published 1905). New York: Reprint Arno Press.

CHOQUETTE, W. T. 1974. Heritage impact assessment, proposed Inland Natural Gas Company Ltd. East Kootenay link natural gas pipeline, Salmo to Yahk section. Unpublished report on file, Williams Brothers Canada Ltd., Calgary.

-- 1981. The role of lithic raw materials studies in Kootenay archaeology. *B.C. Studies*, (Special Issue), 48:21-36.

-- 1984. A proposed cultural chronology for the Kootenay region. In S. Gough (ed.) *Cultural Resources Investigations of the Bonneville Power Administration's Libby Integration Project, Northern Idaho and Northwestern Montana* (Eastern Washington University Reports in Archaeology and History 100-29): 303-316. Cheney (Wa.).

-- 1985. A proposed cultural chronology for the Kootenai region. *The Thunderbird* Volume 5(4):2-5; Vol. 5(5):2-5. Pullman (Wa.): Washington Archaeological Research Center.

-- 1987. Archaeological investigations in the Middle Kutenai region and vicinity in A. Thoms and G. Burchard (eds.) *Prehistoric Land Use in the Northern Rocky Mountains: a Perspective from the Middle Kutenai Valley* (Washington State University Center for Northwest Anthropology, Project Report 4): 57-119. Pullman (Wa.): Center for Northwest Anthropology.

-- 1996. Early post-glacial habitation of the Upper Columbia region in R. L. Carlson and L. Dalla Bona (eds.) *Early Human Occupation in British Columbia*: 45-50. Vancouver: University of British Columbia Press.

CHOQUETTE, W. T. AND D. FEDJE. 1993. Yoho National Park, archaeological resource description and analysis. Unpublished report on file. Calgary: Parks Canada.

- CLARKE, G.; B. HJERMSTAD, R. BALCOM, T. HOFFERT AND J. LIGHT. 1998. Historical resources impact mitigation of EgPs 63 and EgPt 28, the Pigeon Mountain Site. Permit #95-077. Calgary: Golder Associates Ltd.
- COHEN, M. N. 1975. Archaeological evidence for population pressure in preagricultural societies. *American Antiquity* 40:471-474.
- 1977. *The Food Crisis in Prehistory*. New Haven (Conn.): Yale University Press.
- COLLINS, M. B. 1975. Lithic technology as a means of processual inference, in E. H. Swanson (ed.) *Lithic Technology: Making and Using Stone Tools*: 15-34. Chicago: Aldine.
- COUES, E. (ed.) 1897 *New Light on the Early History of the Greater Northwest. The manuscript Journals of Alexander Henry, Fur Trader, and David Thompson, Official Geographer and Explorer of the North West Company*, 3 Vols. New York: Francis P. Harper.
- COWGILL, G. L. 1975a. On causes and consequences of ancient and modern population changes. *American Anthropologist* 77(3): 505-525.
- 1975b. Population pressure as a nonexplanation. In A. Swedlund (ed.) *Population Studies in Archaeology and Biological Anthropology: a Symposium* (Society for American Archaeology Memoirs): 30:127-131.
- CRABTREE, D.E. AND E.L. DAVIS. 1968. Experimental manufacture of wooden implements with tools of flaked stone. *Science* 159:426-428.
- CROTHERS, G. M. (ed.) 2004. *Hunters and Gatherers in Theory and Archaeology* (Center for Archaeological Investigations Occasional Paper No. 31). Carbondale: Southern Illinois University.
- CRUMLEY, C. L. (ed.) 1994. *Historical Ecology: Cultural Knowledge and Changing Landscapes*. Santa Fe (New Mexico): School of American Research Press.
- CURTIS, E. S. 1911 The Kutenai. In *The North American Indian* 7: 117-155, 167-179. Norwood: Plimpton.
- DAMP, J. E., C. E. CONNOLLY AND T. V. SMITH. 1980. Conservation archaeological studies at EhPw-2 and EhPw-4, Banff National Park. Unpublished report on file. Calgary: Parks Canada.
- DAU, B. J. 2005. *Oldman River Dam Stone Features Study, Prehistoric Archaeological Mitigation Program Technical Series* (Occasional Papers of the Archaeological Society of Alberta, No. 6). Calgary: Archaeological Society of Alberta.
- DAVIS, L. B. 1978 Upper Missouri and Scenic River, follow up cultural resources investigation. Unpublished report on file. Lewiston (Montana): Bureau of Land Management.

- DEMPSEY, H. A. 1998. *Indians of the Rocky Mountain Parks*. Calgary: Fifth House.
- DORMAAR, J. F. 2003. Archaeology and geography of vision quest sites, in J. W. Brink and J. F. Dormaar (eds.) *Archaeology in Alberta: a View from the New Millennium: 188-207*. Medicine Hat: Archaeological Society of Alberta.
- DUGAN, K. M. 1985 *The Vision Quest of the Plains Indians: Its Spiritual Significance*. Lewiston (N.Y.): The Edwin Mellen Press.
- DUKE, P. 1991. *Points in Time: Structure and Event in a Late Northern Plains Hunting Society*. Nivot: University Press of Colorado.
- DUKE, P. AND M. C. WILSON. 1994. Cultures of the mountains and plains: from the Selkirk Mountains to the Bitterroot Range, in K. H. Schlesier (ed.) *Plains Indians, A.D. 500-1500, the Archaeological Past of Historic Groups: 56-70*. Norman: University of Oklahoma Press.
- DUMOND, D. 1972. Population growth and political centralization, in B. Spooner (ed.) *Population Growth: Anthropological Implications: 286-310*. Cambridge (Mass.): MIT Press.
- DYCK, I. G. 1983. The Prehistory of Saskatchewan, in H. T. Epp and I. Dyck (eds.) *Tracking Ancient Hunters: Prehistoric Archaeology in Saskatchewan: 63-139*. Regina: Saskatchewan Archaeological Society.
- DYSON-HUDSON, R., AND E. A. SMITH. 1978. Human territoriality: an ecological reassessment. *American Anthropologist* 80(1):21-41.
- EULER, R. C. AND G. J. GUMERMAN. 1978. *Investigations of the Southwestern Anthropological Research Group: an Experiment in Archaeological Cooperation*. Flagstaff: Museum of Northern Arizona.
- EWERS, J. C. 1955. *The Horse in Blackfoot Indian Culture, with Comparative Material from Other Western Tribes* (Bureau of American Ethnology, Bulletin 159). Washington (D.C.): Bureau of American Ethnology.
- 1958. *Blackfeet: Raiders of the Northwest Plains*. Norman: University of Oklahoma Press.
- FEDIRCHUK, G. J. 1987. The Missinglink Site: Kananaskis Country. Unpublished report on file. Edmonton: Archaeological Survey of Alberta.
- FEDJE, D. 1986a. *The Second Lake Site: Archaeological Mitigation in Banff National Park* (Canadian Parks Service Microfiche Report Series 234). Ottawa: Environment Canada.

-- 1986b. Banff Archaeology 1983-1985, in Brian Ronaghan (ed.) *Eastern Slopes Prehistory: Selected Papers* (Archaeological Survey of Alberta Occasional Paper No. 30): 25-62. Edmonton: Alberta Culture.

-- 1987. Banff resources description reconnaissance – 1986. Unpublished report on file. Calgary: Parks Canada.

-- 1989. Archaeological resource description and analysis, Banff National Park. Unpublished report on file. Calgary: Parks Canada.

FEDJE, D. W. AND A. J. LANDALS. 1987. *Archaeological Resource Impact Assessment, Banff Springs Hotel Golf Course and Staff Housing Expansion*. (Canadian Parks Service, Microfiche Report Series No. 411). Ottawa: Environment Canada.

FEDJE, D. W. AND J.B. MCSPORRAN. 1988. "Westerners" in the Eastern Valleys of the Northern Rocky Mountains. Paper presented at the 1988 Canadian Archaeological Association meetings, Whistler, B.C.

FEDJE, D. W. AND J. M. WHITE. 1988. *Vermilion Lakes Archaeology and Palaeoecology: Trans-Canada Highway Mitigation in Banff National Park* (Canadian Parks Service Microfiche Report Series 463). Ottawa: Environment Canada.

FEDJE, D. W., J. M. WHITE, M. C. WILSON, D. E. NELSON, J. S. VOGEL, AND J. R. SOUTHON. 1995. Vermilion Lakes Site: adaptations and environments in the Canadian Rockies during the latest Pleistocene and early Holocene. *American Antiquity* 60:81-108.

FEICK, J. L. 2000. Evaluating ecosystem management in the Columbia Mountains of British Columbia. Unpublished PhD. thesis, Department of Geography, University of Calgary, Calgary.

FLADMARK, K. R. 1982. An introduction to the prehistory of British Columbia. *Canadian Journal of Archaeology* 6:95-156.

FLENNIKEN, J. J. 1981. *Replicative Systems Analysis: a Model Applied to the Vein Quartz Artifacts from the Hoko River Site* (Laboratory of Anthropology Reports of Investigations No. 59). Pullman: Washington State University.

FOLEY, R. 1985. Optimality theory in anthropology. *Man* 20:222-242.

FORBIS, R. G. 1962. Old Women's Buffalo Jump, Alberta, in *Contributions to Anthropology 1960, Part 1* (National Museum of Canada Bulletin 180): 57-123. Ottawa: National Museum of Canada.

-- 1963. The direct historical approach in the prairie provinces of Canada. *Great Plains Journal* 3(1): 9-16.

- 1977 *Cluny, an Ancient Fortified Village in Alberta* (University of Calgary Department of Archaeology Occasional Paper 4). Calgary: University of Calgary.
- FORMAN, S. H. 1988. The future value of the “verticality” concept, implications and possible applications in the Andes, in N. Allan, G. Knapp, and C. Stadel (eds.) *Human Impact on Mountains*: 133-153. New Jersey: Rowman & Littlefield Publishers.
- FRANCIS, P. D. (ed.) 1991. Archaeology of the Echo Creek Site (515R), Banff National Park. Unpublished report on file. Unpublished report on file. Calgary: Parks Canada.
- FRISON, G. C. 1973. *The Wardell Buffalo Trap 48 SU 301 : Communal Procurement in the Upper Green River Basin, Wyoming*. (Anthropological Papers No. 48.) Ann Arbor: University of Michigan.
- GADD, B. 2000. *Handbook of the Canadian Rockies* (Second edition 1995, updated 2000). Jasper (Alberta): Corax Press.
- GAMBLE, C. 1978. Resource exploitation and the spatial patterning of hunter-gatherers: a case study, in D. Green, C. Haselgrove and M. Spriggs (eds.) *Social Organization and Settlement: Contributions from Anthropology, Archaeology and Geography*. British Archaeological Reports (Supplementary) 47:153-185.
- GOODALE, N. B., W. C. PRENTISS AND I. KUIJT. 2004. Cultural complexity: a new chronology of the Upper Columbia drainage area, in W. C. Prentiss and I. Kuijt (eds.) *Complex Hunter-gatherers, Evolution and Organization of Prehistoric Communities on the Plateau of Northwestern North America*: 36-48. Salt Lake City: University of Utah Press.
- GORHAM, L. 1993 The Christensen Site: 7,000 years of Banff chert utilization. M.A. thesis, Department of Archaeology, University of Calgary, Calgary.
- GRAYSON, D AND CANNON M. 1999. Human paleoecology and foraging theory in the Great Basin, in C. Beck (ed.) *Models for the Millenium: Great Basin Anthropology Today*: 141-151. Salt Lake City: University of Utah Press.
- GREAVES, S. 1982. *Upon the Point: a Preliminary Investigation of Ethnicity as a Source of Metric Variation in Lithic Projectile Points* (Mercury Series, Archaeological Survey of Canada Paper 109). Ottawa: National Museum of Man.
- GRUBB, P. J. 1986. Problems posed by sparse and patchily distributed species in species-rich plant communities, in J. Diamond and T. J. Case (eds.) *Community Ecology*. New York: Harper & Row.
- GRUHN, R. 1968 Preliminary report on the Mulbach Site: a Besant bison trap in Central Alberta, in *Contributions to Anthropology VII: Archaeology* (National Museums of Canada Bulletin 232):128-156. Ottawa: National Museum of Canada.

- GRYBA, E. M. 1983. *Sibbald Creek: a Record of 11,000 Years of Human Utilization of the Southern Alberta Foothills* (Archaeological Survey of Alberta Occasional Paper 22). Edmonton: Alberta Culture.
- HALLETT, D. J. 1996. Paleoecological investigations in the montane ecoregion of the Kootenay Valley and its implications for ecosystem management. Unpublished Master Thesis, Faculty of Environmental Design, University of Calgary, Calgary.
- HALLETT, D. J., D. S. LEPOFSKY, R. W. MATHEWES, AND K. P. LERTZMAN. 2003. 11000 years of fire history and climate in the Mountain Hemlock rainforests of southwestern British Columbia based on sedimentary charcoal. *Canadian Journal of Forest Research* 33: 292–312.
- HALSTEAD, P AND J. O'SHEA. 1989. Introduction: cultural responses to risk and uncertainty, in P. Halstead and J. O'Shea (ed.) *Bad Year Economics*: 1-7. Cambridge: Cambridge University Press.
- Handbook of North American Indians, Vol 6. Subartic.* Washington (D.C.): Smithsonian Institution.
- Handbook of North American Indians, Vol. 12 Plateau.* Washington (D.C.): Smithsonian Institution.
- HARPENDING, H. AND H. DAVIS. 1978. Some implications for hunter-gatherer ecology derived from the spatial structure of resources. *World Archaeology* 8(3): 275-283.
- HARRIS, M. 1971. *Culture, Man, and Nature*. New York: Crowell.
- HASSAN, F. A. 1978. Demographic archaeology, in M. B. Schiffer (ed.) *Advances in Archaeological Method and Theory* (Vol.1): 49-103. New York: Academic Press.
- 1981. *Demographic Archaeology*. New York: Academic Press.
- HAYDEN, B. 1992. (editor) *A Complex Culture of the British Columbia Plateau, Traditional Stl'atl'imx Resource Use*. Vancouver: UBC Press.
- HAYDEN, B., E. BAKEWELL, AND R. GARGETT. 1996. The world's longest-lived corporate group: Lithic sourcing reveals prehistoric social organization near Lillooet, British Columbia. *American Antiquity*, 61: 341-356.
- HAYDEN, B. AND J. SPAFFORD. 1993. The Keatley Creek Site and corporate group archaeology. *B.C. Studies* 99:106-139.
- HAYDEN, B. AND R. SCHULTING. 1997. The Plateau interaction sphere and Late Prehistoric cultural complex. *American Antiquity* 62(1):51-85.
- HEAD, T. 1980. Historical resources evaluation ElPu-8 and EkPt-3, Limestone field gas gathering system. Unpublished report on file. Edmonton: Archaeological Survey of Alberta.

-- 1999. Historical resources impact mitigation, Hunter Valley (EiPp 16) and EiPp 18, ASA Permit No. 95-027. Unpublished report on file. Edmonton: Archaeological Survey of Alberta.

HEITZMANN, R. 1982 Archaeological conservation and mitigation program 1981, Sites EdPp 21 and 22, Sheep River Valley. Secondary Road 546, in Fedirchuk McCullough & Associates Ltd. Archaeological conservation and mitigation program 1981, Alberta Transportation projects. Unpublished report on file. Edmonton: Archaeological Survey of Alberta.

-- 1999a. Developing an understanding of long term human influences in the Central Canadian Rockies. In *Learning From the Past, a Historical Look at Mountain Ecosystems*: 60-78. Revelstoke (B.C.): Columbia Mountain Institute of Applied Ecology.

-- 1999b. *Archaeological Investigations at the Salmon Beds, Athalmer, B.C.* in <http://www.livinglandscapes.bc.ca/cbasin/salmonbeds.htm>

-- 2001. Identifying human ignited fires in the Central Canadian Rockies over the last millennium, in J.-L. Pilon, M. W. Kirby and C. Thériault (eds.) *A Collection of Papers Presented at the 33rd Annual Meeting of the Canadian Archaeological Association*, The Ontario Archaeological Society Inc. http://collection.nlc-bnc.ca/100/200/300/ont_archaeol_soc/annual_meeting_caa/33rd/heitzmann.pdf

-- 2006. Kootenae House National Historic Site of Canada, archaeological inventory 2005. Unpublished report on file. Calgary: Parks Canada.

HIGGS, E. S. AND C. VITA-FINZI. 1972. Prehistoric economies: a territorial approach, in E. S. Higgs (ed.) *Papers in Economic Prehistory*: 27-36. Cambridge: Cambridge University Press.

HISCOCK, P. 1983. Stone tools as cultural markers? The last two decades of stone artefact analysis in Australian archaeology. *Australian Archaeology* 16:48-56.

HITCHCOCK, R. K. 1987. Sedentism and site structure: organizational change in Kalahari Basarwa residential locations, in S. Kent (ed.) *Method and Theory for Activity Area Research*: 374-423. New York: Columbia University Press.

HOLLAND, W. D. AND G. M. COEN (eds.) 1982. *Ecological (Biophysical) Land Classification of Banff and Jasper National Parks*. Alberta Institute of Pedology Publication SS-82-44. Edmonton: Alberta Institute of Pedology.

HUGHES, R. E. (ed) 1984. Obsidian studies in the Great Basin. *Contributions University of California Archaeological Research Facility* 45.

INGOLD, T.. 1980 *Hunters, Pastoralists and Ranchers: Reindeer Economics and Their Transformations*. Cambridge: Cambridge University Press.

- IRWIN, L. 1994 *The Dream Seekers: Native American Visionary Traditions of the Great Plains*. Norman: University of Oklahoma Press.
- JANZ, B. AND D. STORR. 1977. *The Climate of the Contiguous Mountain Parks, Banff, Jasper, Yoho, Kootenay* (Atmospheric Environment Service Report No. 30). Toronto: Environment Canada.
- JENNESS, D. 1938. *The Sarcee Indians of Alberta* (National Museum of Canada, Bulletin 90, Anthropological Series, No. 23). Ottawa: Canada Department of Mines and Resources.
- JENSEN, W. 2000. Estimating big game weights. *North Dakota Outdoors* Sept-Oct. http://www.antelope.org/weights/estimate_weights.htm. Accessed March 23, 2009.
- JOCHIM, M. A. 1976. *Hunter-gatherer Subsistence and Settlement: a Predictive Model*. New York: Academic Press.
- 1979 Breaking down the system: recent ecological approaches in archaeology, in M. B. Schiffer (ed.) *Advances in Archaeological Method and Theory*, Vol. 2: 77-117. New York: Academic Press.
- 1980. *Strategies for Survival*. New York: Academic Press.
- 1998. *A hunter-gatherer Landscape, Southwest Germany in the Late Paleolithic and Mesolithic*. New York and London: Plenum Press.
- JOHNSON, E. A., G. I. FRYER AND M. J. HEATHCOTT. 1990. The influence of man and climate on frequency of fire in the interior wet belt forest, British Columbia. *Journal of Ecology* 78:403-412.
- JOHNSON, E. A. AND C. P. S. LARSEN. 1991. Climatically induced change in fire frequency in the Southern Canadian Rockies. *Ecology* 72:194-201.
- JOHNSON, J. K. AND C. A. MORROW (eds.). 1987. *The Organization of Core Technology*. Boulder: Westview Press.
- JOHNSON, O. W. 1969, *Flathead and Kootenay: the Rivers, the Tribes, and the Region's Traders*. Glendale (California): Arthur H. Clark.
- KAY, C. E. 1994. Aboriginal overkill: the role of Native Americans in structuring western ecosystems. *Human Nature* 5:359-398.
- 1995. Aboriginal overkill and Native burning: implications for modern ecosystem management. *Western Journal of Applied Forestry* 10(4):121-126.
- KAY, C. E., C. A. WHITE, I. R. PENGELLY AND B. PATTON. 1999. *Long-term Ecosystem States and Processes in Banff National Park and the Central Canadian Rockies* (National Parks Occasional Paper No. 9). Ottawa: Parks Canada.

- KEEFER, M. AND P. MCCOY. 1999. *All Living Things. A Ktunaxa Ethnobotany Handbook*. Cranbrook (B.C.) Ktunaxa/Kinbasket Tribal Council.
- KEHOE, T. 1966. The small side-notched point system of the Northern Plains. *American Antiquity* 31(6): 827-41.
- 1973. *The Gull Lake Site: a Prehistoric Bison Drive Site in Southwestern Saskatchewan* (Publications in Anthropology and History No. 1). Milwaukee: Milwaukee Public Museum.
- KELLY, R. L. 1988. The three sides of a biface. *American Antiquity* 53:231-44.
- 1992. Mobility/sedentism: concepts, archaeological measures, and effects. *Annual Review of Anthropology* 21:43-66.
- 1994. Some thoughts on future directions in the study of stone tool technological organization, in P. J. Carr (ed.) *The Organization of North American Prehistoric Chipped Stone Tool Technologies*: 132-136. Ann Arbor: International Monographs in Prehistory.
- 1995. *The Foraging Spectrum, Diversity in Hunter-gatherer Lifeways*. Washington and London: Smithsonian Institution Press.
- KERSHAW, L.; A. MACKINNON AND J. POJAR. 1998. *Plants of the Rocky Mountains*. Edmonton: Lone Pine Publishing.
- KEYSER, J. D. AND M. A. KLASSEN. 2001. *Plains Indian Rock Art*. Seattle and London: University of Washington Press; Vancouver and Toronto: UBC Press.
- KIDD, K. E. 1986. *Blackfoot Ethnography*. (Archaeological Survey of Alberta Manuscript Series No. 8). Edmonton: Alberta Culture.
- KIRCH, P. V. 1980. The archaeological study of adaptation: theoretical and methodological issues. *Advances in Archaeological Theory and Method* 3:101-156. New York: Academic Press.
- KOMEX INTERNATIONAL LTD. 1995. *Atlas of the Central Rockies Ecosystem, Towards an Ecologically Sustainable Landscape*. Calgary: Central Rockies Ecosystem Interagency Liaison Group (CREILG).
- KRECH, S. 1999. *The Ecological Indian: Myth and History*. New York: Norton.
- KUTZBACK, J. E. 1987. Model simulations of climatic patterns during the deglaciation of North America, in W. F. Ruddiman and H. E. Wright (eds). *North America and Adjacent Areas During the Last Deglaciation*: 425-446. Boulder (Colorado): Geological Society of America.

LANDALS, A. 2004. Horse heaven: change in Late Precontact to Contact Period landscape use in Southern Alberta, in B. Kooyman and J. Kelley (eds.) *Archaeology on the Edge, New Perspectives from the Northern Plains* (Canadian Archaeological Association Occasional Paper No. 4): 231-262. Calgary: University of Calgary Press.

LANGEMANN, E. G. AND W. PERRY. 2002. Banff National Park of Canada, archaeological resource description and analysis. Unpublished report on file. Parks Canada: Calgary.

LARSON, M. L. AND M. KORNFELD. 1997. Chipped stone nodules: theory, method, and examples. *Lithic Technology*, 22, (1): 4-18.

LEE, R. AND R. DALY. 1999. *The Cambridge Encyclopedia of Hunters and Gatherers*. Cambridge: Cambridge University Press.

LEE, R. AND I. DEVORE. 1968. *Man the Hunter*. Chicago: Aldine.

LEONARD, E. M. 1986a. Varve studies at Hector Lake, Alberta, Canada, and the relationship between glacial activity and sedimentation. *Quaternary Research* 25:199-214.

-- 1986b. Use of lacustrine sedimentary sequences as indicators of Holocene glacial history, Banff National Park, Alberta, Canada. *Quaternary Research* 26:218-231.

LEWIS, H. T. 1977. Maskuta: The ecology of Indian fires in Northern Alberta. *The Western Canadian Journal of Anthropology* Vol. VII(1):15-52.

-- 1980. Indian fires of spring. *Natural History*, 89:76-83.

-- 1982. *A Time for Burning* (Boreal Institute of Northern Studies Occasional Report Publication 17). , Edmonton: University of Alberta.

LEWIS, H. T. AND T. A. FERGUSON. 1988. Yard, corridors, and mosaics: how to burn a Boreal forest. *Human Ecology*, Vol. 16 (1) 57-76.

LIFEWAYS OF CANADA LIMITED. 1973 EfPs-3: a 6500 year old campsite in the Kananaskis Valley. Unpublished report on file. Edmonton: Alberta Department of Highways and Transport.

LOVESETH, B. 1980. Crowsnest Dancehall Site (DjPp 3): interpretation based on lithic artefact and type analysis. Unpublished M.A. thesis, University of Calgary, Calgary.

LOWEN, D. C. 1998. Ecological, ethnobotanical, and nutritional aspects of yellow glacier lily, *Erythronium grandiflorum* Pursh (Liliacea), in Western Canada. Unpublished MSc Thesis, Department of Biology, University of Victoria, Victoria, B.C.

LUCKMAN, B. H. 1986. Reconstruction of Little Ice Age events in the Canadian Rocky mountains. *Geographie Physique et Quaternaire*, 40:17-28.

- 1990. Mountain areas and global change: a view from the Canadian Rockies. *Mountain Research and Development*, Vol. 10(2): 183-195.
- 1993. Glacial fluctuation and tree-ring records for the last millennium in the Canadian Rockies. *Quaternary Sciences Reviews* 12:441-450.
- LUPO, K. 2006. What explains the carcass field processing and transport decisions of contemporary hunter-gatherers? Measures of economic anatomy and zooarchaeological skeletal part representation. *Journal of Archaeological Method and Theory*, 13(1):19-66.
- MACARTHUR, R. H. AND E. R. PIANKA. 1966. On optimal use of a patchy environment. *American Naturalist* 100:603-609.
- MAGNE, M. P. R. 1985. *Lithics and Livelihood: Stone Tool Technologies of Central and Southern Interior British Columbia* (Archaeological Survey of Canada, Paper No. 133). Ottawa: National Museum of Man.
- 1989. Lithic reduction stages and assemblage formation processes, in D. S. Amick and R. P. Mauldin (eds.) *Experiments in Lithic Technology* (BAR International Series 528): 15-32. Oxford: British Archaeological Reports.
- MAGNE, M. P. R. AND CONTRIBUTORS TO THE SASKATCHEWAN-ALBERTA DIALOGUE. 1987. Distributions of Native groups in Western Canada, A.D. 1700 to A.D. 1850, in M. P. R. Magne (ed.) *Archaeology in Alberta 1986* (Archaeological Survey of Alberta Occasional Paper No. 31): 220-232. Edmonton: Alberta Culture.
- MAGNE, M. P. R. AND M. A. KLASSEN. 1992. Were the Shoshone at Writing-On-Stone? in A. S. Goldsmith, S. Garvie, D. Selin, and J. Smith (eds.) *Ancient Images, Ancient Thought, the Archaeology of Ideology*: 449-460. Calgary: University of Calgary Archaeology Association.
- 2002. A possible fluteplayer pictograph site near Exshaw, Alberta. *Canadian Journal of Archaeology* 26(1):25-40.
- MALAINÉY, M. E., AND B. L. SHERRIFF. 1996. Adjusting our perceptions: historical and archaeological evidence of winter on the Plains of Western Canada. *Plains Anthropologist* 42(158): 333-357.
- MARKS, S. A. AND D. E. SHEA. 1977. When the chips are down: buffalo hunters and game theory. Paper presented at the Seventy-sixth Annual Meeting of the American Anthropological Association, Houston, Texas. [cited in Bettinger 1980]
- MARTIN, J. F. 1983. Optimal foraging theory: a review of some models and their applications. *American Anthropologist* 85:612-29.
- MASTERS, A. 1990. Changes in forest fire frequency in Kootenay National Park, Canadian Rockies. *Canadian Journal of Botany* 68:1763-1767.

MCCULLOUGH, E. J. 1982 *Prehistoric Cultural Dynamics of the Lac La Biche Region* (Archaeological Survey of Alberta Occasional Paper 18). Edmonton: Alberta Culture.

MCCULLOUGH, E. J. AND G. J. FEDIRCHUK. 1983. Archaeological investigations, eastern slopes region Sites EdPp 21, EdPp 22, EfPq 5, EfPq 6. Unpublished report on file. Edmonton: Archaeological Survey of Alberta.

MCINTYRE, M. 1978. *Studies in Archaeology, Highway 1A Coal Creek, Alberta* (Archaeological Survey of Alberta Occasional Paper No. 7). Edmonton : Alberta Culture.

MCINTYRE, M. AND B. O. K. REEVES. 1975. Archaeological investigations: Lake Minnewanka Site (EhPr-1). Unpublished report on file. Calgary: Parks Canada.

MCKENZIE, K. M. 1976. Preliminary report of archaeological investigations at Site EcPx 5 under Permit 1976-16. Unpublished report on file. Victoria, BC: Heritage Conservation Branch.

MEIDINGER, D. V. AND J. POJAR (eds.). 1991. *Ecosystems of British Columbia* (Special Report Series 6). Victoria: B.C. Ministry of Forests.

MINC, L. D. AND K. P. SMITH. 1989. The spirit of survival: cultural responses to resource variability in North Alaska, in P. Halstead and J. O'Shea (eds.) *Bad Year Economics: Cultural Responses to Risk and Uncertainty*: 8-39. Cambridge: Cambridge University Press.

MITHEN, S. J. 1990. *Thoughtful Foragers, a Study of Prehistoric Decision Making*. Cambridge: Cambridge University Press.

MOHS, G. 1981. Archaeological investigation of a Kutenai Indian encampment. Permit 1980-5. Unpublished report on file. Victoria, BC: Heritage Conservation Branch.

MOODIE, D. W. AND A. J. RAY. 1975. Buffalo migrations in the Canadian Plains. *Plains Anthropologist* 21(71):45-52.

MORGAN, G. R. 1979. *An Ecological Study of the Northern Plains as Seen Through the Garratt Site* (Occasional Papers in Anthropology No. 1). Regina: Department of Anthropology, University of Regina.

MULLOY, W. J. 1958. A preliminary historical outline for the Northwestern Plains. *University of Wyoming Publications* 22(1). Laramie.

MURDOCK, G. P., AND D. O. MORROW. 1970. Subsistence economy and supportative practices: cross-cultural codes 1. *Ethnology* 9:302-330.

- MURPHY, R. 1970. Basin ethnography and ecological theory. In E. H. Swanson (ed.) *Languages and Cultures of Western North America: Essays in Honor of Sven Liljeblad*: 152-171. Pocatello: Idaho State University Press.
- MYERS, F. R. 1988. Critical trends in the study of hunter-gatherers. *Annual Review of Anthropology* 17:261-82.
- NELSON, J. G. AND R. E. ENGLAND. 1971. Some comments on the causes and effects of fire in the northern grasslands areas of Canada and the nearby United States, ca. 1750 - 1900. *Canadian Geographer*, XV, 4: 295-306.
- NELSON, M. C. 1991. The study of technological change, in M. B. Schiffer (ed.) *Archaeological Method and Theory* 3:57-100. Tucson: University of Arizona Press.
- NEUMAN, M. 1997 Immunological analysis of lithic artefacts from sites in Kootenay National Park. Unpublished report on file. Calgary: Parks Canada.
- ODUM, E. P. 1963. *Ecology*. New York: Holt, Rinehard & Winston.
- ODUM, H.T. 1984 *Ecological and general systems: an introduction to systems ecology*. Niwot (Colorado), University Press of Colorado.
- OETELAAR, G. A. 2003. Tipi rings and Alberta archaeology: a brief overview, in J. W. Brink and J. F. Dormaar (eds.) *Archaeology in Alberta, A View from the New Millennium*: 104-131. Medicine Hat: Archaeological Society of Alberta.
- OETELAAR, G. A., L. GORHAM, AND H. MIDDLETON. n.d. Archaeological investigations at the Christensen Site, Banff National Park, Alberta. Draft report on file, Parks Canada, Calgary.
- OLIVER, S. C. 1962 *Ecological and Cultural Continuity as Contributing Factors in the Social Organization of the Plains Indians*. Berkeley: University of California Press.
- PANTER-BRICK, C.; R. H. LAYTON, AND P. ROWLEY-CONWY (eds.). 2001. *Hunter-gatherers an Interdisciplinary Perspective*. Cambridge, Cambridge U. Press.
- PARKS CANADA AGENCY. 2000. "Unimpaired for Future Generations"? *Protecting Ecological Integrity with Canada's National Parks. Vol. I "A Call to Action."* Vol. II "Setting a New Direction for Canada's National Parks." (Report of the Panel on the Ecological Integrity of Canada's National Parks). Ottawa: Parks Canada Agency.
- PARRY, W. AND R. L. KELLY. 1987. Expedient core technology and sedentism, in J. K. Johnson and C. A. Morrow (eds.) *The Organization of Core Technology*:285-304. Boulder (Colorado): Westview Press.
- PEACOCK, S. L. 1992. Piikáni ethnobotany: traditional plant knowledge of the Piikáni Peoples of the Northwestern Plains. Unpublished MA thesis, Department of Archaeology, University of Calgary, Calgary.

-- 1998. Putting down roots: The emergence of wild plant food production on the Canadian Plateau. PhD. Dissertation, Interdisciplinary Degree Programme, University of Victoria, B.C.

PECK, T. R. 2001. Bison ethology and Native settlement patterns during the Old Women's Phase on the Northwestern Plains. PhD. Dissertation, Department of Archaeology, University of Calgary, Calgary, Alberta.

PECK, T. R., AND C. R. HUDECEK-CUFFE. 2003. Archaeology on the Alberta Plains: the last two thousand years. In Jack W. Brink and John F. Dormaar (eds.) *Archaeology in Alberta, a View From the New Millennium*, pp. 72-103. Medicine Hat: Archaeological Society of Alberta.

PECK, T. R. AND J. W. IVES. 2001. Late side-notched projectile points in the northern plains. *Plains Anthropologist* 46(176): 163-193.

PERLMAN, S. M. 1980. An optimum diet model, coastal variability, and hunter-gatherer behaviour, in M. Schiffer (ed.) *Advances in Archaeological Method and Theory* 3: 257-310. New York: Academic Press.

-- 1985. Group size and mobility costs, in S. W. Green and S. M. Perlman (eds.) *The Archaeology of Frontiers and Boundaries*. New York: Academic Press.

PICKETT, S. T. AND P. S. WHITE. 1985. *The Ecology of Natural Disturbance and Patch Dynamics*. Orlando, FL: Academic Press.

POKOTYLO, D. L. AND D. MITCHELL. 1998. Prehistory of the Northern Plateau, in D. E. Walker, Jr., (ed.) *Handbook of North American Indians, Vol. 12 Plateau*: 81-102. Washington (D.C.): Smithsonian Institution.

POLLOCK, J. 1984. Mitigative excavations at sites EiPs-7 on HWY 940:14 and EdPq-15 and EdPq-16 on the Gorge Creek Trail, Kananaskis Country. Unpublished report on file. Edmonton: Archaeological Survey of Alberta.

PRENTISS, W. C.; J. C. CHATTERS, M. LENERT, D. S. CLARKE, AND R. C. O'BOYLE. 2005. The archaeology of the Plateau of Northwestern North America during the Late Prehistoric Period (3500-200 B.P.): evolution of hunting and gathering societies. *Journal of World Prehistory* 19 (1): 47-118.

PRENTISS, W. C. AND I. KUIJT. 2004. The evolution of collector systems on the Canadian Plateau. In W. C. Prentiss and I. Kuijt (eds.) *Complex Hunter-gatherers, Evolution and Organization of Prehistoric Communities on the Plateau of Northwestern North America*: 49-66. Salt Lake City: The University of Utah Press.

PYKE, G. H., H. R. PULLIAM, AND E. L. CHARNOV. 1977. Optimal foraging: a selective review of theory and tests. *Quarterly Review of Biology* 52:137-154.

- QUIGG, J. M. 1974. *The Belly River: Prehistoric Population Dynamics in a Northwestern Plains Transition Zone*. (Archaeological Survey of Canada Mercury Series No. 23). Ottawa: National Museums of Canada.
- 1976. Field investigations in the Neutral Hills region. In J. M. Quigg (ed.) *Archaeology in Alberta, 1976* (Archaeological Survey of Alberta Occasional Paper No. 4): 54-73. Edmonton: Alberta Culture.
- 1978. Evaluation of EgPt-6, in W. J. Byrne (ed.) *Archaeological in Alberta 1977*. (Archaeological Survey of Alberta Occasional Papers No. 5): 82-93. . Edmonton: Alberta Culture.
- 1981. Highway assessment program in Southern Alberta. Unpublished report on file. Edmonton: Archaeological Survey Alberta.
- 1982. Mitigative excavations at EcPp-24 and EfPq-5 in the Eastern Foothills of Southern Alberta. Unpublished report on file. Edmonton: Archaeological Survey of Alberta.
- 1986 *Ross Glen: a Besant Stone Circle Site in Southeastern Alberta* (Archaeological Survey of Alberta Manuscript Series No. 10). Edmonton: Alberta Culture.
- RAFFERTY, J. 1985 The archaeological record on sedentariness: recognition, development, and implications, in M. B. Schiffer (ed.) *Advances in Archaeological Method and Theory* 8):113-56. New York: Academic Press.
- REASONER, M. A. AND M. HICKMAN. 1989. Late quaternary environmental change in the Lake O'hara region, Yoho National Park, British Columbia. *Palaeogeography, Palaeoclimatology, Palaeoecology* 72:291-316.
- REDMAN, C. L. 1999. *Human Impact on Ancient Environments*. Tucson: University of Arizona Press.
- REEVES, B. O. K. 1969. The southern Alberta paleo-cultural paleo-environmental sequence. In R. G. Forbis, L. B. Davis, O. A. Christensen, and G. Fedirchuk (eds.) *Man and His Environment on the Northern Plains*: pp. 6-46. Calgary: the Students' Press.
- 1977. Historical Site Report: Dome Empress – Red Deer Ethane Pipeline. Unpublished report on file. Edmonton: Archaeological Survey of Alberta.
- 1978. Head-Smashed-In: 5500 years of bison jumping in the Alberta Plains. In L. B. Davis and M. Wilson (eds.) *Bison Procurement and Utilization: a Symposium*: pp. 151-174. Plains Anthropologist Memoir 14.
- 1980. DsPl-10: A Winter Base Campsite in Waterton Lakes National Park. Unpublished report on file. Calgary: Parks Canada.

- 1983. *Culture Change in the Northern Plains: 1,000 B.C. – A.D. 1,000* (Archaeological Survey of Alberta Occasional Paper 20). Edmonton: Alberta Culture.
- 1990. Communal bison hunters of the northern plains, in L. B. Davis and B. O. K. Reeves (eds.) *Hunters of the Recent Past*:168-194. London: Unwin Hyman.
- REEVES, B. O. K. AND T. HEAD. 1978. Final report historical resources impact assessment Limestone gas gathering system. Lifeways of Canada Limited. Unpublished report on file. Edmonton: Archaeological Survey of Alberta.
- REYES, A. V., AND J. J. CLAGUE. 2004. Stratigraphic evidence for multiple advances of Lillooet Glacier, southern coast mountains, British Columbia. *Canadian Journal of Earth Science* 41: 903–918.
- RICHARDS, T. H. AND M. K. ROUSSEAU. 1987. *Late Prehistoric Cultural Horizons on the Canadian Plateau* (Department of Archaeology Publication Number 16)., Burnaby (B.C.): Simon Fraser University.
- ROBINSON, S. P. 1985. Archaeology of the Echo Creek Site (515R), Banff National Park. Unpublished report on file. Calgary: Parks Canada.
- ROUSSEAU, M. K. 2004. A culture historic synthesis and changes in human mobility, sedentism, subsistence, settlement and population on the Canadian Plateau, 7000-200 BP, in W. C. Prentiss and I. Kuijt (eds.) *Complex Hunter-gatherers: Evolution and Organization of Prehistoric Communities on the Plateau of Northwestern North America*: 3-22. Salt Lake City: University of Utah Press.
- SAHLINS, M. 1968. Notes on the original affluent society, in R. B. Lee and I. DeVore (eds.) *Man the Hunter*: 84-89. Chicago: Aldine.
- SANGER, D. 1970. The archaeology of the Lochnore-Nesikep Locality, British Columbia. *Syesis* 3, Supplement 1.
- SCHAEFFER, C. E. 1935. An acculturation study of the Indians of the Flathead Reservation of Western Montana. Submitted to the Commissioner of Indian Affairs.
- 1940. The subsistence quest of the Kutenai: a study of the interaction of culture and environment. Unpublished PhD. Dissertation, University of Pennsylvania.
- 1983. Plains Kutenai, an ethnological evaluation. *Alberta History*, Vol. 30(4):1-9.
- SCHLESIER, K. H. (ed.) 1994. *Plains Indians, A.D. 500-1500, the Archaeological Past of Historic Groups*. Norman: University of Oklahoma Press.
- SCHOENER, T. W. 1971. Theory of feeding strategies. *Annual Review of Ecology and Systematics* 2:369-404.
- SERVICE, E. 1962. *Primitive Social Organization: an Evolutionary Perspective*. New York: Random House.

- 1966. *The Hunters*. Englewood Cliffs (New Jersey): Prentice-Hall.
- SHACKLEY, M. S. 1990. Early hunter-gatherer procurement ranges in the Southwest: evidence from obsidian geochemistry and lithic technology. Unpublished PhD thesis, Arizona State University, Tempe.
- SHEEHAN, M. S. 2004. Ethnographic Models, Archaeological Data and the Applicability of modern foraging theory, in A. Barnard (ed.) *Hunter-gatherers in History, Archaeology and Anthropology*: 163-173. Oxford: Berg.
- SHOTT, M. J. 1986. Technological organization and settlement mobility: an ethnographic examination. *Journal of Anthropological Research* 42:15-51.
- 1990. Stone tools and economics: Great Lakes paleoindian examples, in K. B. Tankersley and B. L. Isaac (eds.) *Early Paleoindian Economies of Eastern North America* (Research in Economic Anthropology, Supplement 5): 3-44. Greenwich (CT), JAI Press.
- SIMEK, J. F. 1994. The organization of lithic technology and evolution: notes from the continent, in P. J. Carr (ed.) *The Organization of North American Prehistoric Chipped Stone Tool Technologies*: 118-122. Ann Arbor: International Monographs in Prehistory.
- SIMMONS, I. G. 1989. *Changing the Face of the Earth: Culture, Environment, History*. Oxford: Basil Blackwell.
- SKIBO, J. M., W. H. WALKER AND A. E. NIELSEN. 1995. *Expanding Archaeology*. Salt Lake City: University of Utah Press.
- SMITH, A. H. 1984. *Kutenai Indian Subsistence and Settlement Patterns, Northwestern Montana* (Technical Report). Seattle: U.S. Army Corps of Engineers.
- SMITH, D. J. AND D. P. MCCARTHY. 1991. Little ice age glacial history of Peter Lougheed Provincial Park, Alberta. *Program with Abstracts Canadian Association of Geographers Annual Meeting*: p. 158. Kingston (Ont.): Queen's University.
- SMITH, E. 1983. Anthropological applications of optimal foraging theory: a critical review. *Current Anthropology* 24:625-651.
- 1991. *Inujjamiut Foraging Strategies*. New York: Aldine de Gruyter.
- SMITH, E. A. AND M. WISHNIE. 2000. Conservation and subsistence in small-scale societies. *Annual Review of Anthropology* 29:493-524.
- SMITH, E. F. AND C. E. OWENSBY. 1972. Effects of fire on true prairie grasslands, in *Proceedings of the Annual Tall Timbers Fire Ecology Conference*, Number 12. Tallahassee (Florida): Tall Timbers Research Station.

SMITHSONIAN 2009 Field guide to North American mammals. National Museum of Natural History. http://www.mnh.si.edu/mna/search_name.cfm Accessed 23 March 2009.

SMYTH, D. 2001. The Niitsitapi trade: Euroamericans and the Blackfoot-Speaking Peoples, to the mid-1830s. Unpublished PhD. Dissertation, Department of History, Carleton University, Ottawa.

STEWART, J. H. 1936. The economic and social basis of primitive bands, in *Essays in Honor of A. L. Kroeber*: 331-350. Berkeley: University of California Press.

-- 1938. Basin-Plateau aboriginal socio-political groups. *Bureau of American Ethnology Bulletin* 120.

-- 1969. Postscript to bands: on taxonomy, processes, and causes, in D. Damas (ed.) *Contributions to Anthropology: Band Societies* (National Museums of Canada Bulletin 228):288-295. Ottawa: National Museums of Canada.

STEWART, O. C. 1956. Fire as the first great force applied by man, in W. Thomas (ed.) *Man's Role in Changing the Face of the Earth*: 115-133. Chicago: University of Chicago Press.

STRONG, W. L. 1992. *Ecoregions and Ecodistricts of Alberta*. Edmonton: Alberta Forestry, Lands and Wildlife.

STRYD, A. H. AND M. K. ROUSSEAU. 1996. The early prehistory of the Mid-Fraser-Thompson river area, in R. L. Carlson and L. Dalla Bona (eds.) *Early Human Occupation in British Columbia*: 177-204. Vancouver UBC Press.

STUIVER, M., P. J. REIMER AND R. W. REIMER. 2003 *CALIB 5.0* (www program and documentation) <http://calib.qub.ac.uk/calib/>

TANDE, G. F. 1979. Fire history and vegetation pattern of coniferous forests in Jasper National Park, Alberta. *Canadian Journal of Botany* 57:1912-1931.

TAYLOR, W. W. 1964. Tethered nomadism and water territoriality: an hypothesis. *International Congress of Americanists XXXV* (2): 197-203. Mexico City: Instituto Nacional de Antropología y Historia.

TEIT, J. A. 1909. The Shuswap. *American Museum of Natural History, Memoirs* 4(7):443-620. New York.

-- 1930. The Salishan Tribes of the Western Plateaus. *Bureau of American Ethnology, Annual Report*, 45: 23-396. Washington.

THOMAS, D. H. 1972. Western Shoshone ecology: settlement patterns and beyond, in D. Fowler (ed.) *Great Basin Cultural Ecology: a Symposium* (Desert Research Institute Publications in the Social Sciences 8): 135-153.

-- 1989. Diversity in hunter-gatherer cultural geography, in R. D. Leonard and G. T. Jones (ed.) *Quantifying Diversity in Archaeology*: 85-91. Cambridge: Cambridge University Press.

THOMAS, D. H. AND R. L. BETTINGER. 1976. Prehistoric pinyon ecotone settlements of the Upper Reese River Valley, central Nevada. *Anthropological Papers of the American Museum of Natural History* 53(3).

TILLEY, C. 1996. *An Ethnography of the Neolithic, Early Prehistoric Societies in Southern Scandinavia*. Cambridge: Cambridge University Press.

TORRENCE, R. 1983. Time budgeting and hunter-gatherer technology, in G. Bailey (ed.) *Hunter-gatherer Economy in Prehistory*: 11-22. Cambridge: Cambridge University Press.

-- 1989. *Time, Energy and Stone Tools*. Cambridge: Cambridge University Press.

TROLL, C. 1943. Methoden der Luftbildforschung. *Sitzungs-Bericht Europaeischer Geographen, Wuerzburg*: 121-146.

TURNER, N. J. 1991. Burning mountain sides for better crops: Aboriginal landscape burning in British Columbia. *Archaeology in Montana* 32(2) 57-73.

TURNER, N. J., R. BOUCHARD AND D. I. D. KENNEDY. 1980. *Ethnobotany of the Okanagan-Colville Indians of British Columbia and Washington* (British Columbia Provincial Museum, Occasional Paper Series No. 21) Victoria (B.C.): British Columbia Provincial Museum.

TURNEY-HIGH, H. H. 1941. *Ethnography of the Kutenai* (American Anthropological Association, Memoirs, No. 48). Menasha.

TYMSTRA, C. 1991. Fire history study of Yoho National Park, British Columbia. Unpublished M.Sc. Thesis, University of Alberta, Edmonton.

TYRRELL, J. B. (ed.). 1916. *David Thompson's Narrative of His Explorations in Western America 1784-1812*. Toronto: The Champlain Society.

UHLENBECK, C. C. 1912. A new series of Blackfoot texts from the Southern Peigans Blackfoot Reservation, Teton County, Montana. *Koninklijke Akademie von Wetenschappen, Afdeeling Letterkunde, Verhandelingen*, new series 13(1).

UHLIG, H. 1984. Die Darstellung von Geo-Oekosystem in Profilen und Diagrammen als Mittel der vergleichenden Geographie der Hochgebirge. In E. Groetzbach and G. Rinschede (eds.) *Beitraege zur vergleichenden Kulturgeographie der Hochgebirge*, 93-152. Eichstaetter Beitrage vol. 12. Regensburg: Friedrich Pustet.

UNFREED, W. J. AND S. VAN DYKE. 2005. *Archaeological Investigations at the Junction Site (DkPi-2)*, (Occasional Paper of the Archaeological Society of Alberta No. 4). Calgary: Archaeological Society of Alberta.

- VALE, T. R. 1998. The myth of the humanized landscape: an example from Yosemite National Park. *Natural Areas Journal* 18:231-236.
- VAN EGMOND, T. D. 1990. Forest succession and range conditions in elk winter habitat in Kootenay National Park. A Practicum submitted for Master of Natural Resources Management, Natural Resources Institute, University of Manitoba, Winnipeg.
- VAN WAGNER, C. E. 1995. Analysis of fire history for Banff, Jasper, and Kootenay National Parks. Unpublished Report on file. Ottawa: Parks Canada.
- VETH, P. 1993. *Islands in the Interior: the Dynamics of Prehistoric Adaptations within the Arid Zone of Australia*. Ann Arbor: International Monographs in Prehistory.
- VICKERS, J. R. 1986. *Alberta Plains Prehistory: a Review* (Archaeological Survey of Alberta Occasional Papers Nos. 27 & 28). Edmonton: Alberta Culture.
- 1994. Cultures of the Northwestern Plains: from the boreal forest edge to Milk River. In K. H. Schlesier (ed.) *Plains Indians, A.D. 500-1500, The Archaeological Past of Historic Groups*: 3-33. Norman: University of Oklahoma Press.
- VINTON, M. A., D. G. HARTNETT, E. J. FINCK AND J. M. BRIGGS. 1993. Interactive effects of fire, Bison (*Bison bison*) grazing and plant community composition in tallgrass prairie. *American Midland Naturalist* 129:10-18.
- WALDE, D. A. 1995. The Ceramic Assemblage from the Hunter Valley Site (EiPp-16). In T. Head, Historical Resources Impact Mitigation, Hunter Valley (EiPp 16) and EiPp 18. Unpublished report of file. Edmonton: Archaeological Survey of Alberta.
- 2003. *The Mortlach Phase* (Occasional Papers of the Archaeological Society of Alberta No. 2). Calgary: Archaeological Society of Alberta.
- 2006. Sedentism and pre-contact tribal organization on the northern plains: colonial imposition or indigenous development? *World Archaeology* 38(2):291-310.
- WALDE, D. A. AND D. MEYER. 2003. Pre-contact pottery in Alberta: an overview. In J. W. Brink and J. F. Dormaar (eds.) *Archaeology in Alberta, a View from the New Millennium*: pp. 132-153. Medicine Hat: Archaeological Society of Alberta.
- WALDE, D. A., D. MEYER AND W. UNFREED. 1995. The Late Period on the Canadian and adjacent plains. *Journal of American Archaeology* 9:7-66.
- WEDEL, W. 1951. Notes on Aboriginal Pottery from Montana. *Journal of the Washington Academy of Sciences* 41(4):130-138.

- WEINS, J. A. 1976. Population responses to patchy environments. *Annual Review of Ecology and Systematics* 7:81-120.
- WHITE, C. A. 2001. Aspen, elk, and fire in the Canadian Rocky Mountains. Unpublished Ph.D. Thesis, Department of Forest Sciences, University of British Columbia, Vancouver.
- WHITE, L. A. 1959. *The Evolution of Culture*. New York: McGraw-Hill.
- WILLEY, G. R. AND P. PHILLIPS. 1958. *Method and Theory in American Archaeology*. Chicago: University of Chicago Press.
- WILLEY, G. R., AND J. SABLOFF. 1974. *A History of American Archaeology*. San Francisco: Freeman.
- WILLIAMS, L., D. H. THOMAS, AND R. L. BETTINGER. 1973. Notions to numbers: Great Basin settlement as polythetic sets, in C. L. Redman (ed.) *Research and Theory in Current Archaeology*:215-237. New York: Wiley.
- WILMSEN, E. N. 1973. Interaction, spacing behaviour, and the organization of hunting bands. *Journal of Anthropological Research* 29: 1-31.
- WILSON, P. J. 1988. *The Domestication of the Human Species*. New Haven: Yale University Press.
- WINTERHALDER, B. 1981. Optimal foraging strategies and hunter-gatherer research in anthropology: theory and models. In B. Winterhalder and E. A. Smith (eds.) *Hunter-gatherer Foraging Strategies: Ethnographic and Archaeological Analyses*: 13-35. Chicago: The University of Chicago Press.
- 1994. Concepts in historical ecology, the view from evolutionary ecology. In C. L. Crumley (ed.) *Historical Ecology, Cultural Knowledge and Changing Landscapes*: 17-41. Santa Fe (New Mexico): School of American Research Press.
- 1994. Foraging strategies in the boreal forest: an analysis of Cree hunting and gathering. In B. Winterhalder and E. A. Smith (eds.) *Hunter-gatherer Foraging Strategies, Ethnographic and Archaeological Analyses*. Chicago: The University of Chicago Press.
- WINTERHALDER, B. AND E. A. SMITH. 1981. *Hunter-gatherer Foraging Strategies: Ethnographic and Archaeological Analyses*. Chicago: The University of Chicago Press.
- WINTERS, H. D. 1969. The Riverton culture. *Illinois Archaeological Survey Monograph* 1.
- WOBST, M. H. 1974. Boundary conditions for palaeolithic social systems: a simulation approach. *American Antiquity* 39(2): 147-148.

-- 1976. Locational relationships in paleolithic society, in R. H. Ward and K. M. Weiss (eds.) *The Demographic Evolution of Human Populations*:49-58. New York: Academic Press.

WOOD, J. J. 1978. Optimal location in settlement space: a model for describing locational strategies. *American Antiquity* 43(2):258-270.

YELLEN, J. 1977. Long term hunter-gatherer adaptation to desert environments: a biogeographical approach. *World Archaeology* 8(3):262-274.

YIP, J. 1982. Archaeological investigations at the Columbia Lake Site, EbPw-1. Permit 1981-14. Unpublished report on file. Victoria, BC: Heritage Conservation Branch.

YOCHIM, M. J. 2001. Aboriginal overkill overstated, errors in Charles Kay's hypothesis. *Human Nature* 12(2): 141-167.

ZIPF, G. K. 1949. *Human Behaviour and the Principle of Least Effort*. Cambridge: Cambridge University Press.