Knowing *Naŝlhiny* (Horse), Understanding the Land:
Free-Roaming Horses in the Culture and Ecology of the Brittany Triangle and Nemiah Valley

by
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AUTHOR'S DECLARATION

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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ABSTRACT

Free-roaming horses (*Equus ferus caballus* L.) – also called wild or feral – have been present in the Chilcotin region of British Columbia, Canada and part of Tsilhqot'in First Nations' culture for over 250 years. The horses, *naŝlhiny* in Tsilhqot'in, have also been a focal point for controversy and power struggles over land use in the same region for at least 120 years. Recently, the wild horses of the Brittany Triangle (called *Tachelach'ed*, near the Nemiah Valley in the territory of the Xeni Gwet'in First Nation) have been used by local First Nations and some non-governmental organizations as an iconic symbol to gain support for wilderness conservation. To some other residents and government agencies, free-roaming horses are invasive pests that threaten forage availability for cattle, range health, and native wildlife habitat. Little peer-reviewed research exists to elucidate the actual ecological impacts and social relationships of free-roaming horses in the particular ecological, cultural and political context of the Brittany Triangle, or to support management decisions concerning the horses.

This research explores how scientific analysis, local knowledge, and socio-cultural perspectives regarding the ecology and cultural role of free-roaming horses in the Brittany Triangle can be integrated to inform conservation planning and land use management. The primary objectives were: 1) to determine and quantify the species of vegetation where horses are feeding; 2) to document local socio-cultural knowledge and perceptions of free-roaming horses; and 3) to determine how ecological information and socio-cultural perspectives can be integrated to inform conservation planning and land use management.

This transdisciplinary, mixed-methods study took an exploratory, adaptive approach over six years of site visits, including two preparatory field visits (2006-2007), four field seasons over two years of formal data collection (2008-2009), and two follow-up visits (2010-2011). A line-point intersect method and statistical analysis were used to assess plant community composition and variance in eight sample sites that are grazing habitat of free-roaming horses. Qualitative research involved literature review, participant observation among host communities, semi-structured key informant interviews, and extensive observation of free-roaming horses and other wildlife in the Brittany Triangle.

Results demonstrate that the free-roaming horses are part of a social-ecological complex, one of many disturbance factors in a system with multiple drivers of ecological and social change. Grazing and disturbance of vegetation by horses are patchy and heterogeneous in distribution, but no statistically significant difference was found in plant community composition or heights between sample sites. Qualitative research demonstrates that while the horses are currently remote from much human contact,

they and the landscape are part of a rich history of interaction with people in Chilcotin society and cultures, particularly in Xeni Gwet'in and other Tsilhqot'in communities. Disagreements over free-roaming horses reveal deeper differences in ways of knowing that underlie management actions, including differing perceptions of "the wild" in relation to humans, and a history of power struggles over land use between First Nations and government authorities from colonial and settler cultures. As well, vegetation communities in sample meadow habitats did not show signs of ecologically significant structural variance or ubiquitous damage on a spatial scale large enough to warrant management intervention in horse populations within the Brittany Triangle at this time. Local knowledge and livelihood practices among Xeni Gwet'in and other local people have functioned as an informal management system for free-roaming horses in the Brittany Triangle and Nemiah Valley.

Broadly, this study suggests a partial rather than full integration of diverse ways of knowing may sometimes be desirable in order to maintain the epistemological and contextual depth and richness of different knowledge systems. Effective integration of diverse ways of knowing in management warrants not only the integration of information into knowledge products (i.e. reports, studies, proposals, etc.), but also the equitable inclusion of knowledge holders in processes and decisions. Narrative can be an effective means of conveying complexity in situations of conflict or controversy. This research also finds that a recognition of the agency that wild animals and the land itself have in relationships with humans, and the sense of collective responsibility towards the land and wild animals are two elements that indigenous perspectives can contribute to management and planning frameworks.

This research indicates that it is possible and desirable to maintain a population of free-roaming horses in the Brittany Triangle as part of a functional social ecological system, in ways that are appropriate to, and expressive of the culture, identity and livelihood practices of the Xeni Gwet'in First Nation. The success of localized stewardship and management depends on: 1) culturally-appropriate means of limiting horse populations including maintaining predator populations; 2) defining management zones based on ecosystems, political and cultural boundaries, and horse sub-populations; 3) basing actions and decisions on systemic, not segmented, ecological indicators; 4) encouraging people to spend time on the land moving cattle more frequently on grazed open range; 5) cultivating stewardship and monitoring activities; 6) including socio-cultural values and goals in management objectives; 7) recognizing diverse people and ways of knowing in land use and management decisions; and 8) encouraging traditional activities as part of dynamic and changing local livelihoods.

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DEDICATION

To Shelley A. Martin

TABLE OF CONTENTS

Author's Declaration ii
Abstract iii
Acknowledgements v
Dedication vii
Table of Contents viii
List of Tables xi
List of Figures xii

CHAPTER 1 – INTRODUCTION 1

Perceptions of 'The Wild' and Horses 2
RESEARCH PURPOSE 5
Research Objectives and Questions 7
Rationale 7
KEY AREAS OF LITERATURE 8
Socio-Ecological Systems 8
Integrating Different Ways of Knowing in Land Management 9
Free-Ranging Horses – Background and General Overview 10
CASE STUDY DESCRIPTION 14
METHODOLOGICAL APPROACH 17
THESIS STRUCTURE 18

CHAPTER 2 - LITERATURE REVIEW 20

CULTURAL VALUES AND HUMAN DIMENSIONS OF NATURE/WILDLIFE 21
Definitions and Perceptions of Wild 24
EPISTEMOLOGIES AND KNOWLEDGE INTEGRATION 26
Science and Scientism 27
Indigenous and Local Knowledge 28
Beyond the Dichotomy – Ways of Knowing 29
SOCIAL, CULTURAL, ECOLOGICAL SYSTEMS – INTEGRATIVE CONCEPTS 31
Socio-Ecological Systems and Resilience 31
FREE-RANGING HORSES AND THE LAND – RESEARCH, ECOLOGY AND MANAGEMENT 34
Free-Ranging Horses and Ecology 35
Socio-Cultural Factors in Conservation 38
APPROACHES TO PLANNING AND MANAGEMENT 39
Stakeholder Consultation and Multi-Agency Processes 43
Lessons from Co-Management and Integrated Resource Management (IRM) 44
Community-Based Conservation and Planning 45
CONCLUSION - CONCEPTUAL FRAMEWORK 45

CHAPTER 3 - METHODOLOGY 48

Transdisciplinary Research 49
Exploratory and Adaptive Research Process 50
RESEARCH WITH ABORIGINAL COMMUNITIES: 51
Developing Respectful Research Relationships 52

FIELD RESEARCH 56
Timeframe 56
Study Region 58
DATA COLLECTION AND ANALYSIS 64
Quantitative Methods 64
Qualitative Methods 68
Analysis of Mixed Methods Data 72

CHAPTER 4: CONTEXT AND BACKGROUND FOR FREE-RANGING HORSES IN THE BRITTANY TRIANGLE 75

REGIONAL ECOLOGY 75
Biogeography 76
Brittany Triangle: Heterogeneous Microsystems 80
DEMOGRAPHIC AND SOCIAL-CULTURAL CONTEXT 87
First Nations and Communities 87
Settlers and Non-Aboriginal People 89
Livelihoods and groups/occupations 91
Recent changes in lifestyle and transportation 93
FREE-RANGING HORSES IN BRITISH COLUMBIA 94
British Columbia and the Chilcotin Background 94
Free-Ranging Horse Studies and Relevant Research in the Chilcotin 96
FORMAL MANAGEMENT CONTEXT FOR FREE-RANGING HORSES IN BRITISH COLUMBIA 98
Provincial Government 98
Court Case Ruling 99
Historic Management 100
Current Management 104
CONCLUSION 110

CHAPTER 5 – HORSES IN AN ECOLOGICAL, SOCIAL AND CULTURAL SYSTEM 112

ECOLOGY OF FREE-ROAMING HORSES IN STUDY AREA 112
Population 113
Conformation and Behaviour 122
Habitat Use 124
Meadow Plant Community (Feeding Habitat) Characteristics 127
Ecological Impacts and Relationships 135
SOCIAL AND CULTURAL USES AND PERCEPTIONS OF (WILD) HORSES 137
Xeni Gwet'in and Local Culture: Practices and Use of Horses 137
Horses in Relationship With People and the Land 143
Cultural Differences in Perception/Attitudes Towards Wild /Feral Horses 149
Valued Characteristics of Wild vs. Domestic Horses 152
Iconic Status and Symbolism of Wild Horses 158
CONCLUSION: HORSES IN CULTURAL-ECOLOGICAL COMPLEX 162

CHAPTER 6 –WAYS OF KNOWING AND LIVELIHOODS: MANAGEMENT IMPLICATIONS 165

POWER RELATIONS – INFORMATION, INCLUSION, AND PROCESS 166

Power Relations and Horses in the Chilcotin 166
Knowledge, Perception and Power in the Chilcotin 171
WAYS OF KNOWING 175
Knowledge, Knowers and Ways of Knowing 177
MANAGEMENT IMPLICATIONS 181
Is Management a Useful Word? 183
Livelihoods and the Practice of Local Knowledge as Informal Management 185
Changing Livelihoods: Effects on Horse Populations 188
Managed Wild Horses? 192
Framing the Issues 193
CARETAKERS AND STEWARDSHIP AS RESOURCE MANAGEMENT 199
Responsibility 201
CONCLUSION 205

CHAPTER 7 – CONCLUSIONS AND RECOMMENDATIONS 208
ADAPTIVE RESEARCH – QUESTIONS REVISITED 208
Research Question #1 208
Research Question #2 209
Research Question #3 210
FREE-ROAMING HORSES IN A DYNAMIC SYSTEM 211
Agency of the Land and Horses 213
Summary of Ecological Implications 216
Summary of Social and Research Implications 217
Summary of Management Implications 219
RECOMMENDATIONS 221
Specific Recommendations 223
FUTURE RESEARCH 231
Recommendations for Future Research 231
Future Research with Xeni Gwet'in and other First Nations Peoples 232
RESEARCH CONTRIBUTIONS 233
Scholarly and Theoretical Contributions 233
Methodological Contributions 234
Applied Contributions 235
THE LAST WORD 235

BIBLIOGRAPHY 239

APPENDICES 269
Appendix A: Research Protocol with Xeni Gwet'in 270
Appendix B: Quantitative Methods Framework 274
Appendix C: Interview Framework 275
Appendix D: Qualitative Analysis Coding Structure 276
Appendix E: Nenduwh Jid Guzit'in Declaration 280
Appendix F: ?Elegesi Qiyus Wild Horse Preserve Declaration 281
Appendix G: Map of Xeni Gwet'in Territory 282

LIST OF TABLES

Table 1: Research Objectives and Questions 7
Table 2: Summary of Literature on Feral Horses and Ecological Disturbance 36
Table 3: Variance (MANOVA) in plant community structure. 129
Table 4: Mean Height of Vegetation. 130
Table 5: Livelihood Changes and Wild Horse Populations. 191
Table 6: Summary of Effects of Systemic Changes on Horse Populations. 195
Table 7: Key factors in a livelihoods-ecology stewardship model. 205

LIST OF FIGURES

Figure 1: Spread of Horses through the USA and parts of Canada. 13
Figure 2: Location of the Brittany Triangle in British Columbia. 14
Figure 3: Map of the study region, Chilcotin, BC. 15
Figure 4: Tsyl'os seen from Vedan Lake. 19
Figure 5: Role of Free-Roaming Horses in the Study Area. 46
Figure 6: Smoke at research cabin. 57
Figure 7: Map of Brittany Triangle and Nemiah Valley. 60
Figure 8: Example of transect photo. 66
Figure 9: Framework for Inquiry and Analysis. 74
Figure 10: View over Konni Lake, southwest along Nemiah Valley. 77
Figure 11: Annual Precipitation, 2008, Lunch Lake, Chilcotin, BC. 79
Figure 12: Annual Precipitation, 2009 Lunch Lake, Chilcotin, BC. 79
Figure 13: Lava Canyon Fire, September 16, 2009. 83
Figure 14: Distribution of feral horses, Chilcotin BC, 2007-2009. 117
Figure 15: Band of wild horses in Brittany Triangle. 118
Figure 16: Brittany Triangle Stallion. 123
Figure 17: Vegetation Frequencies by Family (2008-2009). 127
Figure 18: Meadow #4, August 16, 2008. 131
Figure 19: Meadow # 8, August 19, 2008. 132
Figure 20: Frequency of grazed stems in Season 3 (Spring 2009). 134
Figure 21: Corral used in the 1980s to catch wild horses.. 140
Figure 22: Mountain Race in Nemiah Valley 146
Figure 23: Far Meadow, 2009. 238

CHAPTER 1 – INTRODUCTION

At the outset of the research for this dissertation, I began with some fairly broad questions about different types of knowledge, how to integrate diverse people, perspectives and information into decisions, planning and management processes for land use, conservation, and one very charismatic yet controversial species: horses (*Equus ferus caballus* L.) or *naŝlhiny* in Tsilhqot'in. The free-roaming horses of the Brittany Triangle (*Tachelach'ed*) – near the Nemiah Valley in the Chilcotin region of British Columbia – serve as a focal point for the exploration of those broader topics and themes. Yet as the research progressed and my understanding of the study topic and the Chilcotin region and the Tsilhqot'in[1] people developed, I discovered that the horses are a part of many links and relationships that together form a complex socio-ecological system. Though socio-ecological systems can be examined through any number of entry points or perspectives, horses as a species are uniquely poised to lend insights to human-environment relationships, because they embody an alchemical mix of utilitarian functionality, domestic affection, and untamed wildness that is inspiring to many people. They exist as a part of human technological and transportation history, cultural identity and meaning, and simultaneously can thrive as part of natural ecosystems entirely independent of human beings. Their very ubiquity across so many human cultures and natural landscapes means that there are many, many ways of knowing wild horses, and that quite often, horses have influenced our own ability to know the world around us in diverse ways. Horses, then, are a fascinating lens through which to explore the complexities of social-ecological systems and cultural ecology.

After six years of visiting the Brittany Triangle, and having traversed many kilometres through the bush on foot, one of my first pieces of writing from that place seems to illustrate the research that was to come. The following is an excerpt from the guest book at Far Meadow, which is the homestead and small cabin in the middle of the Brittany Triangle that was one research base for this work.
"The earth tells stories up here. This is a place full of stories, in truth, including those that come from people. There are animal tracks everywhere in the ground…scat, bones, hair, trees rubbed bare. Walking in the woods here is a walk through the untidy, daily scatter of life and I have the distinct feeling of walking through someone else's home, with all the imprints of their presence. I am left with a strong desire to come back, to become more 'literate' in this landscape… to turn the page in Brittany history and see what happens next!" (June 14th, 2006)

[1] Pronounced "Tsill-COAT-ten" (INAC, 2009). The Anglicised spelling Chilcotin is used in this dissertation to refer to the region in British Columbia, while Tsilhqot'in is used to refer more specifically to the First Nations peoples and communities of the area, including their culture, practices and their traditional territory.

Perceptions of 'The Wild' and Horses

Societal values and attitudes towards nature and environmental issues change through time and space, also varying between cultural, social, and professional groups, and among individuals. General changes in societal values towards nature affect human use of, and interactions with natural spaces and wildlife, as well as how we manage them. Social changes in attitudes and values influence management both externally (e.g. public expectations of and reactions to management decisions; political will) and internally (e.g. the attitudes of managers and policy-makers; funding and capacity priorities).

Over approximately the last 40 years in North America (since the 1970s) societal values have tended towards an increasing conservation ethic and mutualism where wilderness and wildlife are concerned (Bengston, 1994; Dunlap and Van Liere, 1978; Teel et al., 2007). At the same time, common conceptions of the *wild*, *wilderness*, *nature*, and *wildlife*, continue to be defined as antithetical to obvious forms of human influence, development and disturbance (Bertolas, 1998; Hovardas and Stamou, 2006; Siipi, 2004; Trigger et al., 2008). However, even if one accepts that humans across cultures tend to experience some form of innate affiliation with nature as some scholars have suggested (Kellert and Wilson, 1995), the form of that affiliation differs between individuals and between cultures (Evernden, 1992; Ingold, 1992; Kahn, 2001; McNaughton and Urry, 1998). Though the concepts of nature, wilderness, and wildlife are interrelated for many people, there are individual, cultural and regional differences in the ways in which those ideas are related, the distinct meanings that the words hold, and in which aspects of nature people value. Social and economic trends, as well as cultural differences, can all have a large influence on how people conceive of and value nature, wilderness, and wildlife (Hovardas and Stamou, 2006; Rinfret, 2009; Siipi, 2004).

The idea that "wilderness" is somehow antithetical to a human presence on the landscape is increasingly being brought into question in academic disciplines related to environmental studies, as scholars learn more about the history of North American landscapes, most of which are the result of complex, mutually forming, culture-nature relationships dating back millennia (Crosby, 2004; Turner and Berkes, 2006a; Worster, 1994). For example, in recent years recognition of systemic, dynamic change processes in ecosystems has provoked debate over what constitutes "invasive" species in given situations (Sagoff, 2005; Simberloff, 2005). Scholars in the ecological sciences have increasingly come to recognize the role indigenous peoples have had and continue to have, in shaping the environments in which they dwell, breaking down the dominant 20th Century Euro-Canadian paradigm which dichotomized between wilderness and inhabited landscapes, between wild and domesticated animals on

the basis of species. Increasingly, North American scholars are learning to look at wild landscapes as areas that are characterised by both natural ecological drivers and human drivers (Higgs, 2006). Beyond the direct effects of human drivers of change and disturbance on wild landscapes and habitat, it has also been demonstrated that people indirectly alter and determine the physiological traits in prey species of wildlife (Darimont et al., 2009) and also that human management decisions often "socially mediate 'wild' animals into ones that are simultaneously docile and useful" (Rinfret, 2009, p. 572).

Free-ranging horses occupy an interesting and unique position in the complex realm between the "wild" and the domestic. Domesticated horses have played an integral role in human history. They have a special place in the hearts of many people, and evoke strong imagery and feelings, even among those who have had limited contact with them in real life. Hence, on the one hand, horses evoke the protective sympathies that people reserve for their most precious domesticated pets, and at the same time the image of a horse displaying natural behavior or running free seems to stir in many people's hearts a deep sense of strength, beauty, and wild freedom.

Free-ranging horses have been the focus of considerable controversy in a number of countries where they were introduced by Europeans, especially in North America (Rikoon, 1996; Symanski, 1996), and Australia (Nimmo et al., 2007; Symanski, 1994). The controversy usually arises over land use priorities and concerns about the degradation of range lands, native ecosystems and/or wildlife habitat from grazing or trampling by horses, and competition between free-ranging horses and cattle for available forage. Details of the controversy and disagreement over the effects that free-roaming horses can have on their environments tend to fall into a spectrum of issues, including: rates of population increase among horses left to themselves; grazing patterns and impacts on vegetation, wildlife and livestock; the legitimacy of horses on given landscapes, and animal welfare or humane treatment for those that are rounded up or captured.

Free-ranging horses in British Columbia are not formally classified by the province as wildlife, nor as livestock unless they are branded, and are not specifically covered under any legal or formal policy. Many free-ranging horses in the Chilcotin fall between conventional North American societal categories, which tend to classify animals at the species level as being either wildlife, or domesticated (livestock or pets). Many of the horses are not owned by anyone in particular, though there are some free-ranging horses with and without brands that do belong to local residents. Those free-ranging horses that are not owned by any people do not have economic value as livestock or wild game. Some people with interests in maintaining the maximum available forage for cattle on open range consider

the horses to be pests (Williams Lake Tribune, 1995), and some people concerned with wildlife habitat denounce both free-ranging horses and cattle for their impacts on native ecosystems (IN14). Yet at the same time, there is a rich history of free-ranging horses being integrated with the livelihood practices, transportation needs, recreation and cultures of the Chilcotin region, and of Tsilhqot'in people in particular.[2] Even in present times, when horses are used less for transportation, they remain a central part of backcountry travel, and form the core of many community-based efforts to engage youth in cultural and physical activities as they connect with their home landscapes and cultural roots.

The issues and controversy that surround free-roaming horses in the Chilcotin are related to the ways in which people use the land and natural resources, and the ways in which they relate to and perceive both wild and tame aspects of nature. In this sense, the diverse attitudes towards wild and feral horses in the Chilcotin are similar to those found in other regions with wild horses around the world. The presence of free-ranging horses is an emotional issue for many people, not simply because of their integration into local culture, but because of the tension and dissonance that many people experience between "wild" horses as part of an open, free landscape, and "feral" horses being perceived as a pest and a threat to ranching and range forage. The terms wild and feral are often used by different people to describe the same horses, indicating as much about the opinions of the speaker as they do about the horses themselves.

Clearly, the decision about what terminology to use when describing free-roaming horses can be loaded with connotation. In this dissertation, I use the terms free-roaming and free-ranging interchangeably to refer to those horses in the Chilcotin that range freely on the landscape. These terms are used generally then, to refer to a variety of animals, including diverse subpopulations of horses that other people refer to as wild and/or feral, and some horses that belong to people and roam freely on the landscape. At times I also use the terms wild or feral, with reference to specific herds or bands of horses, or as a vernacular reference when describing the views of certain speakers who hold strong opinions about the animals.

Through conducting this research, I have become comfortable referring to the horses of the Brittany Triangle as "wild horses". This deliberate usage is consistent with the local use of the term by Xeni Gwet'in and other community members, and reflects my own observations of the behavioural

[2] Throughout this dissertation, the Anglicized word Chilcotin is used to refer to the geographical region by that name, in the south-western part of British Columbia's interior. The word Tsilhqot'in is used to refer to the First Nations people whose territory includes much of that region, their culture and their language.

characteristics of Brittany Triangle horses. When referring to un-owned, free-roaming horses in other areas outside of the Brittany Triangle, I sometimes use the word feral. Once again, this usage is deliberate. I use it when describing the perspectives of, and conversations with, people who preferred that term and with reference to horses that I observed to be free-ranging yet not demonstrating the behavioural traits of wildlife (i.e. some familiarity and comfort with people and/or vehicles). Although the default, generic terms in this dissertation are free-roaming and free-ranging, the terms wild and feral are commonly used in conversation by people in the Chilcotin to refer to the same herds or to all free-roaming horses. This topic will be discussed more in Chapter 5.

RESEARCH PURPOSE

The purpose of this study is *to explore how scientific analysis, local knowledge, and socio-cultural perspectives regarding the ecology and cultural role of free-roaming horses in the Brittany Triangle region of British Columbia can be integrated to inform conservation planning and land use management.*

This study was designed to explore the ways in which different types of knowledge about free-roaming horses and the land in the Brittany Triangle, in British Columbia's Chilcotin region, could be combined or integrated to better inform decision-making about land use and conservation. This focus for the study was developed through preliminary field work and an initial literature review, which indicated that free-roaming horses are a controversial species in the Chilcotin; that they are part of a larger suite of controversies over land and resource management; that the horses hold social and cultural significance for a number of people; and that there is very little location-specific scientific data to inform debate over the horses' ecological impacts. The existing dearth of peer-reviewed research about the ecological impacts of free-roaming horses in the Chilcotin suggests that there is a need for empirical information about the ecology of the horses to inform decision-making in the region, and to contribute to the broader discourse and analysis of issues related to wild horses, given the unique context and characteristics of this case study.

Much of the controversy around free-ranging horses is based deeply in people's values, attitudes, beliefs and opinions. There is a growing and substantial literature that indicates that successful management or stewardship of land and natural resources in the long term requires not only good information, but also that varied stakeholder perspectives and local values must be addressed and reflected in decision-making (Cullen et al., 2010; Fainstein, 2000; Slocombe and Hanna, 2007). A significant question underlying this study is *how* to effectively include or integrate various perspectives

and types of knowledge into land use management or conservation planning? Although a definitive answer to that question varies by case study and location, the exploratory nature of this research does yield a deeper understanding of the issues, and some helpful insights. Given the diverse issues involved, the most effective way to approach a study of the horses was to take a transdisciplinary approach that would recognize the iterative relationships between social practice and ecology, and the ways in which free-roaming horses are part of both cultural and ecological relationships in the study region. The focus of analysis is on planning and management processes pertaining to *conservation* and *land use* for two reasons. First, the lack of provincial policy or designation in British Columbia for free-roaming horses means that the horses of the Brittany Triangle are not directly managed under the policies and practices related to wildlife. Yet they are directly and indirectly affected by management processes affecting the designation of land use and conservation within their habitat range. Second, controversy and debate over the horses of the Brittany Triangle is inextricably linked to contested ideas about their ecological impact on the land use values attributed to their home range.

This study applies a transdisciplinary, mixed methods approach to explore a complex suite of issues, and in doing so to develop a better practice for similar studies and planning documents in the future. The methodology, as well as the ways in which this study relates a particular species to broader and deeper issues of land management, knowledge systems, and decision-making processes, make this study generalizable beyond simply the implications for free-ranging horse research in Canada, though that itself is an area which warrants more academic research. In situ, this study aims to address the controversy over the ecological impacts of free-ranging horses in the study area, by contributing a thorough and focused documentation of the relevant issues to communities and governance agencies.

Research Objectives and Questions

The three primary research objectives, and specific questions related to each one, are listed in Table 1.

Table 1: Research Objectives and Questions

Objectives	Questions
1. Determine and quantify the species of vegetation where horses are feeding.	What do the horses' diets and observed ecological effects of their feeding indicate about their habitat and landscape use? What are their feeding practices? What are their feeding habitats? What are their ecological impacts?
2. Document local socio-cultural knowledge and perceptions of free-roaming horses.	What can local knowledge contribute to the same questions posed above? What personal, social, and cultural meanings and values are associated with the horses? What are people's management preferences for the horses?
3. Determine how ecological information and socio-cultural perspectives can be integrated to inform conservation planning and land use management in the study area.	

Rationale

One of the emergent themes of this research has been a questioning of the assumptions that underlie the concept of management. Academic researchers tend to freely use the term management to describe a spectrum of possible actions (including no action or intervention at all) by which humans monitor and maintain their relationships with wildlife and landscapes, among other things. Yet in reality, the term management carries with it a number of implicit assumptions about the nature of human relationships with animals and ecosystems. In the Chilcotin, the term management is also often loaded with associations related to political power and the assumed authority of governing agencies. Hence, while this thesis does use the term management to refer to a range of human activities in relation to horses and ecosystems, part of its purpose is to question assumptions about what management means, what form it might take, and the conditions under which it is appropriate. This thesis does not rest on the assumption that free-roaming horses require management by a government agency, but rather explores whether management is appropriate, under what conditions, where, and of what sort.

The Brittany Triangle and Nemiah Valley provide a rich and complex case study, in which free-roaming horses are woven throughout a socio-ecological system. Controversy over the ecological impacts of the horses is also related to political and economic power struggles over land and resources,

First Nations culture, local livelihood practices, and diverse cultural perspectives on land, wildlife, "the wild" and human relationships with nature. The socio-ecological system in this region of central British Columbia, and the horses themselves, are in circumstances that are ecologically, culturally and politically unique from populations of wild and feral horses studied elsewhere in North America and around the world. This study addresses the research gap pertaining to the locally relevant and context-specific impacts and characteristics of free-roaming horses in the Chilcotin. By focusing on a unique set of circumstances that is distinct from, yet comparable to, other regions with free-roaming horses, it provides insights to discourse on wild and feral horses, indigenous perspectives on the management of wildlife and socio-ecological systems, and the role of charismatic species in controversies related to land and resource management.

The methodology employed in this study provides one examination of a consistent effort to approach research in First Nations territory in a respectful, place-based way (Bull, 2010). To practitioners, government agencies, non-governmental organizations (NGOs) and academics, this study demonstrates the importance of considering cultural-ecological diversity as a core part of the practice of conservation planning (Beatley, 2000; Higgs, 1997; Higgs, 2003; Naveh, 2000b). To local and regional decision-making agencies (including both First Nations governments and provincial government agencies) in the case study region, this thesis provides documentation of local knowledge and perspectives which are often shared orally and in practice, but not always adequately represented in formal governance procedures or documents shared between government agencies, NGOs and First Nations governments. It establishes a locally specific and relevant precedent for incorporating cultural values into land use planning and management decisions pertaining to free-ranging horses.

KEY AREAS OF LITERATURE

Socio-Ecological Systems

Free-roaming, feral and wild horses in North America have often been studied from disciplinary perspectives based firmly in biology (Berger, 1985), ecology (Salter and Hudson, 1979; Turner, 1987), and historical social studies (Ryden, 1970). Since the 1990s, studies of wild horses have emerged that also recognize the role of cultural perception and the political ecology of issues related to management of free-roaming horses in North America (Beever, 2003; Beever and Brussard, 2000; Rikoon, 2006; Symanski, 1994). However, a review of refereed literature located only two studies examining the role of wild horses within socio-ecological systems in Canada that include consideration of cultural

dynamics and diverse perspectives among indigenous and non-indigenous peoples (Reid, 2008/09; Thistle, 2008/09). Within the case study region for this research, ecological and biophysical issues related to free-roaming horses are inextricably mixed with social, economic, political and cultural issues.

This research is conceptually based in the premise that social, cultural and ecological aspects of the world can be explored as socio-ecological systems, with multi-faceted inter-relationships and linkages between parts (Reid et al., 2006). Scholars in various disciplines – such as geography, psychology, biology, and anthropology to name a few - have long examined the relationships between humans, their environments, and other animals (Manfredo, 2008). Various sub-disciplines deal specifically with these complex relationships, including (but not limited to) human geography, human ecology, political ecology, and others (Manfredo, 2008; Steiner, 2002). The conceptual framework for many scholars within these disciplines has progressed from the perceived interaction between separate but related entities (social and ecological elements) to the belief that social and ecological systems are so intertwined that they can be explored as a whole *socio-ecological system* of inter-relationships. In this dissertation, the term socio-ecological system is used to include the social, cultural, political and ecological aspects of the human-nature environment.

Integrating Different Ways of Knowing in Land Management

Cultural norms and social conventions influence and reinforce certain ways of perceiving, valuing and interpreting individual human relationships with nature and one's environment (Stephenson, 2008). Cultural perceptions are often deeply ingrained in individuals and social groups. The complexity of cultural processes means that various groups of people may not only enter into land planning and management processes with different beliefs about wilderness areas, but also with significantly different ways of learning, interacting, and perceiving situations (Bertolas, 1998; Cruikshank, 1998; Teel et al., 2007; Trigger et al., 2008; Van Sittert, 2005).

There is a considerable body of scholarly work suggesting that it is important to integrate various knowledge systems, and cultures of people affected, into management and planning processes and decisions affecting landscapes, natural environments, wildlife, and communities (Cochran et al., 2008; Drew, 2005; Drew and Henne, 2006; Manuel-Navarrete et al., 2006; Reid et al., 2006). As the goal of knowledge integration becomes more common in the practice of natural resource management and land use planning, critiques have also emerged of inequitable, biased or unsuccessful attempts to integrate diverse forms of knowledge and ways of knowing across cultures (Brody, 1981; Nadasdy, 2003). The

question of *how* best to integrate different forms of knowledge has become a focus for scholars and practitioners (Huntington, 2000; Margerum and Born, 1995; Mabee and Hoberg, 2006; Moller et al., 2004).

It is important to define what is meant by integration in a particular situation (Bührs, 2009; Mitchell and Shrubsole, 2007). The answer is not a simple one, nor is there a single ubiquitous answer for all situations. It is often problematic to simply insert piecemeal components from one knowledge system into a framework based in another way of knowing, or to evaluate the usefulness and validity of one type of knowledge according to the criteria for another (Stephenson and Moller, 2009). It is important to ask what important elements and how much of one way of knowing might be lost in translation as it is articulated in another language, or expressed outside of its socio-ecological context. Yet in some situations, local or indigenous knowledge holders might consider it insulting for outsiders to assume that they *couldn't* translate their ideas into a format useful to other cultures (Reed and Peters, 2004). What becomes important, then, is to consider not only the inclusion or integration of diverse forms of knowledge into land and wildlife management decisions, but to include the knowledge holders, the *knowers* in an equitable process, so that they might articulate and represent their own culturally and environmentally embedded knowledge appropriately (Brosius, 2006; Ommer, Coward and Parrish, 2008; Goulet, 1998). This idea of including diverse knowledge, knowers and ways of knowing is further discussed in Chapter 7.

Free-Ranging Horses – Background and General Overview

Free-ranging horses (*Equus ferus caballus* L.) in North America, and around the globe, are the same species as domestic horses though they represent a similarly diverse range of breeds. Evolutionary ancestors of the modern horse, as well as some other equids, existed in North America and throughout Eurasia. The early North American equine species apparently became extinct during the same period as many other large mammals died off on this continent during the Pleistocene period between 10,000 and 7,500 years ago (Clutton-Brock, 1994; Kavar and Dovc, 2008). Horses continued to range throughout Eurasia, undergoing morphological changes in response to localized environmental conditions, and are believed to have been tamed then domesticated by humans between 5,000 and 2,000 years ago (Berger, 1986). From that time forward, horses became inextricably interwoven with human history in Europe and Asia, an essential partner to human transportation, culture, warfare, agriculture, social hierarchy and political power. Some scholars argue that the only truly wild horse in existence today is the tahk (plural tahki), also known as Przewalski's wild horse (*Equus ferus przewalskii*), a distinct subspecies of

horse which was extirpated from its native habitat in Mongolia in the 1960s, and was successfully re-introduced to the wild during the 1990s from a captive-bred population (King, 2002).

The great variety of horses around the globe – wild, feral, tame, and domestic - are the same species. Free-ranging horses exist around the globe in many regions and diverse habitats, and present management challenges in many locations. Populations of free-ranging horses have been the subject of a considerable amount of research and scholarly attention in the United States (Beever, 2003; Levin et al., 2002; Reinhardt and Reinhardt, 2004; Wagner, 1983), Australia (Symanski, 1994; Nimmo and Miller, 2007), and New Zealand (Cameron et al., 1999; Linklater et al., 2002; Rogers, 1991). Since these animals are generally either free-ranging domesticated horses or their descendants, they are most frequently referred to as feral horses, despite vast variability between populations in factors such as the number of generations spent undomesticated; behavioural patterns; interactions with humans; interbreeding with domestic horses; physiological characteristics and adaptations to environment; ecological impacts; and interaction with native wildlife.

Scholars have also studied the ecological impacts and relationships of feral horses in other regions, including Argentina (Zalba and Cozzani, 2004) and Namibia (Greyling et al., 2007). At the same time, free-ranging horses in Europe are often studied as part of a different milieu. While horses in North America and Australia, for example, are often studied as an invasive species affecting native ecosystems, horses in some regions of Europe are studied for their role in maintaining or restoring natural or semi-natural habitats as reintroduced surrogates for wild horses (Menard et al., 2002; Reed, 2008; Schwartz, 2005). In Asia Przewalski's wild horses in Mongolia are the subject of ongoing scientific study as a native species that has been saved from extinction and reintroduced from captive bred populations (Boyd, 1998).

While it is generally acknowledged that horses were brought to North America (specifically, the region that is now Mexico) by Spanish explorers during the early sixteenth century (Wagner, 1983), there is some debate over whether this action represented the introduction of an exotic species into North America or the re-introduction of a long absent native species (Beever and Brussard, 2000a; Kirkpatrick and Fazio, 2010). This debate influences whether free-ranging horses should be considered a native species, an invasive species, or something else. A more appropriate distinction might be made according to the ecological impacts of various sub-populations, rather than attempting to classify all populations of horses according to a nomenclature that does not entirely fit, and automatically suggests a certain set of value judgments (Wismer, personal communication 2011).

There is no doubt that from the sixteenth century onwards, horses spread rapidly across North America, northwards and westwards through what are now the United States of America, and Canada (Berger, 1986; Flores, 2008; Ryden, 1970). Spreading through human use and trade, as well as through their own free-ranging wild herds, horses adapted to many environments and ecosystems as their populations expanded across the continent, from coastal marshlands on the eastern seaboard, through mountain ranges, semi-arid desert regions, and forest rangelands (Beever et al., 2008; Fahnestock and Detling, 1999a; Rikoon, 1996; Turner, 1987). In some regions, including parts of British Columbia, it appears that horses preceded the arrival of white explorers and settlers. Over time they became deeply integrated into the livelihoods, cultures and identities of some aboriginal peoples (Baillargeon and Tepper, 1998). Some groups, such as the Nez Perce people of the Columbia River Plateau in the USA became known for their skilled horsemanship and for the breed that they developed, the Appaloosa horse. Horses became a valuable trade commodity for both settlers and First Nations peoples. Herds were actively culled in many regions, with wild horses being captured for use as saddle animals by settlers of European descent and First Nations people (Ryden, 1970).

Currently, there are populations of free-roaming horses located in pockets across Canada, though many of them are not widely known. The most famous wild horses in Canada are the ponies of Sable Island, Nova Scotia. A small group of wild horses (approximately 37 animals) received legal protection in Saskatchewan's Bronson Forest in 2009 (Saskatchewan Party Caucus, 2009). Free-ranging horses have also garnered publicity and in some cases controversy in Alberta (WHOAS, 2007) and British Columbia (Findlay and Halley, 2005). A number of First Nations in British Columbia have resident populations of free-roaming horses that range on and around Reserve lands, and which vary from tame to wild in their behavior (Bhattacharyya, personal observation, 2003-2011). In general, free-ranging horses in Canada have received a fraction of the public or political attention of their American counter-parts.

Horses spread throughout Canada just as they did in the United States. Escaped domestic horses mixed and bred with populations of free-roaming horses that had run wild for generations. In British Columbia, the arrival or re-introduction of horses pre-dates historical records by European explorers. Early accounts by explorer Simon Fraser during his 1808 expedition mention encountering First Nations in and near to what is now known as the Chilcotin region who made use of horses (McCrory, 2002), indicating that the local First Nations had been familiar with horses for long enough to integrate them into their lifestyles. Explorer David Thompson described attempts to obtain horses for his party's

use through both trade and by chasing and capturing wild horses in the East Kootenay region of British Columbia, in 1807 (McCrory, 2002; Tyrell, 1916 in Storrar et al., 1977). Oral histories of some First Nations indicate that horses arrived in British Columbia long enough before European explorers that they were well-integrated into the culture and languages of some indigenous peoples by the time settlers arrived in the mid-nineteenth century (McCrory, 2002; Robinson and Wickwire, 2005; Salter and Hudson, 1978; *Tsilhqot'in Nation v. British Columbia* BCSC 1700). Figure 1 represents a historical account of the spread of horses through North America, after their introduction by Spanish explorers. Although the map focuses on the United States of America, it does indicate the spread of horses into Western Canada and the Chilcotin, specifically (though their introduction to Eastern and Central Canada is not shown on the map). Dates shown for the Chilcotin are based on the best available information, though they are not definitively known.

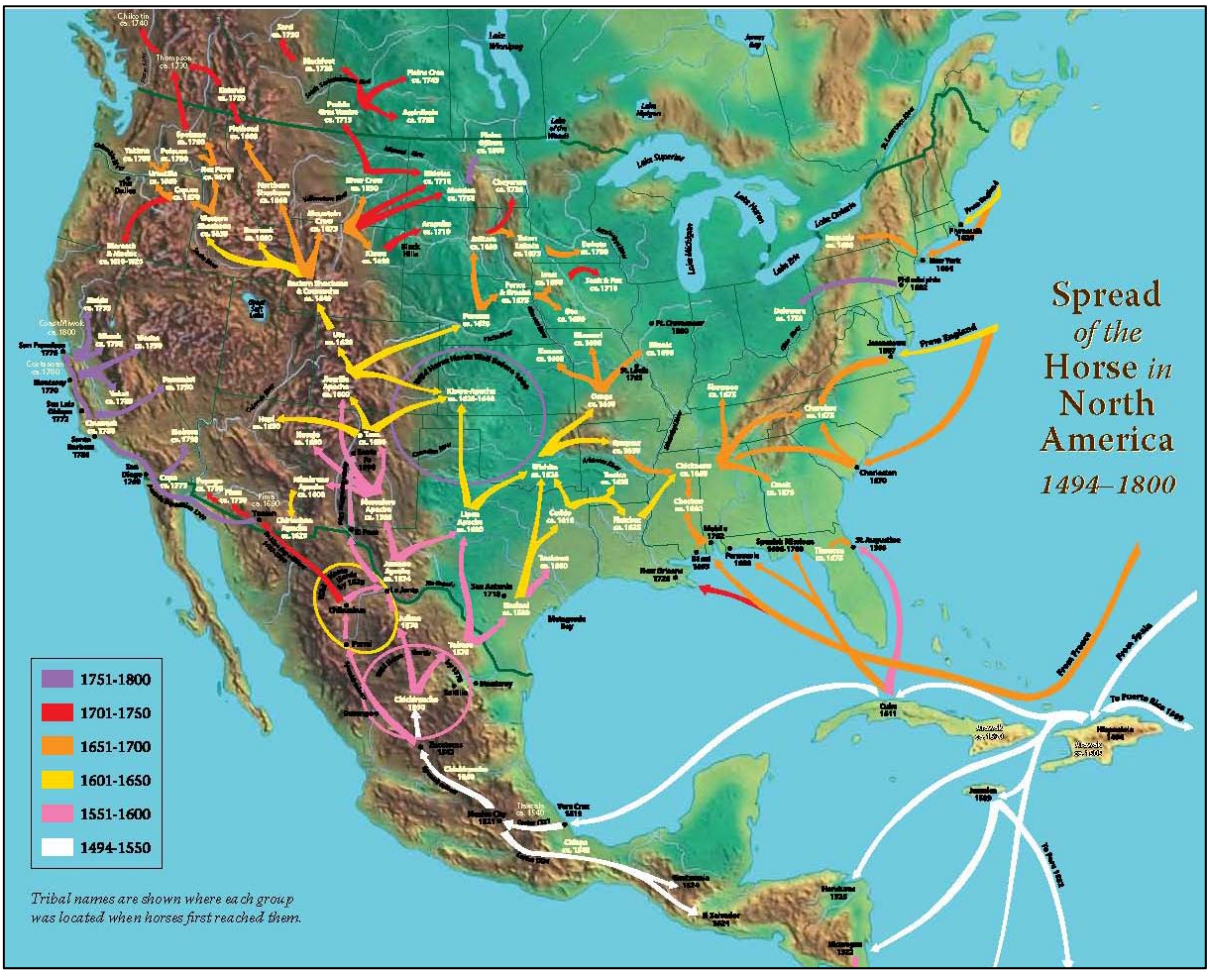

Figure 1: Spread of Horses through the USA and parts of Canada (Cowdrey, Martin and Martin, in-press 2011).

CASE STUDY DESCRIPTION

The Chilcotin region of British Columbia, Canada lies leeward (to the east and north) of the Coast Mountain range, and to the west of the Fraser River canyon, into which the Chilcotin River flows. The Chilcotin is an interior plateau characterised by lodgepole pine, poplar and spruce forests, cold lakes and glacier-fed, salmon-bearing rivers, and punctuated with grass and sedge meadows and wetlands. The region also represents the northern distribution limit of many of British Columbia's grassland plant species (GCC, 2010).

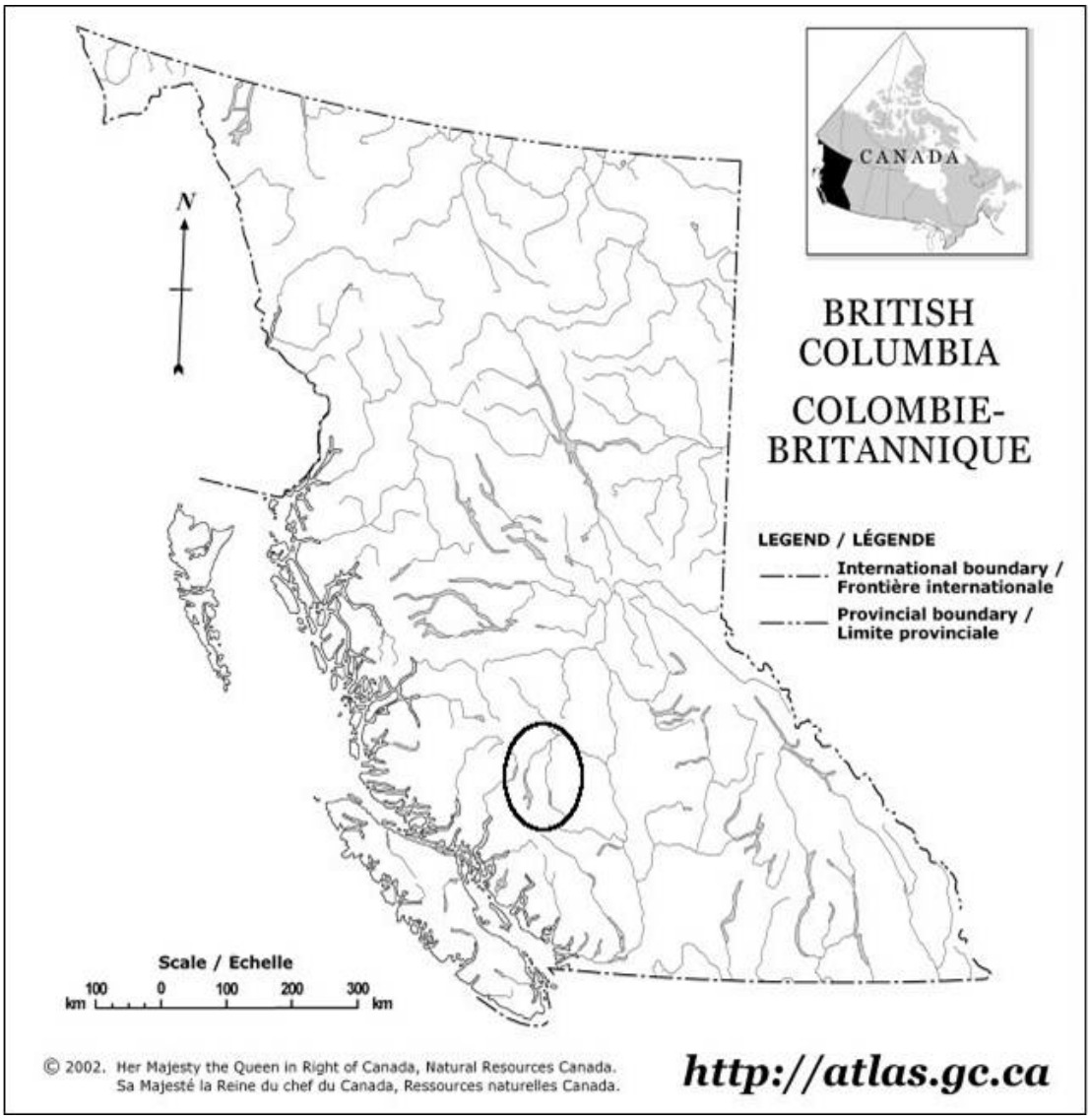

Figure 2: Location of the Brittany Triangle in British Columbia.

Nemiah Valley is a remote rural community in the Chilcotin, located approximately 190 km southwest of the town of Williams Lake (the last 95 km is gravel road), in the lee of the snow-capped Coast Mountain range (McCrory, 2002). The Nemiah Valley forms the southern border of the Brittany Triangle, an area of land approximately 155,000ha in size, bordered to the west by the Chilko River, and to the east by the Taseko River. The Brittany Triangle is also referred to as *Tachelach'ed* in the Tsilhqot'in language (Woodward, Hutchings and Baker, 2008), though the Anglicized name is used throughout this dissertation.

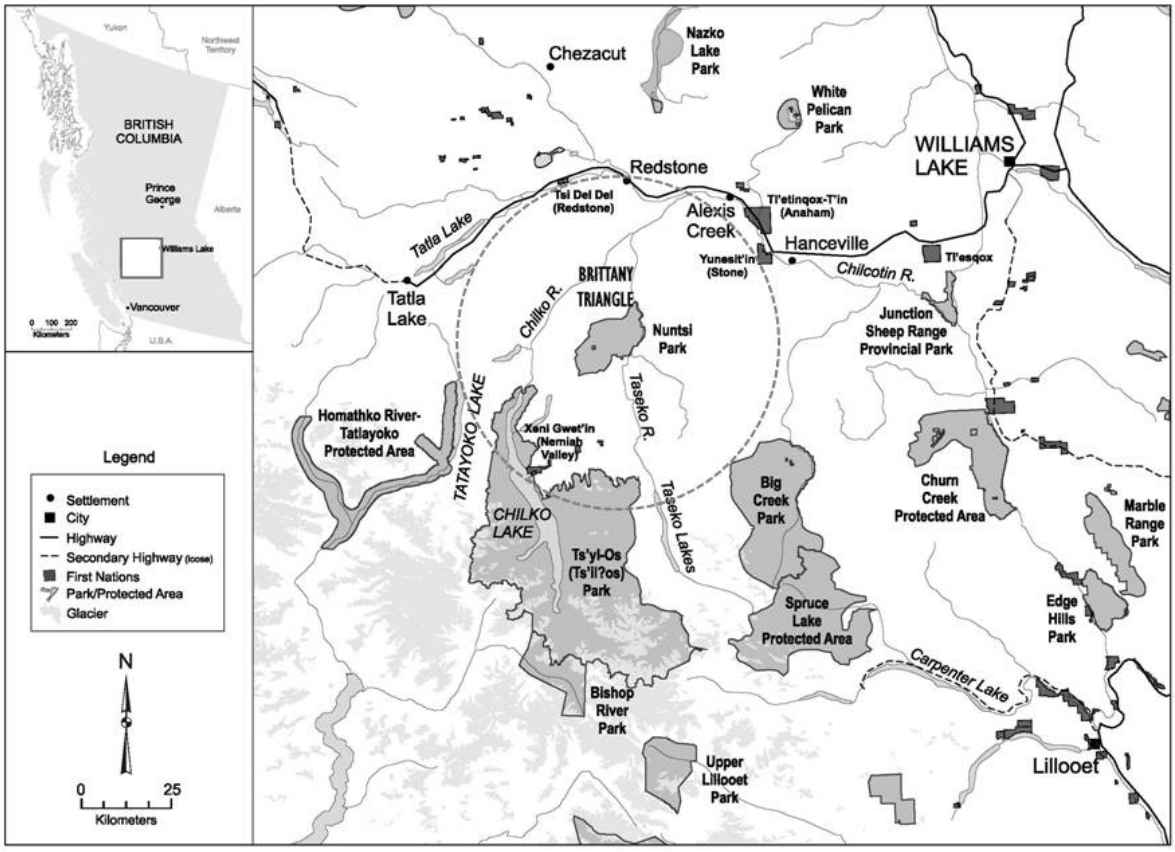

Figure 3: Map of the study region, Chilcotin, BC (adapted from map courtesy of Pam Schaus in Bhattacharyya, Slocombe and Murphy, 2011).

As the home territory of the Xeni Gwet'in[3] First Nation, (one of six Tsilhqot'in communities), the Nemiah Valley and surrounding area is home to a dispersed community of approximately 350 people. Residents include Xeni Gwet'in, other Tsilhqot'in people, and a minority of other residents of varied cultures and ancestry. Livelihoods and economic activities include homesteading, small-scale

[3] Pronounced "Ha-nay Gwet-een" (INAC, 2009).

ranching, trapping, guest lodge operation, and hunting/guiding. Recently, residents have also found employment in government, schooling and health services, and interpretive ecotourism. Wage-earning activities are often integrated to complement traditional livelihoods activities such as hunting, fishing, and gathering seasonal foods (Lutz, 2008; IN03). The Xeni Gwet'in people, together with some small-scale ranchers and other residents, maintained a relatively isolated and self-reliant existence until the current road to Nemiah was built in the 1970s (Glavin and PoNV, 1992; Setah, 2010). Since that time, the community has experienced rapid changes—both internal and external—through cultural influences and economic pressures (e.g. logging and mining).

In 1989, the Xeni Gwet'in First Nation Government (XGFNG) declared the Brittany Triangle area an Aboriginal Wilderness Preserve, as they sought to protect the area from industrial logging initiatives that were unacceptable to them. In 2002, the Xeni Gwet'in, together with the non-governmental organization The Friends of Nemaiah[4] Valley (FONV) also established the ?Elegasi Qiyus Wild Horse Preserve,[5] which encompasses much of the same area. The jurisdictional context within which cultural perception influences management decisions about the horses, shifted more broadly in November 2007, as a result of a Supreme Court of British Columbia ruling on Tsilhqot'in rights to land title in their traditional territory. The ruling explicitly recognized the relationship between Xeni Gwet'in and free-roaming horses. Specifically, it recognizes the right of the Tsilhqot'in people to capture and use horses for the purposes of transportation and work (*Tsilhqot'in Nation v. British Columbia* 2007, BCSC 1700). This legal precedent creates new context for land use decisions and management in Xeni Gwet'in and Tsilhqot'in territory, particularly concerning free-ranging horses, as the value of free-roaming horses to local First Nations people, and their rights to use the horses, has been formally recognized in a court ruling.

Controversy over free-roaming horses in the Chilcotin is similar in many ways to that elsewhere. One end of the spectrum of opinions about free-ranging horses suggests that they are feral pests that compete with cattle for scarce forage, degrade rangelands, and compromise wildlife habitat, while breeding profusely. The opposite end of the spectrum sees free-roaming horses as a completely

[4] [sic] The non-governmental organization's legal name spells Nemaiah slightly differently than the more commonly found Nemiah. The word Nemiah in this dissertation is spelled in a way that is consistent with the Xeni Gwet'in First Nation Government, except when expressly referring to the Friends of Nemaiah Valley (FONV), or when directly quoting other sources that used a different spelling of the same word.
[5] The name of the reserve translates to "Eagle Lake Henry Cayuse Wild Horse Preserve". Eagle Lake Henry was a well known Tsilhqot'in man who lived in various places throughout Tsilhqot'in territory, one of which was the study site for this research. The word "cayuse" is a term for local free-ranging horses (see Footnote # 18, this dissertation).

natural, native part of the culture and ecology in the region, as legitimately there as any other wildlife, and an important part of the character and spirit of the region. There are a range of views and opinions in between these two extremes. The horses in the Brittany Triangle are a unique and fascinating population for study, because although they are the subject of publicity and discussion related to horses in the Chilcotin in general, they also exist in a fairly unique set of circumstances–politically, ecologically, and culturally–that have not been studied in available peer-reviewed literature. Thus, while the Brittany Triangle horses attract the same controversy as many other free-roaming horses in other places, there is less known about them, and the atypical socio-ecological milieu around them suggests that the typical points of controversy may not apply to them in the same way as other horse populations.

METHODOLOGICAL APPROACH

As I began field research for this study in 2006 the Xeni Gwet'in people (in Nemiah Valley), on behalf of the Tsilhqot'in First Nations were in the final stages of completing a lengthy court case (*Tsilhqot'in Nation v. British Columbia,* 2007 BCSC 1700). The court case had required many community members and elders to be interviewed at length, cross examined, and subjected not only to public scrutiny and judgment, but at times to open criticism or disbelief by outsiders and officials from both provincial and federal government agencies. This context, combined with the history of relationships between the Xeni Gwet'in and other peoples, contributed to my own awareness that individuals within the community might be suffering from interview fatigue, and would have good reason to be suspicious of my motives, and of how information may be used if they did talk to me. With these assumptions, I approached the research with the attitude that it would be enriching and positive for the study if community members were willing to do interviews with me, but that I would not push my research agenda on them, if people did not seem receptive to it.

The research was designed to be a transdisciplinary study, combining and integrating tools, perspectives, methods, and literature from several disciplines and from experience in the field (Hochtl et al., 2006). Methods of research and data collection used and combined techniques from ethnographic research (e.g. participant observation, semi-structured interviewing), field biology (e.g. stratified random site sampling, line-point intercept measurements of vegetation), and range assessment (e.g. field assessment and standardized observations). In addition to designing this project as a transdisciplinary study, I took an exploratory, adaptive approach to the research. Exploratory research is appropriate when the goal is to develop a deeper understanding of the topic rather than to test a hypothesis (Babbie, 2004). An adaptive approach to research involves learning from research

participants throughout the entire process from conceptualization to writing (Mendis-Millard and Reed, 2007) and adapting the research accordingly.

Over the course of the study, I visited the field region eight times over six years, spending approximately 33 weeks in the region in total. Quantitative ecological data and direct observations in the Brittany Triangle were conducted primarily during the months of June, and August in 2008-2009. Qualitative research and follow-up took place intermittently from May through to September between 2006 and 2011. The research methodology is discussed further in Chapter 3.

THESIS STRUCTURE

The integrated, transdisciplinary nature of this research guided the structure of the thesis, in which ecological and socio-cultural research results are represented as interwoven when appropriate, and quantitative scientific field data, as well as local knowledge and qualitative interview results are combined to inform ecological research results.

The Literature Review (Chapter 2) outlines pertinent research and literature, and provides a conceptual basis and theoretical context for this study. The methodological approach to the study and data analysis is described in Chapter 3. Chapter 4 provides background information by describing the biogeography and socio-cultural aspects of the study region, plus the governance and management frameworks relevant to free-ranging horses in the region. In Chapter 5, research results demonstrate the ways in which free-roaming horses of the Brittany Triangle fit into the social, cultural and ecological elements of a larger system, and the role of the horses in the relationships between other system elements. Chapter 6 is an analytical discussion of the emergent themes, theoretical insights and management implications from the study. In particular, it explores the relationship between power dynamics, diverse ways of knowing, and the implications of research findings for integrated approaches to management and planning, particularly where free-roaming horses are concerned. Finally, Chapter 7 concludes with a summary of core findings and recommendations from the research.

Figure 4: Tsyl'os seen from Vedan Lake.

CHAPTER 2 - LITERATURE REVIEW

"…And again I hear
These waters, rolling from their mountain-springs
With a soft inland murmur. —Once again
Do I behold these steep and lofty cliffs,
That on a wild secluded scene impress
Thoughts of more deep seclusion; and connect
The landscape with the quiet of the sky…

"…These beauteous forms,
Through a long absence, have not been to me
As a landscape to a blind man's eye:
But oft, in lonely rooms, and 'mid the din
Of towns and cities, I have owed to them
In hours of weariness, sensations sweet,
Felt in the blood, and felt along the heart…"

~ William Wordsworth, *Tintern Abbey,* 1798.

The holistic and transdisciplinary nature of this study means that it crosses between, and combines relevant literature and discourse from numerous disciplines, including studies in geography, environmental planning, landscape and wildlife ecology, psychology, history and anthropology. The goal of this literature review is to combine the most relevant literature from diverse disciplines, in order to provide a background and theoretical context for the research that was done as a part of this study. This chapter begins with a discussion of research on cultural values towards nature and wildlife. That topic naturally leads into current discourse on epistemologies and knowledge integration across different cultures. The fact that human social and cultural systems are integrated with ecological systems is a basic premise of this thesis, and a brief overview of the extensive literature and key concepts follows. Finally, I outline literature specifically about the ecology and management issues of wild and feral horses.

There are several cases in this chapter where integrative or overlapping concepts are discussed, yet the clearest available terminology in the English language carries with it either a history or an implication of mutual exclusion. I refer in places to "nature" and "culture", to scientific and local knowledge, and to socio-ecological systems. In each of these cases, I seek to look beyond dichotomies, and to explore the ways in which the separate words are merely attempts to describe different, interwoven aspects of a complex reality. The relationship between types of knowledge and ways of knowing is discussed below, in this chapter, as is the concept of integrated socio-ecological systems, and terminology usage

is defined for each key concept, in the relevant sections. The term "nature" has numerous meanings and dictionary definitions. The Canadian Oxford Dictionary (Barber, *COD*, 2011) provides an apt definition of nature as "(a) the physical power causing all the phenomena of the material world" and "(b) these phenomena, including plants, animals, landscape, etc." This particular definition is not inherently exclusive of human beings. Similarly, in this thesis "nature" is considered to be a larger concept than those of human and non-human, and consequently the term does not necessarily exclude humans or their artifacts and activities. However, there remains a need to refer to the world that extends beyond humanity and civilizations. While the concepts of nature and culture (defined below) are taken to be mutually forming, and dynamically interactive, they are not the same. For these reasons, the word nature is used here to refer to the world within which humans dwell, the ecosystems that operate around and through us, and the animals that exist without (sometimes despite) us.

CULTURAL VALUES AND HUMAN DIMENSIONS OF NATURE/WILDLIFE

People conceive of, define and relate to wilderness, wildlife and other animals differently in different cultural groups (Bertolas, 1998; Clayton and Myers, 2009; Van Sittert, 2005). The dynamic nature of social attitudes, and the ongoing interaction among diverse cultural attitudes, values and beliefs pertaining to wildlife and nature warrant attention here not only to social change and human perceptions of wildlife, but also the ability to understand the differences between cultures (Dayer et al., 2007; Teel et al., 2007).

Culture and the notions of values, attitudes, and beliefs are complex concepts to define. At its core, *culture* refers to a system of overarching beliefs, values, attitudes, and normative assumptions shared within a society or group, transmitted and evolving over time as one generation teaches the next, and each also learns from personal experience (Inglehart, 1990). Culture is conventionally seen as a form of "external adaptation and internal integration" (Barnes, 1986), a "dynamic process whereby people are actively engaged in constructing group life and its products" (Stephenson, 2008). In contemporary social science, *culture* can be roughly characterised in three main ways: a general descriptive term used to describe the whole 'way of life of a people'; a reference to the functional ways in which a group forms or ascribes its own identity; and finally as a reference to active and ongoing social processes (Stephenson, 2008; Thrift and Whatmore, 2004). Cultural groups need not be regionally or ethnically defined. Groups from a particular professional discipline or vocation can also form a sort of "culture" in their shared attitudes, beliefs, and ways of conceiving of the world including professional cultures divided by the inherent norms and assumptions of people from shared disciplines or schools of thought

(Manfredo, 2008). Kaplan and Kaplan (1995) in their studies of human perception, noticed that "experts" in a particular field may learn to view things in a particular way, but that over time that way of perceiving things becomes second-nature. In other words, disciplinary training can lead to differences in values and beliefs that are essentially cultural (Pohl, 2005; Stephenson, 2008).

Values, in relation to culture and landscape, are defined here according to Janet Stephenson's (2008) Cultural Values Model, which specifies that "understanding how a landscape is valued involves understanding both the nature of the valued 'object' (or aspect of landscape), and the nature of the expressed value/s for that object" (pg. 129). Hence cultural values with regard to landscape are "shared by a group or community" and "given legitimacy through a socially accepted way of assigning value... There can be multiple ways of valuing landscapes" (pg. 129). Michael Manfredo (2008) points out that within a geographical community and even a cultural group, individuals might identify with multiple social networks and be guided by various social norms. At the same time, values are just one aspect of many complex factors that influence environmental attitudes and behaviours regarding specific issues, and worldviews or perspectives which define how people perceive the natural world and choose to live within it (Deitz et al., 2005; Ingold, 2000). *Attitudes* are considered to be the cognitive link between a stimulus and a person's response (Fiske and Taylor, 1984). The much-researched gap between people's attitudes and their behaviours (Ajzen and Fishbein, 2005), serves as a constant reminder not to assume that self-reported attitudes necessarily have predictive power when it comes to actual situations in the real world.

Human value orientations, understandings, beliefs and behaviours towards nature, environmental issues, wilderness and wildlife are gaining increasing attention from scholars and researchers in recently emerged scholarly fields such as conservation psychology (Clayton and Myers, 2009) and interdisciplinary studies of the "human dimensions of wildlife" (Manfredo, 2008). Research by scholars in these fields demonstrates a link between value orientations towards wildlife, and social conflict over issues related to environmental and wildlife management (Teel et al., 2007). In particular, social controversy and conflict over wildlife management issues can occur as a result of socio-cultural differences between people (Dayer et al., 2007).

The salient point to be drawn from these definitions is that people attach meanings to their external environments, meanings that are often shared with other members of the same society and time. Some of these beliefs and assumptions are hidden, becoming moral imperatives, norms and values. These deeply seated beliefs and assumptions become an issue when people from different cultures end up

talking, ostensibly about the same things, but neither conceiving of objects and places, nor approaching processes, in the same way (Berkes, 2004; Bertolas, 1998; Mabee and Hoberg, 2006; Nadasdy, 1999). Culturally biased beliefs may be considered to be "common sense", or even to define rationality, and go unrecognized by those who share each other's beliefs.

Several dominant themes emerge in psychological research concerning the human relationship with nature: measuring and categorizing *how* people perceive and relate to their environments; whether people have innate preferences for certain types of landscape features or natural settings (Kahn, 2001; Kaplan and Kaplan, 1995; Orians and Heerwagen, 1992); and attitudes and behaviours relating to environmental issues (Dunlap & Van Liere, 1978; Jones & Dunlap, 1992; Van Liere & Dunlap, 1981). However, the exploration of how experience, belief and attitude influence our environmental perception extends far beyond the discipline of psychology, and has been the subject of philosophical debate, theoretical discourse, and even empirical studies in other disciplines such as human geography, landscape planning, and restoration ecology (Abrams, 1996; Higgs, 1997; Ingold, 1992; Lewis & Sheppard, 2005; Naveh, 1995).

E.O. Wilson's (Kellert and Wilson, 1995) Biophilia Hypothesis explains aspects of the human relationship with nature as having a biological basis, suggesting that there is "a fundamental, genetically-based human need and propensity to affiliate with life" (Kahn, 2001). In other words, it seats a human desire to connect with the natural world in our biological constitution first, and in our learned behaviour second (Kellert, 1993). In contrast, a social constructivist perspective, when applied to the human relationship with nature, highlights the ways in which the idea of nature, and other similar concepts, are socially and culturally derived. In the past two decades, some scholars have sought to bypass the "realist/constructivist" dichotomy by situating the concept of nature in "embedded social practices" (McNaughton & Urry, 1998), or by arguing that nature and culture are "mutually constituting" through the "continuous intercourse" of people and their environments (Ingold, 1992).

Studies that focus on the dominant Western worldview (either through their research design, or through their sample populations) may not accurately represent the ways in which some Indigenous peoples perceive or view their environments. A significant body of literature explores the relationships *across and between cultures*, between differing social values, perceptions, and people's attitudes towards or identity with nature in general (Bertolas, 1998; Clayton and Myers, 2009; Dietz et al., 2005; Hovardas and Stamou, 2006), conservation, resource use and land management (Siipi, 2004; Trigger et al., 2008) and towards wildlife or animals (Dayer et al., 2007; Manfredo, 2008; Teel et al., 2007). To the extent

that such differences in perspective and assumptions become an implicit bias that defines the discourse and process around land use planning and management, they can play an integral role in structural power relations that favour certain groups and their understanding of a situation, and marginalize others (Stephenson, 2008).

People in Indigenous and First Nations cultures often conceive of and experience nature differently than members of Canadian society who come from European, Asian or other cultural traditions (Nadasdy, 2003b; Turner and Berkes, 2006a). This is not to say that indigenous peoples are cut off from the influences of the dominant culture in North America, nor is it a claim that all members of a particular culture or nation view and experience life similarly. However, cultural norms and social conventions influence and reinforce certain ways of perceiving, valuing and interpreting individual human relationships with nature and one's environment (Stephenson, 2008). Many members of indigenous cultures grow up with a different set of cultural influences, norms, attitudes, and practices as the building blocks of their daily life, and must then mediate between their experience of their traditional culture and language, and the Western influences that also form a large part of their lives (Cruikshank, 2005; Dinwoodie, 2002; Pye, 1992).

As with some other Aboriginal peoples in North America (Basso, 1996; Brody, 1981; Watson and Huntington, 2008), a number of Xeni Gwet'in people report experiencing a direct, mutually forming link between cultural and personal identity, place and landscape (Dinwoodie, 2002; Glavin and PofNV, 1992) which is different than that of people from settler cultures and many people in government professional cultures (Ingold, 2000; Nadasdy, 2003). Even allowing for individual variations in perspective, and after over a century of cultural mixing, there remain some fundamental differences in worldview between how many Aboriginal people perceive and relate to the idea of "wilderness" in general, and how Euro-Canadian descendants of settlers do so (Atleo, 2004; Bertolas, 1998; Castleden et al., 2009; Cruikshank, 1997; Nadasdy, 1999).

Definitions and Perceptions of Wild

Despite the complexity of individual perspectives, vernacular references to free-roaming horses in the Chilcotin indicate some underlying cultural differences in how people characterize and relate to "wilderness" and the idea of a "wild" nature. Even if one accepts that humans tend to have some affiliation with nature (Kellert, 1993), the form of that affiliation and the values placed on nature differ between individuals and between cultures (Evernden, 1992; Ingold, 1992; Kahn, 2001; McNaughton and Urry, 1998).

The tendency of Euro-Canadian cultures (and many professional or disciplinary sub-cultures within), particularly over the last one hundred years, has been to determine or perceive the legitimacy of species on a landscape according to economic or utilitarian values (Worster, 1994). By these assumptions and values, free-roaming horses lack a legitimate role on the landscape because they lack the utilitarian or economic value of being domestic livestock, the anthropocentric value of being game species, or the perceived inherent value of being a native wildlife species (Collins, 1995; Thistle, 2008/9; Rikoon, 2006). In recent decades the legitimacy of animal and plant species has also been evaluated on the basis of whether it is native or indigenous (Simberloff, 2005) to the landscape according to a pre-existing reference state. Within this cultural model, "wild" is contrasted with "domestic" as an absolute state. An example of this way of viewing nature is an opinion expressed by one participant:

> *"I guess I should tell you too, that I personally don't feel that these horses are a wild species or... You know I feel that they're horses people have let go over the years. I mean that's my personal feeling about these horses. So they're not a wild animal..." (IN08)*

Yet the cultural expectation that wilderness is somehow antithetical to a human presence on the landscape is increasingly being questioned in environmental studies as scholars learn more about the history of North American landscapes, most of which are the result of complex, mutually forming, culture-nature relationships dating back millennia (Turner and Berkes, 2006; Crosby, 2004; Worster, 1994). In recent years recognition of systemic, dynamic change processes in ecosystems has provoked debate over what constitutes a "natural" ecosystem for conservation (Siipi, 2004), or an invasive species in a given situation (Sagoff, 2005; Simberloff, 2005). Increasingly, North American scholars are learning to look at wild landscapes as areas that are characterised by both non-human and human drivers of ecological change, and have been for millennia (Higgs, 2006). Internationally, scholars are analyzing the ways in which cultural perceptions of wild animals are often more a result of ideologies and market-driven politics (Van Sittert, 2005), or even "narratives of sustainable rural development" (Schwartz, 2005). Some scholars argue that in reality, the boundaries between wild animals and tame ones are blurry in many cases, for example where wild horses are caught and held for adoption in the United States, or where domestic horses are released into wild areas in the Netherlands (Reed, 2008; Schwartz, 2005).

Concepts of nature, wilderness, and wildlife are interrelated for many people. Yet the ways in which those ideas are related, and the distinct meanings that the words hold, do vary between individuals. Social and economic trends, as well as cultural differences, can all have a large influence on how people conceive of nature, wilderness, and wildlife (Bertolas 1998; Hovardas & Stamou, 2006). Even

allowing for individual variations in perspective, and after over a century of cultural mixing, there remain some fundamental differences in worldview between how many First Nations people perceive and relate to the idea of "wilderness" in general, and how members of Canadian society who come from other cultural traditions do so (Bertolas, 1998; Castleden, 2009; Cruikshank, 1997; Nadasdy, 1999; Nadasdy, 2003; Turner and Berkes, 2006).

The concept of wilderness as we know it is associated with a Western mindset among societies of European descent in North America, particularly when it excludes people, or objectifies nature as being antithetical to culture (Cruikshank, 1997). Wildlife management, as it is generally conceived of among biologists, conservationists, and protected area planners in North America, is also a practice associated strongly with the cultural perspective of the dominant Western society (Nadasdy, 2003a). In the Chilcotin, individual people often embody multiple cultural traditions and cross between groups that tend to be stereotypically grouped together in discussions about land use interests and attitudes (Reid, 2008/09; Lutz, 2008; IN02; IN15; IN03). Individual attitudes towards free-ranging horses, wilderness, and human interests are complex, and influenced by many factors which include but are more complex than simple ethnicity or vocation. There is a vast diversity of perceptions and understandings about how horses fit into the local landscape, with a spectrum of individual opinions and beliefs that is far more intricate than simple divisions between conventional "stakeholder groups". Nevertheless, the reality of social-political relationships in the Chilcotin is such that an analysis of cultural understandings, perception and meaning can yield useful insights.

EPISTEMOLOGIES AND KNOWLEDGE INTEGRATION

Recent decades have seen the emergence of a significant amount of scholarly research and literature concerning cultural perspectives, worldviews and knowledge systems pertaining to the natural world, in scholarly disciplines much more diverse than the traditional anthropology (Berkes, 1999; Bertolas, 1998; Blackstock and McAllister, 2004; Booth and Skelton, 2011; Ingold, 1992; Lewis, 2008; Stephenson, 2007). Studies of how different socio-cultural perspectives, worldviews and knowledge systems influence and are influenced by human relationships with ecosystems and natural resources have stemmed in recent years from diverse disciplinary backgrounds, including history, anthropology, geography, sociology, and others (Ingold, 1992; Bertolas, 1998; Blackstock and McAllister, 2004; Lewis and Sheppard, 2008; Lutz, 2008; Stephenson, 2007). The terms indigenous knowledge (IK), traditional knowledge (TK), traditional ecological knowledge (TEK) are variously used to describe not only information, but the ways in which indigenous and aboriginal peoples understand, learn about, and

know the world (Berkes, 1999; Drew, 2005; Huntington, 2000; Huntington et al., 2002). The term local knowledge is also used often to inclusively describe the mix of knowledge that people local to a place have about that place. Local knowledge can be a more inclusive concept than Indigenous Knowledge or Traditional Knowledge as it is inherently open to information, practices and ways of knowing that are influenced by diverse cultures and held by people from a diversity of cultures. There is active and ongoing debate over whether it is appropriate to dichotomize between local or indigenous knowledge and Western scientific knowledge, how to frame the differences and similarities among the various ways of knowing and types of information that those terms represent (Agrawal, 2009; Berkes, 2009; Stephenson and Moller, 2009).

Attempts to include and integrate local or indigenous knowledge into environmental decisions have often been practical attempts to simultaneously supplement available scientific information and address power imbalances or local conflict over centralized decisions by government and corporate agencies (Clapp, 2004; Mabee and Hoberg, 2006). Knowledge integration initiatives, for all their inherent imperfections and problems, also do often represent a growing and genuine recognition in Western cultures of the value of local and indigenous knowledge, particularly in situations where scientific information is scant, or the capacity to gather more information is limited (Drew and Henne, 2006; Gilchrist et al., 2005). However, despite good intentions by many people involved, attempts to mandate knowledge integration into formal processes (CEAA, 2010a) have highlighted ongoing power imbalances and differences in epistemology, ways of living and understanding the world inherent in many conservation and land use management decisions (Mabee and Hoberg, 2006; Nadasdy, 1999). In turn, such processes have raised questions about not only how to integrate different types of knowledge (Huntington, 2000), but of whether it is even desirable or possible to do so, and under what circumstances (Ellis, 2005; Hanna, 2000; Nadasdy, 2003).

Science and Scientism

Western science is a broad term that refers to a vast array of methodologies, practices, and approaches to gathering knowledge. Science is “systematic knowledge increasingly acquired in the context of society, culture, and the economy. It can either be applied or theoretical (pure)” (Ommer, Coward and Parrish, 2008, p.22-23). While science and all knowledge must be acquired in the context of uncertainty, science does not inherently include or translate into the knowledge or wisdom necessary for humans to understand and act within the world that we inhabit. Such discernment comes through other processes, mediated by cultures and by experience (Ommer et al., 2008). The practice and philosophy of Western science itself rests within contexts, cultural biases, and assumptions as does any

knowledge system. Beyond Western scientific methods and practices, '*scientism*' is a belief or way of seeing the world in which that which cannot be scientifically proven is not real (Lyver et al., 2009; Stephenson and Moller, 2009). When dealing with diverse knowledge systems, such a belief can be a problem given the frequently immeasurable nature of local knowledge (Stephenson and Moller, 2009).

There is a tendency for the term Western science to be used as a vernacular shorthand term to refer to a positivist outlook that emphasises quantifiable information, favours disciplinary expertise and objectivity, and treats information as something that can be transmitted *a priori* between people regardless of context. While these ways of viewing information and establishing the credibility of information and knowledge are common among many scientists and members of Western culture, they are not universal characteristics of scientific inquiry. There is tremendous variability, even within the Western sciences, between the practices, methodologies, norms and values of different scholarly disciplines and sciences. For example, some forms of qualitative inquiry share commonalities with aspects of indigenous knowledge, as they rely on reflexivity and the interpretation of empirical observation, while even certain quantitative studies in fields such as ecology must function within conditions of uncertainty, and without the possibility of complete replication. Thus, discourse that dichotomizes between science and local or indigenous knowledge often is using the term "science" to refer to a specific set of perspectives or philosophies of knowledge, rather than to science as a whole suite of methodologies and disciplines.

Indigenous and Local Knowledge

The terms *Traditional Ecological Knowledge* (TEK)*, Traditional Knowledge* (TK) and *Indigenous Knowledge* (IK) are often used interchangeably, though there are many different ways of defining and conceiving of each term, and of the relationships between them. The definition of TEK that is widely used describes it as "a cumulative body of knowledge, practice and belief, evolving by adaptive processes and handed down through generations through cultural transmission, about the relationship of living beings (including humans) with one another and the environment" (Berkes, 2008 p. 336; Stephenson and Moller, 2009). There is ample evidence to suggest that many Aboriginal peoples do not draw a clear distinction between what Euro-Canadians might consider environmental knowledge and other types of cultural, spiritual and personal knowledge (Basso, 1996; Berkes, 1999; Watson and Huntington, 2008). It can be limiting and inappropriate then, to limit the focus of research to traditional *ecological* knowledge (Brosius 2006). Even if one is willing to distinguish between indigenous and Western scientific knowledge, there remains disagreement over whether the different ways of knowing

should be framed as fundamentally different, complementary, sharing characteristics while still distinct, or all of the above (Stephenson and Moller, 2009).

The broader terms *Indigenous Knowledge* or *Local Knowledge* imply a comprehensive approach to knowledge held by and shared among people, and are more useful for the purposes of this study. Indigenous knowledge usually refers to culturally specific knowledge and practices. Local knowledge differs in some ways from indigenous knowledge, (though some scholars use the two inter-changeably) not least because it can include knowledge created, held and shared by non-indigenous, non-aboriginal people who are local to a particular place, as well as different types of information (e.g. indigenous and Western scientific) that influence the knowledge local to a place. Very simply, the term *local knowledge* is used in this dissertation according to Julie Cruikshank's (2005) definition, to refer to "tacit knowledge embodied in life experiences and reproduced in everyday behavior and speech" (p. 9). As Cruikshank points out, in reality, local knowledge is a composite mix informed by indigenous knowledge, experiential knowledge, scientific information, and other understandings of the world (Cruikshank, 2005).

Despite the difficulty of trying to draw definitive boundaries around the concept of local knowledge, it remains a useful term, as a departure point for discussion about how people learn about, know and understand landscapes, places and animals, as well as their relationships with community, past and future. Many scholars recognize that there are differences in knowing and understanding, and in knowledge itself, which are important to recognize even when the English language doesn't provide adequate ways to describe perspectives and concepts from other cultures (Turner, Marshall, et al, 2008). For the purpose of this dissertation, I accept Cruikshank's (2005) definition of local knowledge (above) and use the term to refer to the knowledge of people who live near or have extensive first-hand experience of the study region to describe their knowledge and understanding of the issues discussed. Consistent with Cruikshank's definition, I use the term to describe knowledge coming from participants who are local to the study area, including First Nations and non-aboriginal people, as well as indigenous and Western scientific information and understandings. The term indigenous knowledge is used in this dissertation to refer more specifically to that knowledge which is based in Xeni Gwet'in and/or Tsilhqot'in culture and society.

Beyond the Dichotomy – Ways of Knowing

Local knowledge systems and Western scientific knowledge systems can both be "depicted as belief systems" with "embedded bodies of knowledge" (Stephenson and Moller, 2009, p. 145). Local

knowledge and Western science both use mixed approaches to gathering information, learning, developing and sharing information, with neither being exclusive of the other (Manuel-Navarrete, et al., 2006). Both local knowledge and Western science can involve experiential and empirical knowledge, though in different ways (Fazey, et al. 2005; Fazey et al., 2006). Far from being distinct and discrete, these knowledge systems are each highly variable and at times partially inclusive or overlapping of each other, to the extent that some scholars argue that the terms "indigenous knowledge" and "scientific knowledge" are themselves misnomers which perpetuate dichotomous thinking (Agrawal, 2009). At the same time, other scholars argue that there are some fundamental differences between indigenous ways of knowing and Western scientific ways of knowing (Berkes, 2009; Moller and Stephenson, 2009). Despite the inherently messy nature of the terminology, there is still some utility in distinguishing between different knowledge systems and ways of knowing in order to address and describe some core differences.

When using terms like indigenous and local knowledge, or Western science, there is a danger of falling into the trap of thinking, speaking and writing about different types of knowledge as static or passive "stuff" – information which can be moved around, divorced from context, objectively known and traded. In some knowledge systems this perspective may be an appropriate epistemological assumption, but not all. The existence of knowledge implies and requires a knower (Agrawal, 2009; Goulet, 1998) and when one attempts to integrate different epistemologies, one must consider more than just information. To achieve a greater understanding of social and ecological systems through the integration of different types of knowledge is not just to combine types of information, but also to combine different processes, ways of understanding, learning, evaluating, sharing and behaving (Cruikshank, 2005; Ommer et al., 2008). Indigenous knowledge and local knowledge, as well as the Western scientific method are as much verbs as they are nouns. Each way of knowing tends to be wrapped up with and embedded in formal and informal institutions and social organizations, and hence also is a part of people's livelihood activities and/or professions. However, the term "knowledge systems" itself can sometimes be problematic. Cruikshank (2005) notes that "one of the more trenchant insights from anthropology is that as soon as taken-for-granted, everyday knowledge practices become defined and bounded as "systems" of knowledge, this sets in motion processes that fracture and fragment human experience" (p. 256). The ways in which different knowledge systems are embedded in social institutions, cultural practices, governance procedures and technologies can present deep-seated challenges and structural barriers to integration attempts (Sherman et al., 2010). For these reasons it is helpful to refer to 'ways of knowing' (Goulet, 1998; Ommer et al., 2008).

The challenges of knowledge integration are dealt with more thoroughly in the discussion of co-management literature (below). The roots of different ways of knowing can be deep and foundational, despite some similarities and parallels (Cochran et al., 2008). Such deep differences are sometimes overlooked when decision-making processes and consultation are conducted in a single common language, even though the meanings of key terms may be interpreted differently by different parties, contributing to conflict, misunderstandings or distrust (Clark and Slocombe, 2009). Thus, it is important to consider not only the information to be integrated in management decisions, but also the place-based, language-based context of knowledge and knowers (Basso, 1996; Goulet, 1998), as well as the practices and processes by which knowledge is acquired, understood, practiced and created (Lyver et al., 2009; Ommer et al., 2008).

SOCIAL, CULTURAL, ECOLOGICAL SYSTEMS – INTEGRATIVE CONCEPTS

Socio-Ecological Systems and Resilience

Since the 1990s, a growing body of literature and scholarly research has emerged that recognizes the complex, variable nature of environmental systems, and the inherent inter-relationships between ecological and socio-cultural systems (Brechin et al., 2003; Gunderson and Holling, 2002; Naveh, 1995; Reid et al., 2006). Although the term resilience has become somewhat of a buzz-word with reference to ecosystems and socio-ecological systems, the concept is useful for researchers and practitioners who recognize the complex, variable and adaptive nature of social and ecological systems, and who seek to better understand the capacities and tendencies within those systems to interact, adapt and self-regulate as they respond to disturbances (Berkes, Colding and Folke, 2003). The term is also frequently useful when characterizing and exploring the many ways in which socio-cultural systems interact with ecosystems, in traditional indigenous societies and in more mixed, changing contexts (Berkes and Turner, 2006; Janssen et al., 2006; Smith and Stirling, 2010; Turner et al., 2006).

The concept of resilience was introduced into ecological literature in the 1970s by C.S. Holling and A.D. Chambers (1973), and later developed into a theoretical framework describing the “non-linear dynamics” of natural systems and an alternative to the equilibrium model which characterized ecosystems as tending to return to a stable state (Berkes, Colding and Folke, 2003). Rather, resilience describes ecosystems as having natural ranges of variability, and multiple states or domains of attraction. The term itself, when applied to ecosystems, does not necessarily have inherently positive

or negative social values. For example, a severely degraded ecosystem may be highly resilient in its tendency and capacity to remain in that degraded state (Suding et al., 2004).

Applied to ecosystems, *and* to socio-ecological systems, the term resilience is defined by the Resilience Alliance (2002) as having three characteristics:

- The amount of change the system can undergo and still retain the same controls on function and structure;
- The degree to which the system is capable of self-organization;
- The ability to build and increase the capacity for learning and adaptation.

Despite the somewhat neutral tone of the definition, in practice the term socio-ecological resilience is often used as a synonym for sustainability (Berkes, Colding and Folke, 2003) or to refer to the ability of socio-ecological systems to absorb or recover from disturbances. In psychology, the term *resilience* applies to the processes by which people to adapt to and recover from stressors or adversity (Bandura, 1997). Thus, in popular usage, scholars often write about managing for, promoting or maintaining socio-ecological resilience (Lebel et al., 2006; Turner et al., 2006) in a way that is similar to the concept of resilience in psychology. As an integrative concept, the notion of socio-ecological resilience is especially helpful for exploring and understanding the ways in which social, cultural and ecological systems may interact or be managed at different scales (Cumming et al., 2006; Smith and Stirling, 2010).

A number of theoretical models for understanding and describing human-environment relationships have merged socio-ecological systems and resilience. Two of these models have particular relevance to this research: the idea of wildlife and humans as part of a cultural keystone complex, and a dwelling perspective or approach to understanding the human-environment relationship. These concepts are outlined below.

Cultural Keystone Complex

The "keystone" concept was originally a biological metaphor, used to describe the crucial ecological role of certain species in maintaining structures, relationships, functional interactions within an ecosystem (Paine, 1969). The metaphor referred to the keystone or central stone used to form an arch, without which the structure and function of an archway cannot be upheld. The keystone metaphor provided a helpful illustration of the inter-reliance among elements in an ecosystem, and the ways in which the presence or health of a single species could potentially affect a whole ecosystem. The

metaphor was soon broadly used. The over-use and broad or unclear definition of the term later drew critique from some scholars, such as Mills, Soule and Doak (1993) who suggested that "neither the science of ecology nor the protection of biodiversity is advanced by continuing to label certain species as keystone" (p. 223). Although Mills et al. acknowledge the contributions that the keystone concept has offered, their frustration with the term is illustrative of the problems that can arise when a metaphor or descriptive concept is translated directly into management actions that focus on individual species.

More recently, the keystone metaphor was adapted by Garibaldi and Turner (2004) to describe "cultural keystone species" (as a conceptual parallel to the biological concept) that serve multiple highly significant and irreplaceable functions within particular cultural-ecological systems. Platten and Henfrey (2009) caution against over-emphasizing or isolating the importance of a single species within cultural-ecological systems, but they acknowledge the usefulness of the keystone concept, instead asserting that a cultural keystone is in fact a complex that includes "numerous other system elements, both material and non-material" (p. 493). They define cultural keystones as "complexes of belief and practice with non-redundant functions crucial to social reproduction at any organizational scale within a socio-cultural system" (p 498).

The idea of a cultural *complex* is particularly helpful because it places the focus of analysis and inquiry on the *system* of functions, interactive relationships, identities, and practices through which a species interacts with the human cultures and ecological processes of a place. The free-roaming horses in the Brittany Triangle are part of a social and ecological system intrinsically related to the larger region, and are most accurately understood as part of a complex, rather than as a conceptually isolated species. Also noteworthy is Platten and Henfrey's qualification that "the keystone status of any species is neither inherent nor inevitable: it is culturally ascribed and this contingently" (p. 496). They specifically point to the management implications of this conceptual approach, since focusing on the complex "may be an effective means of articulating between species-focused and system or landscape approaches" to management (p. 496-497).

Dwelling Perspective

A theoretical and conceptual approach to human-environment relationships that is particularly apt for this research study is Tim Ingold's (2000) "dwelling perspective". A dwelling perspective fundamentally places humans in the context of an ongoing, mutually forming and iterative relationship with the ecosystems within which they dwell. Ingold defines a dwelling perspective as "a perspective that treats the immersion of the organism-person in an environment or lifeworld as an inescapable

condition of existence" (p. 153). He contrasts a dwelling perspective with the more conventional "building perspective" which takes the natural environment to be a source of "raw materials and sensations for diverse projects of cultural construction", and distinguishes between an objective "'real' environment that is given independently of the senses, and the 'perceived' environment as it is reconstructed in the mind through the ordering of sense data in terms of acquired cognitive schemata" (Ingold, 2004, p. 272).

The dwelling perspective has been developed in discourse on socio-ecological resilience into a "dwelling approach" to resilience and to framing stewardship models. Iain Davidson-Hunt and Fikret Berkes (2003) categorized seven emergent themes that group the core components of a "human-in-ecosystem" approach, based partially on Ingold's dwelling perspective. The seven themes are: 1) use of spatially bounded management units; 2) relational networks; 3) embeddedness; 4) knowing-learning-remembering; 5) cultural identity and sense of place; 6) institution building; and 7) livelihood activities. These seven themes and the dwelling perspective are further applied by Sherman, Van Lanen and Sherman (2010) as they develop an indigenous stewardship model based around findings from a study in the Pineridge Reserve, USA. In particular, a dwelling approach to stewardship emphasizes the "generation and transmission of ecological knowledge through relational networks and local institutions", "builds cultural identity and sense of place", and recognizes the essential aspect of local livelihoods activities within an ecosystem context. These qualities are vital to this study of free-roaming horses in the Brittany Triangle, because they provide a conceptual framework for understanding the ways in which Xeni Gwet'in livelihoods and the ecology of the Brittany Triangle are interwoven, and how horses in that area can be simultaneously behaviourally wild and yet also intimately part of local culture. This perspective and the associated themes will be revisited in Chapter 7 with regard to the research findings for this study on horses as they relate to the human-environment relationships in the Brittany Triangle and surrounding region.

FREE-RANGING HORSES AND THE LAND – RESEARCH, ECOLOGY AND MANAGEMENT

The 1971 passage of the *Wild Free-Roaming Horses and Burros Act* in the United States of America spurred a flurry of research on free-ranging horses in that country. Passed partially as a response to the inhumane methods with which wild horses were captured, handled, and transported (Ryden, 1970) the Act embodied the paradoxical situation of wild horses in the USA, stating that wild free-roaming horses and burros "are to be considered in the area where presently found, as an integral part of the natural system of the public lands" (*The Wild Free-Roaming Horses and Burros Act* 1971, Public Law

92-195). Though the decision may already have been made, politically, that horses were to be considered part of the natural ecosystem and managed accordingly, range managers and the Bureau of Land Management (BLM) suddenly needed to know how free-roaming horses behaved in and impacted their home habitats. Research focused primarily on forage preference, palatability, and dietary overlap with livestock and wild game species (Archer, 1971; Hanley and Hanley, 1982; Hansen et al., 1977; Krueger, 1972; Krysl et al., 1984), territorial range and interactions with wildlife (Crane et al., 1997; Ganskop and Vavra, 1986), behavioural ecology of free-roaming horses (Berger, 1977; Berger, 1985; Feist, 1976). As the literature and the management concerns related to free-roaming horses developed further, researchers began to explore management and population control techniques such as immunocontraception (Boyles, 1986; Turner, 2007), and to assess the impacts of free-roaming horses not just on forage production and competition, but also on diverse ecological indicators and on other species (Beever and Brussard, 2004; Beever and Herrick, 2006; Detling, 1998;Turner, 1988). The controversies, emotion, and politics surrounding free-ranging horses were also the subject of some studies, in the USA (Rikoon, 1996; Symanski, 1996), in New Zealand and Australia (Linklater et al., 2002; Nimmo and Miller, 2007; Symanksi, 1994), and in Europe (Schwartz, 2005; Vega Pla et al., 2006).

Free-Ranging Horses and Ecology

The response of vegetation to grazing by horses, cattle and other mammalian herbivores has been widely studied by those concerned with range ecology and management in the United States (Coughenor, 1991; Fahnestock and Detling, 1999; Hansen et al., 1977; Olsen and Hansen, 1977; Westoby et al., 1989), and by those concerned with ecological restoration and pasture management in Europe (Loucougaray et al., 2004; Menard, 2002; Miraglia et al., 2008). Range ecologists and managers have developed methods for quantifying, comparing and assessing the relative dietary preferences of free-ranging horses and cattle in a variety of ecosystems (Hansen et al., 1977; Krysl et al., 1984; McInnis and Vavra, 1987; Olsen and Hansen, 1977). In an environment such as the Brittany Triangle, range ecology studies are most accurate when combined with research on vegetation response to herbivory in forest and meadow environments (Fahnestock and Detling, 1999a & 1999b; Stohlgren et al., 1999) and complex modeling (Janssen et al., 2000) that can account for mixed animal use of “bush range” as opposed to purely grassland environments (Storrar et al., 1977).

Published research on free-ranging horses has focused on topics including: forage preference (McInnis and Vavra, 1987; Olsen and Hansen, 1977); impacts of feeding on vegetation, soils and other fauna (Beever et al., 2003; Beever and Herrick, 2006; Coates and Schemnitz, 1994; Hanley and Hanley,

1982); equine behavioural ecology (Feist and McCullough, 1976; Berger, 1977); interactions with other wildlife (Berger, 1985; Coates and Schmenitz, 1994; Ganskopp and Vavra, 1986); combined ecological effects of horses and cattle (Hubbard and Hansen, 1976); and carnivore predation on feral or wild horses (Robert et al., 2005; Turner et al., 1992; Turner and Morrison, 2001). The ecological relationships that free-ranging horses have with their environments and other wildlife have been researched from a variety of disciplinary areas of specialization. Table 2 summarizes some of the relevant studies and points related to research on free-roaming horses and ecological disturbance.

Table 2: Summary of Literature on Feral Horses and Ecological Disturbance.

Type of Effect	Definitions and Descriptions	Sources
Disturbance	"A change in structure caused by factors external to the hierarchical level of the system of interest; this distinguishes disturbances from other (endogenous) changes in the system" (Pickett et al. 1989). Any "process that alters the birth and death rates of individuals in the patch," directly or indirectly (Petraitis et al. 1989). "Any relatively discrete event in time that disrupts ecosystem, community, or population structure and changes resources, substrate availability or the physical environment" (White & Pickett 1985). Concept of disturbance is important, as it relates to horses' life-history, behavior, and biology, in addition to management. Disturbances may include: - Horses as introduced species - Grazing impacts: consumption of vegetation; preference for certain species; change in ground cover and community composition - Trampling and rolling; soil compaction or turning - Trail creation - Possible transportation and dispersion of seeds through coats or dung - Interactions with other wildlife. Note: Horses may or may not be considered a source of exogenous disturbance, depending on how the term itself is defined, and the temporal and geographical scope of analysis.	(Beever, Pers Com., 2007) (White & Pickett, 1985) (Petraitis et al., 1989) (Pickett et al., 1989)
Direct Effects	Grazing: - Graminous plants are majority of equine diet (grasses and sedges) - Forage preference for certain species – depends on season, availability, ecotypic differences, plant community structure, and more. - Winter horse diets can include shrubs in some environments, under certain conditions.	(Salter & Hudson, 1979) (Kreuger, 1972) (Heady, 1964) (Westoby, 1974) (Hansen, 1976) (Hansen, Clark & Lawhorn, 1977) (Krysl et al., 1984)

Type of Effect	Definitions and Descriptions	Sources
	Range and Territory size: - Estimates of home range vary from 0.9km^2 on Sable Island (NS, Canada) to 303km^2 in Wyoming's Red Desert (USA). - Home range size is negatively correlated with density of water sources, but no predictive power of model used (Ganskopp & Vavra 1986). - Seasonal shift in range size found to depend on availability of forage and water.	(Ganskopp & Vavra, 1986) (Miller, 1980)
	Preferred Habitats: - Studies suggest plant community composition not a driving force in horses' habitat selection; but within home range, horses may demonstrate preference for one plant community over another. - Habitat occupancy during spring relates to stage of plant growth – can result in localized damage from trampling and close-cropped stems. - Near my study area, horses found to utilize sedge meadows and upland forests (Storrar et al. 1977).	(Ganskopp & Vavra, 1986) (Salter & Hudson, 1979) (Storrar, Hudson & Salter, 1977)
	Impacts on Soils, Vegetation, Small Mammals, etc: - At low elevation in Great Basin (USA), strong differences in structure, composition and character of vegetation, and relative density of small mammal burrows, between horse grazed areas and horse removed sites (Beever and Brussard 2000). - Rodent (Hanley & Page 1981;) and small mammal populations (Beever 2003) may be affected by horse grazing, in addition to other factors like precipitation. - Vegetation responses to grazing are often more strongly related to abiotic factors (e.g. precipitation) than herbivory (Fahnestock & Detling 1998).	(Beever & Brussard, 2000) (Beever, 2003) (Fahnestock & Detling, 1998) (Turner, 1988) (Hanley & Page, 1981) (Levin et al., 2002)
Indirect Effects	Grazing: - Significant overlap between horse diet and cattle diet - Some overlap between horse and bighorn sheep diet - Little overlap between horse and moose or mule deer - Species richness may be lower in grazed areas (Levin et al. 2002); or may increase with grazing but then the question is whether increase involves native or exotic species (Murphy pers com 2007). - Tendency for nitrogen content in grazed shoots to increase or remain at higher levels in some plant species.	(Hubbard & Hansen, 1976) (McInnis & Vavra, 1987) (Olsen & Hansen, 1977) (Hansen, Clark, Lawhorn, 1977) (Krysl et al., 1984) (Levin et al., 2002) (Beever & Brussard, 2000) (Fahnestock & Detling, 1998)
	Interactions with Other Wildlife: - Horses and moose in Chilcotin found to have different habitat and forage preferences. This can be used as evidence either for or against competition (Storrar et al. 1977). - Horses and bighorn sheep in Wyoming/Montana found to have different terrain preferences. Both species eat grasses. Horses were competitors for grasses, but facilitators for sheep grazing (Coates &	(Storrar et al., 1977). (Coates & Schemntiz, 1994). (Levin et al., 2002).

Type of Effect	Definitions and Descriptions	Sources
	Schemntiz 1994). - Feral horses grazing in salt marsh and estuarine habitats affected fish habitat and populations (Levin et al. 2002). - In Argentine grasslands, some species of birds increased and other decreased in association with feral horse grazing. Horse presence was associated with increased predation on eggs (Zalba & Cozzani 2004).	(Zalba & Cozzani, 2004).
	Predation on horses: - Predation by mountain lions or cougars was a significant cause of mortality among foals in areas with mountain lion populations in the USA. - Wolf predation has been documented as a cause of mortality among takhi (Przewalski's wild horses) in Mongolia.	(Turner et al., 1992) (Turner and Morrison, 2001) (Robert et al., 2005)

Socio-Cultural Factors in Conservation

Historically, environmental conservation and the creation of protected areas have often been characterized by unequal power relations between Aboriginal peoples and external government or state authorities, and in many cases have resulted in the displacement of Aboriginal people (Spence, 1999). In North America, as in other places, removing indigenous people and their livelihood activities from protected areas has often had the ironic effect of removing key factors which had created and maintained the characteristics of the ecosystems that authorities were trying to preserve. For example, wildfire suppression and the cessation of deliberate burning practices in many parts of British Columbia have contributed to forest encroachment, fuel build-up (Filmon, 2004) and changes in the composition of vegetation and wildlife communities. It is now widely acknowledged that to be effective in the long term, ecological conservation initiatives, and management of protected areas, must include some consideration of social, cultural and political factors (Adams, 2009; Colding and Folke, 2001; Turner et al., 2008). Beyond the simple necessity of social considerations for effective ecological and biological conservation, there is also an increasingly broad role for protected areas to conserve not only biodiversity but also socio-cultural diversity as part of socio-ecological systems (Clapp, 2004; Naughton-Treves et al., 2005). Protecting or preserving human "heritage values" has arguably been a part of protected areas in Canada since their inception (Hanna, Clark and Slocombe, 2008). However, in recent years as the focus of ecosystem science has shifted to dynamic systems and adaptation to change (Gunderson and Holling, 2002; Leys and Vancley, 2011) the definition of those human values has changed in parallel with the ecological qualities, from static historically defined reference states to more dynamic, complex living systems (Hanna, Clark and Slocombe, 2008).

With shifting social values and understandings of socio-ecological systems, the paradigm that underlies the creation of protected areas has also changed since the 1970s. In Canada, this change was marked by Justice Thomas Berger's proposal of a new sort of wilderness park that would protect wilderness, wildlife habitat and landscapes that supported the cultures and livelihoods of Aboriginal peoples, and the subsequent policy changes by Parks Canada in an attempt to redefine the relationship between Aboriginal peoples and protected areas (Dearden and Rollins, 1993). Despite these changes, and some subsequent efforts to involve Aboriginal peoples in the planning and management of protected areas, there remain many uncertainties about how best to do so, and approaches vary. Even so, many protected areas do tend to be more inclusive of indigenous peoples in their stated purposes, management and planning (Clapp, 2004; Jones, Rigg and Lee, 2010; McGee, Cullen and Gunton, 2010; Singleton, 2009).

Taking a step beyond inclusivity of indigenous peoples, some protected areas are initiated, planned and maintained primarily by indigenous peoples. The Xeni Gwet'in Aboriginal Wilderness Preserve and ?Elegasi Qiyus Wild Horse Preserve (both including the Brittany Triangle) are examples of this type of situation. Both names are designations by the Xeni Gwet'in First Nation Government of a protected area within their traditional territory. Rather than excluding local culture and people from the wilderness, those protected areas serve to protect places that support and foster the ecological and cultural characteristics that the Xeni Gwet'in hold dear. By protecting geographical space, they are choosing to protect a sense of place, and a set of human *relationships* with the land (including plants and animals) for the sake of the biodiversity, culture and livelihoods (Naughton-Treves, 2005). In the absence of settled treaties or land claims, the protected area designations initiated and maintained by the Xeni Gwet'in First Nations Government overlapped in the Brittany Triangle with the subsequent provincial designation of a Provincial Park (Nuntsi Provincial Park), which covers a smaller area of land than the Aboriginal preserves, but is included within them, spatially.

APPROACHES TO PLANNING AND MANAGEMENT

Historically, a distinction was made in literature between planning – seen as future-oriented – and management – oriented more towards the present and implementation (Dearden and Rollins, 1993; Wismer, personal communication, 2011). By the 1980s, this distinction was changing and scholars were viewing planning and management together as parts of an ongoing, iterative process (Mitchell, 1997). Throughout the 1990s and turn of the twenty-first century, there has been attention to adaptive planning and management, with growing awareness that dynamic change is the norm in socio-ecological systems.

The word management tends to mask certain assumptions about power, authority and action. For instance, management plans tend to be developed, recognized as credible, and implemented by human agencies with some form of political authority or power. They are often based on some assumption that authorities have the right and the capability to adjust and intervene in social and ecological processes, in order to achieve some desired ends. In situations where some groups are or have been marginalized, where power and control over land and resources are contested, and where desired end goals or management outcomes are a point of disagreement, these underlying assumptions can make the idea of management itself a loaded proposition which becomes the focal point for power struggles and resentment over interventionist actions. Yet despite these implicit assumptions, the term remains in common usage to refer to the choices and practices by which people deliberately influence their environment and each other, and to refer to the formal implementation of plans. Hence this dissertation does use the term management, but questions whether management intervention is necessary at all in some circumstances, and what type of management is appropriate when it is deemed necessary. The point is to emphasize the importance for agencies engaged in management to clearly define terms and to explicitly deal with their assumptions as part of the management process.

Conventional twentieth century planning theory tended to focus on logical, standardized processes such as the rational comprehensive model, which remains influential in the structure and procedures of many government agencies and institutions that are responsible for land management (Mitchell, 1997). The rational comprehensive approach to planning rests mainly on 'expert' input and centralized decision-making, and is based in the assumption that people make rational choices, if they are given enough correct information (Fainstein, 2000; Lindblom, 1959; Mitchell, 1997). The rational comprehensive model is a straightforward method which usually appears to be fairly efficient at moving a project to the implementation stage. However, it can be autocratic, is generally not well-suited to dealing with complexity or uncertainty (social, ecological, or other sorts), and has few built-in opportunities for reflexive analysis of the cultural and theoretical assumptions which underlie it. Consequently, in conditions of social diversity, political complexity, and socio-ecological change, that model of planning may fail to address or resolve problematic issues, which may in turn compromise the success of management efforts later on (Albrechts, 2003; Fainstein, 2000; Mitchell, 1997).

In response to the shortcomings of the rational comprehensive planning model, a number of critiques and alternative theories of planning emerged since the 1950s. The general trend in planning theory has been towards a process that is increasingly inclusive of stakeholders, or people with varied interests in

a given situation. In the late 1950s, Charles Lindblom's (1959) *Incremental planning* theory - the "science of muddling through" - called attention to the messiness of decision-making in real life by assuming that not all information on a matter will necessarily be available or taken into account, and that people simplify facts to a "bounded rationality". It recognizes that values and goals may conflict with each other, that problems may need to be redefined in the course of planning, that a single correct solution does not usually exist for a problem, and that the decision process is ongoing, rather than a discrete event (Lindblom, 1959; Mitchell, 1997).

Participatory planning is a rather generic term that encompasses numerous methods and processes, the most relevant ones to this research being *Transactive*, and *Communicative* planning. Both approaches continue to develop inclusiveness by including multiple voices and interests in a flexible and adaptive planning process. They both are attentive to uneven social power dynamics, as well as conditions of uncertainty and change. Transactive planning, in particular, makes a deliberate effort to include the experiential knowledge of local people, or those who are affected "on the ground" by planning decisions (Fainstein, 2000; Friedmann, 1993). *Communicative planning* supposes that a reasoned, "ideal speech" situation will create the conditions for fully participatory interaction and consensus (Fainstein 2000; McGuirk, 2001). However, this model has been widely criticized for its failure to recognize or address the power dynamics inherent in real-world communication and discourse (Fischler, 2000; Gunder, 2003; Huxley and Yiftachel, 2000; McGuirk, 2001), often citing Foucault's philosophical discourse on power in their analyses (Gunder, 2003; Stein and Harper, 2003).

Knowledge and power are intricately linked in planning processes. Recent theoretical discourse around communication in planning has attempted to address the inherently unequal power dynamics that characterize many participatory planning processes (Albrechts, 2003; Fischler, 2000; McGuirk, 2001; Ploger, 2001). To the extent that any approach to planning assumes formal Western traditions of knowledge to be inherently the most credible, it risks marginalizing and disempowering participants who hold other types of knowledge (Fazey et al. 2006; Flyvbjerg, 2002; Gunder, 2003; Nadasdy, 2003a). Communicative planning theory does address the role that power relations play in planning exercises, and attempts to achieve a degree of equality by allowing for input from multiple participants. However, it does not adequately address the ways in which cultural bias or the selective consideration of certain types of knowledge can maintain or reinforce the marginalization of some participants.

Transactive planning theory (Friedmann, 1993) emerged through recognition of the social and political complexity of planning at different scales, and placed an emphasis on the planner's role as one of many

participants with a contribution to make to a given planning process (Mitchell, 1997). Transactive planning decentralizes decision-making to some extent, values partnerships, and focuses on planning as an iterative process, rather than entirely on outcomes. Perhaps most importantly for the purposes of this thesis, transactive planning explicitly values the experiential knowledge of involved citizens, or those who live in closest contact with the places with which the planning process is concerned (Mitchell, 1997). In doing so, it widens the breadth of available knowledge, by valuing the direct experience of people "on the ground", as well as the contributions that scholars and professionals can make. The drawbacks to this approach are that it can be time-consuming, and difficult to implement, in practice. Also, the simple attempt to include more voices in the process must not be confused with being inherently more democratic, as local and structural power dynamics can still serve to privilege certain viewpoints (Brews & Devavrat, 2007; Friedmann, 1993). Even within stakeholder groups, quite often "the squeaky wheel gets the grease".

Planning and management in cross-cultural situations with indigenous or aboriginal participants and communities adds another layer of complexity to planning processes, which are not fully addressed by stakeholder consultation models (Singleton 2009; Turner et al., 2008). Also, these processes often pertain to remote rural communities, natural resources, land use, and conservation or wildlife management in situations where there are not only diverse interest groups involved, but often diverse *types* of knowledge. These issues and situations tend to be addressed in the literature from specific disciplines (e.g. international development, protected areas planning) or applied studies (e.g. natural resource management, co-management case studies) (Ballard et al., 2008; Bode et al., 2011; Leys and Vanclay, 2011). In many cases, it is appropriate for planning in cross-cultural environments and with indigenous peoples to be addressed in an applied research context, because the issues and relevant forms of knowledge are often context dependent (Booth and Skelton, 2011; Jones et al., 2010; McGee et al., 2010; Miller et al., 2010; O'Flaherty et al., 2008). However, planning under such conditions often takes place without being explicitly linked to the discipline or profession of planning.

Planning literature has traditionally seen a separation or gap between discourse on theory – which conventionally has a somewhat narrow range and focus – and practice – which includes a wide range of applied discourse from a variety of professions and disciplines related to planning as an activity (de Neufville 1983; Wismer, personal communication, 2011). While there have been some efforts since the 1960s to bridge this separation (Fainstein, 2000; Innes, 1995; Margerum and Born, 1995), there remains a need for models and theory to advance the literature on planning in cross-cultural situations and with indigenous or First Nations peoples (Cullen et al., 2010; Wyatt et al., 2008). Yet there is also

a need for reflexive questioning of the fundamental assumptions and implicit power relations that underlie planning theories and practice, and these issues, though raised and informed by empirical examples, require some broad and deep consideration at the theoretical level.

Stakeholder Consultation and Multi-Agency Processes

Planning for land use, conservation, and natural resource management generally involves some recognition of social and economic interests as well as ecological systems, and attention to the interests of multiple "stakeholder" groups (Mitchell, 1997; Singleton, 2009).

First Nations and other aboriginal peoples have fought an uphill struggle to gain meaningful involvement in land use, conservation and natural resource management decisions not merely as one of many "interest groups" but as original inhabitants of landscapes, and as government agencies (Cullen et al., 2010). As aboriginal peoples, communities and governments continue to have to push for active involvement in many land use decisions, there has also been a growing recognition in the scientific community, and among government and non-governmental agencies, that indigenous knowledge (TEK, IK) can contribute valuable tools and understandings to land management and planning decisions (Miller et al. 2010; Turner et al., 2008). However, current research and practice reflects a number of challenges associated with the consideration and/or integration of IK into land use decisions, including how to effectively integrate IK into planning and management (Hanna, 2000); limitations of local capacity and defining new roles for institutions that have historically controlled land use decisions (Jones, Rigg and Lee, 2010; McGee, Cullen and Gunton, 2010), and the need for some reflexive consideration of the ways in which conventional planning and management processes, and institutions often reinforce cultural biases and disparities in power relations between groups (Booth and Skelton 2011; Cullen et al., 2010).

Academic and professional literature has often focused on how best to elicit, include, or integrate traditional and indigenous knowledge in planning and management processes pertaining to natural resources, land use and conservation (Drew, 2005; Huntington, 2000; Moller et al., 2004). It has also focused on attempts to characterize and explain the similarities, differences and complementarities between Western scientific and indigenous epistemologies (Castleden et al., 2009; Lewis and Sheppard, 2005; Moller and Stephenson, 2009; O'Flaherty et al., 2008), and on the need for protocols and guidelines for how to approach and consider IK in different situations (Tri-Council Panel, 2011; CEAA, 2010).

Lessons from Co-Management and Integrated Resource Management (IRM)

A number of scholars and practitioners have offered necessary critiques of consultation and co-management efforts that define TK (or IK) too narrowly or with an implicit ethnocentric bias (Cruikshank, 2005) and the success of processes according to the goals and perceptions of Western participants and government agencies without enough consideration for whether participating indigenous people considered them successful (Brody, 1981; Nadasdy, 1999). Indeed, as much as there is a need for practical guidance on how to approach the consideration and integration of IK, and for the ongoing evaluation or assessment of such procedures and outcomes (Wyatt et al., 2008), it is equally important to use such reflexivity to continually re-define the issues, assumptions and goals that are brought to planning and management initiatives in and with aboriginal communities (Leys and Vanclay, 2011). Some of the most important lessons from co-management literature have emerged from those studies that were bold enough to report honestly and reflect critically on the strengths and weaknesses of research and management efforts. Such studies highlight challenges faced by aboriginal communities and outside agencies, such as: fundamental differences in language, values, meanings, relationships with place, land and wildlife (Clark and Slocome, 2009; Mabee and Hoberg, 2008); different approaches to and experiences of planning and management processes (Brody, 1982; Nadasdy, 2003); different ways of knowing and according credibility to knowledge (Watson and Huntington, 2008); and structural barriers to equality in management processes (Cullen et al., 2010; Sherman et al., 2010).

Scholars and practitioners who research and practice integrated resource management (IRM) have devoted considerable attention to research on how to effectively integrate diverse interests, cultures, disciplines and types of information in land use planning and management (Ballard, 2008; Mitchell, 2007; Slocombe, 2001; Slocombe and Hanna, 2007), and how to understand social and ecological relationships as parts of complex systems (Gunderson and Holling, 2002). Literature in this field explores not only the methodological aspects of *how* to take an integrated approach to research, planning and management (Jensen and Bourgeron, 2001) and flexible frameworks for decision-making (Oxley and Lemon, 2003), but also the practical and applied challenges of such approaches (Berkes et al., 2000; Slocombe and Hanna, 2007; Margerum and Born, 1995). Within the study and practice of integrated approaches to resource management, there remain numerous problems associated with attempting to integrate aboriginal values and perspectives into frameworks and processes that are primarily and fundamentally based in the worldview of a western culture (Booth and Skelton, 2011; O'Flaherty et al., 2008).

Community-Based Conservation and Planning

Since calls for community-based approaches to conservation and land use planning became widespread, a number of critical analyses have emerged, warning against using the idea as a vague catch-all phrase without full consideration (Agrawal and Gibson, 1999; Brechin et al., 2003; Berkes, 2004; Leach, Mearns and Scoones, 1999). Some scholars report that the practical implementation of community-based natural resource management frequently falls short of expectations among those involved (Leach et al., 1999). Focusing too much on participatory processes at the local scale without enough attention to broader social processes can lead to a number of undesirable outcomes, such as the perpetuation of local power inequalities, and a failure to integrate local governance with structures and processes at broader scales (Wismer and Mitchell, 2005). While there are many important elements of participatory, locally-specific and integrative approaches to management and planning, discussion about the importance of that should not eclipse the recognition of the need to deal with varied spatial, organizational and temporal scales.

CONCLUSION - CONCEPTUAL FRAMEWORK

This study represents the convergence of research from a variety of disciplines. In the Brittany Triangle, one cannot fully understand the ecology of free-roaming horses without also addressing the social and cultural dynamics of local communities and the livelihood practices of residents in the past and present. The interactions between people and horses are best understood with reference to socio-ecological systems, cultural differences in ways of knowing, and various management paradigms that guide decision-making about land and natural resources. In order to fully understand the horses in their local habitat then, it is necessary to explore the ecosystem dynamics together with the cultural and social system of which they are a part. Hence, in this dissertation socio-ecological systems and an ongoing inter-relationship between humans and the non-human parts of ecosystems are taken as the fundamental basis for an exploration of issues in the case study.

Culture is taken to be an inherent part of the whole system, interrelated with the broad concept of the social, and also with ecosystems. The concept of ecology in the socio-ecological systems includes landscape ecology at the broad scale, population ecology in more specific applications, and community ecology, which is the chief scale of ecological focus and concern of this thesis research. Within the concept of socio-ecological systems, the social is also given to include politics and economics, although the scope of this thesis limits discussion of these points to basic issues related to jurisdiction and management. A diagram illustrating the role of horses in the social ecological system is illustrated

in Figure 5. While the population of free-roaming horses within the Brittany Triangle is directly linked (solid lines) to other aspects of the social ecological system, horses – including previously wild horses that have been caught and trained – are also part of the relationships between other system elements (shown by dotted lines within the system).

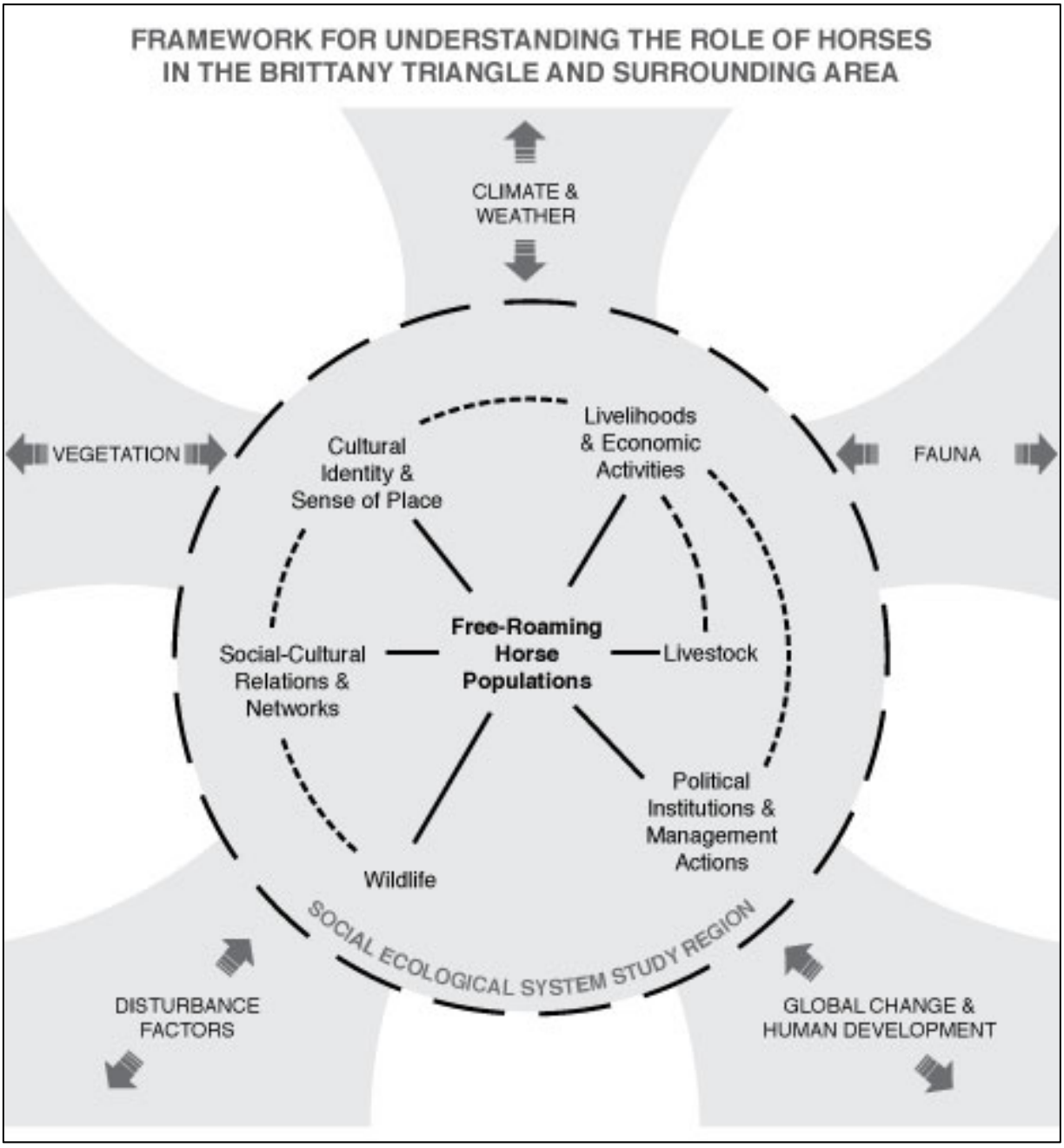

Figure 5: Role of Free-Roaming Horses in the Study Area.

Relative to the discipline of planning, this dissertation is positioned between the theory and practice of planning, using an applied case study to call attention to ways in which planning processes are inherently situated and context-specific, while also raising questions that cannot be sufficiently addressed from empirical cases alone and warrant some reflexive examination of the assumptions and power dynamics that underlie Planning theory and processes. Theoretically, this study takes the position that there are iterative, mutually-forming interactions between people, animals and ecosystem elements, between biotic and abiotic factors, all of which continually create and re-create each other through ongoing process of dynamic change and interaction. These interactions are mediated by different types of knowledge, perception, practice and human experiences, as well as by ecological events and landscape characteristics, among other things.

Ways of knowing can be conceived of as lenses through which socio-ecological system elements are perceived, understood, experienced, acted upon and felt. These 'lenses' are two-way, as influences flow in both directions between the person (knower) and the world in which they dwell. There are numerous ways of knowing in any given situation, including the case study for this thesis. Thus the metaphor does not entirely represent the complexity of reality. However, it does provide a useful illustration of some processes and issues that arise when people attempt to combine or integrate different ways of knowing.

While different perspectives have some overlap or shared perception and agreement about the perceived system, there are also substantial differences between the different ways of knowing. (In reality, there are power dynamics giving different weight to the ways of knowing, and many different ways of knowing.) An integrated approach to dealing with socio-ecological systems that is inclusive of these lenses or ways of knowing yields outcomes in which there is greater overlap and reconciliation between ways of knowing. While there are still fringe areas representing some aspects of diverse ways of knowing that cannot or should not be integrated into other systems, the majority of the views are overlapping.

CHAPTER 3 - METHODOLOGY

And the anthros still keep coming
Like death and taxes to our land
To study their feathered freaks
With funded money in their hands.
Like a Sunday at the zoo
Their cameras click away –
Taking notes and tape recordings
Of all the animals at play.

Here come the anthros, better hide your past away.
Here come the anthros on another holiday.

And the anthros bring their friends
To see the circus, watch the show.
And when their pens run dry,
They pack up their things and away they go.
But there's nothing left to study,
And there's nothing left to see
Still the anthros keep on searching
For the truth and for the key.

Here come the anthros, better hide your past away.
Here come the anthros on another holiday.

~ Floyd Westerman, from album *Custer Died For Your Sins* (1969).

The research for this study was conducted in a relatively remote geographical area that did not have an established research program or infrastructure in place. Although several local, independent studies had previously been completed in the surrounding region (McCrory, 2002; Preston, 1984), my research took an exploratory, adaptive approach that was broader in disciplinary and temporal scope than previously published reports and studies. Exploratory research is particularly useful for developing a deeper understanding of complex issues and situations (Babbie, 2004) such as this case study, in which published research is sparse and local knowledge is rich. An adaptive approach was best suited to the social and ecological context, in which social relationships, understandings and perceptions, and ecological conditions were characterized by change (and at times uncertainty) throughout the project (Mendis-Millard and Reed, 2007; Reed and Peters, 2004;).

A transdisciplinary, mixed methods approach was taken in order to explore the research questions in a multi-faceted, holistic way, and to allow the inter-relationships between research questions to emerge and be adequately represented (Balsiger, 2004; Fazey et al., 2006; Hochtl et al., 2006; Pohl, 2005; Steiner and Posch, 2006). Quantitative methods included deliberately and randomly selected study

sites, and line transects located using a stratified-random design. Line-point intercept methods were used to record and assess vegetation species (Herrick et al., Vol 1 2005). Qualitative research included a combination of methods, drawing primarily upon participant observation and semi-structured interview techniques.

Transdisciplinary Research

Transdisciplinary approaches to research, and to activities such as ecological planning and management, are increasingly common in academic circles (perhaps more in methodological discourse than in reality) (Hocht et al., 2006; Steiner & Posch, 2006). Transdisciplinarity refers to the practice of combining and integrating tools, perspectives and expertise from multiple disciplines, and from grounded experience, in the effort to solve a problem or deal with an issue. It is a collaborative approach to problem solving in which professionals from different disciplines, and members of the public or citizens with an interest in the issue at hand, work together to frame, address, and (ideally) solve a problem (Hochtl et al., 2006; Pohl, 2005). The way in which a problem is defined goes a long way towards determining how operational the subsequent research or planning process will be (Balsiger, 2004).

With its emphasis on inclusivity and the explicit involvement of experiential knowledge (Steiner & Posch, 2006) from people directly affected by a project, a transdisciplinary approach to research resembles transactive planning. However, the literature on transdisciplinary research that was reviewed for this study indicates a stronger, more open emphasis on integrating different ways of knowing (Fazey et al., 2006). In other words, it is not always sufficient to give local people, or people from diverse perspectives equal opportunity to speak; the process and the people involved must also accord equal weight and legitimacy to different types of knowledge and information. Scholars and practitioners dealing with real-world problem-based research often argue that by involving affected members of the public, as well as professionals from the natural and social sciences (and the humanities, when applicable) in addressing real-world problems, research or project teams will be better able to deal with complex issues, and to adapt their process as conditions change (Oxley & Lemon, 2003).

John Sutton Lutz and Barbara Niess (2008) move this discourse a step further, stating that "discipline-based knowledge production will tend to mask or misinterpret processes or outcomes associated with interactive effects" and hence that "we must 'learn how to learn' across cultural and disciplinary boundaries and imposed hierarchies" (p. 11). They further state that:

> *"Documenting these interactive processes and their effects requires cross-disciplinary and cross-cultural collaborations and, in many cases, the development of new methodologies and new approaches to knowledge production… If the creation of new knowledge is a kind of discovery, the spaces between disciplines and cultures are rich spaces for exploration because, by definition, they are neglected spaces. These intellectual 'wild spaces' beyond the cultivated gardens of disciplinary knowledge, where the fisher meets the forest, the scholar meets the storyteller, and the paleontologist meets the philosopher, are in today's world very productive places for the discovery of knowledge and the cultivation of wisdom" (p. 11).*

The metaphor that Lutz and Niess use, of intellectually and culturally rich "wild spaces" at the intersection of different ways of knowing and disciplines, is apt for this study. The process of this research has been one of exploring just such "wild spaces", intellectually, culturally, and ecologically.

Exploratory and Adaptive Research Process

Exploratory and adaptive approaches to research are typically used for three purposes: 1) to develop a better understanding by the researcher of the topic; 2) to test the feasibility of more extensive studies; and 3) to develop methods to be employed in subsequent studies (Babbie 2004, p. 88). Since the goals of exploratory research are to develop a more complete understanding of an issue, a situation, and the meanings inherent within, such research is a journey. A completed study usually represents only the tip of a newly identified and characterized iceberg, with a new suite of better-defined questions and future directions for further research (Babbie, 2004). Research that is undertaken in an adaptive manner is comparable to adaptive strategies for ecosystem management in the sense that the researcher must prepare to be surprised, involve diverse participants, reflexively reconsider the role of the researcher, and at times re-define success for the project (Reed and Peters, 2004).

An exploratory adaptive approach to research was best-suited to this study for a number of reasons. First, there is relatively little pre-existing peer-reviewed literature on the ecology and socio-cultural dynamics relevant to free-ranging horses in the Brittany Triangle from which to identify research priorities or hypotheses. The different perspectives, indeed controversy, over wild horses in the study region indicated a need for research to develop a better understanding of the issues in order to (re)define the problems and issues in the region prior to suggesting any solutions. While this study responds to and builds upon Wayne McCory's (2002) ecosystem inventory to some extent, it also serves to flesh out the foundational understanding of the socio-cultural and ecological milieu around free-ranging horses in the Brittany Triangle and Nemiah Valley.

Second, an exploratory approach is appropriate to research in a varied cultural environment, where one goal is to better understand the perspectives, meanings and values of people in a culture that differs from that of the researcher (Lutz and Neis, 2008; Watson and Huntington, 2008). In order to be truly open to understanding local perspectives and knowledge, especially in a mostly indigenous community, it was necessary that I enter the situation with humility, respect, and an open mind. While it was necessary and useful to approach the early stages of research with some loosely formulated questions and objectives, in order to focus the research it was also important that I remain open to seeing situations, phenomena, and the research itself, in new or different ways. An exploratory approach to research allows the researcher to discover new questions, reframe original questions in different ways, and to recognize meanings or interpretations that emerge from data, rather than merely testing pre-conceived ideas (Babbie, 2004).

Third, the logistical aspects of this research study were such that my capacity to successfully complete various types of fieldwork was somewhat unpredictable. Hence the research methods themselves were a sort of adaptive "pilot study". The goal of that aspect of the project was to develop a better understanding of what research questions were not only important, but also appropriate to the situation. On a pragmatic level, it was necessary to learn through the process of the study what field research methods were feasible in unpredictable environmental conditions (e.g. seasonal flooding in sample sites, wildlife damage to grazing exclosures, evacuations due to forest fires). To truly explore the "wild spaces" between disciplines and cultures there was a need to allow myself as a researcher to 'learn how to learn' in the field: to question, alter and adapt my own cultural and disciplinary assumptions as I learned how to interact with community participants and the land respectfully, to discover what questions to ask, and how best to ask them.

RESEARCH WITH ABORIGINAL COMMUNITIES:

Ethnographers and scholars in the field of anthropology have long been engaged in critical self-reflection about the effects of their research on indigenous people, indeed on any research participants (Brody, 1981; Scott, Jones and Watt, 2010; Van Maanen, 1988). Over the past two decades, it has become more common for scholars, researchers, and professional practitioners in other social science disciplines to address issues related to cultural bias, appropriation of knowledge, power imbalances and the effects of research participation on indigenous populations and communities (Clark and Slocombe, 2009; Ellis, 2005; Mabee and Hoberg, 2006; Nadasdy, 1999). There is a growing body of scholarly work addressing the issue of establishing respectful and collaborative research relationships with indigenous communities and peoples (Basso, 1996; Bull, 2010; Cruikshank, 2005; Mabee and Hoberg,

2008; Mihesuah, 1998; Nadasdy, 2003; Watson and Huntington, 2008). Much research activity has had a distressing or detrimental effect for indigenous peoples (Brant Castellano et al., 2004; Cochran et al., 2008), and researchers are now interested in *how* to alter the research process in order to rectify the feeling among many indigenous communities that they have either been "researched to death" (Brant Castellano et al., 2004) or in some way misrepresented or left wanting. Researchers who wish to do research with or within indigenous communities and their territories must attend not only to the ethics and rigours of the academic institutions from which they come, but also to the culturally different principles, values, ethics and rules of conduct of their host communities (Bull, 2010; Castleden et al., 2010). This imperative has many implications, including the need to make research locally relevant, to broaden research ethics to cover more than just human subjects but also animals and the land, and the need to openly define and agree upon how information will be used, and what follow-up will occur with the local community (Brant Castellano et al., 2004; Bull, 2010). When the relationships are robust, environmental research with indigenous communities can benefit both the researchers and communities with deeper understandings of the issues at hand, and often can yield positive support for communities as they manage their lands and resources (Stephenson and Moller, 2009).

Developing Respectful Research Relationships

During my first field season, my guide and local contact told me that there was a wry joke he had heard from some First Nations friends:

> *"If a white person comes to your house, chances are he's either there to take something from you, or to tell you how to do something" (Williams, pers. com. 2008)*

We stood there and looked at each other - two (partially) white people in a First Nations community. They had a point, we had to agree. That saying, along with cultural reference points such as the Floyd Westerman song that opens this chapter (which I had listened to many times while growing up) were as much a part of my methodological approach to this study as were the academic references and ethnographic methodology texts (Denzin and Lincoln, 2000; Ellis and Bochner, 2001; Emersen, Fretz and Shaw, 1995; Tedlock, 2000). I knew what sort of researcher I did not want to be. However, I also felt the uncomfortable truth that the song was accurate in some ways, and that the very nature of graduate research tends to be unavoidably selfish. While I considered it of paramount importance to approach research with a First Nations community in a respectful and open manner, I did not know how to do so.

There were a number of ways in which I sought to establish a positive foundation for qualitative research, prior to and throughout the process. First, I was fortunate to be introduced to many

community members by a well-respected member of a non-governmental organization, who holds close and mutually respectful relationships with many individuals, and with the Xeni Gwet'in First Nation Government. Second, I chose to review interview transcripts from court proceedings prior to talking directly with locals, in order to develop some sensitivity to the issues faced by the community, and to avoid ignorantly re-iterating questions that individuals had been answering for years, in other settings.[6] Third, I took the initiative to propose and draft a research protocol with the Xeni Gwet'in. Fourth, and perhaps most important, I followed the advice of colleagues with close community ties regarding how to respectfully develop relationships with community members, when most of my time during the initial years of the study was spent out in the bush, far from the community in the Nemiah Valley (McCrory pers. com., 2008; Williams pers. com., 2008). The most important research method for building community relationships in a respectful manner was the practice of "showing up and hanging out" at the Band Office, and community events whenever I was close to Nemiah Valley. My visits were only ever in the Spring or Summer seasons. Yet in a small, close-knit community, it does not take long for people to recognize an outsider, or to notice those who continually return. Despite a naturally shy disposition, I dropped in to the Band Office whenever I passed through Nemiah, and sat to chat with whoever was around. At gymkhanas, rodeos and community gatherings, I watched, participated in games, and volunteered to wash dishes after communal meals. All these actions were informal means of building relationships with the community over a period of years, making myself transparent, useful, even vulnerable, to locals. These times were genuine attempts on my part to be a thoughtful and conscientious guest, to contribute in small ways when possible rather than simply showing up with a research agenda and expecting community members to give their time to me. It is through such informal situations and moments that mutual trust is earned and built, and that outside researchers like me learn how to behave, and what is important to local people.

A researcher is always an "outsider" to host communities. The goal for many researchers, including me, was to learn how to *be* in that context, how to behave respectfully…essentially to *learn how to learn* from the Xeni Gwet'in and other local people in the Nemiah Valley. A large part of this process involved spending time on the land myself, trying to learn local place names, walking and travelling to well-known places in the bush, and watching wildlife and free-ranging horses. This direct experiential learning gave me something to talk about with local people when we did meet, and also demonstrated a certain level of commitment on my part to the place, and to learning, in a culture that values experiential learning as highly as "book learning". Also essential was knowing when to stay quiet,

[6] This approach was actively supported by Woodward and Company, legal counsel for the Xeni Gwet'in.

observe and *listen* in the presence of locals while also remaining open and friendly to conversation, knowing when to joke around and join in. Finally, I continued to show up at community events and in the Nemiah Valley, year after year. I visited the region for three years before approaching people for interviews. By the fourth year of my time spent there, local people knew who I was, what I was doing, and often volunteered suggestions about who would be best to talk to for interviews. The more significant challenge to interviewing local Xeni Gwet'in officials was one of capacity: the time and stretched resources of people in leadership positions in the community.

The distance between my sample sites in the Brittany Triangle and the community in Nemiah Valley meant that scientific field work was conducted separately from the time spent meeting and developing relationships with community members for social research. This distance presented a challenge by reducing opportunities for community engagement in the scientific research process, and by making me less of a visible presence to community members despite my spending a month at a time in the region. However, the time that I spent in the Brittany Triangle, sleeping and camping "out" in the bush, also created opportunities for building trust and social relationships with community members, which enriched the qualitative research process. I came to know places that had a long history for local people, their families and their ancestors. I was able to better appreciate the landscape and gain a measure of credibility by spending time on the land. Perhaps I was also the butt of some local jokes, being the naïve young researcher who kept going out into the bush. Yet the fact that I kept showing up year after year, that I slept and camped outside rather than staying in houses the whole time, and that I was willing to make self-effacing jokes about my own lack of experience all seemed to help when it came to developing trust with local residents.

All of these factors built a foundation for my social research, and for a long-term relationship with the community that will outlast this research project. My gradual and sustained introduction to the community helped me to understand the local context for research, demonstrated to people that I was committed to returning and to learning from them. I was repeatedly welcomed with warmth, friendliness and gracious ease by Xeni Gwet'in and all Nemiah community members. Not only did people help me to learn how to learn from them, they received me with genuine warmth, guided my questions with patience and humour, and looked out for my safety and welfare.

Permits and Research Protocol

In order to conduct fieldwork, I obtained three types of formal permission: approval from the University of Waterloo Office of Research Ethics to conduct interviews with human subjects; a Park Research Permit from the BC Ministry of Environment to conduct research within Nunsti Provincial Park; and a Research Protocol with the Xeni Gwet'in First Nations Government to conduct field research on Xeni Gwet'in territory and to guide communications and the handling of information.

The ethics approval and the park research permit were both standardized processes with pre-existing forms and application procedures. In addition to those permits, it was important to develop a research protocol with the Xeni Gwet'in First Nation Government (XGFNG) to obtain formal permission from the First Nation to conduct my research activities within their territory, and to guide knowledge sharing and communications throughout the research project. The research protocol (Appendix A) with the Xeni Gwet'in was a vital, yet voluntary agreement, which was developed and negotiated between the primary researcher, the Xeni Gwet'in Chief and Council, with assistance and guidance from Friends of Nemaiah Valley (FONV), legal advisors for the Xeni Gwet'in at the law firm Woodward and Company (located in Victoria, British Columbia), and other individual researchers. The protocol was drafted with reference to existing templates from the University of Victoria, and FONV. The *process* of developing this protocol through face-to-face meetings was as important as the resulting document, as it facilitated ongoing communication between the researcher and the XGFNG which, in turn, helped to develop a trusting and respectful relationship. The protocol served as a template for the XGFNG to use with other subsequent researchers working in the community.

Institutional Deterrents and Procedural Challenges

The awareness of issues pertaining specifically to graduate student research with indigenous communities varies greatly among individuals, departments and universities. While some individuals and institutions demonstrate comprehension of how research practices might need to be adapted to specific situations in concert with indigenous communities, there remain some significant challenges and deterrents to graduate students who wish to engage in culturally sensitive and progressive research practices, depending on individual circumstances. Some of the challenges and deterrents that affected this research are listed below.

- The standard timeframe for a doctoral program (4 years) does not formally allow for more than one or two years of fieldwork, whereas the development of a long-term, trusting relationship with the host First Nation and community warranted a longer timeframe.

- It was difficult and often not possible to secure funding (from university scholarships or grant agencies) to support travel to remote communities prior to or after the actual collection of data, for the purpose of building or maintaining collaborative relationships and following up with host communities, though such travel was as essential as the data collection.
- There was a lack of awareness or preparedness within the University of Waterloo Office of Research Ethics to provide support or advice on research protocols pertaining specifically to research with a First Nations community.
- The informal expectation that field assistants will be low-paid or volunteer students made it difficult to hire local people in the community as research and field assistants or guides, for a fair wage.

While it was generally possible to find creative and informal solutions to a number of these challenges, they remain significant barriers and a deterrent to the more collaborative, ethical approaches to research with indigenous communities that are discussed in academic literature. Future graduate student research would benefit from pro-active institutional support in these matters.

FIELD RESEARCH

Timeframe

Over the course of five years, I spent a total of approximately 240 days in the field. Of those, approximately 160 days were spent in the study area within the Brittany Triangle, while the rest were spent in Nemiah Valley, and the surrounding region and communities.

An initial field visit was made to Nemiah Valley and the Brittany Triangle in May-June 2006. A second visit in August 2007 was used to ground-truth and scope the study area, establish sample sites, and to initiate discussion about a research protocol with XGFNG. Quantitative data were gathered from sample sites over the course of four field seasons, in two years: June (Spring) and August (Summer) of 2008 and 2009. In each field season, researchers spent between 21 and 30 days in the study area defined for ecological data collection. Additional time was spent building and repairing experimental grazing exclosures in five meadows, hiking and making observations of ecology, habitat conditions, and wildlife in the study area beyond sample sites, and maintaining living conditions in the research camp. Outside of the study area in the Brittany Triangle, field time was also spent in the Nemiah Valley

and surrounding communities where I volunteered at local events, visited people and developed the qualitative research.

In August and September 2009, a forest fire burned a total of 66,719 ha (667 square km) in and around the Brittany Triangle. The largest fire in British Columbia during 2009 (MFR, 2009), the Lava Canyon fire was "uncontained" for most of August 2009, and the southern border of the fire reached the study area, burning the northern-most sample sites and surrounding forest. The southern front of the fire reached within 10km of the research cabin. The researcher, field guide and field assistants were conducting field work on foot within the study area as the fire burned, with only intermittent satellite phone contact to obtain updates on the status of the fire. Three evacuations were made within one week, before continuing the research was deemed to be unsafe and impractical. As a result, the August 2009 field season was truncated, and the fourth season of plant data collection could not be completed.

Figure 6: Smoke at research cabin shortly before one of numerous evacuations.

The Lava Canyon fire burned throughout August and September of 2009 in the Brittany Triangle and the area immediately to the north and west of the confluence of the Chilko and Taseko Rivers. The fire

burned some portions of my study area and sample sites. Fire-fighting efforts also significantly affected sample sites. For example, a machine fireguard temporarily compromised the only known drinking water source at my backcountry field research camp, and fragmented previously contiguous areas of the ecosystem. The proximity of the fire to nearby communities, ranches and guest lodges also necessitated road closures and evacuations, making further interviewing for social research difficult and in some cases impossible. I remained in the study region until September 2009, continuing with interviews when possible, and assisting with fire prevention work around the research cabin.

In June 2010 I returned for a follow-up visit to the study region for approximately one month, during which time I mapped sample sites in the Brittany Triangle, followed up with interview participants, and participated in community events as a volunteer. In September 2011, I returned to the Nemiah Valley to meet with Xeni Gwet'in Chief and Council, in order to report on and discuss my research results and dissertation. I was also able to make follow-up visits to some additional interview participants.

Study Region

The Brittany Triangle and Nemiah Valley were selected as the study region for this research because it is a focal point for many of the social, cultural and ecological issues pertaining to free-roaming horses in the Chilcotin, yet also presents a situation unique to other research studies. The Brittany Triangle was selected as the study area for ecological research for several reasons. First, the horses of the Brittany Triangle have been the focus of considerable publicity aimed at generating support for landscape and wildlife conservation efforts in the region, yet they are some of the most remote and least studied sub-populations of horses in the Chilcotin. Second, the Brittany Triangle has been declared a protected area by both Provincial and First Nations governments. Not only is the Brittany Triangle part of an Aboriginal Wilderness Preserve (XGFNG, 1989) and the ?Elegesi Qiyus Wild Horse Preserve (XGFNG & FONV, 2002), but it also has a provincial park (Nunsti Provincial Park) within it. In addition, a portion of land within the Brittany Triangle has been purchased by Valhalla Wilderness Society and designated a conservation area for grizzly bears, with recognition for salmon bearing streams and cultural heritage values. The free-ranging horses of the Brittany Triangle have been specifically and deliberately linked to conservation efforts by First Nations and Non-Governmental Organizations (NGOs) through public events and conservation campaign materials. Third, despite a rich history of inhabitation and homesteading in and around parts of the Brittany Triangle, it remains relatively remote, and the study area is not currently grazed by cattle, providing an opportunity to study wild horses and their ecology without the confounding influences of cattle. These multiple layers of conservation status by different governance and conservation agencies (McCrory,

2002), one of which explicitly recognizes the role of the free-ranging horses as part of the conservation mandate, made it a suitable area for a study about how to integrate information and perspectives on free-ranging horses into conservation and land use planning.

The Brittany Triangle is a forest-meadow ecosystem (McCrory, 2002) which is quite different from surrounding semi-arid grasslands (GCC, 2010; Preston, 1984), and which provides habitat for a relatively intact suite of predators (McCrory, 2002). These factors may influence the population dynamics of free-ranging horses in ways not observed elsewhere in North America, where free-ranging horses tend to inhabit lands in different biogeoclimatic zones, and where fewer natural predators influence wild horse populations (Beever, 2003; Berger, 1986; Turner, 1992; Turner, 2001).

The scope of the study region for field work and data collection differed slightly between qualitative and quantitative data collection. The primary focus of this study was the free-roaming horses and landscape of the Brittany Triangle, and their socio-cultural associations with people of the Nemiah Valley. These places are both within the territory of the Xeni Gwet'in First Nation, most of whom currently live in Nemiah Valley. Perceptions, opinions, management issues and politics related to the management and land in the Brittany Triangle and Nemiah influence, and are affected by people and communities extending further afield. Hence my investigation of the social and cultural issues associated with the Brittany Triangle necessarily extended to surrounding areas and included consideration of a larger geographical range. Interviews were conducted in and around the Nemiah Valley with Xeni Gwet'in and non-aboriginal key informants. In addition, I conducted interviews with key informants in the nearby Tsilhqot'in communities of Yuneset'in (Stone), and Tsi Del Del (Redstone), as well as with non-aboriginal people in Alexis Creek, Hanceville and Williams Lake. The region as a whole is pertinent to this study, even as the focal area remains in the Brittany Triangle. The location of the study area and sample sites, and the study design of this research project were selected and developed through an iterative process of ground-truthing, consultation with local people and disciplinary experts about methodologies, cost assessment, and first-hand experience of the logistical issues that influenced access to the sites. Figure 7 illustrates the relative location of the Brittany Triangle and Nemiah Valley.

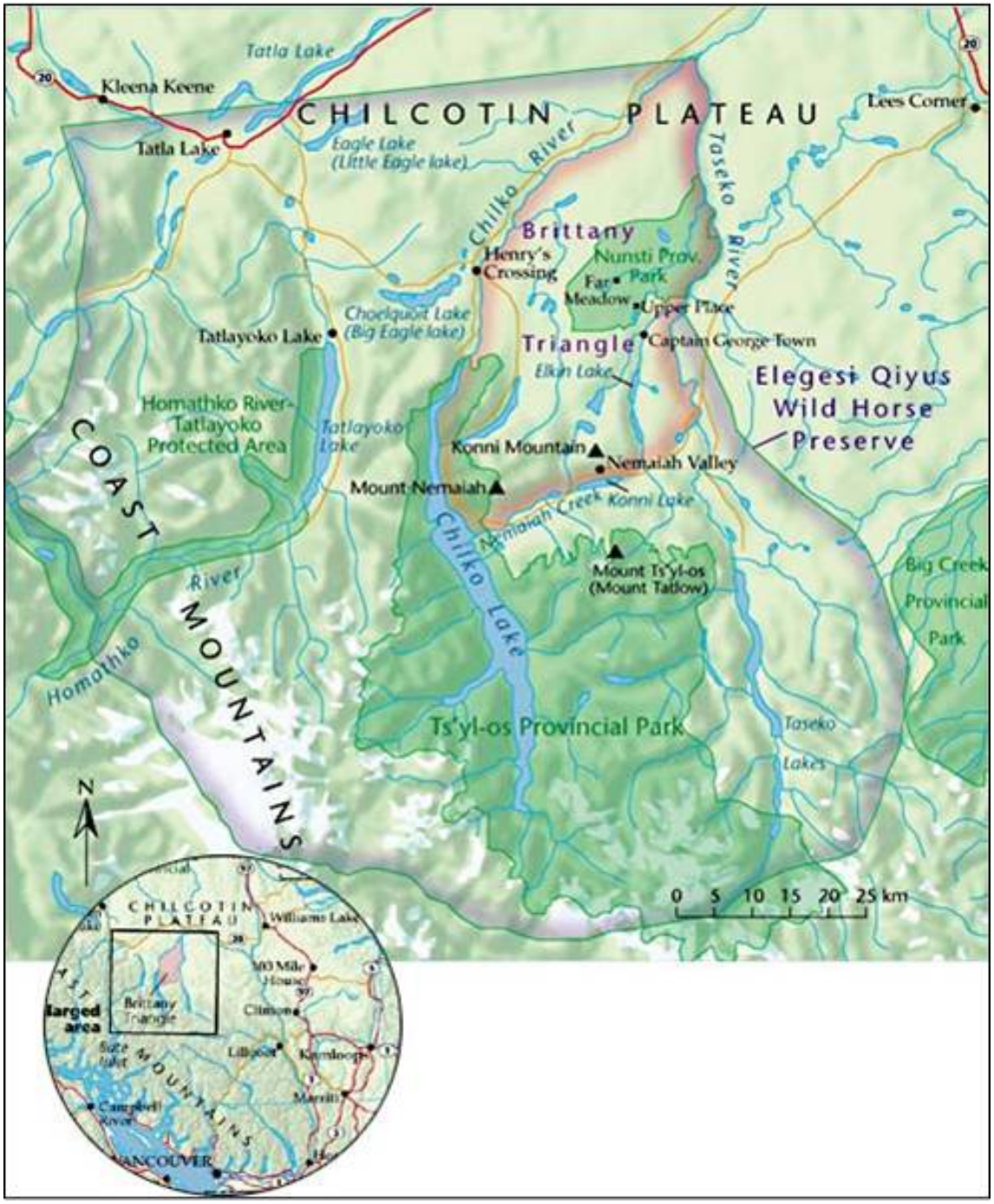

Figure 7: Map of Brittany Triangle, Nemiah Valley, and surrounding area (map from *Canadian Geographic* in Findlay, 2005).

Site Access and Study Design

Nemiah Valley is approximately 200km southwest of the nearest town and service centre, Williams Lake. After the first 90km, the remaining distance is on gravel and dirt roads. Field sample sites in the Brittany Triangle are located approximately 50 kilometres north of the Nemiah Valley itself, 25km from the nearest gravel road. The journey from the road head to the research cabin (Far Meadow) takes 2-5 hours with a vehicle, depending on conditions. The trail conditions warrant either an All Aerrain Tehicle (ATV) or 4 wheel drive truck, and include varied terrain and a river crossing. Fallen trees are commonly encountered along the way, and must be cut and removed from the path in order for vehicles to pass. Mud holes and wildlife encounters are common and vary seasonally. Once at Far Meadow, vehicles were parked and almost all further travel was done on foot or by canoe.

The logistics of access to sample sites, power, communications, and water affected the study design and implementation in a number of ways, including: timing and seasonality of field work; length of time available to spend in the field; personnel selection and safety requirements; equipment choices; selection of sample sites; metrics and methods used for data recording; sampling methods and success rates; skill development by the researcher; and opportunities for building relationships with community members and First Nations. All sample sites had to be reached by hiking through burned forest, deadfall, and along horse trails. Compass, maps, GPS unit, and most importantly an experienced guide were used to find walking routes through the bush in 2007, and these were flagged for future reference.

The remote study location required a number of field skills related not only to research methods (e.g. plant sampling, point-line intercept metrics), but also to basic functionality in that environment. These practical skills were as much a part of the field methods for this study as those related to formal data collection, because they were necessary to the successful completion of the research. Such skills included: learning to drive a 4x4 truck off-road; basic navigation using compass and GPS, backcountry camping and survival skills; bear safety; wilderness first aid; operation of an ATV; and planning trip and food logistics for field crews. Experienced guidance with navigation, wilderness safety and survival skills were provided during every field season by the President of Friends of Nemaiah Valley, almost entirely on a volunteer basis.

Quantitative Sample Sites (Study Area)

The study area for quantitative field data was defined within the centre of the Brittany, in an area known to be inhabited by free-ranging horses. Since all sample sites were accessed on foot, they were selected within an area defined as a 12 km radius of the research cabin, which served as a base camp

for data collection activities. Within that area, a total of ten specific sample sites were identified, each on a meadow surrounded by forest. Five sample sites (the "Home Meadows") were selected within a 5 kilometer radius of the research cabin. The selection criteria for the Home Meadows were that they were used by free-ranging horses, and had similar site characteristics in terms of aspect, elevation, vegetative structure, and climate (i.e. precipitation and temperature). However, there were site-specific differences in vegetation, and ground-water levels. Differences between sites appear to have been exacerbated by the ecological processes that followed a forest fire in 2003, which had burned much of the study area. Subsequent to the fire, ground water levels rose, and previously dry meadows flooded (Goddard and Smitten, 2002; Ministry of Lands and Forests, BC circa 1980s;[7] Williams pers. com., 2006). Individual sites differed in the extent and duration of flooding, and the seasonal presence of standing water. Vegetation patterns also varied slightly between sample sites as a result of differences in the soil and hydrological regime.

Five additional sample sites were then randomly selected from a map within the larger 12 km area (the "Random Group"). The randomly selected meadows were identified by marking the geographical study area on a map. The entire area was known to be used by free-ranging horses. All meadows evident on topographical maps (Elkin Creek 92-O/12 1985; Scum Lake 92-O/13 1985) were then numbered. A random number generator in Excel was used to select sample sites.

During the first field season, it became apparent that one of the randomly selected study sites was completely submerged under water, which extended beyond the tree line surrounding the clearing. One of the Home Meadows was too wet to sample during Spring 2008 (i.e. there was standing water above ground). Given the incomplete data set, impossibility of data collection and field time constraints, these two meadows were subsequently dropped from the study. Hence the total number of sample sites was eight.

Qualitative Study Region

The historical and present patterns of human inhabitation and land use in the Brittany Triangle are such that few people have extensive first-hand knowledge of the land or the wildlife within that area. Currently, only one person is resident for part of each year within the study area defined for ecological research. Some individuals make regular seasonal visits to the area (including Provincial Park staff, consulting biologists, trappers, and Xeni Gwet'in community members). Several other individuals

[7] Aerial photographs, British Columbia Ministry of Lands and Forests, taken circa 1980s. Exact date unknown.

make regular forays into the Brittany, including the Xeni Gwet'in Wild Horse Ranger, who monitors conditions and wildlife in the region, and two nearby residents who hike and ride extensively through the bush. A small number of Xeni Gwet'in people who grew up in the Brittany Triangle and know parts of it well now live in the Nemiah Valley. Of the people with first-hand knowledge of the Brittany Triangle ecosystem and free-ranging horses that dwell there, all but one live outside of the area defined for quantitative ecological research. At the time this research was conducted, there was only one inhabited dwelling within the study area – the research cabin, which is also a seasonally used private dwelling – and one trapper's cabin approximately 6 kilometres from the research cabin used in the winters by trappers. Several other properties on the west side of the Brittany Triangle, with the nearest approximately 10km outside of the study area, are currently occupied by residents year-round. Thus I conducted qualitative research over a large area in order to reach people with knowledge of the study area in the Brittany Triangle.

Logistics and Equipment Choices

The research methodology for this project was largely influenced by the logistical and financial scope of the study. A number of methods of data collection were pilot tested. Field conditions and available funding determined their success. The time available to record field data depended on the daylight hours of the season and the basic necessities of life that also had to be taken care of during daylight, since even the research cabin had no power source. Morning field work had to be started several hours after dawn, and completed several hours before dusk, partly for safety in bear country. The hike each way to field sites varied from 30 minutes to 1.5 hours. Prior to and after each day's field work, meals had to be prepared and cleaned up either at a cabin or camp site, water had to be hauled by hand for all washing, notes were taken and plant samples sorted and labeled. Also, every few days time had to be allowed for clothes to be laundered by hand, drinking water to be collected from a spring by canoe or ATV, and showers to be taken outdoors. When sampling sites were accessed from a back-country campsite, the logistics were even more definitive. We had a finite amount of food and supplies that had been carried by backpack to the campsite, and we had to adhere to a pre-determined field schedule, despite poor weather or other influences.

Transect measurements in the field were influenced by weather (plant height could not be measured in high winds), environmental conditions such as extreme heat and rain, and encounters with bears, horses, moose, coyotes and other wildlife which delayed (though pleasantly) field measurements. In August, when transect measurements took longer due to the abundance of vegetation, the daylight hours were also shorter, and the days hotter, making it more challenging to complete field work in the

time allowed. Since my field guide and assistants were participating in the work on a volunteer basis, there was no flexibility to go over the 25 days allotted for each field season.

Once the research team was on location, we could not leave or communicate easily with the outside world. Hence all materials, equipment and food had to be properly prepared ahead of time, and transported in during a single trip with either a small truck or an ATV and small trailer. There was no way of consulting in any depth with university advisors during a field season to confirm methodology, or to identify plants. (Though on two occasions, brief contact was made by satellite phone to confirm a methodological change.)

The logistics of travel to field sites and the site conditions required that research equipment be lightweight, compact, durable in a range of temperature and moisture conditions, reliable, and not at all reliant on electrical power sources. Data were recorded on paper data sheets, and during inclement weather in water-resistant notebooks. Line transects were established using a portable survey tape and two metal rods. The remote location also necessitated that field research equipment be simple and cost-effective, as the distance from the University of Waterloo, and the duration of field visits prevented the use of most university equipment. The original study design involved building grazing exclosures. Building materials were carried by hand through the bush to sample sites in 2007 (including metal re-bar, chicken wire rolls and sledge hammers). Chainsaws, fencing wire and axes were used to re-build more robust exclosures in 2008, and an ATV was used whenever possible on old wagon trails to assist in the transport of equipment. Plant samples were collected in blotting paper and cardboard, and transferred to a plant press at the end of each day at the research cabin. The plant press was then transported by ATV and truck from the research cabin to Victoria, BC, and from there by courier to the University of Waterloo for sample identification.

DATA COLLECTION AND ANALYSIS

Quantitative Methods

Quantitative data collection assessed plant community composition and graminoid species in core grazing habitats for free-roaming horses of the Brittany Triangle (Herrick et al., 2005). (See Appendix C for a Table of quantitative methods.)

Field Metrics

Using a stratified random design, 10 transects were established in each sample site (meadow). Each linear transect was 10 metres in length, with the 0 metre point marked by a labeled tent peg, its coordinates recorded by GPS, and bearing noted in field notes. Data points were then established at 0.2m intervals along each transect (for a total of 50 points on each transect), by dropping a measuring "pin" vertically at those locations. The density of grass and sedge vegetation was such that this interval or distance between data points was sufficient to maintain independence of sample points.

Vegetation metrics to compare plant community structure and composition were taken at each of these points, including: plant species (or nickname); tallest height for each species and number of vertical repeat intersections by the same species on a single point; and whether the plant stems were grazed or broken. Since sampling techniques were designed to allow for repeat measurements over time, no destructive sampling techniques were used along the transects. Plants which could not be identified from above-ground biomass were photographed and nicknamed. Samples of the same type of plants were then taken from nearby in order to avoid destroying the original plant or disrupting the transect. Soil penetration resistance was measured at 1m intervals along the transect (for a total of 10 points on each transect) using a hand held soil penetrometer, which measured penetration resistance.

Also at each transect, general site conditions and distinguishing features were noted, as well as the number of equine fecal piles within one metre each side of the transect, evidence of other wildlife, moisture levels and condition of vegetation. A photograph was taken at each transect (see Figure 8 for example), during each field season. Site conditions were also noted for each meadow as a whole, with categorical observations of vegetation growth and characteristics, stratification, hydrology and moisture, evidence of grazing, wildlife encounters and signs, soil disturbance, and any other general observations. Measurements were repeated at the same transects (as closely as possible) each field season. In cases where wildlife had removed transect markers, GPS coordinates and field notes were used to re-establish a new transect as close to the original as possible, on the same compass bearing.

In 2009, five additional transects were established within each of the four exclosures. The same intervals, metrics and techniques were applied. However, due to the size and shape of exclosures, transects varied in length, and were located parallel to each other. Data gathered from points equal to or less than 0.5m from the edge of the exclosure were discarded.

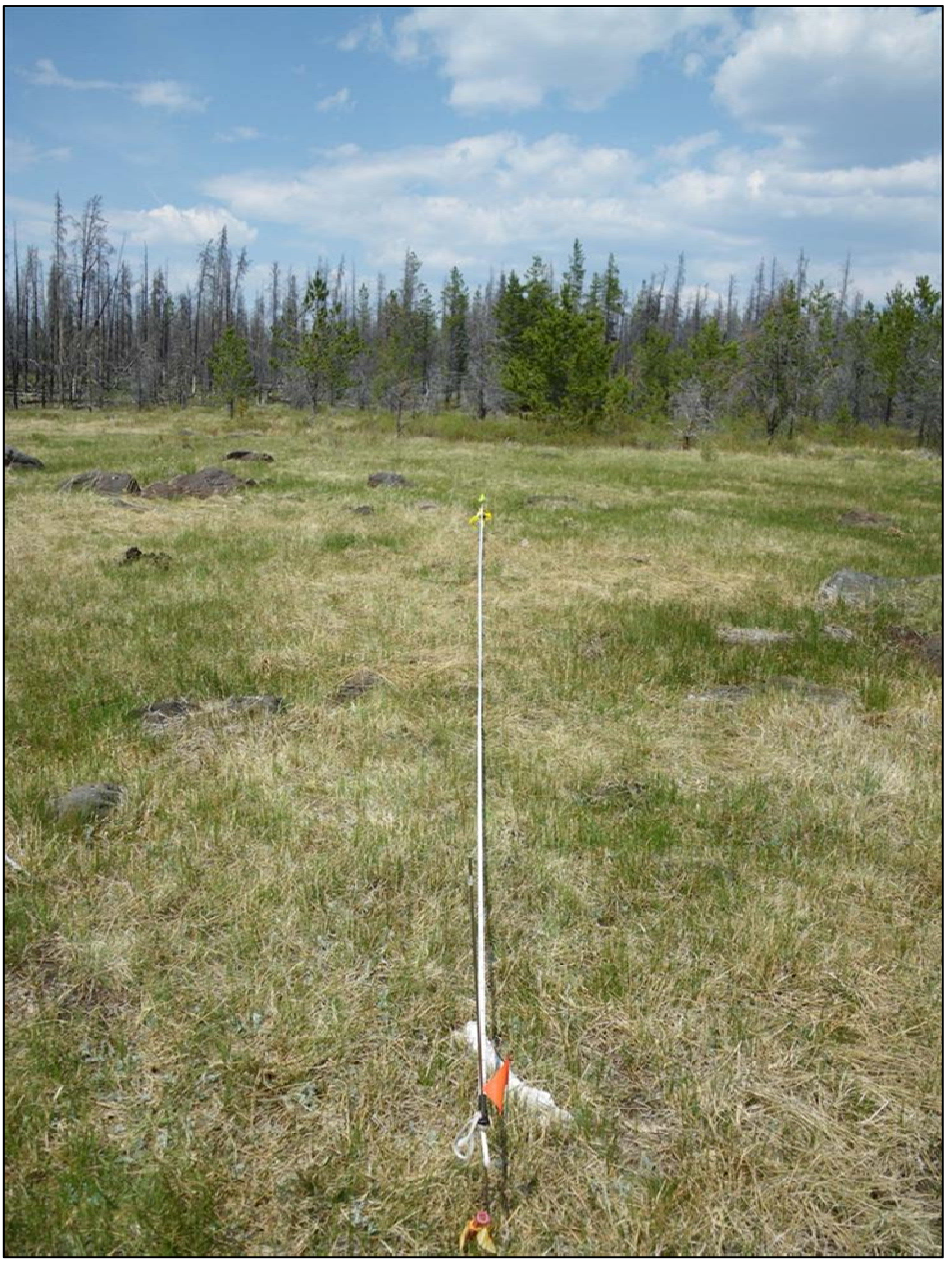

Figure 8: Example of transect photo, taken in Meadow #1 (North Meadow), Transect 9, June 5, 2009.

Exclosures

The study design included the experimental construction of grazing exclosures in Home Meadow sample sites. In August 2007, the researcher and two volunteers constructed square grazing exclosures using steel rebar and chicken wire. The exclosures measured approximately 4.5metres by 4.5 metres.

By Spring 2008, three of the four exclosures had collapsed under snow pack, and had failed to exclude wildlife. Two exclosures exhibited visible signs of grazing, compaction, and wildlife faeces, and one had been thoroughly demolished by a moose (wire mesh was ripped off the rebar posts and wrapped around a tree in the forest nearby).

In Spring 2008, the researcher and five volunteers rebuilt and strengthened the exclosures. Standing dead timber (which had burned in 2003) was used from the surrounding forest area to construct seven-sided snake fence "corrals" around the original square exclosures.[8] The fencing was approximately 1.6 m high, and the new structures were 6m in diameter. The original wire and rebar were removed from the new exclosures. These structures successfully discouraged grazing and entry by wildlife and horses (evidenced by the lack of broken or torn vegetation stems, tracks, prints, depressions, and fresh feces). Thus the first season of data from within grazing exclosures was Spring 2009.

Faecal Samples

Composite equine faecal samples were collected from free-roaming horses in the Brittany Triangle in 2007, and sent for microhistological testing at the Wildlife Habitat Nutrition Laboratory in the Department of Natural Resource Sciences at Washington State University, USA. Further testing of faecal samples in subsequent years was not feasible due to logistical and financial constraints. Some samples collected during the 2008 field season were compromised (went moldy) during storage and transport from the study region. The remaining samples could not be sent for laboratory testing due to a lack of funds. Samples collected during the 2009 spring field season could not be transported for laboratory testing because of the schedule for social research, which kept the researcher camping in remote environments throughout the summer. The remaining faecal samples from that season went moldy during prolonged storage that resulted from forest fire evacuations.

Sample Identification and Data Analysis

After the initial field season (Spring 2008), plant samples were examined by a grass and sedge specialist at Camosun College in Victoria, British Columbia. The early stage of plant development, combined with time constraints prevented conclusive identification of species. However, this meeting did lead to improved sampling and preservation technique in subsequent field seasons. Following the Summer field season in each of 2008 and 2009, plant samples were shipped to the University of

[8] An amendment was made to the Park Research Permit, and permission for this action was granted by the Area Supervisor for Nuntsi Provincial Park. The XGFNG was made aware of the rebuilt exclosures through direct discussion.

Waterloo where they were stored and identified using the *Illustrated Flora of British Columbia, Volumes 6-8* (Douglas et al., 2001) and the *Electronic Atlas of the Plants of British Columbia* (E-Flora BC, 2010). In some cases where samples were compromised or not present, field photographs and notes were used to supplement identification of vegetation recorded in field data.

Information from field data sheets was entered into electronic spreadsheets using Excel software. Field photographs were sorted and labeled as necessary. Field data were analysed using descriptive statistical techniques. Frequency counts were completed to ascertain the relative frequency of species, the relative abundance of genus and family, and plant community composition. Frequencies were calculated for the data set as a whole, and also for each sample site (meadow) across seasons, as well as for each season (across meadows). Multivariate Analysis of Variance (MANOVA) was conducted by Dr. Stephen Murphy using the software "R" and applied to plant species and genus frequencies in order to test variance in community composition for significant differences between meadows (sample sites) and between seasons. A Pearson Product Moment Correlation was used to analyze the correlation between points where no live vegetation was recorded, and the presence of a vegetative litter layer. MANOVA was also used to test for differences in the height of vegetation litter layers between transects that were inside exclosures and those outside the exclosures.

Qualitative Methods

Review of Secondary Sources

Secondary sources (peer-reviewed journals, government reports, popular magazines and newspapers, and television documentaries) were reviewed to ascertain historical and cultural context for the research, and to identify key issues and appropriate research questions. In particular, available court transcripts from the case *Tsilhqot'in Nation v. British Columbia* (2007 BCSC 1700) were searched prior to interviewing for relevant information pertaining to Xeni Gwet'in culture, livelihoods and wild horses.

Key Informant Interviews

In 2008, the second year of field data collection (the fourth year of visiting the region), semi-structured interviews were conducted with key informants. Due to the relatively small number of people who have current, first-hand knowledge of the study area within the Brittany Triangle, their sparse distribution over a broad geographical area, and the overlap in identities between categories of human participants, interviews with key informants (rather than attempting to interview representative samples of any particular sub-populations of people) provided the strongest data set (Denzin and Lincoln, 2000; Miles

and Huberman, 1994). Sixteen separate key informant interviews were recorded with 23 participants. (Some interviews took place with family couples or groups). Additionally, discussions and informal interviews with 10 other participants were not recorded with audio equipment. Notes were taken during and/or after those discussions and interviews.

Interview participants were identified through field observation and snowball (network) sampling. An introductory letter explaining the research and requesting an interview was sent to participants affiliated with government or non-governmental organizations. Other participants (ranchers, community members) were approached initially in person or by telephone, and a letter was provided subsequent to initial contact. Some participants did not have regular telephones, and in those cases I would approach them either by driving to their house, or meeting them at a community or social event. A research assistant who was local to the community was a great help in this process. Sometimes several visits to a specific house were necessary before participants were available to talk.

Given that the research took place within a rural context where some interviewees did not have regular telephone access, the snowball sampling technique was a two-way interaction. In other words, just as I identified prospective participants through observation and word of mouth, it was equally important that participants identified me, the researcher, in the same way. Local credibility is established largely through personal conduct and first-hand interaction. It was more appropriate for me to approach some participants in person rather than through formal written documents. By the time I conducted interviews I had been visiting the study area seasonally for four years, so many local residents knew who I was, and had a general understanding of what I was doing there. Of those participants who did not know me, some were introduced by mutual acquaintances and community members, while others I approached cold.

Semi-structured interviews were conducted in a variety of settings, including residences, offices, and outdoor locations. Permission was sought from key informants to record interview sessions. A handheld Edirol digital recorder was held or placed within view between the researcher and participant for the duration of the session. A cloth was placed over the recorder during interviews, to avoid distraction to participants. The study purpose, goals, and researcher affiliations were explained verbally and confidentiality and anonymity were discussed with all participants on tape. Verbal permission to use the interview for research purposes was recorded in each case. (See Appendix C for a list of interview questions and prompts).

Informal discussions and interviews took place at community gatherings, in social or shared-work situations (such as washing dishes in an outdoor tent at a community gathering). These conversations provided important opportunities for me to develop relationships with community members from a variety of age groups, and to deepen my own understanding of the issues related to my research topic. While a researcher still holds a significant (and imbalanced) amount of power in interviews, these informal interactions also provided a different power dynamic than the more formal, recorded interviews. The informal situations placed me more clearly in a student role, as I assisted, took direction from, and listened to participants who were willing to teach me about their culture and their land.

One unrecorded interview was conducted with a First Nations elder as he guided me and a colleague while I drove through the bush and backcountry roads for seven hours. An audio recording was impractical due to noise from the truck, and frequent interruptions as I got out to move fallen logs from our path. However, the experience of going on a backcountry tour was invaluable, as it allowed our host to comment on landscape features, and show us an abandoned corral built for trapping wild horses.

Qualitative research with people was affected by seasonal timing and the remote location. During the summer of 2009, interviews were conducted between July 1st and September 30th, in locations varying over hundreds of kilometres. Several times, I drove hundreds of kilometres and arranged a camping schedule around an interview that had been pre-arranged, only to get there and find that the person was unavailable. Allowances had to be made in the research for the seasonal availability of participants. Guest lodge operators were in the middle of peak season and several were too busy to participate during the research timeframe. Throughout the summer, many local people were occupied with community gatherings and events that took place in seasonal camps outside of the main community in Nemiah Valley. In August, forest wildfires were forcing evacuations in communities around the Brittany Triangle, and it was not appropriate to approach some residents about interviews. Also, from late August through September, many local Xeni Gwet'in people were absent from the community and occupied with salmon fishing and hunting in order to store food supplies for winter, and hence were unavailable for interviews.

All participants were sent Thank You cards as a follow-up to the interviews. Wherever possible, participants were visited in person during follow-up visits to the study area in 2010 and 2011.

Participant Observation and Time on the Land

Participant observation refers to a suite of methods that are rooted in ethnographic methodology. The type and degree of participation that a researcher may engage in, in field settings, varies greatly (Scott, Jones and Watt, 2010). In this case, participant observation included not only time spent with community members in Nemiah Valley and places surrounding the Brittany Triangle, but also spending time out on the land – living outdoors and in a remote cabin, walking and observing the land, watching and interacting with wildlife, and learning from direct experience and the guidance of more experienced people. The importance of spending time on the land highlights the ways in which participant observation can refer to a range of experiences, including those which do not directly involve interaction with other people. By participating directly in my own relationships with the land and with wildlife, I developed a better ability to relate to other participants in my study, and a deeper understanding of all subjects in the research including the land, wildlife and horses.

The use of participant observation was appropriate then not only to social and cultural research, but to the ecological research as well. It served as a source of empirical observation from which to generate scientific questions and hypotheses, as well as a form of experiential learning that served as an entry-point into questioning participants regarding local ecological knowledge.

Transcription and Coding

Recorded interviews in digital file (mp3) format were transferred to a computer, and manually transcribed into text documents (Word 2007). Recorded interviews were transcribed verbatim, except where discussions were interrupted, or social conversation deviated entirely from topics relevant to the research. Field notes from several unrecorded interviews were also transcribed into text files.

Given the subject matter, subtle meanings and variations in cultural and linguistic expression among interviews, it was most appropriate to manually code and analyse qualitative data, and to use the software package simply as an organizational tool. Transcripts from interviews and excerpts from court testimony were analyzed using a multi-stage coding process (Emersen, Fretz and Shaw, 1995; Miles and Huberman, 1994). The initial *open coding* involved reading the transcripts in hard copy, making margin notes labeling the topics and subject matter at each paragraph or section of dialogue. A list of these topics and subject labels was kept separately. These labels were examined for obvious groupings, categories and themes. The labels were then cross-referenced with research questions and objectives for this study. From this process a series of thematic categories or *pattern codes* were developed, which included a combination of pre-developed research topics (deductive codes) and emergent themes

(inductive codes). Transcripts were then coded again using pattern codes and colour markers to group and sort interview data.

Subsequent to the coding and analysis process, transcripts were transferred from Word into NVivo 9 software, where text was electronically labeled and sorted according to the categories and codes that were developed through the manual coding process.

Analysis of Mixed Methods Data

While the methods for collecting qualitative and quantitative data were separate and discrete to some extent, they inherently overlap with each other. The data sets influenced each other in an iterative process throughout the duration of the study, both in terms of the context within which they were gathered, and in the information and knowledge that they yield. Participant observation and qualitative research provide insight about the long term ecological trends, historical land use activities, and wildlife use patterns in the study area. Local knowledge and socio-cultural information provide invaluable insight to the ecology, and plant community composition in the area, as well as information about equine patterns of habitat use, guiding my attention towards the variables recorded in ecological field notes. While the basic notations and metrics recorded on data sheets remained consistent throughout the study, notes were added about possible explanations or questions to follow up on, based on qualitative data. In a similar way, ecological field observations and vegetation data from sample sites informed my approach to interviews and discussions with participants, and clarified directions for future research.

Vegetation data were gathered at the same time as field observations that were separately recorded in a field journal. The time and focused attention required to measure field transects afforded extended opportunities for the observation of wildlife, habitat use by free-roaming horses, spatial and temporal changes in vegetation and moisture regimes, and numerous other aspects of the landscape ecology in the region. These observations, along with observed cultural artifacts in the study area, provide background information and some context for the quantitative observations of plant species frequency, differences between sample sites, and implications of these data for grazing impacts by horses. Field observations from quantitative ecological research was cross-referenced with interview data during and between field seasons, informing interview questions, and my understanding of the local knowledge provided by participants. During analysis, various data sets were used along with referenced literature to triangulate results.

Analytical Framework

Based on the defined purpose statement for this research, data were sought through methods of inquiry that incorporated information from three main sources: 1) literature; 2) primary field research from Western scientific methodologies; and 3) local knowledge. Research questions and topics investigated were categorized under three inter-related themes with regard to the free-roaming horses of the Brittany Triangle: 1) ecology (focused primarily on their feeding habitats and the plant communities therein); 2) social and cultural uses and meanings associated with horses in the study region; and 3) management actions and preferences.

Analysis of data from qualitative inquiry used a three-stage coding process to name, categorize and identify emergent themes as "Pattern Codes". Pattern codes were then also grouped and cross-referenced according to the original research themes/categories listed above.

The significance of emergent themes was assessed according to three criteria: 1) those topics or themes that were frequently mentioned by numerous participants and sources; 2) those themes or topics that evoked particularly strong agreement or disagreement among participants and sources; and 3) those themes that lent insight to the original categories of the study or were somehow surprising/separate from original categories. Data were analyzed for theoretical or conceptual insights, and for applied management implications. Theoretical and conceptual insights were determined by cross-referencing the emergent themes from qualitative research with the original topic categories, and assessing the links between them. The resulting insights and discussion points were then cross-referenced with existing literature and the results from the quantitative assessment of field ecology in order to determine the management implications of the study, and to yield recommendations. The methodological approach taken to this study is summarized in Figure 9.

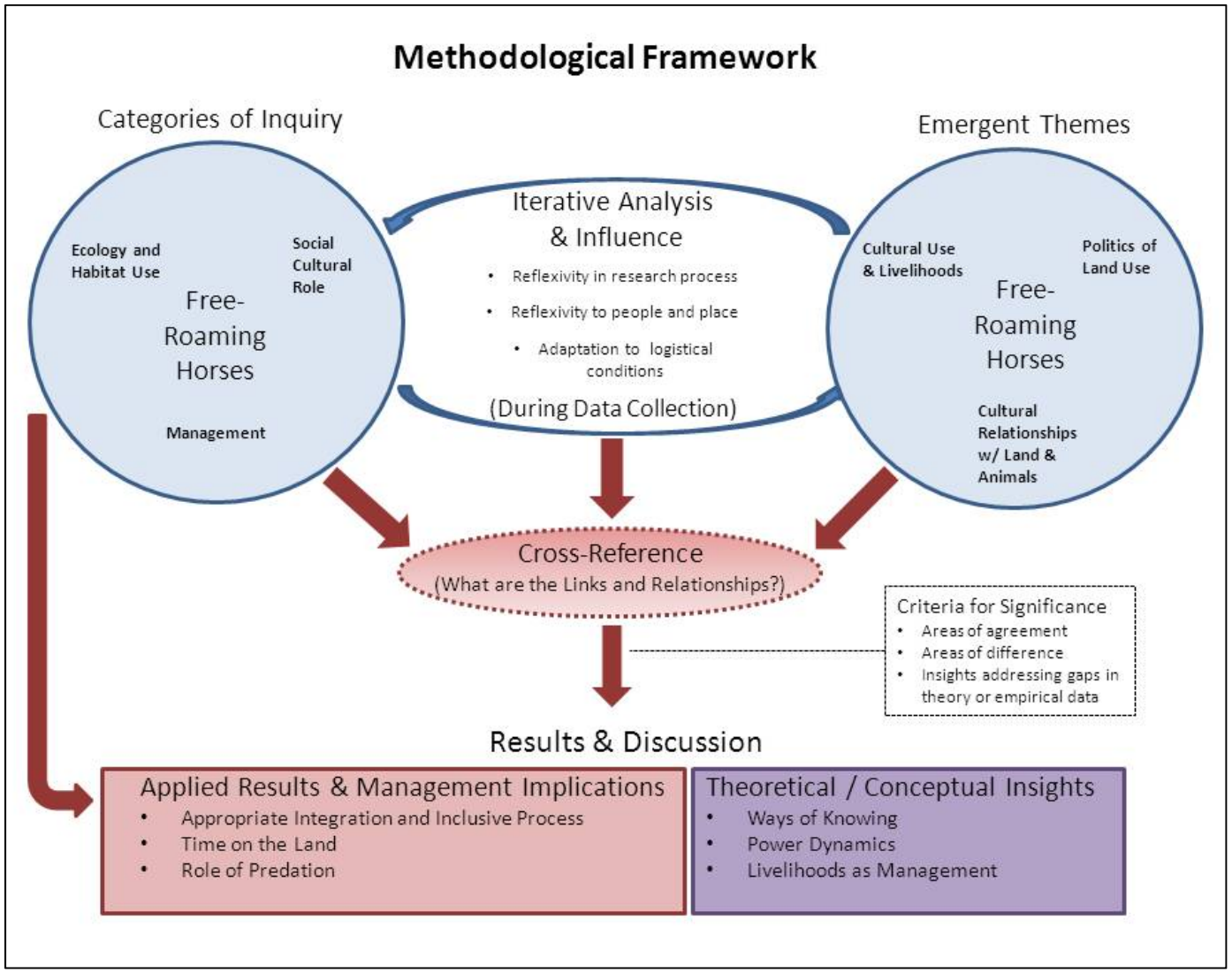

Figure 9: Framework for Inquiry and Analysis.

CHAPTER 4: CONTEXT AND BACKGROUND FOR FREE-RANGING HORSES IN THE BRITTANY TRIANGLE

"Although the place we set out for that morning is known to the locals as Captain George Town, there's no such place on any map. It's a cabin or two and some fenced pasture of swamp hay and one or two hay cribs tucked away in a series of low meadows in a far-away valley. There's certainly no town there at all, and by all accounts there never was.

It tends to be like that all over the Chilcotin country. Maps aren't of much use. Nothing written in English is of much use in finding your way around."

~ Terry Glavin and the People of Nemiah Valley, *Nemiah: The Unconquered Country* (1992)

This chapter describes the biogeoclimatic and socio-political context of the study region, followed by the formal management context pertaining to free-ranging horses in the Chilcotin. While the focus of this research is the horses of the Brittany Triangle, the relevant historical governance policies have not distinguished between those horses and others in the Chilcotin. Hence the discussion of historical management actions, and the socio-political context relevant to free-roaming horses refers to the Chilcotin region as a whole. The discussion in this chapter demonstrates the ways in which the Brittany Triangle is part of a network of ecosystems, and part of the territories of Tsilhqot'in communities which extend across a larger landscape. Yet at the same time, the ecosystem characteristics of the Brittany Triangle do set it apart from the surrounding landscape in some ways, as do the overlapping jurisdictional layers of protected area status initiated by several different agencies. More in-depth analysis and discussion of the relationships between system elements are included in Chapters 5 and 6.

REGIONAL ECOLOGY

Community ecology, also called synecology, refers to the study of the living components of ecosystems, and often "involves description and analysis of patterns within the community…and examining the interactions of community members" (Allaby, Oxford Dictionary of Ecology, 2005). Many of the management concerns and controversies that are associated with the horses are chiefly concerned with the interactions between the horses and other ecosystem components. Since community ecology is essentially the "ecology of interactions" (Molles, 2005), it can help to develop the scientific understanding of free-ranging horses as one part of a system which is full of constant interactions. Hence a community ecology approach to the research directly addresses common management

concerns about the horses' impacts on other ecosystem and habitat components, as well as wildlife populations. While an in-depth population ecology study would help to answer some questions about the free-ranging horses of the Brittany Triangle (e.g. reproductive dynamics and territorial range), the logistical demands of such research were beyond the scope of this study. A focus on community ecology can help researchers and managers to avoid focusing too much on the impacts and manipulation of a single species when dealing with systemic issues (Suding et al., 2004). In situations where limited capacity is available to gather scientific data, a community ecology approach is a useful and efficient way to identify key patterns, relationships and synergistic effects among and between ecosystem components.

The Brittany Triangle, like most ecosystems, is subject to a variety of natural and human disturbances which cumulatively characterize ecological processes and often drive environmental change. Pickett and White define a *disturbance* as "any relatively discrete event in time that disrupts ecosystem, community, or population structure and changes resources, substrate activity, or the physical environment" (Pickett and White, 1985, p. 7). They distinguish between two general kinds of disturbance - destructive events and environmental fluctuation – and note that "disturbances merge with secular environmental change over various spatial and time frames" (Pickett and White, 1985, p. 7). Ecological disturbance events are not necessarily aberrations, and can form a normal part of ecosystems (Petraitis et al., 1989; Pickett, 1989).

The concepts of community ecology and disturbance ecology are useful for understanding the ecology of free-roaming horses in the Brittany Triangle as one of many driving forces in the ecosystem. Some of the major and obvious disturbance factors that affect the system are fire and human activities. While horses do have an observable presence and impact within the ecosystem in the Brittany Triangle, their disturbance patterns vary across the landscape, and the effects of their presence on other parts of the ecological community also vary with the cumulative impacts of other disturbance factors. For example, the severity of horse impacts on vegetation and soils is directly related to the climatic and moisture regimes of specific locations and years.

Biogeography

The Chilcotin region lies leeward (to the east and north) of British Columbia's Coast Mountain range, and to the west of the Fraser River canyon, into which the Chilcotin River flows. Within the Chilcotin region, the Nemiah Valley is a remote rural community, located approximately 200 km southwest of Williams Lake, BC. The landscape of the Brittany Triangle is mostly forested, while the nearby

Nemiah Valley is slightly more open, with hillsides of bunchgrass rising up through aspen, poplar and pine forests to open rocky scree slopes on the mountains that rise around it. The region as a whole is characterised by cold lakes and glacier-fed, salmon-bearing rivers, and corridors of sub-alpine lodgepole pine, poplar and spruce forests interwoven with networks of natural grassy sedge meadows and wetlands (GCC, 2010).

Figure 10: View over Konni Lake, southwest along Nemiah Valley.

The Brittany Triangle is classified as part of the Sub-Boreal Pine Spruce (SBPS) biogeoclimatic zone (SBPSxc subvariant) (McCrory, 2002). The sample sites for this study are grass and sedge meadows within a pine-spruce forest ecosystem in the Brittany Triangle, which is a plateau. The elevation of sample sites for this study ranges between 1220-1350 metres above sea level. Variability in micro-climates and regional topography within the study region are such that the Brittany Triangle, while mostly classified within the SBPS zone, is surrounded to the east, north and northwest by drier areas of Interior Douglas Fir zone (IDFdk4 subvariant), and the northern limits of the Bunchgrass Ecosystems that stretch northward from the Great Basin region in the western United States (GCC, 2010; McCrory, 2002). The Grasslands Conservation Council (GCC) of British Columbia describes grasslands in the Cariboo-Chilcotin region as “extensive open grasslands [that] hug the Fraser and Chilcotin river valleys and higher benchlands with open, dry Douglas-fir and lodgepole pine forests above them... A number of plants reach the limits of their distribution in parts of this region, creating some unique plant associations.” (GCC, 2011).

While vegetation measurements at sample sites for this study were situated entirely within the Brittany Triangle SBPS zone, it is important to recognize the prevalence of drier ecozones in the surrounding study region as a whole, as wildlife and people range across a variety of terrain. The high visibility of semi-arid rangelands close to the highway, roads, settled areas and rivers in the region mean that most people who live in and visit the area, and many key informants to this research, have first-hand experience with the effects of free-ranging horses in those habitat conditions.

Climate; precipitation

Mean annual precipitation for the SBPS biogeoclimatic zone in the Chilcotin Plateau ranges between 335-580mm (Wong et al., 2004). The elevation of the Plateau contributes to a cool, dry climate with cold winters and dry summers. There is considerable variability in micro-climates and precipitation patterns throughout the region. However, precipitation and temperature data are not available for any location within 25 kilometres of the study area. Records for Lunch Lake (Latitude 51.82 North, Longitude 124.47 West, Elevation 1017m), which is the closest weather station to the study region with available precipitation data for the years when field work for this study took place (2006-2009), indicate somewhat typical annual patterns of precipitation for those two years (Figures 11 and 12), though 2009 was considered to be a drought year. The majority of rain tends to fall in June-July of each year, with major winter precipitation (snow) falling between November and January.

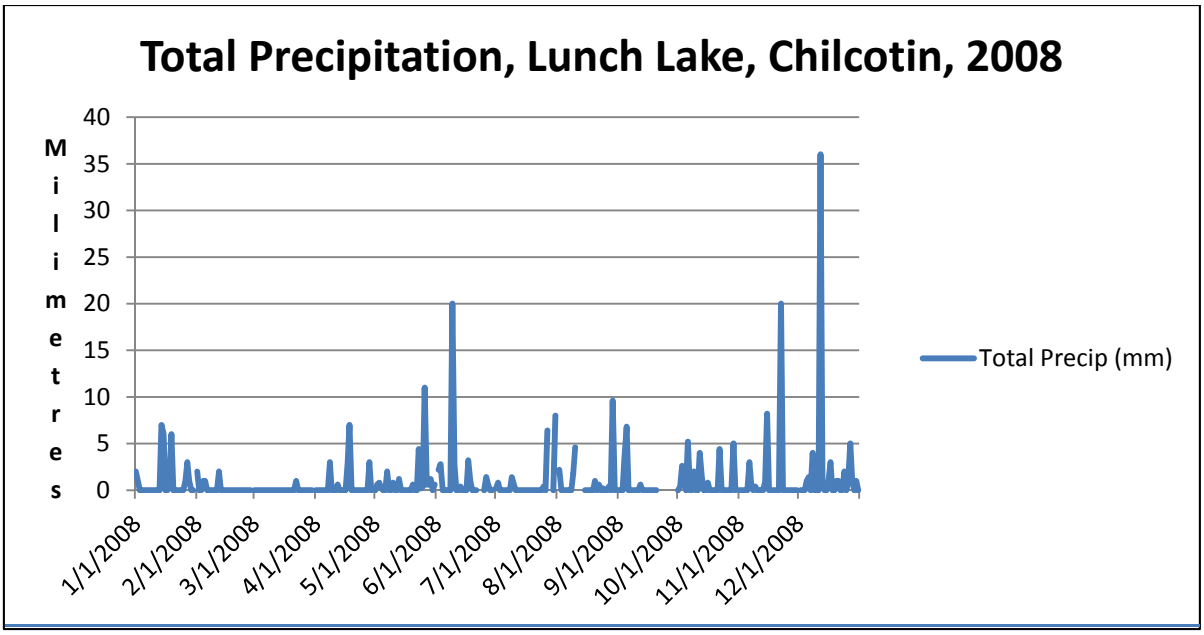

Figure 11: Annual Precipitation, 2008, Lunch Lake, Chilcotin, BC (Environment Canada, 2011).

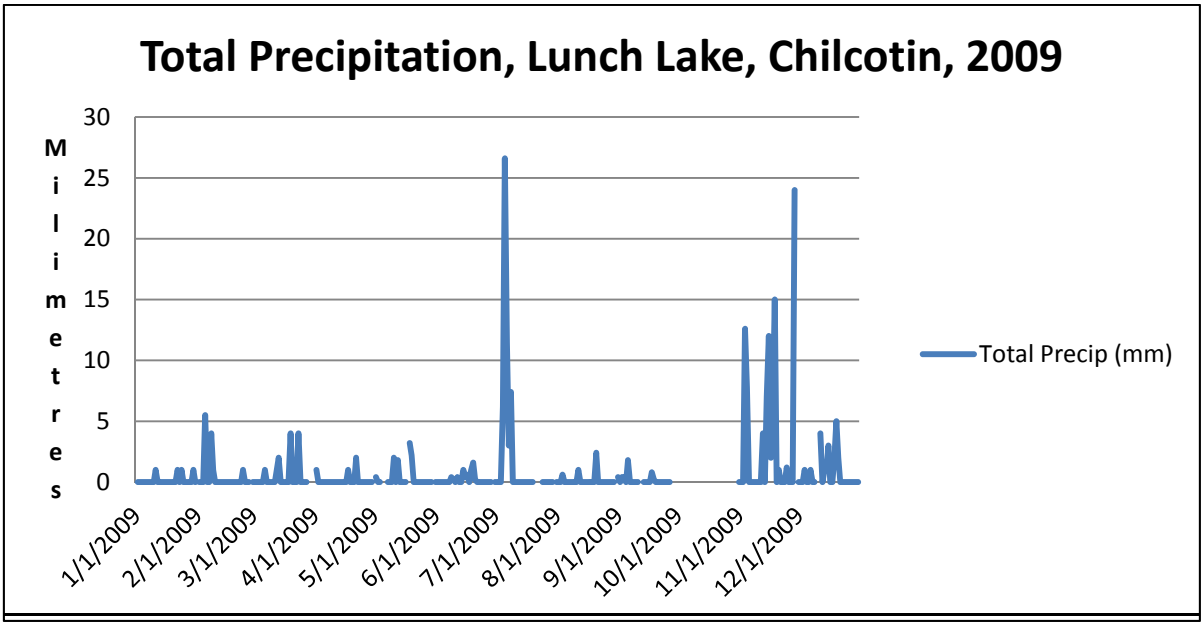

Figure 12: Annual Precipitation, 2009 Lunch Lake, Chilcotin, BC (Environment Canada, 2011).

While the charts look relatively similar at this (annual) resolution, there was a significant difference between the two field seasons in terms of precipitation and its effects on spring and summer vegetation. While the spring season in 2008 contributed to somewhat typical though fairly damp conditions, 2009 saw relatively little rainfall and hot temperatures in June, and throughout most of July and August

(except for one major precipitation event in early July). As a result, 2009 was considered a drought year, and conditions were dry enough to contribute to major forest fires during the summer months.

Vegetation and Plant Communities

Dominant tree species in the SBPS biogeoclimatic zone are lodgepole pine (*Pinus contorta*), and trembling aspen (*Populus tremuloides*), with less-frequent occurrences of white spruce (*Picea glauca*) in wet areas and older forest stands that have been missed by several fire cycles. Prevalent shrub species include common juniper (*Juniperus communis*), soopalallie (*Sheperdia canadensis*), kinnickinnick (*Arctostaphlos uva-ursi*), prickly rose (*Rosa acicularis*), and in the wetter areas grey-leafed willow (*Salix glauca*), and scrub birch (*Betula glandulosa*). Forested areas commonly host such herbaceous species as pine grass (*Calamagrostis rubescens*), and wild strawberry (*Frageria virginiana*). Forest in the Brittany Triangle is mixed with a network of open meadows and, in the southern portion, small lakes. Meadows in the Brittany Triangle are primarily vegetated with graminoids, including various species from the families Poaceae, Cyperaceae and Juncaceae. Species frequency and distribution among and within meadows varies (Meidinger and Pojar, 1991).

Brittany Triangle: Heterogeneous Microsystems

Previous studies conducted in the area have identified habitat types for the specific region in and around the Brittany Triangle. Karen Preston (1984) conducted extensive fieldwork in the region immediately northwest of the Brittany Triangle. Although Preston's study area is 200-300 metres lower in elevation, and tends to be slightly drier than the study area for my thesis, her habitat types provide useful descriptive categories for the landscape in the area.[9] Preston identified ten habitat types, and reduced or aggregated those to seven categories to reflect broad habitat-use patterns by free-ranging horses, cattle and moose (p. 20).

1. Open Forest
2. Semi-open forest
3. Closed forest
4. Meadow (combining wet and dry meadow sites)
5. Shrub-Carr
6. Interface Zone
7. Other (e.g. roads, etc.)

[9] Much of Preston's study area has been subject to clearcut logging and road construction in the 30 years since her study.

A more recent conservation assessment and wildlife habitat inventory was conducted in the Brittany Triangle (inclusive of the study area for this thesis) in 2002 by McCrory Wildlife Services, Ltd. McCrory identified eight habitat types in the Brittany Triangle, based on associated forage species of vegetation for bears and wild horses (pg. 19).

1. Lodgepole pine-kinnickinnick-pinegrass
2. Douglas fir-aspen parkland-grasses
3. Riverine breaks grasslands-bluebunch wheatgrass
4. White spruce-horsetail
5. Wet meadow/shrubfield/sedge complex
6. Dry meadow/shrubfield/grass complex
7. Riparian salmon spawning/migration areas
8. Disturbed (i.e. road, dwelling, clearcut, etc.)

McCrory's (2002) fieldwork and report were completed prior to the Chilko wildfire of 2003 which burned much of the study area for this research. Subsequent to the fire, hydrological and vegetative characteristics changed dramatically in many of the meadow areas (Williams pers. com., 2006; aerial photographs Ministry of Lands and Forests c. 1980s). Previously dry meadows were flooded year-round, some turning to small lakes, and others to wet meadow shrub-sedge ecosystems with seasonally fluctuating surface water lakes or ponds.

In the years during which sample sites for this study were selected and fieldwork was carried out, sample meadows ranged along a spectrum of hydrological conditions from completely dry (i.e. dry ground with no water bodies or standing water present in the meadow) to flooded (i.e. water covering the entire meadow to the tree-line). The hydrological characteristics in sample meadows changed somewhat over the course of the study, partially as a result of yearly fluctuations in precipitation and temperature. Observed changes may also have been influenced by the longer-term successional changes taking place in vegetative and moisture regimes in the wake of the 2003 fire. Examples of these changes include significant changes in the seasonal fluctuation of standing water in wet meadows. Such changes were evident in the relative proximity of transects to water's edge, vegetative characteristics and depth of animal tracks in soil near water bodies, and altered habitat use of grass litter layers and wetland features by nesting birds and muskrats, respectively.

Fire Cycle

The Sub-Boreal Pine Spruce zone is conventionally characterized by mixed-severity and high-severity fire disturbances, in which "many frequent, small-to-medium fires are punctuated every 40-100 years by extremely large fires" (Wong et al., 2004, p. 20). Wetter subzones on the Chilcotin Plateau may have less frequent occurrences of severe or large fires; however, Wong et al. (2004) comment that "much of the landscape was influenced by very large events (~70,000 ha) at some point in time" (Wong et al., 2004 pg 20). There is also some evidence of fire-scarred lodgepole pine which suggests that lower-severity fires may have been important in some areas. However, since it was a common practice for First Nations and (later) Euro-Canadian settlers to deliberately burn grasslands, meadows and open areas of pine forest in the Chilcotin – including in the Brittany Triangle – from before historical records began, through until approximately the 1960s (IN04; IN06), it would be more accurate to consider "historic" fire cycles as having been influenced by human and non-human causes.

Fire has been a major factor in the ecology of the Brittany Triangle in recent years. The study area for this research was mostly located within the boundaries of a large wildfire that occurred in 2003, three years prior to my initial visit to the study area, and five years prior to the first year of data collection. The 2003 Chilko Fire, was 29,207 hectares in size (MoF 2003), and burned in the Brittany Triangle, mostly within Nunsti Provincial Park. It was the largest wildfire in British Columbia during the historic 2003 wildfire season (McCrory, 2005). The fire came in the wake of approximately five decades of fire suppression activity, and consumed considerable fuel build-up within the Brittany Triangle and Nunsti Provincial Park. Several sample sites for this study were located outside of the 2003 burn area. In 2009, the Lava Canyon Fire (66,719 ha) was again the largest wildfire in BC during that year (MFR 2010) - and burned the remaining northern portion of the Brittany Triangle, from the north boundary of the 2003 Chilko Fire, to the confluence of the Chilko and Tasko Rivers at the "apex" of the Brittany Triangle, and beyond. Figure 13 illustrates the extent of the Lava Canyon Fire by September 16th, 2009.

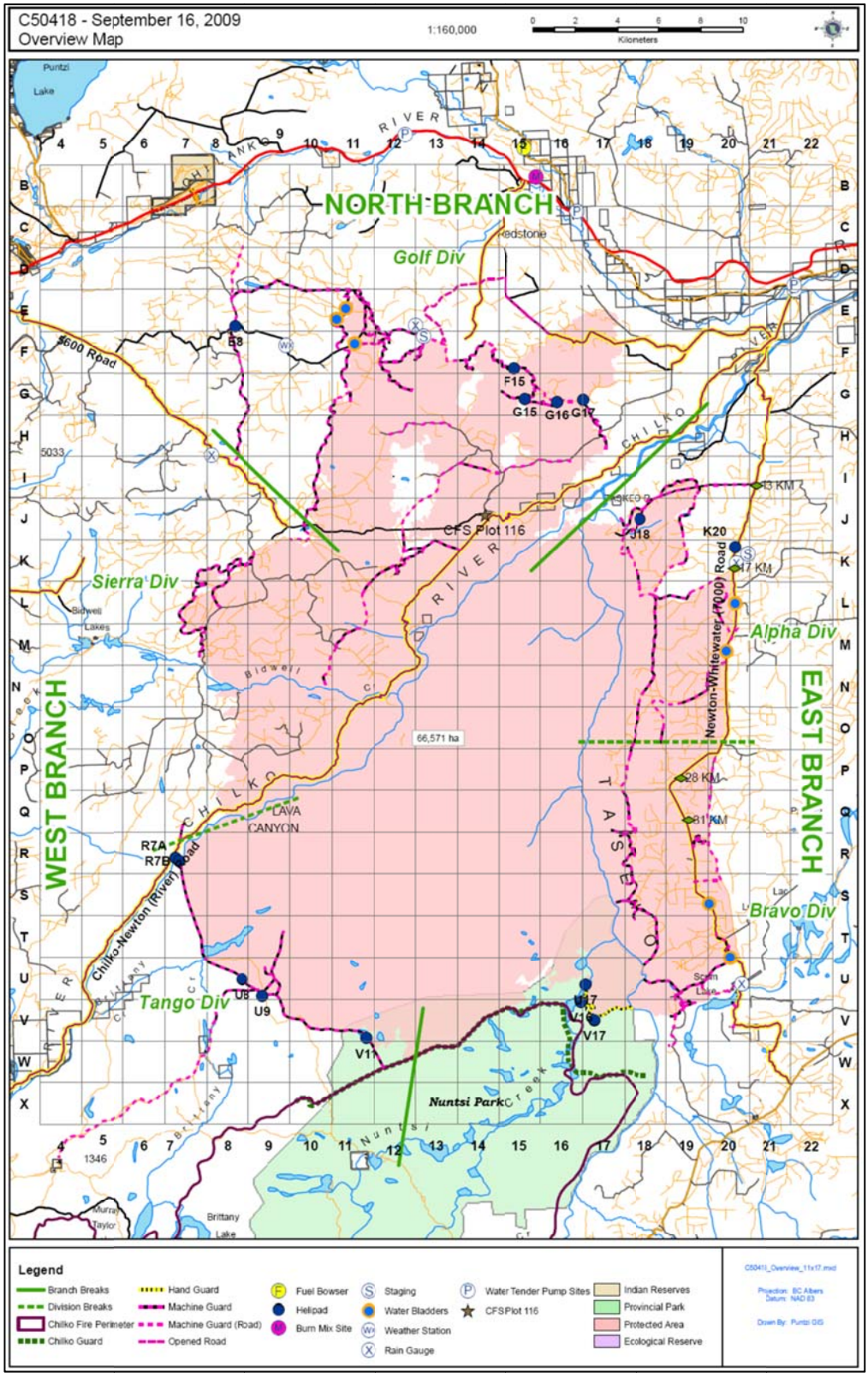

Figure 13: Lava Canyon Fire, September 16, 2009 (BC Wildfire Management Branch, 2009).

The 2003 wildfire burned intensely enough in some meadows to ignite peat fires underground, including in the four sample sites referred to as the "Home Meadows" in this study. Provincial firefighting efforts did not extend to the underground peat fires. After assessing the damage to wildlife habitat from the catastrophic wildfire, a team of volunteers coordinated by Friends of Nemaiah Valley (FONV) spent two weeks in October 2003 digging trenches to put out underground peat fires. These trenches were subsequently filled in by the same volunteers, after serving their purpose. Vegetation in several meadows sampled for this study was characterized in places by the patch dynamics and disturbance patterns of burned peat soils. Formerly dry meadows within the 2003 burn area were flooded partially or entirely by the time of the initial site visits for this research (2006-2007). Those sample meadows remained moist and in some cases had year-round standing water (pond or lake) during the years of data collection (2008-2009), and subsequent follow-up visits (2010).

These two large wildfire events, though heterogeneous in their intensity across the landscape, combined with the effects of mechanical firefighting efforts (e.g. machine guards, clearings, and staging areas cut into the bush) were observed to have significant effects on the vegetation, soils, and hydrology of the study region. Thus the response of vegetation and soils to grazing and habitat use by free-ranging horses, as well as the foraging behaviours of the horses, were strongly influenced by the ecosystem-level response to fire (Fuhlendorf et al., 2008; Leonard et al., 2010).

Interviews with study participants indicate that low-severity fires were commonly used as a management technique throughout many areas of the Chilcotin and other parts of BC's Southern Interior (IN06), including land around the Brittany Triangle (IN04). Participants indicated that First Nations and settlers of Euro-Canadian descent routinely engaged in seasonal prescribed burns in order to maintain forage plants, lodgepole pine forest habitat, and the open meadow ecosystems that characterize the region.

> *Participant IN04: Well, I think...you know in the '60s, when I was growing up. First Nations just took care of some stuff. You just didn't worry about it. It wasn't an issue. It's like the fires. You know… they'd pass through and there'd be fire and you know, they set it, and it was no big deal. And now, they [Provincial Government] take these little fires and blow 'em into such a...I don't know …It's so bizarre. I mean like the Chilko fire should have been put out in an hour.*
>
> *It's just like the Brittany, I mean there were always little fires in there.*

Such practices waned as provincial government scrutiny increased and fire suppression policies were enforced, from the 1960s to the present.

> *IN06: Oh yah. I mean everybody burned all these meadows off. And the reason was to burn it off, and fresh moose feed. But also to keep the willows back. Because the willows, you know they'll extend out into the meadows every year. Well if you don't burn them back, then pretty soon your meadow is nothing but a buck-brush meadow or a willow meadow, you know, the feed's all gone.*
>
> *Interviewer: Do they not allow any burning now?*
>
> *IN06: Oh they... you can burn some but you have to do it really early. I mean after the first of April they [Forestry] start having kittens, and diarrhea attacks and everything else.*

Prescribed burning techniques are increasingly recognized as good management practice by resource management planners and the Forest Practices Board in British Columbia (Filmon, 2004). The traditional "informal" burning practices that participants describe are consistent in many ways with the more formal prescribed burns recommended by government agencies. However, current regulations must create standards for burning practices that minimize risk and liability, and accommodate the accumulated fuel load, climatic conditions, and increased infrastructure around many remote communities. Consequently, there are government regulations and guidelines stipulating the seasonality, wind speeds, temperature and other conditions under which deliberate burning is considered inappropriate.

Wildlife and Habitat

The Brittany Triangle provides habitat for a diverse suite of wildlife. McCrory (2002) reports a "relatively high ungulate biomass" including native and introduced species with "various seasonal ranges" (pg. 6). The portion of the Brittany Triangle covered by this study supports mule deer (*Odocoileus hemionus*), moose (*Alces alces*), and free-ranging horses. Oral history indicates that the area historically supported elk (*Cervus canadensis*), and that moose arrived in the region only recently, in the 1920s or so (*Tsilhqot'in Nation v. British Columbia* BCSC 1700, 2007). Free-ranging horses "appear to be the dominant herbivore" (McCrory, 2002, p. 6) in the Brittany Triangle. Although there is continued debate over when horses were introduced or spread naturally into the region, both oral and written accounts agree that their arrival certainly predates that of moose (Bergerud and Elliot, 1986; Darimont et al., 2005). There is a Tsilhqot'in word for horse (*naŝlhiny*), but no linguistically distinct word for moose (First Voices, 2011).

The Brittany Triangle is habitat for numerous omnivores and carnivores, including: grizzly bear (*Ursus arctos horribilis*), black bear (*Ursus americanus*), grey wolf (*Canis lupus*), cougar (*Puma concolor*), Canada lynx (*Lynx canadensis*), wolverine (*Gulo gulo*), coyote (*Canis latrans*), red fox (*Vulpus fulva*), Canadian river otter (*Lutra canadensis*), mink (*Mustela vison*), pine marten (*Martes americana*), and fisher (*Martes pennanti*). It is also home to other wildlife species too numerous to list, including beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), sandhill cranes (*Grus canadensis*), bald eagles (*Haliaeetus lucocephalus*) and golden eagles (*Aquila chrisaetos*), great horned owls (*Bubo virginianus*), and a diverse array of other birds and small animals. Some streams and rivers around the edges of the Brittany Triangle are salmon-bearing (habitat for sockeye and chinook), while lakes and rivers in the region also support a number of freshwater fish (McCrory 2002).

The grass, sedge and shrub meadows in the Brittany Triangle provide habitat and forage plants for deer, moose, horses, and bears. Researchers routinely observed sign (scat, tracks, evidence of grazing) from all these species in the sample sites, in addition to direct observations. During the wetter years of the study, muskrats apparently occupied some flooded meadows. Coyote were observed several times in meadows. Bird nests were frequently observed in grass litter layers in the sample site meadows during Spring field seasons, especially during 2009.

Livestock

There are several ranches, guest-lodges, and guide-outfitter operations which hold Crown range tenure (grazing licenses) for seasonal cattle grazing in perimeter areas of the Brittany Triangle (Dobb, 2010). While one rancher does apparently hold a grandfathered grazing lease for some areas within Nunsti Provincial Park (IN08), there is currently no grazing within the Park, the study area for this research, or the northern portions of the Brittany Triangle. No signs of cattle were evident in the study area between 2006 and 2010.

Historically, the study area and some of the sample sites were utilized by homesteaders and ranchers who cut wild grasses and sedges (referred to locally as “swamp hay”) to feed cattle and domestic horses (IN13; IN01b; Lutz, 2008). While it was not possible to definitively ascertain whether all sample sites had historically been used to feed livestock, several facts indicating historic patterns of livestock use are certain. The property now used as a research base for this study (Far Meadow) was previously occupied as a homestead with resident domestic cattle and horses, as was another property approximately six kilometers to the south-east (Upper Place) which is now the site of a trapper’s cabin. It was common practice for homesteaders and small-scale ranchers to allow some livestock to range

freely, and to cut and stack wild grasses and sedges (or "swamp hay") in natural meadows in order to have a feed supply for livestock throughout the winter (IN03; IN13). These meadows were not planted, tilled or cut with motorized machines. Haying was done with horse-drawn mowers, dump rakes, and hay sleds. Of the eight meadows used as sample sites for this study, one has a remnant hay sled, and another has the scar from an old hay corral which burned in the 2003 wildfire (Williams personal communication, 2009).

Local participants report that historically interactions between ranchers, livestock, free-ranging horses, and wildlife were fairly regular. Interactions varied, but participants who lived in the Brittany Triangle described moose eating from stacked hay racks, domestic horses (usually mares) joining with wild horses, domestic horses and/or their offspring being re-captured from wild bands, and wolves attacking horses (IN13; IN01b).

DEMOGRAPHIC AND SOCIAL-CULTURAL CONTEXT

First Nations and Communities

The Chilcotin region of British Columbia seems further from the urban British Columbian settings of Vancouver and the Lower Mainland than geographical distance would suggest. It retains a "frontier" feel, characterized by dirt roads, dispersed settlements, cattle ranches, and "big sky country" where a vast plateau of grasslands and glacial deposits is framed by snow-capped mountains and rushing rivers. William Turkel (2007) aptly describes the journey along Highway 20 westwards from the nearest town centre feeling "as if it were possible to travel back in time by following the road" (p. 3). Once travelers cross the Sheep Creek Bridge over the Fraser River and climb the steep series of switchbacks up onto the Chilcotin Plateau, they do seem to have entered a distinct place which runs on its own time. There is no cell phone coverage, only dispersed settlements, and by turning off Highway 20 either northwards or southwards one can travel for hundreds of kilometres without seeing any pavement. John Lutz (2008) describes how even "today, the Chilcotin remains largely 'unsettled' by Euro-Canadians, whose few communities still have the character of islands," and adds that "this is not an accident of history or geography," but rather "the result of the actions of the Tsilhqot'in in the nineteenth century: they did their utmost to prevent settlement and to keep a road from being built through their territory" (p. 119).

The Xeni Gwet'in First Nation is one of six Tsilhqot'in Nations. The Xeni Gwet'in, together with Tl'etinqox (Anaham), Tsi Del Del (Alexis Creek), Yunesit'in (Stone), and ?Esdilagh (Alexandria) each

have their own governments, and are also represented by the Tsilhqot'in National Government (TNG). In addition Tl'esqox, the Toosey Indian Band, is a Tsilhqot'in community that works in affiliation with the TNG (TNG, 2006). The Xeni Gwet'in are the most remote community of Tsilhqot'in people. Partially as a result of their geographic distance from Euro-Canadian settlements and travel corridors, and partially as a result of deliberate decisions, the Xeni Gwet'in people have managed to maintain a relatively strong cultural identity, language and connection with their land (Baptiste personal communication, 2010; Lutz, 2008).

Home territory of the Xeni Gwet'in First Nation, the Nemiah Valley includes a dispersed community of approximately 350 people (FPHLCC, 2011). Residents include Xeni Gwet'in, other Tsilhqot'in people, and a minority of other residents of varied cultures and ancestry. Several other small communities are located within the vicinity of the Brittany Triangle (50-100 km): Yuneset'in (Stone) Reserve and Hanceville to the northeast, Alexis Creek and Tsi Del Del (Alexis Creek Indian Band, also known as Redstone) to the north, and Tatla Lake, to the northwest. Dispersed ranches, guest lodges, and other private residences are scattered in between. Some Tsilhqot'in families and individuals established small homesteads and trappers' cabins within the Brittany Triangle during the twentieth century. Since 1990, fewer people have lived in remote locations within the Brittany Triangle, though a few ranches, homes, and seasonal properties exist around the perimeter of the area. A number of Xeni Gwet'in participants who grew up living or spending time in the Brittany Triangle now live in the Nemiah Valley or other Tsilhqot'in communities. The nearest town is Williams Lake (population 11,153) (BC Communities.ca 2011), approximately 200 km northeast of the Brittany Triangle.

Xeni Gwet'in First Nations refers to their traditional territory as the "Caretaker Area" because of their cultural identity as Caretakers of the land. Traditionally, each Tsilhqot'in nation had their own lands and areas, for which they were caretakers (Setah personal communication, 2010;). When asked who they are, many Xeni Gwet'in people answer with reference to place: where they were born, where the family comes from, the parts of the landscape they inhabit and know best. The statement "We are Xeni Gwet'in" tells visitors, quite literally, "We are the People of Xeni" which is a place in what is now known to outsiders as the Nemiah Valley. The identity of the Xeni Gwet'in in particular, and Tsilhqot'in people in general, is inextricable from their history of defending and caring for their land and territory (Bhattacharyya et al., Forthcoming 2012).

Cultural history tells of runners who would run between distant and remote Tsilhqot'in communities to communicate threats to people and the land (Setah personal communication, 2010). Dispersed

communities could then work together to protect themselves and their lands. Visitors who were benign, guests or simply passing through, were welcomed. But those who were disrespectful to local people or the land, or deemed to be a threat, risked incurring negative responses from the local communities whose warriors could join together. This form of social organization and cooperative spirit between dispersed communities served to protect the interests of culture, territory and the land.

Settlers and Non-Aboriginal People

Subsequent to the European explorers, Hudson's Bay Company traders, and Christian missionaries who passed through the Chilcotin region in the early nineteenth century, a more persistent Euro-Canadian presence began with the early settlers who arrived to homestead and ranch in the region in the second half of the nineteenth century. The Tsilhqot'in people, like many other First Nations and aboriginal peoples, were severely and harshly affected by the diseases that arrived with Europeans in North America. Smallpox had a devastating effect on Tsilhqot'in people and communities (Lutz, 2008). Tsilhqot'ins were also a culture of fierce warriors, who were willing to fight to protect their land from unwanted occupation by outsiders, and their people from threats.

As invasive pressure from colonial governments and settlers began to infringe upon Tsilhqot'in Territory, war was triggered. Historian John Sutton Lutz (2008) describes truthfully the lasting and extremely current impact that the Chilcotin War of 1864 has had on the Tsilhqot'in people and the place.

> *"You cannot spend too long in Tsilhqot'in country before you hear of the 'Chilcotin War.' To hear local people discuss it, it might have happened a few years back instead of in 1864, so vivid are the memories, so precise the details" (p. 119).*

The War itself was a defense of Tsilhqot'in territory against invasion and occupation by outside interests. There had been an increasing number of incursions into Tsilhqot'in territory in the years preceeding the War (Foster in *Tsilhqot'in Nation v. British Columbia*, 2007 BCSC 1700, para. 286), many of which were actively resisted or fought off by Tsilhqot'in people (Lutz 2008). A number of precipitating incidents led to an act of war by Tsilhqot'in people in 1864, many of which were centred around the contruction of a road that was intended to connect the settlements and shipping channels of the west coast to the gold fields of the Fraser Canyon. Initially, some Tsilhqot'in people worked on the road crew. After the devastating impact of small pox in the preceding years (which may well have been partially induced by infection travelling from Victoria with road-building crews), many surviving Tsilhqot'in people were starving. However, relations quickly disintegrated when road crews refused to

pay or feed Tsilhqot'in workers, treating them "like slaves", and also assaulted some Tsilhqot'in women (Lutz, 2008, p. 133). The work party had not paid for the use of Tsilhqot'in trails, timber, or for the occupation of land. The final straw was a threat by European workers on the crew to bring back smallpox.

The cumulative effect of these factors was for the Tsilhqot'in people, in an act of war, to attack and kill fourteen members of the seventeen man road crew. When word of that attack and other skirmishes reached Victoria, reinforcements were sent from the coast, and a volunteer army – unable to locate or catch Tsilhqot'in warriors – laid waste to the winter food stores and lodges of the Tsilhqot'in people. Finally, under a flag of truce, eight Tsilhqot'in leaders were invited to Williams Lake, apparently for peace talks. However, when they arrived, they were imprisoned and immediately tried, not as prisoners of war, but as murderers. Five men were hanged, and another a year later (Lutz, 2008). The road was never built.

The events of the Chilcotin War, and the circumstances under which it ended, remain extremely relevant and current in the Chilcotin. It was a defining moment in recent Tsilhqot'in history, and part of local identity that gives a sense of strength and conviction to current community members and leaders, who view their ongoing struggles against industrial exploitation of natural resources as a continuation of the same fight. The similarities between attempts in 1864 to build roads through Tsilhqot'in territory to gold mines, and the present-day struggles by the Tsilhqot'in people against proponents of a gold-copper mine at Teztan Biny (Fish Lake) are clearly articulated by Xeni Gwet'in community members (Bhattacharyya et al., Forthcoming 2012).

Despite the protectiveness of the Tsilhqot'in people over their communities and land, and the fact that they never signed a treaty or relinquished title to their lands, successive waves of settlers continued to arrive and pass through the region. By the 1890s settlers were claiming parts of the Chilcotin to establish homesteads and ranches. In 1898, a second wave of gold-seekers passed through British Columbia on their way north to the Klondike. Although Euro-Canadian settlers remained a minority in the more remote parts of the Chilcotin for many decades, some families of Euro-Canadian descent do have a long history in the Chilcotin, and around the Brittany Triangle. They have contributed to the formation of the Chilcotin as it is now, the character and culture of the place (Bonner, Bliss and Litterick, 1995; Lee and Elliott, 2005).

Currently, First Nations people outnumber other ethnic groups and settlers in the Nemiah Valley and many communities in the vicinity of the Brittany Triangle. However, the Chilcotin region continues to attract settlers from other parts of Canada and Europe. In particular, the wide open spaces, majestic landscape, and frontier image of the area seems to be a strong attractor for German immigrants. The town of Alexis Creek hosts a provincial government branch office which attracts employees from other parts of the province, and the town is also home to a number of ranching families of Euro-Canadian origins.

Livelihoods and groups/occupations

For much of the twentieth century, livelihoods and economic activities in the Chilcotin region surrounding the Brittany Triangle included homesteading, small-scale ranching, trapping, guest lodge operation, and hunting/fishing/guiding. These occupations and livelihoods activities remain central to the local economy and way of life. Recently, residents have also found employment in government, schooling and health services, and interpretive ecotourism, as well as seasonal or contract labour in natural resource industries such as logging, mining, ranch employment and fighting wildfires. Wage-earning activities are often integrated to complement traditional livelihoods activities such as hunting, fishing, and gathering seasonal foods (Lutz, 2008; William, 2009). This practice is typical of a rural way of life common to many small communities in Canada, where people patch together a diverse range of paid and unpaid activities in order to meet their basic needs. Whether this patchwork approach to livelihoods occurs by necessity, choice or some combination of the two, it often involves a delicate balance between spending time at home versus leaving for paid employment. Families and individuals generally seek opportunities to earn enough in wages while also attempting to live with autonomy over their own lifestyles and home locations.

The traditional livelihoods that Tsilhqot'in people established on the land were and are based around the capacity of the landscape to support them, seasonal availability of food and water, the presence of animal species, and other practical factors. Small family and community groups would move seasonally to different locations within their territories (IN03). New developments and changes in the landscape were incorporated into the existing relationship between people and land in an adaptive and flexible way. For example, horses came to be used as transportation and pack animals. Even with the introduction of ranching, and the pressure from colonial and later provincial governments for First Nations to adopt Euro-Canadian economies, Tsilhqot'in people chose to adapt the practice of ranching to their own livelihoods and seasonal movements, creating a mixed economy (Lutz, 2008; IN03).

This mixed, adaptive approach to economic and livelihood activities is termed a "moditional economy" by John Sutton Lutz (2008). The term refers to the "distinctive economy" that many aboriginal British Columbians created, "neither traditional nor modern...[it] combines wage labour, capitalist investment, prestige, subsistence, and welfare" (Lutz, 2008, p. 281). Developed through the late nineteenth century as Tsilhqot'in people adapted small-scale ranching and farming practices to their existing livelihoods activites on the land, the Tsilhqot'in moditional economy continues to this day.

Although the occupational, professional and ethnic groupings of people living in the Chilcotin are mixed and intermingled, there do remain some group identities, stakeholders, or "interest groups" that are often spoken of categorically by others, and which tend to share some certain basic values, assumptions, or beliefs. First Nations, ranchers of Euro-Canadian descent, government employees (i.e. "Forestry Service" or representatives from other provincial Ministries), and guide-outfitters form the major stakeholder groupings in the Chilcotin when land use and management issues arise. When discussing land use or management issues, members of these groups tend to make clear distinctions between their own perspectives or interests, and those of other groups.

Perhaps even more basic than these group idendities is the clear difference between people who are "from around here" and those who are not. The Chilcotin is an area with the social characteristics often associated with rural areas or a small town mentality. There is an ethic of warmth, caring, hospitality and generosity to visitors. People demonstrate an awareness and willingness to look out for each other, and for visitors, whether it is checking on stranded vehicles, sharing food or equipment, or inviting strangers to share a home-cooked meal. At the same time, there is a noticeable wariness of outsiders who may have an agenda or seek to impose their views or plans on local people. The Tsilhqot'in people were historically extremely wary of outsiders, and the Xeni Gwet'in in particular did not want early settlers moving into their territory (Lutz, 2008; IN11). After the larger geographical region was settled, a self-reliant frontier attitude dominated the social sphere, and even today long-term residents of the Chilcotin tend to mix a sense of independence with wariness of outsiders. For some ranchers and First Nations people, that wariness applies particularly strongly to government authorities, especially those who are based far away in urban centres. Among local government employees, the same wariness tends to apply to members of NGOs and the public who express strong opinions about local conditions or management practices, especially where free-roaming horses are concerned.

This paradox in local attitudes is relevant to the emphasis and credibility attributed locally to empirical knowledge and the understanding of local issues that is gained through direct personal experience. These issues are discussed later, in Chapter7.

Recent changes in lifestyle and transportation

The Xeni Gwet'in people, together with some small-scale ranchers and other residents, maintained a relatively isolated and self-reliant existence until the current road to Nemiah was built in the 1970s (Glavin and PoNV, 1992; Setah, 2010). Since that time, the community has experienced rapid changes—both internal and external—through cultural-technological influences and the economic pressures towards resource development (e.g. logging and mining). Despite the creation of the Nemiah Indian Reserve [sic], many Xeni Gwet'in residents have remained dispersed in the rural ranching landscape. Xeni Gwet'in leaders have chosen to keep the Nemiah Valley off the provincial power grid in order to preserve the dispersed settlement pattern in the area, and in order to maintain independence from provincial infrastructure constraints. In 2000, the community connected to telephone and internet service for the first time (Goddard and Smitten, 2002). These media for communication have been essential to the Xeni Gwet'in people's ongoing fight to maintain and direct cultural and environmental change in their community. Paradoxically and somewhat typically, the recent influx of communications technologies, has also exacerbated many challenges for Xeni Gwet'in community, youth, language, and culture, even as they have become essential to the legal and political battles necessary for First Nations to protect their communities and culture.

Even with the recent introduction of telephones, internet and the increase in motorized vehicular access, many residents and communities in the area remain relatively aloof from the North American popular culture of ubiquitous communications technology. Much of the Chilcotin (certainly all of the study area) remains outside of cell phone network range. Some remote ranches and family households remain off the main telephone grid as well, instead relying on radio or satellite telephones for occasional emergencies.

Until very recently, horses were the primary form of transportation in the Nemiah Valley, and other remote areas around the Brittany Triangle. One participant, now in his early fifties, recalled how during his childhood in the 1960s there were only two vehicles in Nemiah. Even after the road to the Valley was built in 1973, people continued to rely heavily on saddle horses and teams pulling wagons until the late 1980s or early 1990s (Glavin and PoNV, 1992). Participants describe using horses as primary transportation within Nemiah to get to work in the morning (IN02) and to visit friends and relatives

beyond the Valley (INNB). While trucks and cars have replaced horses as the primary form of transportation between and within communities around the Nemiah Valley, horses remain central to numerous livelihood activities, such as ranching and hunting for food, as well as to cultural and community activities, including youth programs, and community trips to the back country. A significant proportion of activities that maintain Xeni Gwet'in community bonds, culture, and quality of life occur on the land, in places that cannot be reached by road access. While the use of ATVs and quads is increasing, horses can access areas through the bush without road access, and hence they remain essential to those who frequent un-fragmented back country areas.

FREE-RANGING HORSES IN BRITISH COLUMBIA

British Columbia and the Chilcotin Background

Horses arrived in what is now known as British Columbia prior to settlement by Europeans in the 1800s, and in the Chilcotin prior to the first documented European contact (*Tsilhqot'in Nation v. British Columbia* 2007 BCSC 1700). First Nations peoples in BC were already "mounted" (i.e. actively training, and using horses) by the mid-1700s (Salter and Hudson, 1978; Goddard and Smitten 2002). By the time of early written documentation – by explorer Simon Fraser in the Fraser River and Chilcotin region, and Thompson in the East Kootenays – horses were established as wild populations on the landscape, and well-integrated into a number of First Nations societies (McCrory, 2002). Practices of chasing, capturing and training wild horses existed among First Nations peoples in the Chilcotin (IN03), the South Okanagan (Robinson and Wickwire, 2005) and likely in other parts of the province as well.

The fact that there is a word for horse in the Tsilhqot'in language (*naŝhliny*) is one of many factors that indicate a history of cultural and functional integration with horses among the Tsilhqot'in people (*Tsilhqot'in Nation v. British Columbia* BCSC 1700, 2007). Horses were easily integrated into Tsilhqot'in lifestyles, initially facilitating rather than changing traditional economies and livelihood practices (Lutz 2008). Horses helped as transportation for seasonal movements by families throughout the landscape, and to bear weight when hunting or gathering wild foods (IN01a). Later, they also formed an essential part of small-scale ranching activities for First Nations people and settlers (IN03; Glavin and PoNV, 1992; Thistle, 2008/09). "By 1887, the sixty-eight members of the Stone band of Tsilhqot'in had 168 horses," and the Anaham people had two hundred horses (Lutz, 2008, p. 144).[10] By

[10] Lutz does not provide numbers for the horses of Xeni Gwet'in people in and around Nemiah. The lack of available information about the Nemiah Valley at that time is likely due to the remote location of the Nemiah

the 1890s, there were already emerging conflicts between some ranchers, First Nations and government agencies over the presence of free-ranging horses that were "claimed" by First Nations as their own, and accused of over-grazing rangelands shared with cattle (Thistle, 2008/09).

Not only did First Nations in the central interior of British Columbia claim wild horses as part of their own natural resources to use when needed (Thistle, 2008/09) but it was common practice for horses used by First Nations and ranchers alike to be turned out on open range (IN05). Particularly in winter, horses would be turned out to fend for themselves in order that bought or stored hay could be used for cattle (IN03). When cattle were driven or kept on open range in the winter, horses would be kept with them or driven into snowy meadows before the cows to paw through snow and ice for the available forage underneath (IN01a). Hence some horses in the Chilcotin were thoroughly wild. In some cases domestic horses were turned out regularly, overnight, or seasonally. Other free-ranging horses were ranch animals that had either escaped or been released from human settlements. This situation continues to this day, and can be a confounding factor in aerial counts of "wild" horses in some areas of the Chilcotin, as it is generally not possible to see brands on free-ranging horses from the air (Alphonse personal communication, 2009).

It is not known how much mixing or inter-breeding may have occurred between free-roaming domestic livestock and wild horses in the Brittany Triangle. In the Brittany Triangle (study area), wild horses may have been more isolated than in other areas, due to the geography and natural landscape features that limit movement and interaction, particularly in the more remote northern parts of the Triangle that are less frequently visited by people. Local participants with personal experience in the Brittany Triangle commented on how the horses there are "more wild" than those in other areas, including Nemiah Valley (IN01b; IN01c; IN14). This observation is consistent with assessments by a field biologist (McCrory in Goddard and Smitten, 2002) my own observations, and those of other research assistants (Card, 2010).

In the central and southern parts of the Brittany Triangle, several homestead properties were occupied by families throughout the 20th century. Within the study area for this research, Far Meadow was occupied by a family who kept cattle and horses until the 1980s (IN13). During these times, wild horses were usually driven away from the home property in order to prevent them from stealing hay, or

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Valley and the deliberate actions taken by Xeni Gwet'in to resist incursion by settlers. Lutz notes that the anthropologist James Teit recorded as late as 1909 that "the remote Nemiah band of the Tsilhqot'in were not under the supervision of any [Indian] agent since none had been able to visit" (Lutz, 2008, p. 143).

domestic mares (IN13). For much of the twentieth century free-roaming horses, including in the southern portions of the Brittany Triangle, were actively rounded up and shot in addition to being chased for capture and domestication.

Currently, horses – domestic and wild – are a central aspect of local culture and identity, as well as initiatives to ground youth in healthy development and activities which teach them about their own land and community (IN01a-e; IN03; IN10; Bhattacharyya personal obs., 2009). Saddle and pack horses are still used by some First Nations community members to access and hunt in remote areas inaccessible to motorized vehicles, as well as for ranching. Some Xeni Gwet'in elders also caution the community's political leaders and youth that the era of using cars and trucks as primary means of transportation may not last for a long time, and that horses will become more central to local life one again in the future (IN03; IN16).

Free-Ranging Horse Studies and Relevant Research in the Chilcotin

Several peer-reviewed studies of forage and dietary preference among feral horses in Western Canada emerged in the late 1970s (Salter and Hudson, 1978; Salter and Hudson, 1979), one specifically focused on the Chilcotin, though the study area did not include the Brittany Triangle (Storrar et al., 1977). Yet there is a relatively small amount of peer-reviewed information on the ecology of wild horses in mesic or forested landscapes like that of the Brittany Triangle. There are some studies from comparably damp climates in Europe (Gudmunsson and Dyrmundsson, 1994; Schwartz, 2005) and from the Pryor Mountain region in the United States (Singer and Schoenecker, 2000). However, none of these regions are similar enough to support a direct comparison of ecological conclusions. While basic equine behavior patterns tend to be comparable from one region to another, habitat use, forage preference, territoriality and range all vary between different environments. The entirely different set of social, political and ecological circumstances surrounding the effects of horses on the landscapes in other countries and continents mean that research results are of limited applicability to Canadian situations, and British Columbia in particular.

The majority of studies available from recent years appear to be in the form of unpublished professional reports by provincial government employees, consultants, and graduate research projects., The most extensive fieldwork-based ecosystem inventory available for the Brittany Triangle in recent decades, with supplementary historical analysis of wild horses, was completed by McCory Wildlife Services, Ltd (2002; 2005) for the non-governmental organization, Friends of Nemaiah Valley. Allen Dobb (2010) produced an assessment of range conditions and fencing options (pertaining to cattle) for

Valhalla Wilderness Society, concerning Captain George Town, inside the Brittany Triangle. Reports concerned with feral or free-ranging horses were completed by other consultants or provincial government employees on the topics of range assessment and monitoring (Fraser, 2007), and range management preferences with regard to feral horses (Hayes, 2008). Provincial Ministry of Forests and Range staff also released a report on aerial count data concerning free-roaming horses in the Chilcotin, including a portion of the Brittany Triangle (Hamilton, 2010).

Since 2002, publicity about the wild horses of the Chilcotin (Findlay, 2003; Findlay and Halley, 2005; Goddard and Smitten, 2002) has resulted in increasing academic interest in the topic. However, completed graduate theses or published scholarly papers on the horses remain somewhat scant. Karen Preston's (1984) masters thesis (mentioned earlier) was completed almost 30 years ago through the University of British Columbia. Preston documented free-ranging horse and cattle dietary composition in a forested study area approximately 25km northeast of the Brittany Triangle, a region that has since been mostly logged by clear-cutting. In 2010 a masters research project was completed which documented rancher and First Nations management preferences regarding free-ranging horses in a Chilcotin study area north of the Brittany Triangle (Card, 2010). The environmental and political history of free-ranging horses in the Chilcotin and Fraser Canyon grasslands as they related to the struggle between First Nations and Colonial then Provincial and Federal governments was extensively explored in a PhD dissertation from the University of British Columbia (Thistle, 2008/09). In addition, linguistic and cultural ethnography studies of the Xeni Gwet'in have been completed (Dinwoodie, 2002; Glavin and PoNV, 1992; Pye, 1992).

By far the most comprehensive recent source of documented ecological and social information on the Brittany Triangle are the volumes of local knowledge, oral histories, expert interviews and historical information of the Xeni Gwet'in people compiled as background documentation for the court case, *Tsilhqot'in Nation v. British Columbia* (Argument of the Plaintiff, BCSC 1700, 2007). This compilation of cultural experiences, knowledge, history and practices includes extensive documentation of the use of horses by the Xeni Gwet'in, as well as local cultural values, ecology and landscapes. While the court documents provide a deep, rich compilation of information about the cultural values and ecology of horses in the Brittany Triangle and Nemiah Valley, the purpose of those documents was to support an Aboriginal rights and title case, a considerably broader goal than the specific analytical focus of this dissertation.

FORMAL MANAGEMENT CONTEXT FOR FREE-RANGING HORSES IN BRITISH COLUMBIA

Management authority for the free-roaming horses of the Brittany Triangle, Nemiah Valley, and other areas within their traditional territory rests with the Xeni Gwet'in First Nation (Pynn, 2008). Historically, the BC provincial government has taken action to control or eradicate free-ranging horse populations. Despite current political uncertainty about the jurisdiction and authority of lands and free-ranging horses in the study area, provincial ministries remain concerned with the horses and the issues of range and wildlife management that tend to be associated with the horses. The Xeni Gwet'in have asserted responsibility for, and rights to steward the free-ranging horses in their traditional territory since Europeans arrived in the Chilcotin (Thistle 2008/09; *Tsilhqot'in Nation v. British Columbia* 2007 BCSC 1700). They maintain this position and it was recognized by the British Columbia Supreme Court in 2007. Yet the Xeni Gwet'in relationship with horses that range in their territory, while it could be described in the terms of monitoring and management, is not locally referred to in those terms and differs fundamentally from that of the provincial government. The basic legislative and jurisdictional context for management of free-ranging horses in the study area is summarized in this section. The relationship between local First Nations and community members is described in Chapters 5 and 6, in more depth.

Provincial Government

Free-ranging, wild or feral horses are not specifically labeled or categorized by any legislation in British Columbia, as a distinct animal population type. In other words, wild or feral horses are not officially considered to be wildlife, game, or livestock, nor are they labeled as anything else in a separate category by any provincial legislation – the Range Act (SBC 2004), Forest and Range Practices Act (2004) and the Wildlife Act (RSBC, 1996). Horses with brands that are ranging freely without specific tenure by an owner, on land that the Province of British Columbia considers to be Crown Land would be considered "untenured livestock" under the Forest and Range Practices Act (IN12). In the Chilcotin, the provincial government agencies most concerned with land use management and free-ranging horses tend to be the Ministry of Forests and Range (MFR) and the Ministry of Environment (MOE).[11] While the MOE is concerned with wildlife and ecosystem health in parks and protected areas, the majority of land in the Chilcotin that is not privately owned has been administered as Crown Land by the MFR, and leased out either under forestry licenses or range tenure. Prior to 2007, parts of the Brittany Triangle outside of Nunsti Provincial Park were considered by the

[11] During the course of this study, the name of the former Ministry of Forests and Range was changed in October 2010 to the Ministry of Forests, Mines and Lands, then again in March 2011 to its current name, the Ministry of Forests, Lands and Natural Resource Operations.

Province of British Columbia to be Crown Land, despite the Xeni Gwet'in Declaration of an Aboriginal Wilderness Preserve. (This situation changed somewhat after the Supreme Court ruling on the *Tsilhqot'in Nation v. British Columbia* case, in November 2007, described below in the next section.) These crown lands, though difficult to access because of the natural topography of the area, were nonetheless legally available for tenure as forest and/or range land. As a result, free-ranging and wild horses in much of the Brittany Triangle and elsewhere in the Chilcotin were considered a pest species to be dealt with by the MFR as a range management problem (IN08; Resh, File No. 760-4, 1989; Collins, 1995). However, without a specific mandate or policy to direct government programs and funding towards free-ranging horses, both the MFR and MOE have tended to lack sufficient capacity (i.e. budgeted money and staff time) to study, monitor or manage free-ranging horse populations in a comprehensive or strategic way.

Court Case Ruling

The jurisdictional context for management of land use activities, which frames discussions and decisions about wild horses is in a state of ongoing uncertainty and flux. Tsilhqot'in territory was never ceded to Europeans or Canadian governments by Treaty or for payment. Struggles and disagreements over land and resource use, including aboriginal rights to hunt and fish on their own territory, have been a constant factor for the Tsilhqot'in people for well over 150 years, since early European incursions and settlement into the area. After more than a decade of disagreement and protracted negotiations over industrial logging interests in the Brittany Triangle and surrounding areas, The Xeni Gwet'in consolidated two existing court cases into a single case in 2002: *Tsilhqot'in Nation v. British Columbia* (2007 BCSC 1700). Through this court action the Xeni Gwet'in claimed their aboriginal title, and rights to hunt, trade and trap in 438,100 hectares of land including the Brittany Triangle and Nemiah Trapline Territory, a portion of their traditional territory (Lutz 2008; Woodward, Hutchings and Baker 2008).

On November 20, 2007, Justice Vickers gave a final decision in which he recognized the Xeni Gwet'in right to aboriginal title of more than half the Claim Area and some areas outside of it, as well as their aboriginal rights. While the Court stopped short of actually declaring Aboriginal title, it was recognized, and the Judge's final decision stated that the BC Forest Act does not apply to Aboriginal Title lands. Given the courts findings, it was concluded that "British Columbia has apparently been violating Aboriginal title in an unconstitutional and therefore illegal fashion ever since it joined Canada in 1871" (Woodward & Company, 2007). Among the Aboriginal rights of the Xeni Gwet'in that were

recognized by the court, Vickers specifically noted the right of Xeni Gwet'in to "capture and use horses for transportation and work" (*Tsilhqot'in Nation v. British Columbia,* 2007 BCSC 1700).

While the Xeni Gwet'in court case was significant in a number of ways and did set precedents for Aboriginal rights and title cases in Canada (Mahoney, 2008), both through the way in which indigenous knowledge was submitted and treated, and in the ruling by Vickers J. regarding aboriginal rights and title, all parties involved did appeal the decision (Woodward et al., 2008).

Apart from its legal ramifications, the court case, decision, and appeal have had some effects on the ground, among residents, landowners, businesses, and professionals who deal with the Claim Area. The Court decision, with its specific reference to Xeni Gwet'in rights to capture and use horses along with other animals and fish, challenged the jurisdiction of the provincial government with regard to free-roaming horses. Following the Court decision, a number of provincial government employees and participants in this study stated that they were adopting a "hands off" approach to dealing with the issues surrounding wild horses, and with the horses themselves, saying that the matter and responsibility now rests with First Nations (IN08; IN14). It was unclear whether this response was indicative of provincial agencies truly reducing their interests and involvement in issues related to wild horses, or whether it was merely a reluctance to discuss the issue with researchers. Personal correspondence with provincial managers (Pedersen, 2008), a record of recent round-up contracts between provincial ministries and First Nations (discussed below), and a record of some attempts at knowledge sharing through range management workshops (Hayes, 2008) indicate that provincial agencies do remain concerned and involved with management interventions pertaining to free-ranging horses. Their recent management actions regarding free-ranging horse populations have been somewhat more limited and less aggressive than they were throughout most of the twentieth century.

Despite the use of terminology referring to co-management agreements, the relationship between provincial agencies and First Nations governments appears to remain one characterized by wariness and distance, even in the midst of collaboration.

Historic Management

While there is a long history of disagreement between First Nations, ranchers, and government authorities about how to deal with wild and feral horses, the lines of history are not clearly drawn between stakeholder groups. Just as wild and domesticated horses had already been integrated in the First Nations way of life prior to Euro-Canadian settlement, so too did early settlers and ranchers often

adopt similar practices, chasing some wild horses for use as domestic stock, and releasing domestic animals to winter in the bush, or to breed with and alter the genetic stock of free-ranging horses. Individuals from all groups participated in round-ups, sales, and shooting of wild horses, though perhaps with different motivations and pressures behind their actions. Yet despite the mixed history of participation and disagreement over the management of free-ranging horses in the Chilcotin, documented and oral histories do indicate a basic divide between First Nations and government authorities over the issue of wild horses. Although individuals from all parties participated in both the round-ups and the release of horses on the range, there seems to have been a consistent claim by First Nations communities that the horses were theirs, that they were less of a problem and required less management or intervention than the provincial government asserted. Also fairly consistently documented are provincial government concerns that there are too many horses, assertions that they are feral, escaped and lost animals rather than "wild", and a desire that local people (especially First Nations) be encouraged, pressured or paid to round the horses up off the land (*Tsilhqot'in Nation v. British Columbia*, BCSC 1700, testimony of Harry Setah, 2004; Thistle, 2008/09; Bouchard, 1971).

Throughout the first half of the twentieth century, as First Nations people, ranchers and government authorities wrestled with each other over land use and resource management priorities, Tsilhqot'in communities were pressured to adopt agrarian and ranching lifestyles, and to remain primarily on reserve lands (Lutz, 2008; Thistle, 2008/09). The land itself in the Chilcotin was better suited to the seasonal movements and traditional livelihoods of the Tsilhqot'in than it was to the stationary agrarian practices and cattle ranching of the settlers (Lutz, 2008). A participant commented on the lack of suitability of much of the Chilcotin for raising cattle.

> *This is crappy ranching country. Bottom line. The number of hectares that you have to have per animal on crown range is friggin' insane.*
>
> *I'm sure there's some...the original pioneers when they came out, they scoped out the swamp lands out in Anahim Lake and went, "Yah, we can make a go of it here." But that industry's expanded now to where pretty much there's cattle everywhere (IN07).*

Not only did horses facilitate the traditional livelihoods and seasonal movements of the Tsilhqot'in people, wild or free-ranging horses adapted better than cattle to the landscape and climate of the Chilcotin. Wild horse populations were valued by First Nations people as one of many types of wild animals to be used as necessary, as a resource (trained for transportation and work), and a source of income (sold). Historic documents and oral histories both demonstrate that Tsilhqot'in people claimed free-ranging horses as their own, and viewed them as an important resource and income source (*Tsilhqot'in Nation v. British Columbia*, Testimony of H. Setah, 2004; Thistle, 2008/09).

At the same time, historic sources – oral and written - also indicate that government and some ranchers considered free-ranging horses in the Chilcotin to be a problem of feral or escaped livestock which were a threat to cattle forage and other economic landscape values (Resh, 1989; Thistle, 2008/09; Wallace, 1965). Thus the presence of free-ranging horses and responsibility for them was contested from the 1890s onwards (Thistle, 2008/09). Even through the middle decades of the twentieth century, documents indicate that the horses typified and were a part of ongoing power struggles over land use and access to resources. First Nations claimed the horses as their own, while ranchers and government authorities sought to clearly define allowable livestock and to eliminate or reduce the numbers of free-ranging or feral horses on the land, particularly in areas that were under grazing pressure from both horses and cattle (Bouchard, 1971).

Round-Ups and Shooting Permit system

Local knowledge, shared by all participants in this study who lived in the Chilcotin, indicates that horses were not only rounded up but also shot in significant numbers off open range land in the Chilcotin, throughout the 1930s, 40s and 50s. While accounts and memories differ regarding the payments obtained in exchange for dead horses at that time, participants explained a system under which the provincial government would pay a set price for each pair of horse's ears that were turned in, with a higher price for stallion ears and testicles. A few participants with long family histories in the region spoke of dead horses being hauled out by the wagon-load during those decades, and of individuals who were proud of their records for shooting large numbers of horses off the range.

> *Across there at Chilquot Lake, there was hundreds of horses. They, Forestry… 'bout 1940… Forestry… gave 'em $2 a horse and free shells, eh? They shot 1100 horses in two months.*
>
> *Interviewer: Holy Crow. That's about 1940, you said?*
>
> *Yup. '40, '41.*
>
> *Interviewer: So they just take the ears in? Is that what you said?*
>
> *Yup. The ears. And that time, in World War II they ah...cut all the horse hair off, and yah. 'Cause I can remember I was a small kid when they'd come into Alexis Creek with two, four horse teams, and it was just heaped with horses, eh? But there was so many horses out there that they'd eat it [ground] just as bare as this table, eh? And there's still lots of bones out there. There's still horses there. You know? (IN05).*

Records of official documents made available from the Ministry of Forests and Range field office in Alexis Creek, BC show permits issued by the provincial Forest Service at first under the Grazing Act (RSBC 1960), Chapter 168, and later under the the Range Act, Section 45 for rounding up and/or

shooting feral and free-ranging horses dating back to 1965. Permit applications were filed with attached maps specifying the geographic area where roundups or shooting would take place. By the 1970s, permits were more frequently for round-up and sale, with shooting being named as a secondary option only under circumstances where horses were difficult to approach, inaccessible for round-up, or when rounding up individual animals would have been inhumane (Stokes, Permit File 052130, 1975). Horses that were rounded up for sale were either taken to auctions in Williams Lake (IN05) or shipped directly for slaughter. While the practice of shooting free-roaming horses continued, the process and procedures under which this was formally considered to be acceptable changed.

A report by a Ranger stationed at the Alexis Creek field office for the MFR, dated 1971, mentions that "an attempt was made to encourage more riding [to round up feral horses] by local Indians [sic] by increasing the round-up fee" and specifically recommends that "in the future this approach may be worth considering" (Bouchard, 1971). Notably, this recommendation was made on the same day as a second report by a Deputy Ranger (Nichols, 1971) which detailed a mostly unsuccessful MOF attempt to round up wild horses by snowmobile. The experiment involved range officers on four snowmobiles equipped with portable phones and radio headsets, and lasted for several hours. Despite the equipment used, and the fact that winter "conditions were as favourable to the snowmobiles as possible and about as unfavourable to the horses as could be imagined" (p. 2) the chase resulted in the capture of only one young, "exhausted" horse after the other animals chased escaped into dense timber. Given that riders from local First Nations and ranching families had considerable skill with bush riding and great success rounding up wild horses when they wanted to, as well as the fact that many local people were personally familiar with at least some of the free-ranging horse populations, it is likely that the MOF recommendation to use First Nations riders is reflective of the skill required for the task, as well as a cost-saving measure.

Permit records and local participants indicate that roundups and shooting of wild horses continued throughout the 1970s. These permits were generally issued to a relatively small group of regular individuals who were known to be skilled riders. Both First Nations and non-First Nations people regularly took out these permits, caught wild horses, and sold them. At times, doing so involved some internal divisiveness and tension for First Nations communities and individuals who participated. First Nations participants in this research spoke of pressure exerted by the provincial government on First Nations to remove more horses than they wished to (IN03), the desperate need for money that drove some locals to chase horses in order to earn payment (*Tsilhqot'in Nation v. British Columbia*, BCSC 1700, Testimony of H. Setah, 2004), and in Nemiah a sense that locals preferred to have control of the

roundups by doing it themselves and choosing which horses would be taken, rather than letting outsiders come in and take their horses (IN01a). Ministry of Forests memorandums from 1970 and 1971 indicate internal frustration with some Tsilhqot'in people garnering "protection permits", by obtaining round-up permits for free-ranging horses on their land, and then deliberately not acting on them, or only bringing in a very few horses (White, 1970).

Change to Range Act and Policy

By the 1980s, changing values in the provincial government, increased public scrutiny and criticism, and changing relationships between First Nations and the provincial government began to influence both informal and formal policy towards free-ranging horses in the Chilcotin. Round-up permits and internal letters from the Ministry of Forests indicate that while feral horses were still a concern to range managers, there was also some concern about humane practices and public image when handling feral horses. Round-up permits and shooting permits were still issued regularly during this decade. Documents continued to stipulate a preference that shooting only occur when rounding up a specific group of horses became impractical or inhumane (Nakken, 1982). As media attention began to alert the public in other parts of British Columbia to the rounding up and shooting of free-ranging horses in the Chilcotin, regional range officers with the MOF wrote letters to concerned public explaining that the horses were "feral, escaped or lost", and not at all similar to the wild mustangs of the United States (Resh, 1989).

Documentation of the Horse Control Program was not available for the years subsequent to 1989 through the information request made to the Alexis Creek MFR office. It appears that the sections of the Range Act pertinent to the issue of permits for rounding up and or shooting horses were amended in 1989 or 1990, and subsequent actions were undertaken less frequently through contracts. It is not clear how frequently officially sanctioned horse round-ups and shooting occurred after that, as no systematic set of records were available.

Current Management

Provincial Government

Free-ranging, wild or feral horses remain outside of any formal classification within existing provincial policy or legislation, including the *Range Act* (SBC 2004) and the *Wildlife Act* (RSBC 1996). In other words, there are currently no formal provincial policies, management frameworks or consistent, sustained formal management interventions aimed at free-roaming horse populations in the Brittany Triangle (IN08; IN12). This situation is consistent with the historical model for the Chilcotin in some

ways: action or intervention is taken by various parties on an "as needed", case-by-case basis, to deal with specific geographical areas and/or specific bands of horses. Also similar to the historical situation in British Columbia, horses that are branded (owned by someone) and ranging freely on the landscape without specific permission are considered to be untenured livestock. Unbranded free-ranging horses are considered to be feral. Without a formal classification for free-roaming or wild horses, there is little capacity, political will or ability for the provincial government to develop policy or management guidelines specifically for them. Provincial government attention to free-roaming horses is primarily oriented to population monitoring and observation, including somewhat regular (annual) aerial counts in the Chilcotin by the Ministry of Forests and Range (Hamilton, 2010), and the monitoring of grazing impacts on some range shared by horses and cattle.

In general, it appears that provincial government agencies have reduced their involvement and active interventions with wild horse populations in the Chilcotin, in the last decade. This change may be due to increased public scrutiny of issues related to wild horses, the BC Supreme Court ruling that First Nations have a right to use wild horses and the right to title of some traditional lands (*Tsilhqot'in Nation v. British Columbia* BCSC 1700), and changes to the values of government institutions to be more open to consultation with First Nations and stakeholders (Pedersen, 2008). However, it is not clear whether the lack of available documentation regarding active management of wild horse populations in recent years is truly reflective of reduced intervention activities in practice. Provincial government concerns about free-ranging horses in the Chilcotin tend to be related to concerns over the health and productivity of range lands and forage for cattle (in the case of MFR), or ecosystem health and wildlife habitat values (in the case of Ministry of Environment).

First Nations Governments

The Xeni Gwet'in First Nation has primary responsibility for the Brittany Triangle, as traditional caretakers of that land. Their rights and title to that area were recognized in the 2007 BC Supreme Court decision (*Tsilhqot'in Nation v. British Columbia* BCSC 1700). When the Xeni Gwet'in First Nation Government declared the Brittany Triangle and Nemiah Valley to be a wild horse preserve in 2002, they proclaimed that the traditional relationship between Xeni Gwet'in and wild horses shall continue, and that, subject to the existing Aboriginal Wilderness Preserve and traditional uses, the horses and their habitat shall be protected from human-related disturbance (FONV, 2011). Currently, wild horses in the Brittany Triangle are monitored by the Wild Horse Ranger, and counted on an irregular annual basis (when funding is available) with an aerial count separate from the one conducted

by the provincial government. Both the Wild Horse Ranger position and the aerial counts are partially funded by the non-governmental organization, Friends of Nemaiah Valley.

In the Nemiah Valley, the Xeni Gwet'in First Nations Government tends to manage free-roaming horse populations with slightly more frequent interventions than in the Brittany Triangle, since the land in Nemiah is under greater stress and grazing pressure from human inhabitation and cattle as well as the horses. Community members and government leaders are familiar with most of the free-ranging horse bands that live in the Nemiah Valley. In many cases people refer knowledgeably to individual animals, at times explaining which colts and fillies are the offspring of which mares (IN01a-e). If areas of land become overgrazed or stressed, steps are taken to round up free-roaming horses and at times to remove some from the range. (The full system or etiquette of round-ups and redistribution are described in Chapter 6.) While horses – both owned and unowned - have always been allowed to roam freely in the Valley, during the last decade the Xeni Gwet'in First Nation Government began to require local residents to keep owned (branded) horses confined to pasture space and to feed them adequately. An unbranded animal over two years of age is considered to be a "slick" (unowned) and in the event of a round-up is fair game to be claimed or sold by the person responsible for catching it. Other Tsilhqot'in nations develop and maintain their own policies and practices with regard to free-ranging horses on their lands.

The informal, individualized practice of chasing, rounding up and capturing horses still takes place, though less frequently in the present than in the past. Chapter 6 offers a detailed discussion of these practices.

Recent Round-up Contracts

In recent years, the provincial Ministry of Forests and Range, and the Ministry of Environment have arranged contracts to round up wild horses - with the Yuneset'in (Stone) First Nation in 2008 and with the Xeni Gwet'in First Nation in 2008 (Pynn, 2008). These events precipitated some disagreement, not only between the provincial and First Nations governments over how many horses should be removed from the range (IN11; IN09), but also between and among First Nations community members (IN16). Consistent with the historical difference in perception between First Nations and provincial government employees, First Nations participants in this study described implicit disagreement over how many horses to remove from the range: there was a general feeling among First Nations community members that the provincial government pressures them to remove more horses from the range than they believe to be necessary (IN11).

The 2008 contract with Yuneset'in resulted in the construction of corrals for rounding up free-roaming horses in the Haines management unit, to the North-east of the Brittany Triangle near Stone Reserve. Approximately 25 horses were rounded up, with some being sold for slaughter and some being kept for training as personal saddle horses (Pynn 2008). Participants reported that the timeframe of government contract and funding was too short and not seasonally compatible with the logistical requirements of chasing wild horses. Riders must have enough time to condition their own horses for the chase, and the payment must be adequate for chasers to put their own horses at risk with the bush riding. Also, chasing wild horses is most effective in specific winter conditions, when snow forces wild horses to remain on trails, and tires them out more quickly (IN11; IN09).

The other round-up, undertaken by the Xeni Gwet'in First Nation in 2008, was conducted closer to Nemiah Valley. The chase and live capture of horses was commissioned by the Ministry of Forests and Range. The Ministry of Environment paid for six horses to be shot so their carcasses could be used for wolf bait as part of a predator study in the BC interior, focused on caribou (Pynn, 2008). While the round-up and shooting of free-roaming horses was nothing new to residents of the region, this particular event garnered publicity and criticism from both outside and within the local communities. Chasing wild horses on horseback and capturing them for sale or use is recognized by most locals as an acceptable activity, and has historically been a source of much-needed income at times. However, shooting them is controversial, and not all methods of chase or capture are considered acceptable under normal circumstances in the present day (Alphonse, quoted in Pynn, 2008).

Community Politics, Management and Perceptions

Participants from First Nations and from provincial government agencies separately described parallel challenges of enforcing management interventions or regulations in small communities. One provincial government participant openly criticized the range management practices of ranchers in the Chilcotin, stating that land was poorly managed and range was degraded. Such problems have been common and systemic for at least a century, but have been exacerbated in recent decades by cumulative ecological effects of overgrazing and soil degradation, drought, and increased numbers of cattle on the range. However, the participant described how, in practice, standards and regulations are rarely enforced in small communities where government employees and their families are neighbours and friends with ranchers, and sometimes the same people are engaged in both professions.

> *"Out here if you say something against a rancher... Like I keep my thoughts on ranching basically to myself. Because you're not...because a lot of my friends are*

ranchers. Some of my best friends I go riding with all the time, they're like the... Business and your personal friendship is so… they're like here and here [gestures side by side but separate]. You never talk. I never talk to [coworkers] about their range practices. And I've got to admit, I'm not going to go out there and raise stink to the Forest Service about their range. And it's simply because the thing is so all pervasive that it's only if I go to a really well known fish stream and I just see something that... I just take pictures of it, give 'em to the range folks here and say, 'You know you really should find some way to keep cattle out of here.' But then they just go to another spot" (IN07).

There is a sense of forgiveness and loyalty among colleagues and friends, and a desire to keep the peace which prevents many government employees from charging their own neighbours with violations of range management practices.

Similarly, in Nemiah Valley management interventions can also cause some discontent or resentment if undertaken in a heavy-handed or authoritarian manner, and not everyone in the community agrees about what actions are necessary or appropriate. One local government and community leader articulated the necessity of being sensitive, especially in a small community, to the personal struggles that individual families might be experiencing, when deciding what management interventions to act upon. The participant explained the complexity of trying to administer fines or require range fees from friends and family to the locally controlled Stockman's Association, when the First Nations government was overseen by the Department of Indian Affairs (DIA) and their financial decisions were undermined by authorities.

"So from the '90s on it was really good. But as time went on, some of our people were... we got alcoholic problems, drug problems, other problems... and then, now that it's, because we're paying ourselves [range fees] some of them are choosing not to pay, saying, "This is my land. Why should I pay?" So...we try to find a way to make them pay and … we used to deduct it off their cheque. We used to be able to do that. So...but if a person wants to they can go to DIA and say, "This is what's happened to my cheque." And then DIA would take the funds away from us.

And then they [DIA] will manage, third party will manage us. So our people, majority of the ranchers said, "No, we gotta keep paying; we gotta look after..." Minority of our ranchers were saying "No, no, no..." So you got the problem on [names local range land in Nemiah that is overgrazed].

But these individuals, [I] got lot of respect... The alcohol was controlling them. They know what's right and wrong, but their horses are out on the [rangeland]. …Those horses come from here. So they don't want to get rid of their horses on [the degraded range]. That's a culture here, that...that's a part of that. They don't want to get rid of it. But we're saying, "Well, control it." And they tried to but they're...alcohol and...

Interviewer: Struggles they're dealing with...

Yeah. So we're still dealing with that. And you know we're, we're working on a plan to eventually control that [degraded range land], for example.

And we got some people like my Aunties, my cousins that have cattle and, same thing – alcohol problems where they... And then they can't find anyone to cut their hay because of their age, but the cattle survive off the land because they know the land. And that's what we're dealing with. We're dealing with helping them get those cattle and selling them and getting them hay, so...

Interviewer: Right, helping them to manage the...

Right. So this is our group that's got some, I say minority, eh? But majority are all good. But you got a minority that affects everybody. And some people get too frustrated, and... we're trying to work with that" (IN03).

This sort of personalized flexibility, and the ways in which management actions in practice are mediated by personal relationships in small communities is similar to the situation described by provincial government participants when referring to the challenges of enforcing range management policies in ranching communities north of the Brittany Triangle.

The similarity between situations faced by First Nations government leaders and provincial government employees in their own communities can provide common ground for shared understanding of management challenges, even for people with different opinions about the need for management itself. However, the statements of one provincial government participant serve as an example of the unintentional double-standard that can pervade ethnic stereotypes. The participant was fully cognizant and openly vocal about the different priorities and discrepancies between provincial government agencies when it came to enforcement of land and wildlife management policies on the ground. However, when referring to First Nations communities, the participant seemed to expect a smooth and consistent execution of management policies, concluding that if First Nations range lands were degraded, then "they must not understand" the ecological complexity of the problem.

"I just, don't get the sense that...I always have a feeling that if people knew what they were doing, and if they knew how badly they were doing it, that they wouldn't do it. So, the extent of the, you know, degradation of that, of that [rangeland in Nemiah][12], and all through there. I mean it's pretty widespread. You know, and my concern obviously are all the indigenous wildlife that are being impacted as a result of all the overgrazing … deer and moose and...all the things that the Xeni Gwet'in people hold dearly to themselves are being impacted by these horses. And I think that...and I don't know...I don't know whether they're getting that message.

Interviewer: Have you talked, have you had a chance to-?

No. No.

Interviewer: Oh, you haven't had a chance to talk to them?

[12] This speaker is referring to the same patch of land that the participant from Nemiah was referring to in the previous quotation.

No. It's very difficult to reach them.

No. No. And I don't know whether they're going to want to hear... You know the Xeni Gwet'in band better than I do. I've never had any contact with them whatsoever. Um...but, you know...allowing these feral horses, I think, to...the population to expand as they have, is not good for that area in the long term, and is not good for the resources that they hold dear to themselves" (IN14).

This provincial government employee (IN14) was referring to the same patch of degraded range that the previous First Nations participant had described. From the words of the local First Nations participant (IN03), it was clear that the land was degraded as a result of overgrazing by known cattle and horses, belonging to families who were struggling to cope with a number of issues. It was also clear that the local government and community leaders were attempting to address the ecological problems, while also maintaining relationships with neighbours and family members, similarly to the situation described by the first participant in this section (IN07) related to the challenges of enforcing provincial range management standards among neighbours and friends.

This participant (IN14) seemed willing to accept that "understanding the problem" did not necessarily lead to the immediate cessation of range and habitat degradation on provincially managed range lands. However, he/she not only assumed that the visible degradation of range on First Nations lands was due to feral horses, but also that degraded range lands and habitat on First Nations lands indicated a lack of understanding by FN governments and community members. The participant had reached this personal opinion without having spoken to members of the First Nation whose land was being discussed. This inconsistent attitude is typical of a fundamental attribution error, in which people attribute their own short-comings to situational influences, yet they attribute short-comings in others to personal qualities (Gleitman, Gross and Reisberg, 2011). It is also indicative of how stereotypes or prejudice can influence the attitudes of even the most well-intentioned, highly educated and experienced members of one culture, when perceiving and interpreting the actions of those from another culture.

CONCLUSION

This Chapter has outlined the ecology of the Brittany Triangle study area, described relevant social and demographic contexts, and outlined the historic and current management practices relevant to free-ranging horses in the Chilcotin in general. Horses have been ranging freely in the Brittany Triangle, Nemiah Valley, and other parts of the broader study region for a significant period of time and multiple equine generations. There is disagreement among individuals and political agencies over the ownership, classification and legitimacy of wild and free-ranging horses in the study region. The history of these disagreements is tied to power struggles over territory, land and resource use, and

autonomy between First Nations, some settlers, and provincial/federal governments. There is a long history of disagreement between Tsilhqot'in First Nations and the provincial government over the management of free-roaming horses. At the same time, there is a long history of individuals from both groups participating in round-ups and the shooting of free-roaming horses, though in many cases these actions originate from different motivations between the different groups. As the jurisdiction over land use, territory and free-ranging horses changes with the ongoing court cases and territorial negotiations, many of the same tensions over free-roaming horses remain, though perhaps less obviously than at other times in history. The free-roaming horses of the Chilcotin in general are indicative of broader struggles over land use, power and competing cultural perceptions of how people should interact with animal populations. The horses of the Brittany Triangle, though more remote geographically than other Chilcotin horse populations, in other ways are most central to these broad issues and power struggles, as they dwell in the centre (literally and symbolically) of a landscape that has multiple layers of human and animal inhabitation, multiple land titles and multiple layers of designated protected areas. The horses, and the Brittany Triangle, are also at the cultural and political heart of legal and public relations campaigns to assert First Nations rights and responsibilities to their own territory.

CHAPTER 5 – HORSES IN AN ECOLOGICAL, SOCIAL AND CULTURAL SYSTEM

"Horses – they eat, shit and walk around. That's it…unless you chase them. Then they run around."
~ Anonymous cowgirl visiting Nemiah from Big Creek, 2009.

The conversation that led to the comment above occurred during a casual chat with two people from a different part of interior British Columbia, who were visiting Nemiah Valley for the annual rodeo. At that point I was in my fourth year of studying the complex issues surrounding free-ranging horses, and I laughed at the comment. On one level, it seemed to sum up my full-time studies in a nutshell, and was typical of the sort of straight-forward conversations and dry opinions that I enjoy about the Chilcotin. On another level, it was just one opinion, typical of some people's views and sharply contrasting with others'. That contrast was evident in other conversations that I had with some local people in Nemiah who took time to tell me in great detail the complex intricacies of behavioural traits, feeding habits and physiological distinctions among local free-ranging horses, from the level of horse bands or groups in particular territorial ranges, to individual animals. There is a rich array of locally specific information to be gathered about wild, feral, and free-ranging horses in the Brittany Triangle and Nemiah Valley, as well as other parts of the Chilcotin. There are also multiple layers of perception and meaning through which people interact with, observe and form opinions about the horses.

This chapter outlines the research findings about ecology, social and cultural values of wild and free-roaming horses in the study area, as well as the varied perceptions and meanings which people associate with those horses. It presents research results as a foundation for subsequent discussion (in this Chapter and Chapter 6) about some of the complex interactions between people, horses and the land in Nemiah and the Brittany Triangle, and the ways in which horses are part of the functional, socio-cultural and spiritual relationships that many locals have with their home places.

ECOLOGY OF FREE-ROAMING HORSES IN STUDY AREA

This section reports on research results obtained in response to the first major research objective of the study: to determine and quantify the species of vegetation where horses are feeding. Controversy over free-ranging horses in the Chilcotin tends to focus on their perceived ecological impacts, particularly on range shared with cattle (Williams Lake Tribune, 1995; IN08), and habitat used by wildlife species

(e.g. moose) (IN07; IN14). The designation by the Xeni Gwet'in and FONV of a Wild Horse Preserve in the Brittany Triangle exacerbated concerns of some range managers and wildlife conservationists who witness the cumulative ecological impacts of combined grazing by free-ranging horses and cattle in the semi-arid and grassland ecosystems closer to ranching communities near Highway 20 and the Nemiah Valley (IN14). There may be a tendency to assume the ecological impacts of free-ranging horses to be ubiquitous across the landscape despite the heterogeneity of ecosystems and habitat use by horses and cattle. However, relatively little scientific information concerning the ecological impacts of Brittany Triangle horses is available, and very few people have first-hand knowledge of ecological conditions inside the Brittany Triangle. As a result, controversy over the designation of a Wild Horse Preserve may be partially exacerbated by first-hand knowledge in areas which do not accurately represent the actual conditions inside the Brittany Triangle.

This study builds on previous research done in the area by integrating a quantitative assessment of plant community composition and species in the forage habitats of Brittany Triangle horses with other rich sources of observational and experiential data, as well as local knowledge about their ecology and feeding practices. This section provides a descriptive overview of research results concerning the population, habitat use, and feeding practices of free-ranging horses in the Brittany Triangle.

Population

Numbers and Aerial Counts

Free-ranging horses in the Brittany Triangle represent a portion of the total number of free-roaming horses in the Chilcotin region. A *population* is "a collection of organisms of the same species that freely share genetic material, that is, that interbreed" (Morrison, Marcot and Mannan, 1998, p. 49). Within the Chilcotin, there are various sub-populations of free-roaming horses, where *subpopulation* refers to "a portion of a population in a specific geographic location" (Morrison et al., 1998, p. 49). These sub-populations are also characterized to varying degrees by a mixture of horses descended from multiple generations of wild or free-roaming animals, as well as more recently escaped feral and some branded or "owned" animals (*Tsilhqot'in Nation v. British Columbia*, BCSC 1700, 2007; IN05; IN03; IN01).

Both the provincial Ministry of Forests and Range, and the Xeni Gwet'in First Nations Government in partnership with Friends of Nemaiah Valley, have attempted at intervals over the past twenty years to assess the number of free-ranging horses in areas of interest using aerial counts. The Xeni Gwet'in and FONV generally focused on the Brittany Triangle and Nemiah Valley, while the MFR tended to cover

a broader area, divided into geographical units. The aerial counts by both parties provide an indication of free-roaming horse numbers in the region. However, a combination of logistical and financial challenges with aerial counts, and count methodologies mean that no statistically significant assessment of the total number of horses in the Brittany Triangle is available.

Such inconclusive data is fairly typical of aerial counts of wildlife populations, particularly in forested or semi-forested regions where visability is extremely low and forest cover contributes to poor visibility (Lubow, Ransom and Singer, 2004). Since a census (defined as a total count, without error, of a population) is generally not possible for wildlife populations, some estimation technique is necessary. However, most statistically valid estimation techniques rely on systematic flight techniques and counting methodologies. Even then, variability in weather conditions, snow cover, and other factors make it difficult to apply a uniform estimation technique to different counts (Lubow et al. 2004). Also, the escape behavior of animals being counted can have a strong effect on the accuracy of aerial counts. A study of feral horse responses to helicopter counts in New Zealand found that flights at low altitudes prompted escape behavior in feral horses, which included running. At times horse groups would run from one flight path to the next line in the flight grid before the aircraft reached it, leading to the same horses being counted twice and confounding total population counts (Linklater and Cameron, 2002).

Another factor that can contribute to inaccuracy in aerial counts in the Chilcotin is the practice of turning out ranch horses or horses that are "owned" to range freely when not in use. From the ground, many local ranchers and First Nations community members can identify horses which belong to people, either by brands on the animals, or simply because they recognize the individual animals. However, from the air the ownership and domesticity of free-ranging horses is not apparent, and hence estimates of the number of feral or wild animals may be falsely inflated. This source of error is not likely to be a problem in the Brittany Triangle where subpopulations are relatively isolated from domestic livestock, but it does apply to other count units in more populated areas of the Chilcotin.

The most recent aerial count by the XGFNG and FONV, an aerial survey conducted by helicopter in February 2011, identified 127 horses in the Brittany Triangle. That number is fairly consistent with the 121 horses counted during the Xeni Gwet'in's previous aerial survey in 2005. For the 2011 survey, a grid flight pattern was flown over the Brittany Triangle, with four people spotting and one person recording species and locations on a map. On the same occasion, between 130 and 140 free-roaming horses were counted in the Nemiah Valley, though some of those were known to belong to local residents (Williams, 2011). Spotters who conducted the counts were experienced hunters who had

participated in previous aerial counts, and were familiar with the terrain and the horses on the ground. The XGFNG and FONV estimate – given conditions, terrain and visibility – that the number of horses counted represent approximately 60%-70% of the total population present. Hence the total population of free-roaming horses in the Brittany Triangle was estimated that year to be between 203 and 215 animals. The total area of the Brittany Triangle is approximately 155,000 ha or 1,550 km^2 (FONV, 2011).

The Ministry of Forests and Range produced a report in 2010 summarizing aerial count data collected since 1991 (Hamilton, 2010). MFR aerial counts are generally conducted in fixed-wing aircraft (all years except 2008), and cover a larger area than the Xeni Gwet'in counts. While surveys and results are divided into geographical "count units", these units do not match up precisely with the area covered by Xeni Gwet'in aerial surveys. The Brittany unit surveyed by the MFR represents only a portion (approximately half) of the total Brittany Triangle area covered by the Xeni Gwet'in survey, with a northern portion of the Brittany Triangle (Lava Canyon range unit) having been omitted from the flight path of the MFR survey. Hence data from the different sources are difficult to compare. MFR aerial surveys counted 81 horses in the Brittany count unit in 2009, which included only the lower half of the Brittany Triangle (inclusive of Nunsti Provincial Park), and a portion of the Tsuniah count unit (Hamilton, 2010).

In general, survey data appear to indicate an overall population increase for free-roaming horses in the Chilcotin as a whole between 1991 and 2009. The 2009 MFR survey was the first one conducted by that agency to have recorded flying on a grid path and used statistically valid count methodology. Aerial counts conducted by the MFR in previous years relied on the local knowledge of the pilot and spotters, and flew directly to places where free-roaming horses were known or anticipated to congregate. Consequently, it is impossible to conclusively compare 2009 data with population numbers counted in previous years. In 2009, the MFR aerial surveys recorded a total of 790 horses (including foals) in the North and South Chilcotin combined, an area of approximately 7000 km^2. The total number of horses counted in the South Chilcotin (count units south of the Chilcotin River) was 415 in 2009. Despite more accurate and intensive survey methods in 2009, that number represents a small decrease from previous counts. The reason for the decrease is unknown (Hamilton, 2010).

While there are insufficient data to support long-term historical estimates of trends in the population numbers of free-roaming horses, a letter written by the Chief Forester for the Chilcotin region in 1965 estimated that there were more than 400 horses on Crown range "in the Chilcotin area" at that time

(Wallace, 1965). However, the extent of the area to which he was referring, and his methods for arriving at that estimate are not known. Key informants to this research recalled hundreds of horses being shot off crown range in the Chilcotin during the 1940s and 1950s, suggesting that there were more than 400 free-roaming horses in total on the range at the time (IN05; IN15).

While the numbers collected by both agencies would imply an extremely low density of horses on the landscape overall, horse impacts tend to be concentrated in specific habitat types within the landscape, and hence may be more intense than straight numerical density would imply. Areas with the most usage and habitat pressure include meadows and wetlands, as well as areas around water sources. Outside the Brittany Triangle, horses and cattle exert a combined impact on the same habitat areas. A map created by Allen Dobb (2010) used aerial count data from the British Columbia Ministry of Forests and Range, to illustrate the density patterns of free-ranging horse populations in several geographical areas (count units) including the Brittany Triangle (Figure 14).

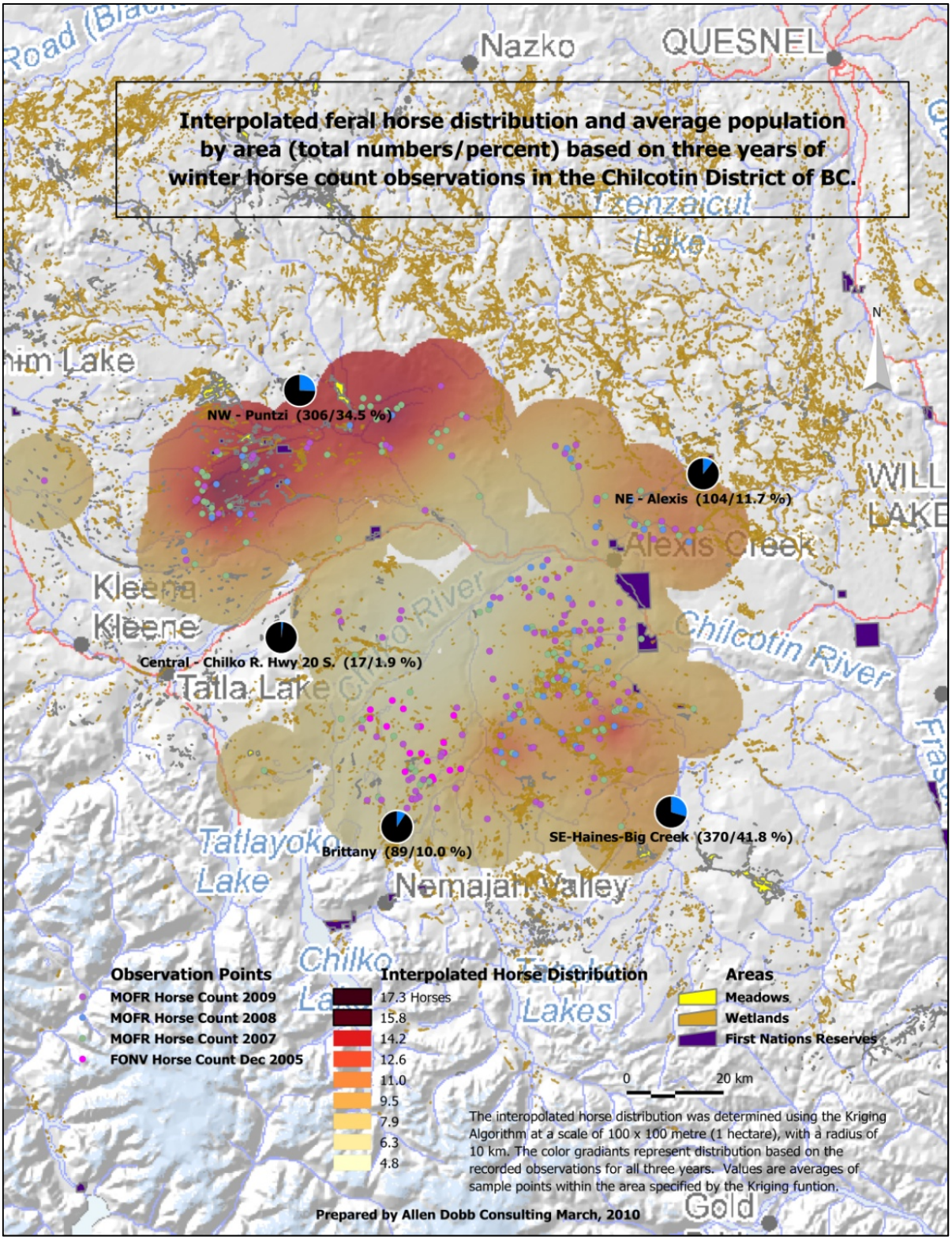

Figure 14: Distribution of feral horses, Chilcotin BC, 2007-2009 (Allen Dobb, Xeni Gwe'tin First Nations Government, Valhalla Wilderness Society, 2010).

Horses in the Brittany Triangle range in bands observed to vary between 3 and 17 animals (Bhattacharyya personal observation 2006-2010; McCrory 2002; Williams field notes 2007). Most commonly, we observed groups of 5-12 horses composed of a stallion with mares, foals and yearlings, as illustrated in Figure 15. Young males without mares, referred to as bachelors, were observed alone, and in groups of 2 or 3. At times, two bachelor groups were observed to temporarily graze together in a combined group of 5, but they subsequently split again into two smaller groups. These numbers are consistent with literature from studies in other regions, which report a similar social structure among bands and bachelor groups of wild horses (Berger, 1986; Miller, 1980).

Figure 15: Band of wild horses in Brittany Triangle (Meadow #3 of sample sites), June 2010. This group has a stallion (centre, with blaze), three mares with foals, and a yearling – eight horses in total.

Predation and Limiting Factors

Currently, the major limiting factors on the free-ranging horse population in the Brittany Triangle appear to be predation and environmental factors. Oral history and local knowledge indicate that throughout much of the twentieth century, human influences and actions (i.e. capture, selective culling,

castration, and release of domestic animals) were likely also a major influence on the population numbers, dynamics and physiology of wild horses in the Brittany Triangle.

Free-roaming horses in the Brittany Triangle share habitat with a number of predator species which likely exert some influence on the horse population, including cougar, wolf, and possibly bears. Studies of cougar or mountain lion (*Felis concolor*) predation on feral horses in the California-Nevada border region reported that mountain lions in that region had a significant effect on feral horse populations (Turner and Morrison, 2001; Turner, Wolfe and Kirkpatrick, 1992). Mountain lions were responsible for killing an average of 45.1% of foals produced over the 11 year study period, though the authors noted that increased foal survival during the latter years of the study was related to a decrease in the number of mountain lions (Turner and Morrison, 2001). Although cougars are known to be present in the Brittany Triangle, there is no direct information available on their interactions with the resident horse population.

Wolves are apparently active predators of wild horses in the Chilcotin, including the Brittany Triangle. A number of participants in the study commented that wolves prey on free-roaming horses (IN09; IN13; IN06; IN16). Some participants who spent a significant amount of time in the bush or working with livestock observed that wolves preferentially prey on young, strong horses, and several participants suggested that wolves kill by giving chase to an animal that will run, and hence more often prey on horses than cattle (IN06; IN05; IN09). One participant recalled watching as a pack of four wolves passed by some cattle, preferring to try to chase domestic horses.

> *…When there was one wolf, one or two wolves, it didn't seem to be a problem [for horses]. But if they [wolves] were in a bunch, that's when there was a problem. We've seen wolves here....the neighbours… were feeding cows there [gestures to pasture] one winter, there was a string of cows. And then at the top end there was a bunch of horses, and there was a colt with them. And we saw four wolves come trotting out, and they trotted right by the cows. Cows just ate. And they trotted right by them. And they circled the horses. There was about four wolves, I think. And they circled them, and one wolf tried to get the horses to run, and the horses just kicked at it. And the wolves trotted off!*
>
> *It was pretty neat to watch that, yah. But I think the wolves, um... I think wolves need to either get something that's either very old and by itself, or they need to get something running (IN02).*

This observation that wolves like to get prey running was also expressed by other participants. Participants suggested that wolves seemed to prefer the meat of young, fit prey animals rather than the

old or sickly ones, though this assertion is not necessarily borne out by research from other regions (Robert et al. 2005).

> *[Wolves], they'll prefer a moose over a cow, or a wild horse over a cow. Anything that will run. They want to chase something. Old cow that'll turn and fight, they'll never bother her.*
>
> *And they talk about wolves picking the sick and the weak – like hell! You can have a herd of beef out there and a wolf will go in, pack of wolves will go in and they'll pick your prime beef outa there. I mean they're just like us! You want to eat some old sick creature? They ain't that stupid!*
>
> *And another thing with horses, like I told some of these harpin' ranchers down here that are bitchin' about these horses. I said, "with the wolves and the predators we got, if it wasn't for those wild horses, you couldn't put a cow out there. The wolves would wipe out your cow herd." And they're picking on the horses is what they're doing. They're saving their cattle (IN06).*

There is little available scientific literature from North America on the specific topic of wolf predation on free-roaming horses, though anecdotal evidence indicates that wolves do prey on free-ranging horses (Berger, 1986). A study of wolf predation on livestock in the Himalayas indicate that Tibetan wolf (*Canis lupis chanku*) in that region prey on horses in a higher ratio to cattle than was expected from the relative availability of livestock (Namgail, Fox and Bhatnagar, 2007). Wolves were also reportedly responsible for some mortality in Przewalski wild horses in Mongolia, though subsequent testing found that the prey animals had been weakened by disease (Robert et al., 2005).

One reason for this dearth of literature on this topic from the United States may be that wolf populations were dramatically reduced or extirpated in many areas of the United States where feral horses studies have been conducted. Similarly to feral horses, wolves are the subject of much controversy in ranching cultures in the USA and Canada. Some participants in this study felt that free-ranging horses helped to divert wolf predation away from cattle and livestock (IN06), and that wolves helped to limit population increase in free-ranging horse populations. Other participants felt that both species presented a threat to viable cattle ranching – horses by competing for forage, and wolves by preying on cattle – and that populations of both should be either severely culled or eliminated (IN08; IN05).

Grizzly and black bears likely contribute to some mortality of wild horses in the Brittany Triangle, though horses do not constitute a large portion of bear diets (McCrory, 2002).

Environmental factors that limit horse populations in the Brittany Triangle are forage availability and climate. The Chilcotin Plateau is a region with harsh winters where temperatures traditionally drop below -30 C on a regular basis. Extreme winter temperature lows have been rare in the last two decades (Environment Canada, 2011). However, cold temperatures combined with limited winter forage continue to be a natural factor in horse mortality. The effects of warmer winter temperatures which could be associated with climate change are uncertain. While temperatures could be less severe, reducing energy demands on horses, increased snow or ice resulting from freeze-thaw cycles and increased precipitation can make it more difficult to for horses to paw for forage.

Human influences on horse populations in the Brittany Triangle were more prevalent during the twentieth century than currently. It is not clear to what extent the government sanctioned horse culls throughout the twentieth century affected the Brittany Triangle bands of horses. The geographical remoteness of northern parts in the Brittany Triangle may have effectively buffered horse bands in that area from human contact. However, since the territorial range of the horses is not conclusively known, it cannot be assumed that even the most remote bands of horses were entirely unaffected by human activities around the perimeter of the Brittany Triangle. For much of the twentieth century, when saddle horses and wagons were the major form of transportation in the Chilcotin, the Brittany Triangle was effectively less "remote" than it now seems to be. In particular, the homestead property at Far Meadow, as well as Upper Place, Captain George Town, and areas on the west side of the Triangle such as Tsuniah, Burnt Meadow, Brittany Creek and Mountain House were all actively used by families and small-scale ranching operations, with the trails and meadows that linked all those areas being in regular use. Oral history indicates that sites in the northern portion of the Brittany Triangle were also traversed by people for hunting and other seasonal food gathering activities (*Tsilhqot'in Nation v. British Columbia* , Plaintiff Final Argument, No. 90-0913, 2007). Horse populations in the southern half of the Brittany Triangle were certainly subject to human influences which both limited and contributed to population numbers (IN13; IN05). As human influences become more benign towards wild horses in the Brittany Triangle, the role of wildlife predation and natural environmental factors in horse mortality may become increasingly important.

Politics of Horse Population Numbers

Disagreement over the number of free-roaming and wild horses, and their impacts, has been part of the ongoing controversy over the horses in the Chilcotin, a situation that has also characterized controversies over wild or feral horses in other parts of the world, too. In Australia, official estimates of feral horse populations were raised and lowered dramatically by government agencies, in order to

motivate and justify changes in management policy (Nimmo and Miller, 2007; Symanski, 1996). In the United States of America, a flurry of studies followed the passing of the Wild and Free-Range Horse and Burros Act in 1971. Over the decade that followed, many studies reported a dramatic rate of population increase from the original 17,000 animals reported to exist on American rangelands in 1971 to over 50,000 animals by 1980 – an annual increase rate of 16-17% (Wagner, 1983 p. 13). However, the Committee on Wild and Free-Ranging Horses and Burros noted in their 1982 report that estimates of population change after 1971 may have been inaccurate for two reasons: 1) a shift from aerial counts using fixed wing aircraft to helicopters during that time period may have affected numbers; and 2) the original numbers reported in 1971 may have been no more than an aggregation of "educated guesses" from field managers who had no direct count data at that time. Even after aerial surveys began, many field managers reported that only some of their areas had been accurately censused (National Research Council, 1982).

Thus total population numbers, while often cited in politically controversial discussions over the management of wild horses, have tended to be of questionable accuracy in numerous situations, including in the Chilcotin. While the aerial surveys conducted prior to 2009 by both the Xeni Gwet'in First Nation Government and MFR provided each agency with adequate information to assist in their own decision-making activities, survey results and the interpretation of management implications based on horse population numbers differed between agencies. The numbers themselves could not be accurately compared between agencies (FONV, 2009; Hamilton, 2010; IN13; IN08).

Conformation and Behaviour

Free-roaming horses in the Brittany Triangle have a variety of colour traits, with different bands of horses displaying distinct characteristics. Colours include black, bay, brown-black, chestnut, as well as strawberry and blue roan, and markings commonly observed are white blazes, stripes and stars, as well as socks. North of the "Nuntzi Chain" of lakes, the colours most commonly noted among horses during field studies were bay, brown-black and black. Horses' conformation tended to be of medium size (est. between 14 and 15 hands), with slender build, compact hooves and some occasional light feathering on the cannon bones, pasterns and fetlocks. Tails were generally long and full, with manes varying in length. Some stallions exhibited distinctly thick necks and long, wavy manes. Brittany Triangle horses did not appear to have the same prevalence of palomino, pinto, buckskin or chestnut colours that are found frequently among free-ranging horses in Nemiah Valley and closer to areas near Yuneset'in (Stone Reserve). Figure 15 shows a stallion in the Brittany Triangle typical of the colour and conformation of horses observed in that area during this study.

Figure 16: Brittany Triangle Stallion with typical conformation and colouring.

Study participants reported stories of horses from a variety of breeds escaping or being released into areas in and around the Brittany Triangle at various times since the 1940s. Most stories were related second- or third-hand. Breeds reportedly released or lost to Brittany Triangle wild horses include: quarter horses, thoroughbreds, percheron, and other mixed breeds (IN05; IN01). However, genetic research from a combination of blood and hair samples of Brittany Triangle horses indicate a fairly limited or narrow genetic diversity among some sub-populations, implying that certain populations were relatively isolated for a significant period of time. Genetic analysis of these samples is underway. The thick build, long manes and colouration of some Brittany Horses could result from either a mixed "warmblood" breeding history (i.e. draft horses mixed with lighter breeds), the influence of specific breeds carrying those traits (e.g. Morgan, Canadian, or Friesian), or the genetic influence of Spanish Colonial horses.

Brittany Triangle horses were observed to show social behaviour consistent with those described in behavioural studies of wild horses in the United States (Berger, 1982; Feist & McCullough, 1976).

Escape and alert behaviours of Brittany Triangle horses have also been labeled as akin to other wild species such as musk-ox (McCrory in Goddard and Smitten, 2002), with social structures and interactions as complex as grey wolves (McCrory, 2002). During field work, most horses encountered in the Brittany Triangle were extremely sensitive and averse to human presence, with the occasional individual animal (estimated 1 in 20) demonstrating more curiosity than fear.

Typical behavior for a band of horses with mares and foals who sensed our presence (usually by sound or smell) would be for all mature members to stand alert in the centre of a meadow (away from the tree line), listening and visually scanning the forest in our direction, before we were even visible. Often, the stallion would break from the group and approach our location, staying well away from the tree line, and maneuvering to get down-wind of us. The stallion would posture and adopt a bold stance, flaring his nostrils, and snorting (Berger, 1985), at times trotting back and forth within the meadow, between us and the mares. Meanwhile, mares and foals most often positioned themselves either at the centre of the open space (in larger meadows) or took off at a canter or gallop, to form a group at the far edge of the meadow from our location. Foals would usually be shielded by mares, which positioned themselves between the foals and observers. The decision to leave the meadow appeared to be taken by a lead mare most often, with mares and foals taking off at a gallop through the forest, and stallions following in the rear, usually with a parting snort.

As a rule, horses in the Brittany Triangle could only be observed from a distance of at least 50 metres at times when we were down-wind from the horses, obscured from their sight, and they were unable to hear our approach (due to the noise of wind, or distance). Bachelors, alone or in groups, were less alert and concerned with our presence than were the family groups or bands of mares with foals. However, several times we did have relatively close encounters with mature stallions (and once with a curious mare) who approached us to within 20 metres. Sightings and observations were also limited by the dense forest and "bush" landscape in the region, which made it difficult for observers to get a clear view of horses without being detected by them.

Habitat Use

Territory, Range and Travel Routes

The size of territorial range used by free-roaming horses varies greatly, from 0.9 km^2 on Sable Island off the coast of Nova Scotia, to 303 km^2 in Wyoming's Red Desert (Miller, 1983). Ganskopp and Vavra (1986) observed that the size of horses' home range in their semi-arid study region was negatively correlated with the density of water sources, though the correlation was not strong enough to

have predictive power. Salter and Hudson (1979) noted that horses' habitat occupancy during spring in Western Alberta was related to stage of plant growth. Plant community composition has not been found to have a major influence on horses' habitat selection overall, though they may demonstrate seasonal preferences for one plant community over another within their home range (Ganskopp & Vavra, 1986). Horses tend to shift their use and occupation of core areas within their home range seasonally, but are relatively consistent in their use of specific areas within their territory from one year to the next, essentially following a seasonal grazing rotation (Crane, Smith, & Reynolds, 1997; Linklater et al., 2000; Miller, 1980).

Different bands of horses often share their territory, and overlap in their home ranges (Ganskopp & Vavra, 1986; Miller, 1983). Dominance hierarchies between different bands of horses may determine how and when different bands of horses can access core areas, particularly water holes (Miller, 1980). However, aggression between stallions from different bands is more likely to be related to mares than to territorial disputes (Cunningham & Berger, 1986).

The territorial range of horses in the Brittany Triangle is not conclusively known (McCrory, 2002). Family groups or bands of horses resident within the Brittany Triangle have been observed consistently within certain territories and meadows. Water sources and forage are abundant in the study area, where most observations have occurred. Although there appear to be some behavioural differences between horse bands in the Brittany Triangle and those in areas closer to human settlement, local knowledge indicates that Brittany horses do cross the Taseko River at times, to range outside of the Brittany Triangle. In particular, during major forest fire events in 2003 and 2009, horses were believed to have forded the Taseko River to escape the fires, and then to return again afterwards (IN02; IN01a; IN06). Some participants also reported that Brittany Triangle horses may cross the Taseko River during winter months (IN13), though others suggested that they had seen no evidence of such winter movement (IN16).

Habitat Use

Free-roaming horses in the Brittany Triangle graze primarily in meadow ecosystems year-round (Hamilton, 2010; McCrory, 2002; Preston, 1984). Although field research for this study was conducted only in spring and summer months, observations by participants and informants indicate that horses may exhibit seasonal fidelity to specific sites – returning to the same meadows at the same times of year (IN03; IN06; IN16). This observation is consistent with studies of feral horse territorial range and habitat use in the United States (Berger, 1982; Ganskopp and Vavra, 1986). However, informants gave

conflicting reports of the amount that wild horses move around on the landscape. Some participants claimed that horses prefer to move around a landscape, and that they tend not to remain in one location for long, grazing areas with varied intensity (IN06; IN03; IN16). Other participants claimed that wild horses tend to "camp out" in early spring grazing range, grazing the early spring forage down to the ground before moving off (IN08; IN14). Those participants who described horses staying in one location for extended periods of time and overgrazing spring forage were people whose direct experience was of feral horses on range outside of the Brittany Triangle, closer to human settlements and cattle ranches. It is not clear whether their observations could also be applied to horses in the Brittany Triangle. Not only are the sub-populations different in the Brittany, but the landscape itself differs in terms of hydrology and forage availability, as do the demands on forage supply (i.e. presence of cattle). Also, there are more physical barriers on the landscape outside the Brittany Triangle (i.e. fences) than inside. While fences are mostly built to specifications that could be jumped by wild horses, they may still influence or impede movement of wild horses, particularly in winter and early spring.

Salter and Hudson (1979), in a study of foraging behavior of feral horses in the western foothills of Alberta, noted that horses made use of a variety of habitat types in order to access available forage, particularly during the winter. Local informants suggest that free-roaming horses in the Brittany Triangle and surrounding regions exhibit similar behaviour: preferring to spend time in open meadows and to graze on grasses, sedges, and rushes in open meadows (or clearcuts, outside the Brittany) (IN01; IN06; IN13; IN16; IN10; IN09), but also making use of forest cover for shelter and available forage (e.g. pine grass), and even shrubs or woody species in times of forage scarcity. Horses were observed to combine the use of flat, open meadows and forest cover as escape terrain.

Winter Foraging

Although it was beyond the scope of this research to conduct winter field work in the Brittany Triangle, qualitative research indicates that free-roaming horses in the Brittany Triangle feed primarily in frozen meadows and on frozen ponds in the winter months, where they paw through snow cover to reveal the protruding graminoid species. Free-roaming horses are also known locally to forage on some shrub species during winter months, to varying degrees (IN01a). When freeze-thaw cycles cause the areas that horses have pawed in meadows to become compacted and covered by ice, then horses are more likely to browse on shrubs (IN05). They likely supplement their diets as necessary with some limited grazing of forest understory species. However, local knowledge offered by participants consistently indicated that horses prefer to graze in open meadows when possible, even in the winter, and that they

use the forest, specifically spruce groves, for drinking water and warm shelter during winter months (IN16; IN13; INNB; IN10; IN11; IN01a).

Meadow Plant Community (Feeding Habitat) Characteristics

Plant Species and Frequencies

Data recorded from sample sites over three seasons (Spring 2008-Spring 2009) demonstrate that the most prevalent plant families recorded in those meadows were *Poaceae* and *Juncaceae*, followed by *Asteraceae* and *Rosaceae*, with significant proportions, also, of *Cyperaceae* and *Caryophyllaceae* (see Figure 17).

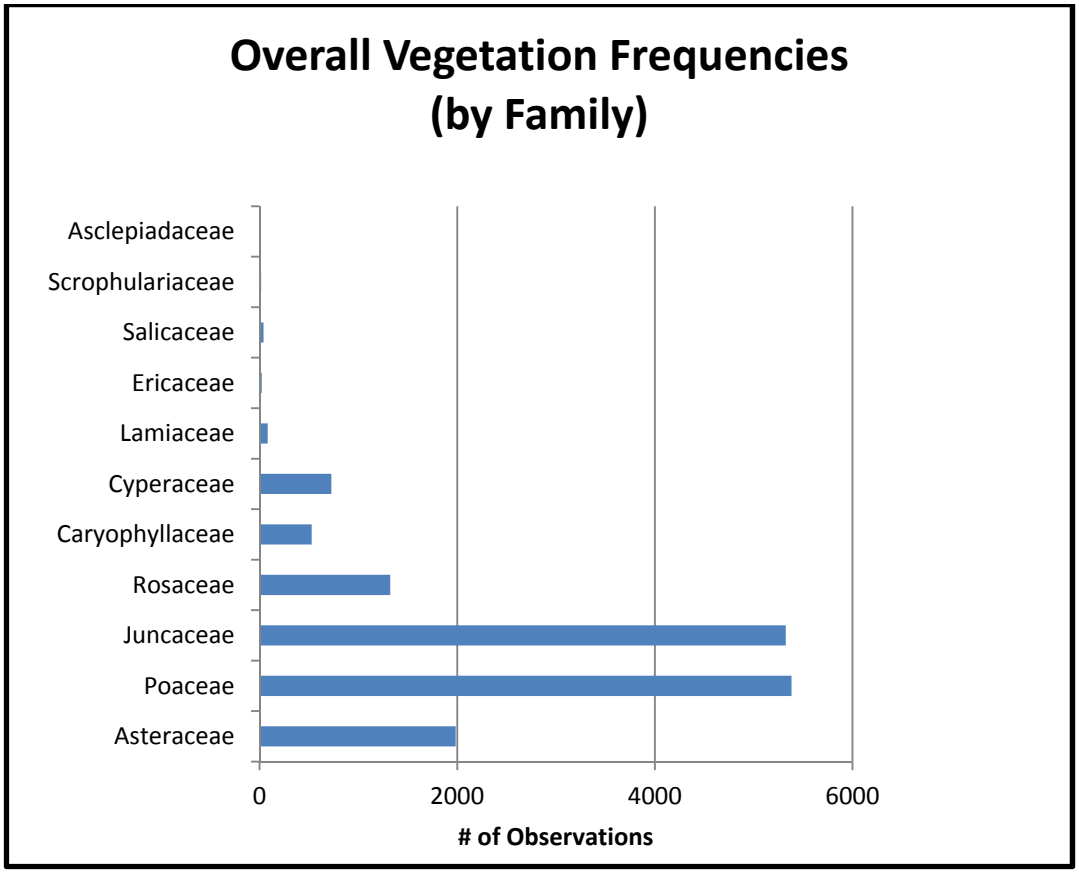

Figure 17: Vegetation Frequencies by Family (2008-2009).

The most prevalent species, by far, was Baltic Rush (*Juncus balticus)*, which accounted for 25% of total observations. While not all observed vegetation could be identified to the species level, the other most common types of vegetation observed in sample sites were dandelions (*Taraxacum*), silverweed (*Potentilla anserina*), redtop (*Agrostis gigantea*), yarrow (*Achillea millefolium)*, followed by perennial

tufted grasses from the genus *Festuca*, flowering plants and ground-covers from the genus *Cerastium*, other grasses from the family *Poaceae*, plus the species Canada bluegrass or flattened meadowgrass (*Poa compressa*), and Rough fescue (*Festuca campestris*). In the field, it is particularly challenging to accurately distinguish between and identify all grasses and sedges to the species level, particularly when field methods prohibit the disturbance of sample populations, and only above-ground biomass is available for identification. Of the total number of data point observations in this study (20,262 observations), identifications to the level of species, genus or family were made for 88.9% of observations.

Factors Influencing Frequencies by Species

The aggregate frequencies of identified species were influenced by several factors. First, the premature termination of data collection in the Summer 2009 season meant that the over-all data set included two Spring seasons, and only one Summer season, effectively skewing observations of vegetation towards those species and conditions that are evident and identifiable in early Spring. This seasonality influenced the relatively high number of observations characterized by "No Live Vegetation", which was a category that included early season terrain in which live grasses and sedges had not yet emerged, ground covered by dry or dead moss, rocks, dung, fallen tree trunks, and most importantly dry litter layers of vegetation from the previous year's growth. The correlation between the "no live vegetation" occurrences and the presence of a measured litter layer in sample sites is discussed below.

Second, the numerical distribution of observed vegetation by frequency is influenced by the ability of the researchers to identify the vegetation to the level of species, genus or family. Those grasses and sedges that were identified to the species level may not appear to occur as frequently as other species that were identified only to the aggregate level of genus or family. Similarly, species frequencies may falsely imply that a few flowering species such as dandelion, yarrow and silverweed were dominant, because they were consistently identified with certainty, while grass and sedge species were diverse and hence numerically diffuse in the data set. Such plants may appear from the numbers alone to be more prevalent than they actually were. The high frequencies of these species in the data set are not a result of sample bias. Rather, they are a result of the researchers' differential ability to identify some species with certainty, while other plants that were difficult to identify were aggregated into genus or family groups.

Variance between Sample Sites[13]

A multivariate analysis of variance (MANOVA) showed no significant differences in plant community structure (species frequency) overall, between any of the eight sample sites, where the significance threshold (p-value) was set at 5%. (See Table 3.) This result likely reflects the dominance of relatively few species, in particular *Juncus balticus*. There is no evidence from these results that plant species are responding to any unusual disturbances. Similarly, there was no significant variance between the "Home Meadows" (sample sites #1-4, which were selected for accessibility) and the randomly selected meadows (sample sites #5-8).

Table 3: Variance (MANOVA) in plant community structure (species frequency) between meadows.

Sample Sites (Meadows) Pairs Compared by Number	F value	P value
1-2	1.75	0.212
1-3	1.63	0.284
1-4	1.88	0.201
1-5	1.91	0.190
1-6	2.34	0.172
1-7	2.15	0.181
1-8	1.64	0.286
2-3	1.66	0.279
2-4	1.78	0.208
2-5	1.73	0.221
2-6	3.38	0.116
2-7	3.04	0.137
2-8	1.67	0.275
3-4	1.81	0.203
3-5	1.90	0.194
3-6	3.24	0.122
3-7	1.77	0.209
3-8	1.72	0.224
4-5	1.79	0.213
4-6	3.20	0.128
4-7	1.79	0.205
4-8	1.47	0.297
5-6	1.41	0.297
5-7	1.33	0.318
5-8	1.52	0.288
6-7	1.65	0.253
6-8	1.68	0.247
7-8	1.63	0.260
Composite 1-4 (Home Meadows) vs. Composite 5-8 (Random Group)	2.29	0.177

[13] Plant identification and statistical results were jointly obtained and confirmed by Jonaki Bhattacharyya and academic advisor, Dr. Stephen Murphy.

The mean height of vegetation also does not show a significant difference between meadows, between seasons, or between the "Home Meadows" and randomly selected meadows, given a p-value of 5%. Overall, the analysis of variance resulted in f = 4.97 with p = 0.09. (Although the differences would be significant if the p-value were set to 10%, a 5% threshold is more appropriate in this case given the large size of the data set.) The primary reason for the lack of statistically significant difference in vegetation height between sample sites is likely due to the large standard deviation in vegetation heights at each sample site (Table 4). This variance exists regardless of whether one assesses all seasons together, or divides the data into Spring and Summer.

Table 4: Mean Height of Vegetation by meadows (sample sites) in centimetres, with standard deviation.

Meadow Sample Sites by Number	1	2	3	4	5	6	7	8
Mean Plant Height (cm) (standard deviation)	**13.3 (8.8)**	**10.2 (6.7)**	**7.7 (5.5)**	**15.1 (11.2)**	**7.9 (4.5)**	**8.2 (4.9)**	**7.6 (5.2)**	**7.7 (6.1)**

Despite the lack of statistically significant difference in plant height between meadows, the mean values shown above do indicate some differences, in particular between the Home Meadows and the randomly selected meadows. Those differences between sites are observable to the naked eye, also, in particular between Meadow #4 and each of the randomly selected meadows. Ultimately, the key question to ask about the meadows grazed by horses is not whether the observed characteristics are statistically significant, but rather, is there an ecologically significant difference? To properly answer that question would require many years of data. However, the important points to remember are that the statistical results provide an indicator towards real ecological conditions. While all sample sites are known to be grazed by wild horses, they do differ in moisture regime. Meadow #4 has remained especially wet since the 2003 Chilko fire, and transects had to be established around the edges of what has become a year-round lake. Vegetation on that site (Figure 18), while evidently subject to grazing by horses, achieves an overall height and density that is noticeably different from the drier randomly selected meadows.

Figure 18: Meadow #4, August 16, 2008, showing lush growth, and patchy grazing intensity (flooded area in background).

Figure 19: Meadow # 8, August 19, 2008, showing dry conditions, and noticeably shorter vegetation outside the area of the 2003 Chilko fire.

These differences, together with the statistical analysis, indicate that while there is considerable heterogeneity in vegetation and the impacts of grazing among sample sites and throughout the study area, there is no evidence of ubiquitous negative impacts on a spatial scale large enough to warrant management intervention.

Mean plant height for vegetation within exclosures was compared to the means for plants outside of exclosures for the field season that did yield a full data set for exclosures (Spring 2009). In this case, there was a statistically significant difference in height between vegetation inside exclosures (mean

height = 15.6, standard deviation = 5.2) versus that outside exclosures (mean height 6.3, standard deviation 5.1), where $f = 6.91$, and $p<0.05$. These results can be attributed to numerous influences, including the tendency of plant growth to respond with an initial surge following the immediate removal of grazing pressure, trampling and soil compression. Another factor that can affect initial changes in plant growth patterns in newly built exclosures include shelter from wind provided by the structures (Beever, personal communication, 2008; Beever and Brussard, 2000). There is a known phenomenon of vegetation immediately next to exclosures being considerably shorter and more heavily damaged by grazing and trampling as a result of wildlife being curious and investigating the exclosure fences (Gayton, personal communication, 2007). However, that factor was accounted for in the methodology of this study by ensuring that all transects outside of exclosures came no closer than 10 metres from the structure. There was no statistically significant difference measured in the height of litter layers within exclosures versus outside exclosures. Without a series of comparable seasons, it is not possible to draw conclusions from the results of data from exclosures.

Composite faecal samples collected in the study region during August 2007 and tested at Washington State University's Wildlife Habitat Lab for dietary analysis found that among the samples, sedges (Carex) and rushes (Juncus) together comprised 53%-76.7% of the horse's diet, and grasses (Agrostis, Alopecurus, Calamagrostis, Deschampia, Poa, and unknown species) between 21.5% and 46%. While there were not enough samples tested to yield results that can be reliably generalized to characterize the diets of horses in the Brittany Triangle, in general (see Chapter 3 for a discussion of faecal sampling in this study), these "pilot tests" do provide anecdotal indication of the summer grazing practices of horses in the study area, relative to plant community composition and species frequencies that are reported as part of this study.

A chart (Figure 20) showing the proportion of plant stems measured that were noted as "grazed or broken off" by plant family, from Season 3 of data collection (Spring 2009) illustrates the high proportion of grazing on Juncaceae in the study area. These results do not represent a statistical comparison of data over time, and were reflective of only one season. The chart illustrates the same sort of proportions of vegetative matter identified in faecal samples as described above, and consistent with field observations. Field observation does suggest a greater reliance by horses in the study area on Juncus balticus during early Spring grazing, compared to Summer, when a greater variety of grasses and sedges are available.

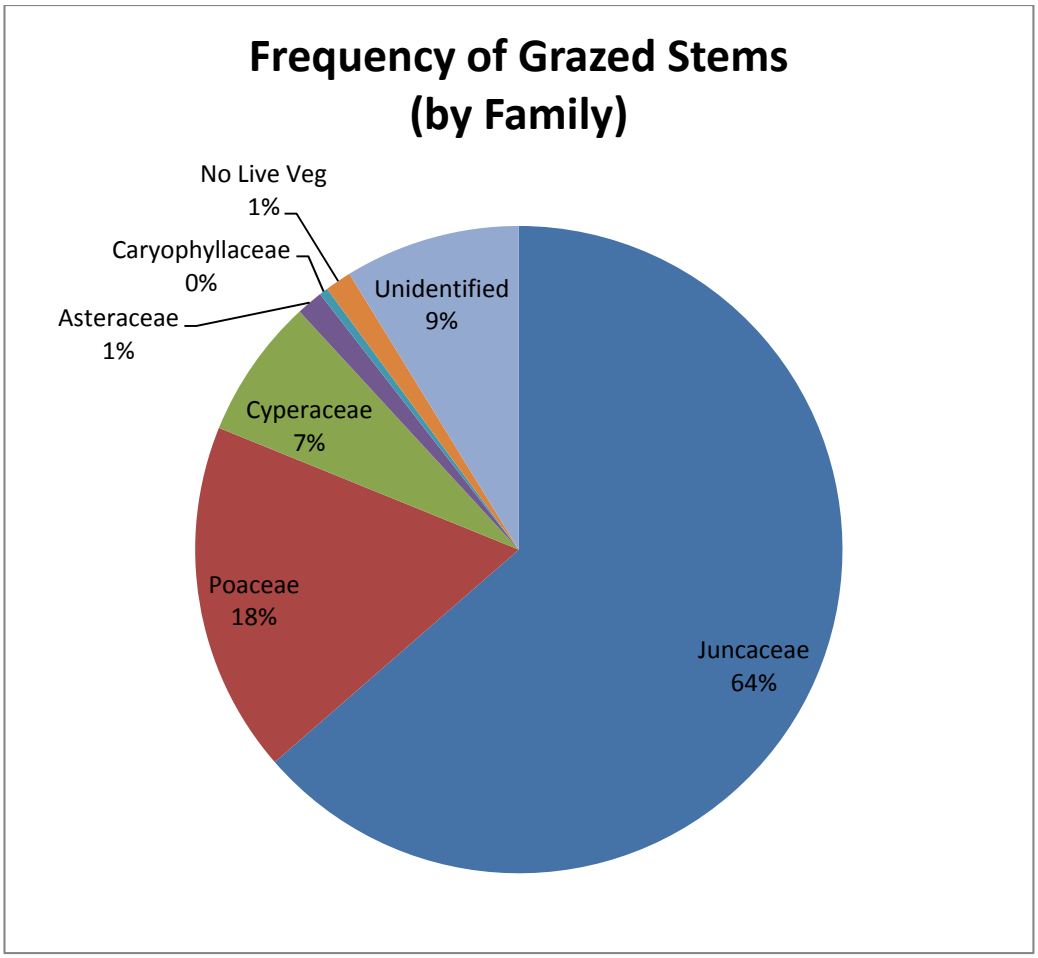

Figure 20: Frequency of grazed stems (by family) among sample points in Season 3 (Spring 2009).

Correlations

The category "No Live Vegetation" was used for each observation point along line transects where a living plant failed to intercept the pin measurement. Conditions and reasons for there to be "No Live Vegetation" varied. In spring seasons, there were numerous instances where vegetation had not yet grown and bare or moss-covered earth was exposed (sometimes as water levels receded). Also, in both spring and summer, at times a dense litter layer of vegetation (i.e. dead stems from previous year's growth) was present, despite "no live vegetation" touching the pin in an observable manner. This category also included cases where the point intercepted a rock, dung heap, bone, ant hill or other such characteristic.

A comparison of litter layer and the "no live vegetation" classification (using Pearson Product Moment Correlation) indicates some correlation between the presence and/or height of litter layer, and the lack

of live vegetation recorded at data points. Overall in the complete data set, there was a statistically significant, direct correlation between the presence of litter and the occurrence of "no live vegetation" observations in the data set (Pearson's $r = +0.5$, $p<0.5$). Overall, there was a direct correlation between "no live vegetation" and litter height (Pearson's $r = +0.3$, $p = 0.08$) that was statistically significant if the threshold was set at 90% but not if it was considered to be 95%. When data were divided up by season, there was a statistically significant direct correlation between the "no live vegetation" occurrences and both the presence (Pearson's $r = +0.5$, $p <0.5$) and height (Pearson's $r = +0.6$, $p<0.01$) of litter layers in Summer. In spring, there was a statistically significant direct correlation between the "no live vegetation" occurrences and the presence of a litter layer (Pearson's $r = +0.4$, $p<0.05$), but not the height of the litter layer (Pearson's $r = +0.1$, $p = 0.15$). These results suggest that at least some of the lack of vegetation is related to the presence and sometimes the thickness of litter layers, in addition to the more obvious factors of grazing, drought and fire.

Ecological Impacts and Relationships

Research results indicate that free-roaming horses have heterogeneous impacts on plant communities within sample sites, the study area, and the Brittany Triangle as a whole. Field observations reported that grazing patterns were "patchy" or of varied intensity and impact, within sample meadows and between meadows. This observation is consistent with interview data among participants familiar with the Brittany Triangle (IN01a; IN13; IN16). While some open grassland meadows in the northern part of the Brittany Triangle outside of the study area (approximately 15 kilometers north of sample sites) were observed to be overgrazed (i.e. grasses cropped low to the ground with exposed soil), these observations were neither consistent with the study area, nor widespread in the Brittany Triangle. Field observations outside of the Brittany Triangle also confirmed that there are some areas of grassland and open range that are heavily impacted by grazing. It is beyond the scope of this study to quantify the relative impacts of cattle and horses on ecosystems outside of the Brittany Triangle. However, field research for this study found no evidence of overgrazing on an extensive scale within the study area. Some areas are intensively grazed; other areas are not. The Home Meadows generally had healthy litter layers, and were observed to support grass-nesting birds. The randomly selected meadows, further north and all but one of which was outside of the area burned by the 2003 Chilko fire, were drier with less of a litter layer, and appeared to be grazed more closely. Vegetation in the sample sites appeared to be influenced by precipitation, hydrological regime, temperature and fire cycle in addition to horses.

The plant species that occurred with the highest frequency in sample sites was *Juncus balticus*, and that species was also heavily grazed by horses. Field observations suggested that the species was

consistently grazed by horses, particularly during the spring season. Grazing patterns within each meadow followed the growth of *Juncus balticus* through the stratified vegetation areas of meadows from driest to wettest strata throughout the summer, as standing water levels receded. Future research could study and seek to confirm the palatability of *Juncus balticus* and the Brittany Triangle horses' forage preferences.

The mixture of introduced and native vegetation species in sample meadows is consistent with the settlement history of the region, including homesteading activities, the keeping of domestic cattle and horses by residents of the Brittany Triangle throughout the Twentieth Century, and other human disturbances. Resident families and homesteaders cut wild plant species for hay in the meadows, though they did not plant hay crops there. After the 2003 Chilko fire, the BC Ministry of Forests conducted aerial seeding (by helicopter) of machine-cut fireguards with grass species as part of their fireguard rehabilitation program. A report by McCrory Wildlife Services (2005) reports that the seed "mix was comprised of:
25% Nordan Crested Wheatgrass
20% Hard Fescue
20% White Clover
15% Creeping Red Fescue
10% Western Wheatgrass
10% Big Bluegrass" (Section 2.4).

The fire regime in the Brittany Triangle appears to spread out the effects of horse grazing by fluctuating available forage spatially and temporally. As some areas burn periodically, horses are forced to temporarily find new forage areas, and to change their seasonal grazing patterns in order to accommodate the lack of available forage in burned areas. As burned areas recover, there is some indication that the Brittany horses temporarily forage more than usual under forest cover as understory species experience an initial surge in growth and available nutrients. Over time, grazing horses return to seasonal use of meadows within the area that had once burned. Recent catastrophic wildfires in the Brittany Triangle are not necessarily typical of the historical fire regime in the region, which was characterized by frequent, low-intensity fires. The large catastrophic wildfires of the past decade may result partly from a build-up of fuel after decades of fire suppression. In the event of such large and intense fires, free-roaming horses and other wildlife in the Brittany Triangle experience a large and extensive disruption to available forage. As horses leave the Brittany Triangle to escape the fire and

find available forage elsewhere, these large fires may temporarily place more pressure on range lands in the lands surrounding the Brittany Triangle.

Horse grazing in combination with moose browsing may be one factor in maintaining meadows from shrub and forest encroachment (IN06), though this study does not provide conclusive evidence of such an effect.

Aside from the direct impacts of grazing on vegetation, free-roaming horses also impact vegetation, soils, ecosystems, and wildlife through their movement on the landscape, effecting localized soil compaction and disturbance. Sample sites bore localized instances of soil disturbance (compaction and/or "turning") as a result of horses treading on soft ground to access standing water in the middle of flooded meadows (sample sites 1, 2, and 4), and well-worn trails around the perimeter of meadows. There also tended to be several localized areas of disturbed vegetation and soil compaction on the perimeter of each meadow where stallions had formed "stud piles" (Miller, 1983) and other horses in the band had also used the same location as a latrine area. Free-roaming horses tend to form trails when they move across the landscape, so that they have an intense but localized impact on soils and vegetation (forming trails) as opposed to cattle which tend towards dispersed travel patterns (trampling larger areas to varying degrees) (Beever and Brussard, 2003). Horse trails form an extensive network through forested areas within the Brittany Triangle, connecting meadows, watering sites and other natural habitats. These trails are used not only by horses, but by other animals as well. McCrory (2002) suggests that horse trails may serve to help other wildlife conserve energy in the winter, by easing the energy requirements of travel through snow and ice.

SOCIAL AND CULTURAL USES AND PERCEPTIONS OF (WILD) HORSES

Xeni Gwet'in and Local Culture: Practices and Use of Horses

In the Nemiah Valley, horses are a central part of local Xeni Gwet'in cultural identity. People identify with the horses' behaviour and the seasonal movements of small family herds throughout the landscape, which parallel the traditional seasonal movements of small Tsilhqot'in family and community groups (IN03). Whether horses are wild or domesticated is a minor matter, as many local people catch and train wild horses, then use them as saddle animals. People make a stronger distinction between "barn horses" (those which have been bred and raised in domesticity and trained outside the community) and local horses than they do between local horses that are free-ranging versus those

which have been caught and trained (IN01). Horses are integrated into local life as transportation, with local wild horses earning the reputation as the best saddle horses once domesticated due to their strong hooves, adaptation to local wild plants for feed, sure-footed movement on rough terrain, speed and endurance, and their intelligence when confronted with wildlife. The traditional practice of chasing and riding wild horses, and the skills needed to do it are marked by an annual Mountain Race. Formerly wild horses that have been captured and trained are said to make the best competitors for that race. Also, horses are increasingly used by community leaders in the conscious effort to engage youth in healthy physical activities that ground them in local cultural tradition.

A number of local people use the term wild to describe animals in terms of behaviour, ownership and whether horses dwell in confined spaces or range freely (with those animals that are owned being determined by brand markings on mature horses), rather than to refer to their status as a species.

Horse Chasing

Historically, common practice for ranchers, First Nations and some guide-outfitters in the study area was to use free-ranging horse populations as a resource, chasing and catching animals and training them for use as domestic saddle horses, or selling them. This practice dates back as far as early written records by explorers in British Columbia during the early 19th century. While some local residents would historically release their own branded horses to range freely and catch them as needed (IN03; IN06; IN05), it is also apparent from interviews that there have been other bands of wild horses on the land since before written record (IN03; *Tsilhqot'in Nation v. British Columbia* BCSC 1700, 2007). Hence the practice of chasing and catching free-ranging horses was sometimes an exercise in retrieving free-ranging domestic stock animals, and at other times meant catching for the first time horses that had never been owned, caught or trained before. Often, group round-ups resulted in a combination of owned and un-owned horses being caught and corralled together. In those cases a commonly accepted etiquette (described below) existed for handling the interests of a horses' owner and those of the person who caught the animals.

The specific techniques used to chase and catch wild horses vary among individuals, communities and First Nations. Chasing horses was most often a cooperative group endeavour which traditionally involved people from different Tsilhqot'in communities or ranches working together (IN01a; IN05). However, individual people often developed their own techniques and practices through experience (IN09), and such expert knowledge was sometimes protected carefully by individuals (IN01a).

Wild horses were most often chased and rounded up during winter months. At that time of year wild horses are slowed down by poor footing in the snow (the best conditions were deep snow with an ice crust on top) and are most likely to stay on established pathways and trails in the bush. The combination of difficult terrain and lack of energy during lean winter months with cold temperatures and limited food supply make the horses easier to tire out and catch (IN13). Even under these conditions, a band of horses might be pursued for between 4 and 8 hours before being caught. People chasing horses would often work in teams, driving the wild herds towards corrals built for the purpose of catching them (IN10). Riders would relay the herd from one group to the next, and when possible might have more than one horse per-person ready, to replace exhausted saddle horses with fresh ones as the pursuit continued (IN10; IN11).

Chasing horses requires a high degree of skill and knowledge. The land around Nemiah Valley and the Brittany Triangle consists of hundreds of square kilometers of "bush range" – densely forested bush and "dog hair" interspersed with open grasslands, steep cliffs and scree slopes, lakes, rocky creek beds, ravines, and swampy wetlands. Riders would navigate any and all of those terrains at a full gallop on horseback, in pursuit of a panicked group of wild horses. Teams of riders needed to know the land well enough to know exactly where they were in the bush, and to guess which way the horses would choose to run, or where to meet up with their counterparts in order to take over the chase. Not only does chasing horses that way require advanced skills as a rider, it also requires a detailed knowledge of the landscape, local terrain, and of the way wild horses would think. To complicate matters further, wild horses learn quickly, and if they were being driven towards a corral that had been used to catch them previously, they would deliberately avoid that area (INNB).

Key informants and participants in this study frequently brightened in expression and demeanour when talking about chasing wild horses. Without being prompted or asked, every interviewee who had participated in chasing horses at some point in their life described the activity as fun and exciting (IN09; IN01a; IN13; IN10).

Three main methods were used to capture wild horses: corrals, baiting, and snares. Corrals were often built specifically for the purpose of capturing wild horses (Figure 21). They would be constructed with high wooden fences (approximately eight feet high was standard), in locations where horses could be driven into them, or even at times right on established horse trails. At times they would be constructed next to a stream so that they contained a natural water source. Corrals built for this purpose usually had broad "wing" fences that would narrow down towards a gate which would be left open, so that horses

could be driven in along the wings like a funnel, until they had no choice but to enter the corral, after which the gates would be closed. At times there would be a gate at each end of the corral, so that horses could be driven in from either direction.

Alternatively, free-ranging horses were sometimes baited into corrals with the use of hay in the winter time. A trail of hay would be left along established horse trails, leading to a large bale in an enclosed corral. Hungry horses in the winter would eventually end up at the hay bale. One participant described an elaborate system that he had devised through years of practice, for setting a trip wire with a weighted spring release on the corral gate. As horses walked to the hay bale, they would push into the wire, releasing a lead weight that would slam the gate closed. The animals would have enough hay, and water in the form of snow, to last for at least three days in the corral. Locals would ride out to check the corral every two days, hoping to find some horses in there (IN09).

Figure 21: Elder Orrey Hance shows Katherine Card a wing corral that was used in the 1980s to catch wild horses.

A third method of catching wild horses involves the use of a snare. Snares would either be set up along established horse trails, or horses would be driven into them. As with corrals, wild horses would often learn to identify and avoid a snare if it had been left up too long, or if they had narrowly avoided capture in the past. Snares consisted of a firm rope, tied with a loop across a trail to trees on either side.

The type of rope, the size and flexibility of the trees were important considerations. A stick would be tied into the rope loop to prevent it from tightening too much around a horse's neck. Once snared, a horse would often be left for a period of time until it was calm or too exhausted to fight. Then it would be haltered and led out of the bush behind a trained saddle horse.

Culling Wild Populations

Despite differences in the perception and valuation of wild horses by provincial government agencies, ranchers, and First Nations, local residents from various cultural groups tended to take individual initiative to manage sub-populations of wild horses that were familiar to them or which roamed in their known territory. At times, individual people would prevent aggressive stallions from stealing domestic mares or limit population growth among wild horses by either killing or castrating stallions (IN09; IN13).

Release or Re-release

Horses were released or re-released to range freely under various circumstances. In combination with the culling practices described above, these strategies are generally believed to prevent inbreeding among free-ranging horse populations and to promote traits desired in good saddle horses. After round-ups or culls, individual horses with undesirable traits would be culled, while those with obvious strength or desirable traits would be spared and left to breed with wild herds (IN09; IN11; IN06; IN02; IN01). Also, horses that were too old to train easily would often be re-released. At times, horses bred and purchased outside of the community would be brought in and released in order to promote desired traits among free-ranging horse herds (IN09; IN10; IN06).

Some domestic horses would be "stolen" or would escape with bands of wild horses. Participants talked frequently about "losing" horses to wild bands. At times they would be recaptured at a later date, or they would yield offspring that would be caught and trained. One participant explained that they kept domestic stallions in their own fields, so that they would fight off wild stallions that might try to steal away domestic mares (IN01).

Beyond the deliberate or accidental release of a few individual animals, it was common practice for many people in the Chilcotin to deliberately release ranch horses (livestock) onto the open range for the winter (IN03). A few domestic horses would be kept close to home for use, others would be freed to fend for themselves (IN05). In this way, ranchers and landowners would not have to provide winter hay for all their horses – something that most people could not afford to do. This practice selected for

desirable traits among horses as they bred, as the strongest, toughest animals would survive through the winter, and others would not (IN05; IN06).

Etiquette of Distribution

In the past, individual people might chase and catch individual horses for their own use at any time in the year, though winter was the preferred season. For many local residents over the age of forty in Nemiah and surrounding communities, chasing horses was either a fun pursuit during their youth, or a necessity. Prior to the construction of the present gravel road into Nemiah in 1973, horses were a primary and necessary form of transportation. Having a good horse meant having the freedom to travel between communities, and beyond. Youths would sometimes go out to chase horses in order to obtain a horse of their own, to have fun, or with the hope of getting their own transportation to explore beyond their own communities. One participant described how, when she was a child, she wanted to experience the "outside world" (i.e. beyond the Nemiah Valley):

> *"My mother told me, 'If you want to see the world out there, you're going to need a horse.' So when I was up there [at Far Meadow] helping to hay [the meadows], I went out chasing horses. I was only about 14! I ripped up my coat. Ripped it up [on tree branches]. Didn't want to go home because my mother would see what I did [to the coat]. I was so scared! [laughs]" (INNB)*

She went on to finish the story, describing how her mother didn't get as angry as she'd expected. She did eventually catch a horse, and had to seek help to train it.

When groups of people rounded up and caught larger numbers of wild horses, they were likely to include a combination of free-ranging horses that belonged to local residents, and wild horses that did not belong to anyone. In such cases, a system of etiquette existed to guide the distribution of horses appropriately. Any horse that was branded could be claimed by its owner for a fee. Those animals without brands could be claimed by the person who had caught them. By the 1980s, official permits issued by the Ministry of Forests under the Section 45 of the Range Act were including similar rules of conduct to those described above as formal conditions of the permits (MoF File 760-4, 1984). However, this process of distribution and payment had already existed in the Chilcotin and elsewhere in British Columbia (Robinson and Wickwire, 2005) for much of the twentieth century.

Unclaimed, unowned wild horses that were caught in the past would either be kept for training and use as a saddle horse, released, or shipped out for sale. During the years of provincial government roundups and culls, a fee was paid for each horse that was shot. (See the section in Chapter 4 on the provincial government permit system.) Horses shipped out for sale would either be sold directly to buyers (often

guide-outfitters looking for mounts), or taken to horse auctions in Williams Lake. Those that were not bought for use as saddle horses would usually be sold and shipped for slaughter.

Horses in Relationship With People and the Land

Horses in Community Culture and Identity

Horses are a central part of the culture for Xeni Gwet'in people and the community in Nemiah Valley, even as the local culture and community adapt and transform in the face of change. Horses are woven throughout the relationships that people forge with the land through activities, identity and community culture.

In a letter dated December 31, 1922, to J.E. Umbach, the Surveyor General, R.P. Bishop (*Tsilhqot'in Nation v. British Columbia* 2007, BCSC 1700, para. 317) wrote of the Xeni Gwet'in:

> *Ten families of Indians have their headquarters in the valley but lead a semi-nomadic existence during the greater part of the year. Like all the Chilcotens,[sic] they are born horsemen and do not like going where they cannot ride; …*
>
> *After a few years residence in one place they have a tendency to move on, possibly being influenced by the condition of the range and of the hay meadows. At present the main village of the band is near the south boundary of lot 305, but there are several old village sites in the valley.*
>
> *The Nemaias go in largely for horses, and two members are said to own between them several hundred of these beasts … At present the extent of the Indians' holding is not clearly defined and a good deal of uncertainty exists on the subject. The settlement of this question, which has been pending for some years and is now on the verge of completion, will make things much more satisfactory both for the white men and the Indians …*

Horses were, and still are, used to travel through the backcountry in a landscape that has only recently been accessible by roads. They pack supplies and bear weight on hunting trips, and when gathering traditional crops (*Tsilhqot'in Nation v. British Columbia*, Testimony of H. Setah, 2004). Horses were vital to the ranch work, haying, and often to the survival of cattle in winter when forage plants were covered under snow. Historically, when ranchers fed cattle throughout the winter from open range as much as possible, horses were necessary to the survival of cattle in the winter time (IN01). Since cattle usually would not or could not paw through snow and ice to access feed, cowboys would often drive a herd of free-ranging ranch horses before cattle into a meadow. Horses would paw through the snow sufficiently for both themselves and cattle to access the forage below (Hobson, 1955; Phillips, 2008). In First Nations communities, many of the horses that have been part of these relationships and activities

have traditionally been horses that were captured and trained from free-ranging populations (*Tsilhqot'in Nation v. British Columbia* BCSC 1700, 2007).

One long-standing structural element of the relationship that horses and the Xeni Gwet'in have with each other and the land is thorugh the vast network of trails in Xeni Gwet'in territory. Tslihqot'in people have a long history of walking and running through well-established routes and trails in their territory (IN11; Setah, personal communication, 2010; *Tsilhqot'in Nation v. British Columbia*, Plaintiff Final Argument, Registry No. 90-0913, BCSC 1700). As the Xeni Gwet'in and other Tsilhqot'in people adopted horses into their lifestyles, many of those routes became trails for traveling on horseback. At the same time, wild and free-roaming horses have established their own vast network of trails throughout the forested landscape, particularly in the Brittany Triangle, many of which are used by people and other wildlife to make backcountry travel easier.

Although many aspects of local lifestyles are undergoing rapid changes in the Nemiah Valley, horses remain central to those lifestyles, partially through the deliberate choices of local leaders, and youth. A number of participants in this study commented on the ways in which horses continue to play a central role in community activities, and positive initiatives to engage youth in healthy sport, and to cultivate youth awareness of the land and their own cultural roots.

> *IN01a: Well it's nice to own horses, too. And this way it keeps the kids out of trouble. It even keeps us out of trouble, too eh? From what the old timers always said, before: own a horse and you'll stay out of trouble. I believed them too, eh? They know. They know about it. If you own a horse, if you look after him, you're going to stay out of trouble.*
>
> *IN01c: Yah there was one kid that was into trouble. Today, I noticed him today when we were at the rodeo grounds...he's always in trouble. And he's not even drinking or anything. He's riding a horse around. [Names the youth.]*
>
> *IN01a: Yah, yah, that's right. [Names the youth.] He was always in trouble with the law. He's got a horse now. And right now, he's concentrating on his horse. It's really awesome.*
>
> *Well just...we sort of pass the word along too, and it's true like the old timers said: one horse and it will keep you out of trouble. It sure does. There's no two ways about it. You yourself probably know. You've been handling horses and very young.*

Through horses, youth are engaged in physical activities, they learn independence and responsibility, and also how to ride out into the backcountry. As young adults mature, they often learn techniques for handling and working with horses that are passed down through families or between generations. One

participant spoke about how he learned a way of tying rope around wild horses to lead them out of the bush without resistance, and related the story of how he had learned the technique as a young man.

> *So it was that technique that Isaac Myers showed me. It was around 1960....it was about 1965, I was about 14 years old. He said, "I'm going to show you something." He said, "I don't want you showing it to everybody." So at that young age, he had no choice but to show me. I wasn't going to ride away. I wanted to see how it was done. I wouldn't learn, if he didn't show me!*
>
> *Interviewer: So you made sure that he showed, you stayed until he showed you. [chuckles]*
>
> *Yah. I told him, "I'm not riding out of here until I see what I wanted to see." He said, "If I see you showing it to anybody else, you're gonna get this!" [laughs, showing his fist] I told him, "I could run faster that you!" [laughs] So that's how I learned.*
>
> *Interviewer: And did you end up using that?*
>
> *I use it often. I even use it in front of my son-in-law, too... And I'm teaching him how to do it too (IN01a).*

As community leaders seek ways to engage teenagers in healthy activities, horses play a vital role not only as positive activity, but also as a form of common activity that can bridge between generations and create a connection with elders. Throughout the summer months, community gatherings occur and it is common for them to involve gymkhanas, horse races, or for people to ride through traditional backcountry trail routes to get to them. Beyond simply catering to youth, study participants who were in leadership positions also spoke very clearly about riding and spending time on the land, on horseback as a form of stress-relief, "therapy" and a way of remaining grounded.

> *Yah I still use horses. I had four around all last winter, you know, well...it's good to have horses around. Whenever you get bored or stressed out or something, you just jump on a horse and take off. Horses are good therapy. [Chuckles] It's good for young people too. Well I know it's good therapy for young and old alike.*
>
> *Interviewer: Do you see that interest coming back in the youth?*
>
> *Yah. We got rodeo ground out there and slowly young people are getting back into horses... (IN10).*

Figure 22: The annual Mountain Race in Nemiah Valley maintains some skills used when chasing wild horses.

In addition to the functional role of horses in people's relationships with the land, there are deeper, more implicit ways in which Xeni Gwet'in cultural identity includes free-roaming and wild horses. One participant articulated the parallels between Xeni Gwet'in culture and community structure, and that of the wild horses who share the same territory.

> *The wild horses are like us. They've got routes they go to. They have plans.*
>
> *You got a...you know younger studs that are hanging out together, and you got an older stud that's got his own mares. Until a younger stud takes over that old stud, then...So you got a mix of young stud and old stud that learn from each other? Just like an elder and a youth, and they move around and they know where the places to go...the ones that are strong enough take over a herd. They take over a herd and they know...'cause the bunch they hang out, they know where to go.*

> *The mares are sort of the leaders, like in our culture the women have power. They are really respected and strong. So, so the stud would protect the mares, and...but the mare would decide where to go, when to go. And it's quite interesting, in our culture it's the same. So um...you know you would...traditionally you've got a family, you've got intermarriages in different communities, and you had a leader that just takes over and they lead until somebody is better or stronger and people would go to that. So it's quite interesting when I think about the wild horses and us...(IN03).*

While this description does help to elucidate for a Western audience a different way of perceiving and relating to animals that is specific to wild horses in this case, the way of perceiving and relating to animals who share a home place, live on the land and use the same resources is indicative of a "way of knowing" that extends far beyond just Xeni Gwet'in and horses. That description illustrates the way that Xeni Gwet'in culture relates to many wildlife species and the land itself.

Spiritual Role

As a part of the social, cultural and ecological milieu of the Chilcotin, horses have spiritual meaning for many Xeni Gwet'in and other Tsilhqot'in people, in the same way that many other animals, and parts of the land do. The central feature of this spiritual role is not the horses themselves, but the fact that they are one part of a world in which many elements, animals, mountains, streams, and people have spirit, and are related to each other in spiritual ways just as they are in more tangible ways.

> *Guess ah...a while back, I'm not sure when that was... I happened to visit [Elder] in Nemiah. But [names elder and his wife] told me what he saw when they opened the door to the east. They live in a small log cabin. And they open the door. And way up in the sky they saw horses trailing, one after another into the sky. The horses' spirit.*
>
> *Says those horses that are going up into the sky....there are people up there shooting them. And they killed, and they'll fall on each other (IN11).*

Rather than singling out the horses as separate or distinct from other parts of Xeni Gwet'in culture and territory, this spirituality links them all together as parts of a whole, equally as important and sacred as many other parts of the system.

> *Because I mentioned about the fish, they have spirits. Waters. The grass. Trees. The air. They all have spirits. Those whirlwinds? They have spirits in them. When you talk nicely to ah... water, they'll be nice to you. But if you talk bad to water, they'll cringe. Down the road they'll capture you. So you gotta be nice to them. No difference than talking to a human being. If you talk down on another human being, they'll snap at you, just like that. If you talk nicely to them, they'll bring you the same message. Except for some people, they are very arrogant. I've met some arrogant people, they are hard to talk to. They think they know 'em all, but they don't (IN11).*

Through spirit, horses also help some Xeni Gwet'in people to know themselves in relation to the land, in similar ways that other animals might help other individuals.

> *There was stories of how powerful our people are, like um, the different rituals our people did when they're becoming an adult, and going up high in the mountains and doing this ritual where you drink very little and you eat very little and you work hard, you think positive and you get a power. Every individual Tsilhqot'in had a power. So you either had a power of the beaver or... you know some kind of animal like an eagle, or maybe a salmon. Like those were normal. Everybody had that. Thi'en in our language means medicine person, medicine doctor? Those people had three or four. They're the ones that people go to to get healed. And wild horses, like my uncle…And he got his power from that...ah, horse power.*
>
> *My Mum was telling me a story that one time at [place name for his birthplace] where I was born, he was just crawling around below the horse and he just trained it. He was slapping the legs and the horse was just shaking. Wouldn't do nothing. And my Mum was saying, "That horse is going to kick you!" and...my Mum told her brother, my uncle, he said, "He'll only kick me if he's going to kill me."*
>
> *But um... he had a horse power. He'd train any kind of horse. He owned horses. You know he had like, what is it, maybe 30 head of cattle, but he had like 50-60 head of horses (IN03).*

In such a grounded spirituality, horses are acknowledged as parts of a sacred whole, and may still be chased, captured, and at times even killed. The sacred is not revered as something beyond reach, but rather respected as something within reach. Understanding this worldview helps to clarify the ideological consistency, for the many Xeni Gwet'in people, of using wild horses to further the cause of promoting stewardship of the whole suite of wildlife, cultural practices, and the ecosystems that are all interconnected with horses. The horses are one animal that captures the attention and hearts of many people. If the local community can translate the reverence of strangers for wild horses into an understanding of the reverence that is an inherent part of traditional Xeni Gwet'in culture for the whole cultural-ecological system of which the horses are a part, then they hope to gain support for attempts to protect the lands and people from excessive exploitation.

This discussion of spirituality is not to imply that all Xeni Gwet'in people hold the same set of beliefs about horses, or about spiritual matters in general. However, to the extent that any general characterizations can be made about cultural identity, beliefs and the worldviews that form the fabric of cultural groups, it is important to articulate here the role that horses do have in the spiritual aspects of the relationship that many Xeni Gwet'in people, and the culture in general, have with the land.

Cultural Differences in Perception/Attitudes Towards Wild /Feral Horses

Interviews with local key informants revealed some variance among speakers in usage and implied meanings of the term wild. Many interview participants belong to more than one of the groups listed above. For example, some First Nations participants are also small-scale ranchers, government representatives, and grew up on the land. This mixing of cultures and identities adds to the variety of social and cultural beliefs and values on individual attitudes and opinions. In the Chilcotin, the identification as a local (implying a sort of "insider" status) versus a visitor (or "outsider") had as much of a strong influence on people's attitudes as did their ethnic cultural background and professions. Some local ranchers and First Nations participants who participated in the study would refer comfortably to a broad variety of free-ranging horses as wild, as long as they were not domesticated, branded animals kept in corrals or confined pasture space (IN03; IN01; IN09) indicating a vernacular use of the term wild. In contrast, other participants, including but not limited to some ranchers and government officials, suggested that since horses are an introduced species, the term wild was a misnomer, and the horses should properly be termed feral (IN14; IN08).

Many ranchers, particularly those who are from settler cultures and for whom ranching is a primary source of income, rely on the forage that is available from open range (for which they pay range use fees). These ranchers are concerned with keeping the weight of their cattle up, and deal with the fluctuation of market prices for beef as they weigh the costs of feed for cattle against the money made. The availability of forage on open range depends on numerous variables, including annual precipitation, temperature conditions, soil health, and successional stages in forest clear-cuts, in addition to the degree to which forage is also grazed by free-ranging horses. Historically, horses were driven ahead of cattle on the range during winter, because horses paw through snow and ice to reveal the forage below, which allows cattle to eat (IN06). However, among those variables which can potentially reduce available forage, free-ranging horses are perceived by many ranchers to be the only "illegitimate" factor, and one that can be controlled or managed. Many ranchers appreciate the symbolic value and the presence of some free-ranging horses on the landscape, but express concern over there being "too many" horses when the range becomes degraded, overgrazed, or when there is not the desired amount of forage available for cattle (Card, 2010; IN05; IN04; IN12; IN15). It is part of ranching culture to appreciate the wild freedom of open range and to some extent, the ways in which free-ranging horses symbolize those qualities; however, as their livelihoods depend on the health of their cattle, it is also part of that culture to value livestock most highly, and other animals secondarily, to the extent that they do not threaten livestock values.

"I'm not against having some horses out there. But I mean, after a while they get out of control, you know" (IN05).

Professionals who work within the culture of the provincial Ministry of Forests and Range (MFR) express concern about over-grazed and degraded range lands (IN08; IN12). Individual opinions vary regarding the impacts of free-ranging horses on the landscape and range health, and regarding how the horses should be managed. Yet in general, since the 1950s the culture of expertise among forest and range managers has been primarily oriented towards managing to optimize sustained economic yield and utility of forests and range lands to the forest industry and other stakeholders with economic interests, whether it is through timber or cattle (Green, 2007; Hauer et al., 2010; Jackson and Curry, 2002; Wilson, 2002; Vernon, 2007; IN07). Although public values and preferences for land management have driven a shift towards more community-based values and decisions-making since the early 1990s (Pinkerton et al., 2008), the policies, practices, legal frameworks and culture of governance institutions such as the Ministry of Forests and Range tend to be slow to reflect changes in public values (Holling and Meffe, 1996; IN12; Takeda and Ropke, 2010). Since free-ranging horses compete with cattle for scarce forage, and do not yield any direct economic value, they are perceived by many people as a threat that warrants management and population control (IN08; Bhattacharyya Personal Observation, 2009).

In a small community where local range managers with the field office for the provincial government are also residents and ranchers, themselves, there can be a blending of identities and priorities. While some MFR participants expressed their priority as one of range health and productivity, others spoke in a way that suggested they equate healthy range with ranch land that is productive primarily for cattle.

"What we're doing is not working – Well, we're not doing anything and that's not working. To me that's not working. And um... You know, we've got a, a business. You know the business of ranching is mine to advocate for and all that sort of stuff. So, I mean my take would be to get the horses off the range" (IN08).

Another participant from MFR offered a more distanced reflection on the role of his ministry, yet still participates in the professional culture by attributing range degradation to free-ranging horses, without mentioning the cumulative effects of cattle ranching.

"If you read back in the history, and I've done a tonne of that. You know, some of the history goes back into Gold Rush times when they said there wasn't a blade of grass between um...Boston Bar and Barkerville. Because there were horses everywhere. So you're dealing with a problem that started over a hundred years ago. And as expectations and the population in Canada and the people who manage the resources change, and their impressions and worldviews changed, so must the Ministry of Forests change to meet those, right? Those are the people we serve. Um...and it's

hard for a big organization to make some of those quantum shifts in...in perspective I guess, more than anything else" (IN12).

Alternatively, professionals who work within the Ministry of Environment, and others who have training as conservation biologists and ecologists, tend to place a high value on ecosystem health, and habitat for native, wild species of plants and animals, in particular for wild game species (IN14; IN07; Bhattacharyya Personal Observation, 2009). Horses are considered to be an introduced species in North America, and if they have a negative effect on natural wildlife habitat, are considered an invasive species. Since there is an extremely limited budget for monitoring the actual impacts of free-ranging horses on wildlife habitat in the Chilcotin (IN14), the perception of most wildlife biologists and ecologists is formed by observing the condition of easily accessible, intensely used range lands where horses and cattle have a combined impact. Free-ranging horses tend to lack legitimacy in this professional culture, too, but in this case it is because of their perceived status as an introduced species, among professionals who place high value on certain reference states for ecosystem integrity. This perspective was reflected among participants in this study (IN12; IN07; IN14; IN08), and is consistent with studies of professional resource managers in other regions with free-ranging horses (Nimmo and Miller, 2007; Rikoon, 2006; Symanksi, 1994).

You know, and my concern, obviously, are all the indigenous wildlife that are being impacted as a result of all the overgrazing. So, and everything from small mammals to reptiles, to...raptors to... deer and moose (IN14).

The difference in perspective and management priorities between the two provincial ministries is evident as one MOE participant describes personal preferences for managing ecosystem health in regions that are simultaneously wildlife habitat, open range for livestock, and home habitat for free-ranging horses.

Maybe they are reducing numbers of AUMs,[14] authorized AUMs, as a result of the presence of feral horses. I don't know. I don't believe it's widespread if it is going on. But it needs to occur. There needs to be some...that professional out there who is doing this management needs to go on site and they need to do these assessments and say "This stuff is hammered." And whether it's feral horses or livestock they should be doing something about it. And if it's hammered as a result of feral horse grazing, then it's irresponsible to put authorized AUMs over top of that.

[14] AUM stands for "Animal Unit Month". An Animal Unit (AU) is defined by the Alberta Ministry of Sustainable Resource Development as being one mature cow weighing approximately 1,000 pounds, that is either not nursing, or has a calf up to six months old. An Animal Unit Month (AUM) is the amount of forage required by one AU for one month, or approximately 1,000 pounds of dry forage matter (Rangeland Management Branch, 1997).

> *…It's gotta be managed for all. You know range management is all about maintaining the wildlife on the land base as well as having, you know, authorized AUMs and that sort of thing (IN14).*

Many local people use the term wild to describe animals in terms of behaviour, ownership and whether horses dwell in confined spaces or range freely, rather than to refer to their status as a species. Horses that range in areas remote from human settlement are extremely wary of humans and exhibit herd behaviour patterns similar to other wildlife species (McCrory in Goddard and Smitten, 2002), leading locals to describe them as "more wild" than those which range closer to ranches and human settlements (IN01b). Some First Nations participants who spent years living in the Brittany Triangle carefully qualified their discussion of wild horses by specifying that Brittany horses are "more wild" than those found closer to the human communities and settlements (IN01b; IN01a; IN01c; IN02; IN13?).

> *I have a hard time with the so called wild horses here in the [Nemiah] Valley, and the wild horses over there [in the Brittany]. Because I grew up with those other ones [in the Brittany]. So people say these ones are wild horses, but [these are] horses [bred] from their horse, from their horse. It's still, there's an ownership. …Whereas the wild horses over there, there's no claim to them.*
>
> *The real [wild horses], like… you won't see them. Those ones, you won't see them because they'll sense you, know that you're coming (IN01b).*

By referring to horses as being more or less wild based partially on their behavioural response and proximity to humans, First Nations community members demonstrate a tendency similar to many Euro-Canadian cultures: characterizing "the wild" in opposition to human domesticity. However, at the same time, Tsilhqot'in First Nations interviewees demonstrate a complex concept of wildness that is not exclusive to human presence, as they search for language to distinguish between different populations of horses geographically and behaviourally. These distinctions are often based on direct experience, and even the most remote or "more wild" herds of horses are referred to through stories of personal interactions, which families' traditional lands they inhabit, and in terms of spiritual and functional relationships between the individual horses and people. In other words, even the most wild horses are conceptually integrated into the functional, spiritual, and cultural lives of many local First Nations people.

Valued Characteristics of Wild vs. Domestic Horses

When participants in Nemiah Valley and surrounding areas were asked about what they value most about wild horses, they responded consistently with pragmatic, identifiable characteristics. As described above the Chilcotin is a region where people have maintained an ongoing interaction with wild and tame horses, as wild horses were caught and domesticated for use, and domestic horses were

released onto the range temporarily or permanently. Thus participants who lived and worked on the land in and around the Nemiah Valley and Brittany Triangle tended to make a greater distinction between local horses and horses bred or raised elsewhere, than they did between wild and tame horses. The positive characteristics that local wild horses develop by growing up and surviving in the local landscape were named consistently by a number of participants as strengths when it came to cultural and pragmatic uses of tamed horses. The characteristics that distinguished local wild and tamed Chilcotin horses, or cayuse,[15] from well-bred domestic breeds that were raised elsewhere are described below.

Tough

Local horses that grow up in the wild are known for their toughness and endurance – both highly prized qualities in a horse.

> *Well they're very hardy, compared to the horses (bred) today. Got more endurance. (IN01b; IN01e)*
>
> *That's actually...that's your ideal horse for chasing horses. [Names friend's horse], they rode it all the way to Williams Lake, and there's no give to that one. He's just strong all the way. Just prancing. No give, he's just ready to go, just any second (IN01d).*

One participant described what sort of tough qualities he looked for in a horse, having spent a lifetime working on the range, and referred to wild horses that he had domesticated and ridden from the nearby Fraser River area.

> *Oh yah. Yah. Well they're good anywhere. I mean you take any wild horse you catch, I mean he comes from generations of survivors. He's a tough horse. And there's still people...average people riding today don't need a tough horse and they wouldn't know what to do with one if they had one. But there is still people that need a tough horse. I hear these guys talking about, you know... these... a quarter horse is a horse that I just hate. I think they're the most useless thing on earth. You know and they talk, "Oh ya, it's a good horse, you know, he'll go 30 miles a day." Jesus Christ, thirty miles a day?! You'd never even get away from camp on that bastard! I wanted a horse that'll take me 70 miles today, eat a belly full of swamp hay and take me 70 miles tomorrow. If he couldn't do that he was no good. You know, and never fall down. I hate a horse falling down. Just hate 'em.*
>
> *And those wild horses that grew up down along the Fraser River there, you couldn't knock 'em off their feet once they got full going (IN06).*

---

[15] The term cayuse is a word for "a native [sic] range horse" (Merriam-Webster, 2011), and is common throughout Western North America. The word may be from the Chinook language. At times historically the term has been used as a derogatory reference to wild horses kept and used by First Nations. However, during this fieldwork the term was used in a positive way primarily by First Nations people, who referred with some pride and admiration to those horses that were cayuses, always explaining the specific part of Tsilhqot'in territory from which an individual animal came.

Fast

Wild horses from the Brittany Triangle area are also known by locals for being particularly fast – a quality that is highly valued by people who must use their own horses to chase other wild horses, and to race in the annual Mountain Races at local rodeos. One participant who had two horses in his possession which he had caught in the Brittany Triangle and trained, commented on the speed of wild horses in the Brittany.

> *I've chased horses around Stone, and the horses around there are kinda small and they don't, they're not as fast. Yah. The horses at Far Meadow [in the Brittany Triangle] are fast. Yeah. Good runners. You have to have a pretty good horse to keep up to them, winter time, yah.*
>
> *I know one guy he caught a horse in the Triangle, they put him on a race track down in Vancouver somewhere. He did real good on the track. He was fast (IN13).*

Easy Keepers: Good Feet and Know What to Eat

A vernacular term among horse owners is to call animals "easy keepers" when they require little investment of money, time or resources in order to maintain their health. Wild horses from the Chilcotin were described by a number of people as being easy keepers, with particular reference to their strong hooves and ability to forage effectively in the bush, even during harsh winters.

> *Yah, the thing about these horses: they got good feet, tough feet. And they know how to rough it. They're easy keepers (IN13).*

The ability of local horses that came from the wild to survive and remain healthy on wild plant species, and to paw through snow in order to access winter forage is a form of local adaptation and knowledge among the horses, themselves. Participants describe how horses raised in other environments do not come with the same knowledge base.

> *They're easy keepers. A lot of those [domestically raised] barn horses wouldn't last long out here. You gotta look after them. The quarter horse or the thoroughbreds. They're more...To me they're more... like barn horses, you gotta look after them all the time. You gotta feed them (IN01a).*
>
> *Another thing to mention about these [wild] horses, too is …they know how to paw, compared to the thoroughbred and the quarter horse. They don't know that… unless they're taught, or some of them, you know, maybe do catch on. But these ones naturally do know how to look for their feed in the winter (IN01e).*

These qualities in local wild horses are not only crucial to the animals' ability to thrive in local environments, but also have very tangible economic implications for the people who use horses in the

local terrain and backcountry. A horse can become crippled or useless for transporting people and equipment if it is lame from hoof problems. If a horse cannot get enough nutrition from available forage in the bush, then it becomes dependent upon people to feed it. Feed for horses can be expensive, and on backcountry trips adds weight to the supplies that must already be packed. In an environment where people have limited income, and must be self-reliant in the bush, these qualities in horses are important not only to the survival of the horses, but also to the survival and safety of the people relying upon them.

Sure-footed / Know the terrain

Horses that grow up fending for themselves in the bush learn to be sure-footed, and develop an intimate knowledge of the local terrain. Wild horses in the Brittany Triangle and other parts of the Chilcotin must frequently run from predators through dense forest, over rocky ground with root holes, and through willow shrub wetlands where the ground is a series of hummocks and plunging depressions. One participant told me stories contrasting horses from the Prairies which were in danger of tripping in small gopher holes, with horses from the Chilcotin that could gallop across uneven ground with large holes in it (IN06). Other participants offered similar comments about local wild horses knowing how to navigate the terrain encountered in the Chilcotin backcountry.

> *"…They're born out in the bush. You take some of these town horses and you'd kill them off [going through here]" (IN05).*
>
> *"They know the area. They know where to go-" (IN01e).*

These statements are consistent with my own observations of wild horses in the Brittany Triangle, many of which astounded me by moving with grace and suspension I had only previously seen in expensive sport horses, while trotting or galloping through dense burned forest lands in which I frequently twisted my ankle.

Again, sure-footedness and knowledge of local terrain on the part of horses is also a matter of safety and survival for people riding them. A falling horse can injure or kill a rider, and if the animal becomes injured or stranded while in the backcountry a rider's life can also be at stake. In contrast, people learn early on that trusting the instincts of a reliable horse in the bush can often augment a person's best abilities and decisions about which routes to use around natural obstacles, and the presence of wildlife.

Smart with Wildlife

Horses that are bred in domestic environments retain the acute senses and prey instincts of their species, yet often lack the experience and knowledge to understand which wild animals present a danger, or how to behave when in the presence of danger. The result can be a domestic horse that may startle even when it senses wildlife that do not necessarily pose a real threat, or worse, the horse may panic and throw its rider in the face of true danger and predatorial wildlife. Wild horses are not immune to these instinctive responses, but rather, their instincts are attuned to the local environment through experience, and they can more easily become a partner whose acute sensory perception may help rather than endanger the rider. A number of participants agreed with each other about this valued characteristic in wild horses, relating personal experiences.

> *IN01b: They know danger. They sense, yah. In the habitat [of] different animals...where one can be on alert for whatever.*
>
> *IN01e: They react differently to wild animals compared to your thoroughbred, or your quarter horse.*
>
> *IN01a: …A wild cayuse, geldings or mares, they got good sense, too. If they sense danger up ahead, you cannot push them forward. If they know there's danger ahead, won't even go that way. They'll go around it.*
>
> *Interviewer: Have you ever had that happen?*
>
> *IN01a: Yah, I've had that happen. Not only me, but to my wife, too. It has happened for her. One of our appaloosas... When my kids were small. And it saved her life. She was kickin' it really hard and it wouldn't move. So they had to go around. That's the only way.*

Think for Themselves

Finally, participants who live and work with wild horses from around the Brittany Triangle and Nemiah Valley credit the horses that come from the wild with being particularly intelligent and thinking for themselves in what could be described as a form of local "street smarts" among the horses. Participants gave examples of wild horses, once caught and accustomed to humans, being easier to train than horses bred and raised in domestic circumstances.

> *The most wildest horse right from the Brittany Triangle, you can train that one in the corral faster than this barn horse. This barn horse...sure he's nice and tame. Soon as you put a saddle on him, he could be a really good bucking horse, too! It's the strangest thing about a horse that you raise on your own place here, or "barn horse" I call them. Or take… a gentle horse you raise on your ranch? They're harder to break than these ah... wild horses. This wild horse will train a lot faster than these ones here (IN01a).*

When I asked why the horses might respond differently, one participant explained the equine behavior to me by giving me a relatable example of a situation in which a person suddenly placed in a foreign environment would have to be more attentive, in some ways more trusting of strangers, and in other ways more self-reliant while thinking through different situations.

> *You know how, like even you if you're taken and you're put in Spain or something like that. Then you start to figure your way through everything. Horses do the same thing...with people. A wild horse, they don't have that chance to know. So they have to really read your body language. They have to trust you, for their survival (IN01b).*

Another example of how local people find wild horses to be "smarter" than domestic horses relates back to their toughness in the face of a challenge. Participants referenced an incident that we had all witnessed several days prior to the interview, in which an unsupervised horse that was tethered to a fence caught its leg in the rope, panicked and broke its leg. The horse had to be put down immediately. It was the sole domestically bred horse among several horses of wild descent which had all been tethered in the same way.

> *Here's another thing, [about] the cayuse as opposed to well-bred horses. That horse that he had to shoot up there the other day… I was talking to [names Xeni Gwet'in Elder], and him and I both agreed, if that had been a cayuse and it had hit the end of the rope, he might have burnt himself, but that would have been all. That well-bred horse, he hit the end of the rope with it tangled on his leg and broke his damn leg! You know like [Elder] said, "Those damn horses are no good in this country." (IN06)*
>
> *If it had been the old pinto tied up there, that cayuse, he'd have hit the end of the rope, he'd have got up with his leg rope-burned, but that would have been it. He would have stood up and said, "I won't do that again!" [laughs] "That hurt!" (IN06).*

All of these traits and behavioural tendencies that participants named as valued characteristics among local wild horses, particularly horses in the Brittany Triangle, indicate the ways in which those horses have developed survival skills and physiologies that serve them well in the local environment. Yet these conversations are also indicative, perhaps even more so, of the relationships between local people and their horses that are also local. By naming certain characteristics prized in horses, people are also identifying the traits and characteristics that are culturally valued and pragmatically necessary in that place, the horses' habitat, and society. The quotations above illustrate the functional roles and cultural values by which wild horses and tamed wild horses are integrated with local socio-ecological relationships. Essentially the characteristics that people describe as valued traits among wild horses in the Chilcotin are a form of local equine knowledge and practice. This is a knowledge and practice acquired through generations spent surviving on and knowing the same landscape as the local people,

and it is local people who are best equipped to recognize, understand, and "read" that knowledge when working with the wild horses from their region. People and horses earn respect for their local knowledge, strength of character, and smart behaviour in very similar ways. This idea is developed further in Chapter 7.

Iconic Status and Symbolism of Wild Horses

Symbolic Values and Meanings Associated with Wild Horses

The idea and image of wild horses holds a strongly affective mystique, and they are potent symbols for many people, representing freedom, aesthetic beauty, and raw power, and grace. One participant summarized these feelings.

> *There's another element of course, the horse has immense cultural and spiritual value, not just to First Nations but to everybody. We know that from the response we get when we talk about the wild horses or present material on them, whether the articles or whatever. There's an immense connection, a tremendously strong connection between human beings and horses, and the horses. And ah...even the old horse hunters from the '30s and '40s and '50s will say that, "Well, we had to hunt them because we got through the Depression that way," for instance or "hardtimes, cause we got some money," and there were too many, no question. I guess there were, and that's because they killed off the predators, probably. And, ah...but they feel that something very, very important would be lost if there were no more wild horses, which has happened in most of the world (IN16).*

Beyond their continued utilitarian value to the ranching and backcountry activities of the Chilcotin region, horses remain a symbol of the frontier feel of that place. Both aboriginal and non-aboriginal residents of the region are part of the local "cowboy culture" (Baillargeon and Tepper, 1998; Iverson, 1994). Tourism pamphlets tout photos of rodeo events, trail rides, wild horses, and the wild Mountain Races of the region. Artistic logos for several Tsilhqot'in First Nations include images of horses, demonstrating the centrality of horses to the culture and identity of local people.

Numerous key informants from a variety of interest groups, livelihoods and cultural identities clarified during interviews that while they may have concerns about the number of free-ranging horses that are on the range, they consider the horses to be "part of the place" (IN05; IN11; IN16; IN04; IN06). Though frequently expressed, this view was not universal, with some informants expressing a preference for all free-ranging horses to be eradicated (IN08).

The tolerance and interest expressed by non-aboriginal participants regarding wild horses in the Chilcotin seemed to relate as much to the associated values, principles and way of life that the horses represented symbolically, as it did to the animals themselves. The primary symbolism associated with wild horses was that of freedom: freedom of choice, freedom of movement, freedom from human-imposed restraint or regulations, and the symbolic self-reliance of the Western frontier.

When First Nations participants referred to wild horses in symbolic terms, it was generally either to refer to a broader ecosystem concept, cultural identity, or spiritual association. Wild horses were specifically invoked to symbolize the integrity of the land and protected ecosystems (IN03; IN01e). Bands and herds of wild horses were also mentioned in directly comparative terms with the family units, decision-making power, and patterns of movement of Xeni Gwet'in culture (IN03). The power of that sort of perceived corollary is a deeply embedded identity of local culture with the wild herds, such that if the rights of the horses to exist and thrive on the landscape is threatened, it is felt as a personal threat to the integrity and values of the Tsilhqot'in people.

There was also a politicized symbolism associated with wild horses, for some First Nations participants. There was a direct link drawn between the identity of the people and their right to inhabit and use their own land, and the right of the horses to inhabit that landscape without persecution.

Political Strategy and a Double-Edged Sword

In addition to the symbolic meanings associated with free-ranging or wild horses in the Chilcotin, they have become icons in a political, public relations struggle over resource use and land management (Findlay 2005). In 2002, the Xeni Gwet'in First Nation joined with the Friends of Nemaiah Valley (FONV) to declare a portion of Xeni Gwet'in traditional territory – including the Brittany Triangle – the ?Elegasi Qiyus Wild Horse Preserve.That declaration came 13 years after roughly the same area – covering an area of approximately 779,000hectares – had already been designated by the Xeni Gwet'in as an Aboriginal Wilderness Preserve in 1989 (CEAA, 2010). (See Appendix G: Map of Xeni Gwet'in Territory.) The emphasis of both designations was on preservation of the landscape, natural resources and socio-ecological integrity, rather than on any single use, species or purpose. In the midst of a legal struggle by local First Nations to assert decision-making authority, aboriginal rights and title over their land, the declaration of a wild horse preserve was one way in which the Xeni Gwet'in and Tsilhqot'in people could assert their right to determine their own land use priorities, protect the land base from industrial resource development, and garner public support and attention from far afield.

Magazine articles (Findlay 2003) and a film documentary (Goddard and Smitten, 2002) about Xeni Gwet'in culture and their home landscape highlighted wild horses and the Xeni Gwet'in horse culture as an iconic image. Fundraising efforts by FONV to support the legal costs of the Xeni Gwet'in and Tsilhqot'in nations over a period of years strategically used the image of wild horses as way to hook the attention and garner support from a distant urban public in Victoria and Vancouver (FONV, 2011). The wild horses of the Brittany Triangle themselves were never the sole focus for those people organizing fundraising, land preservation, and legal battles, nor the only priority for everyone involved. Although the horses themselves may have been the primary concern or even the only concern for some members of the public who took an interest in the campaign, the horses quickly became an iconic image symbolizing a suite of more complex socio-cultural and environmental issues in the area. Free-ranging horses of the Brittany Triangle and Nemiah Valley are intricately interwoven with the society, culture and ecology of the place, yet they are not the most important characteristic of the place. Similarly, the 'wild horses of the Chilcotin' became inextricably linked to the image of the area, icons of Xeni Gwet'in culture, socio-political power struggles, and the regional landscape, even though they are not the most important or definitive aspects of that place.

> *But to us horses um...you know when we want to protect horses, we're thinking of the future. We're gonna protect the wild horses." For two reasons. One is um...everybody loves wild horses. So if you're going to damage the land that's going to affect wild horses, we can lobby and protect wild horses. That's just like protecting the land. You protect the wild horses, you're protecting the moose, the deer, the bear... Because the habitat that the horses need also protects... If we can protect the horses' habitat and where they go, we're protecting moose, deer, like all these other wildlife.*
>
> *The other [reason] is that we know that one of these days, these kids are going to get back on that horse. And there's going to be more, and it's going to keep coming back. … Right now maybe, some of our youth are riding, some of them aren't. But you look at they're coming back, the youth. Youth love horses.*
>
> *So if you're thinking of um...pre-contact, post-contact 'till now...we got vehicles, we got quads, motorbikes, we got games. You know. And we got wild horses, and it's like um...you want to protect them because one of these days we'll need to go back to them IN03.*

This statement demonstrates how the reasoning for Xeni Gwet'in to protect wild horses is not focused on the one species. Rather, horses are a useful symbol or icon for their political struggle to maintain entire ecosystems in the face of industrial development pressures, while also re-engaging youth in cultural activities. The participant's words also demonstrate a long-term perspective on development and social change, with awareness that gas-powered vehicles and other technologies which have only been available in the community for a few generations might also become less available once again, within another few generations.

The use of wild horses as an iconic image for the Xeni Gwet'in and Tsilhqot'in struggle is, strategically, a double-edged sword. The horses are a powerful image, evocative of deep emotions in many people, and curiosity in many others. Unlike in the United States, wild horses are also a relatively unique image in British Columbian and Canadian environmental politics. Members of the public in BC and across Canada were inundated in the 1980s, 1990s and 2000s with environmental conservation campaigns earmarked by images of breathtaking vistas, grizzly bears, and other species of 'charismatic megafauna' which many members of the urban public value but cannot relate to on a personal level. The image and idea of wild horses successfully caught the attention of a sympathetic public and the news media throughout the province and the country, and held it long enough for them to hear a deeper message about a First Nation's legal battle and habitat protection for a suite of flora and fauna, in the Chilcotin.

However, the use of 'wild horses' as an iconic image has contributed to misunderstandings about the mandate and priorities of the Xeni Gwet'in, FONV and other organizations, by some people – particularly rural ranchers (IN06; IN05) and government employees (IN12; IN14), as well as biologists and environmental professionals who are normally sympathetic to habitat conservation efforts (Pers. Com. 2007). The necessity of simplifying complex issues for a broad-reaching public relations campaign inevitably carries with it the danger that people receiving the message will mistake the symbolism for the entire message, or mistakenly assume that the campaigners themselves have an overly simplistic view of the issues. Advocates of environmental conservation in British Columbia and elsewhere are often accused of over-simplifying issues. Add to that the fact that free-ranging horses are a (re)introduced species in North America, considered by many to be an invasive or pest species, it immediately becomes an ironic choice to use them as icons for an environmental and cultural conservation campaign.

Having been relatively remote from urban development during the 20th century, the Chilcotin retains a culture of wariness and suspicion towards outsiders, especially people perceived to be urbanites from the government power centres of Victoria and Vancouver. A significant number of local people – particularly ranchers and government range managers – heard about the declaration of a wild horse preserve and immediately assumed: 1) that the Xeni Gwet'in had somehow unwittingly fallen prey to undue influence from outsiders in their political strategy (IN14); 2) that urban 'bleeding hearts' from Victoria were advocating the preservation of a species which is seen as a threat to viable cattle ranching, and to native ecosystems (IN14); and 3) that a wild horse preserve means no management of horse populations (IN08; IN06). None of those assumptions are entirely accurate. Yet they underlie

much of the dialogue about free-ranging horses with people from a variety of sectors, and tend to alienate some ranchers and biologists who may actually share common goals, conservation ethics and land management preferences with First Nations and environmental NGOs.

Iterative Flow of Ideas between Cultures

The decision to highlight wild horses as the poster image for the Xeni Gwet'in and Tsilhqot'in people's traditional culture and territory was a politically strategic one made by the Xeni Gwet'in together with colleagues from FONV and other conservationists with common interests. Through that decision, the horses have become icons of something else, too: the joint creation and cross-cultural mixing of symbolism that holds multiple meanings for people of different backgrounds and fuses them together in the context of a place.

Skeptics may question whether the use of an introduced species to symbolically represent traditional indigenous culture and ecology might be a constructed image of "nativeness" that is somehow inauthentic. However, in the case of the Xeni Gwet'in and Tsilhqot'in people, the integration of horses (wild and domestic) into their culture, landscape, and livelihoods is precisely the sort of adaptive approach to interactions with wildlife, animals and landscape that characterizes their traditional culture and practical history (Lutz, 2008). The promotion of wild horse imagery and the horse culture of the Xeni Gwet'in was not considered to be the construction of something false, or a passive conformation to imposed commodification of native culture. On the contrary, it was a deliberate and strategic act of making *explicit* an aspect of local culture which had been *implicit*, promoting one aspect of a way of life to outsiders in order to garner support for the continuation of a much broader spectrum of traditional practices and values (IN03; IN16).

CONCLUSION: HORSES IN CULTURAL-ECOLOGICAL COMPLEX

Free-roaming horse herds in the Chilcotin are behaviourally and physiologically heterogeneous, with some displaying behavior traits of wild animals, and others indicating more traits associated with tame or domestic horses. These differences vary by geographic range and territory, and by horse herds/bands. Some free-roaming horses are known to have been recently introduced, released, or escaped from domestic circumstances while others are known to have been wild for multiple generations. These characteristics vary by individual animals, bands and herds (or subpopulations). Their ecological impacts, and behavioural traits are as varied as the animals themselves, and the ecosystems that they inhabit.

Within this spectrum, the horses of the Brittany Triangle are behaviourally wild, have been present on the landscape in that place for many equine generations, and are some of the least habituated to contact with human beings. This study indicates that free-roaming horses in the Brittany Triangle have spatially heterogeneous impacts on other ecosystem elements. In remote regions of the Brittany Triangle, free-ranging horses inhabit forest and sedge meadow ecosystems that are protected from the effects of logging, and are not currently grazed by cattle. In this area, horses exhibit behavioural patterns characteristic of wild herd behaviour (Berger, 1977; McCrory 2002) and a prey response to humans. The Brittany horses are considered by most locals to be "more wild" than those that range closer to human settlements. They have heterogeneous effects on the meadow/forest/wetland ecosystem complex in terms of their effects on ground cover, soil disturbance, vegetation height, litter layer, wildlife presence, grass-nesting birds, and species richness. Given the many human and non-human disturbance factors and drivers of change influencing the region, it is evident that free-roaming horses are one of many system elements in the Brittany Triangle (and surrounding region) that affect and are affected by change.

In other regions of the Chilcotin, such as those closer to human populations, free-ranging horses share habitat with domestic free-ranging cattle, and their combined effects on the landscape are more severe. In addition, horses in such regions often exhibit more "tame" characteristics, being considerably less alarmed by the presence of humans (Bhattacharyya Personal Obs., 2010). To broadly discuss all free-ranging horses in the region as though they were a homogenous group, and to argue generally about their origins or discuss management options for them all, would be an oversimplified understanding of the heterogeneity of the horse populations, landscape, and of local communities.

The Chilcotin has traditionally been a landscape where people interact with free-ranging horses through a suite of practices, a cultural-ecological complex (Lescureux and Linnell, 2010; Platten and Henfrey, 2009; IN03), that blurs the conventional Western understanding of the boundaries between domesticity and wildness (Schmidt and Dowsley, 2010). The concept of a cultural-ecological complex is used here with reference to Platten and Henfrey's (2009) development of the idea of a "cultural keystone complex", (See Chapter 2). For the purpose of this discussion about free-ranging horses in the Brittany Triangle, the notion of a complex is apt and especially useful for describing the ways in which free-ranging horses are part of a cultural-ecological complex in the Brittany Triangle. The horses' ecological impacts and relationships, as well as the cultural values and management preferences associated with the horses can be best understood through discussion and analysis of the cultural-ecological complex of which they are a part, rather than focusing too narrowly on the species

characteristics of the horses, alone. Whether the idea of an inter-related social, cultural, ecological system is represented in terms of a keystone complex, a socio-ecological system (Berkes, Colding and Folke, 2003) or a network (Janssen et al., 2006), the central point in this case study is that horses not only represent one node in the system, but in Nemiah and the Brittany Triangle horses are functionally, culturally and spiritually part of the links (relationships) between other factors in that system.

There is a long-standing practice in the Chilcotin whereby both First Nations and members of settler cultures in the Chilcotin regularly chase and capture free-ranging horses. Those horses that are already branded can be reclaimed for a fee by the owners. Other animals can be trained as needed for use as saddle and work horses, or sold. One long-term resident of the Chilcotin described chasing wild horses as "the national sport of the Chilcotin" (Richburg in Grindlay, 1995). Human communities have influenced horse populations directly by culling and capturing some animals from free-ranging herds, culling or killing other horses, and releasing domestic horses into free-roaming herds, sometimes with the deliberate intent to breed desired traits into the free-ranging populations (IN09). Horse populations have also been indirectly affected by human cultures and politics through land management and resource use practices, forest fire suppression and fire-fighting efforts, management of predator populations, and other such actions.

Horses in general have been integrated into the livelihood activities of local communities and individuals, functionally, and in terms of socio-cultural practices and identity. As such, horses also play a role in the relationships that local people form with their environments and with each other. In the Nemiah Valley and around the Brittany Triangle, the primary factors that determine how wild a horse is considered to be are the behavioural characteristics of the horse(s), geographical proximity to humans, and the number of generations an individual horse is removed from domestic animals. The boundary between wild and domestic horses in this discussion is fluid and difficult to define, since a core part of the relationship that local people have traditionally had with horses involves the ongoing dynamic interaction between people and animals as locals chase, capture and train wild horses for their own use, as well as releasing horses onto the range. This suite of practices and interactions has shaped both the horse population in the Brittany Triangle, as well as local culture.

CHAPTER 6 –WAYS OF KNOWING AND LIVELIHOODS: MANAGEMENT IMPLICATIONS

It seems fairly obvious to some of us that a lot of scholars need to go outside and sniff around– walk through the grass, talk to the animals. That sort of thing.

"Lots of people talk to animals," said Pooh…
"Not very many listen*, though...*
"That's the problem."

~ Benjamin Hoff, *The Tao of Pooh* (1983, p. 29)

This research sought to better understand the ecology and cultural values associated with free-roaming horses in the Brittany Triangle, as well as how to integrate different types of knowledge and information about them. The study led directly and unavoidably to an exploration of controversies and issues that surround free-ranging horses in the broader Chilcotin region. That consideration of issues and controversies pointed beyond the single subspecies of *Equus ferus caballus* to deeper and broader forces and dynamics which influence communities, the land, and horse populations: linked social, cultural, political and ecological forces. Wild horses in the Chilcotin are symbolic not only in the typical ways (as images of freedom, the wild west, and qualities of power, grace and beauty) but also as a "tip of the iceberg", visible figureheads for issues pertaining to culture, human-environment-animal relations and political decisions over land use that are much larger than the issue of free-ranging horses alone.

The combination and integration of scientific information (quantitative and qualitative data) and local knowledge in this study highlights the relationships between three core themes: power relations, ways of knowing, and the effective integration of diverse ways of knowing in management and planning. These themes provide a framework for the subsequent discussion in this chapter of implications for approaches to land use decisions among various actors, including First Nations and non-aboriginal agencies. This chapter explores the implications that have emerged from this study with regard to the relationship between knowledge, power, management and the land. A key theme that emerged from the research for this study is to question the underlying power dynamics that are often implicit in conventional approaches to planning and management processes associated with land use and wildlife (Holling and Meffee, 1996). The word "management" clearly has different connotations for different people, depending on the relative power that they wield in management processes. The discussion returns to several fundamental questions. How do power relations influence the integration of different

ways of knowing in management and planning? What sort of integration is appropriate under the given set of circumstances? What sort of management – if any – is appropriate, given research results?

POWER RELATIONS – INFORMATION, INCLUSION, AND PROCESS

The relationship and interplay between information, knowledge, and power relations has been explored and discussed in considerable depth (Rabinow, 1984; Cooke and Kothari, 2001; Lutz and Neiss, 2008; McGuirk, 2001; Nader, 1996). In particular, the management of land, animals and resources in situations where aboriginal peoples and other government agencies have different perceptions and preferences can exacerbate existing structural inequalities in power between different groups (Booth and Skelton, 2011; Nadasdy, 1999; Turner et al., 2008; Sherman et al., 2010). Even where people make genuine efforts at inclusivity, the different ways of evaluating credibility of knowledge and information can end up delegitimizing some forms of knowledge (Chambers, 2009; *Delgamuukw v. British Columbia* SCC 1010, 1997; Singleton, 2009).

Power Relations and Horses in the Chilcotin

The history of land use in the Chilcotin over the last two centuries is characterized by deeply rooted and overt struggles over territorial control, land and resource use, and autonomy of decision-making. The Chilcotin War in 1864 was a direct action taken by the Tsilhqot'in people in defense of their territory, against invasion by unwelcome outsiders (*Tsilhqot'in Nation v. British Columbia*, Argument of the Plaintiff, 2007). Power struggles continued as settlement by Euro-Canadians became more commonplace and formal control over the territory was assumed by the colonial government initially, followed by provincial and federal governments. From the 1890s onward, some ranchers and colonial government administrators contested First Nations' use of the grassland and open range resources that were vital to ranching (Reid, 2008/09).

John Thistle (2008/09) combed through extensive archival records to support his analysis of the links between wild horses, First Nations, and power struggles with the governing authorities in the Chilcotin. Wild horses grazing on open range were claimed by many First Nations peoples as their own, and were considered a natural resource with intrinsic and economic value by many First Nations. However, First Nations and provincial governments have a long history of disagreeing over how many free-ranging horses should be left on the range.

The following excerpt from letters exchanged in 1927 between William Ditchburn, Department of Indian Affairs and George Pragnell, Indian Officer for the Nicola District, illustrates the relationship between wild horses and power struggles over the land base and economic viability of raising cattle and horses. Pragnell wrote to Ditchburn:

> *"With reference to the matter of trying to persuade the Indians [in the southern interior and around Williams Lake] to give up raising useless horses, this matter has been constantly impressed upon them by the Agent, the Constable, and myself… They argue that with the present shortage of hay, particularly on the reserves, they cannot keep cattle whereas horses can exist after a fashion…. I must add that these various troubles will not be settled until Chief Chilliheetza (Nicola) and his followers are finally and firmly dealt with and repressed" (Pragnell 1927 quoted in Thistle 2008/09, p.86).*

Thistle adds that "for the Native people involved, this was a fight against processes of colonialism that had dispossessed them of both land and livelihood" (p.86) and goes on to describe how the government-ordered horse hunts which followed were often protested and sabotaged by local First Nations.

During the same time period, disagreements over hunting and fishing rights for First Nations people were characterized by power struggles, especially throughout the first half of the twentieth century when governments imposed restrictions on First Nations' hunting to the extent that feeding a family through the winter was difficult to do legally (Lutz 2008). These power struggles have continued in recent decades between the Tsilhqot'in people, especially the Xeni Gwet'in, and provincial and federal governments with disagreement over approaches to industrial logging in the 1980s and 1990s (Woodward et al., 2008) giving rise to the court case to assert territorial rights (*Tsilhqot'in Nation v. British Columbia,* 2007 BCSC 1700). More recently, power struggles over land use, animals and resources have continued, with major disagreements such as the fight against a copper and gold mine that threatens to permanently and adversely affect wildlife habitat, traditional territory, and the water and food supplies for some people in Nemiah Valley (CEAA, 2010).[16] In addition there have been other shorter disagreements between First Nations and provincial or federal government agencies over

[16] It should be noted that the issue of the proposed "Prosperity Mine" proposed by Taseko Mines Ltd. for Teztan Biny (Fish Lake) was not a polarized case of power struggles between government agencies and the local community. Some government agencies such as the provincial Ministry of Environment and the federal Department of Fisheries and Oceans were opposed to the proposed mine, along with the Xeni Gwet'in and other member communities of the Tsilhqot'in First Nations. Some other provincial government agencies were in favour of the proposed mine, together with a number of community members from the town of Williams Lake. The complexity of this issue is typical of many such disputes over land and resource use. However, despite its nuances, the struggle over the proposed mine remains a current example of power struggles over land use decisions that affect and are affected by differing cultural values and perceptions of land, and wildlife.

land and resource use decisions, wildlife management, hunting and fishing in the past two decades. For example, disagreements continued between the provincial Ministry of Forests and local First Nations governments over how many free-roaming horses should be taken off the land, even when they collaborated on round-up contracts. This is not to say that the relationship between the Tsilhqot'in people and non-First Nations government agencies has been entirely antagonistic, but rather that power struggles have characterized the relationship between them on a regular basis for at least 150 years. These disagreements are about more than just the self-interest, values and priorities of different groups. They are also a result of differences in how knowledge is gained and accorded credibility, how the world is known and understood.

Contention over free-ranging horses has been a part of these power struggles. The clear and at times explicit link between free-ranging horses and colonial administration attempts to restrict and confine First Nations land use to reserves was an early example of the role horses played in power struggles. From the 1930s-1970s, financial incentives and pressures were used to encourage people to round up and sell, or shoot, free-ranging horses in exchange for their price at sale or a fee for dead animals (McCrory, 2002; *Tsilhqot'in Nation v. British Columbia*, BCSC 1700, Testimony of H. Setah, October 18, 2004). From approximately the 1940s until approximately the late 1960s, the provincial government supported extensive culls and slaughters of free-ranging horses by offering payment per animal killed (McCrory, 2002; MFR Permits 1963-1969, Obtained 2009) in a bounty system (Ministry of Forests, *Bounty Form*, 1982). Despite amendments to the legislation and corresponding changes to the system of record-keeping and the conditions on permits for horse culls, permits continued to be issued for horses to be either rounded up and sold for use or slaughter. As free-ranging horses came under legal protection in the United States (1971) and public criticism of practices in British Columbia increased, throughout the 1970s and early 1980s shooting was formally allowed as a secondary resort for horses that could not be "reasonably and humanely" rounded up and caught (Forest Service Round-up Permit, File No. 052130, 1968). Although permits to allow horses to be shot became less common in the 1980s, the permits for round-ups and bounty claims for horses shot did not cease. The provincial Horse Control Program apparently ended with an amendment to the Range Act in 1989, although no government records subsequent to 1989 were available through a request made to the Ministry of Forests and Range under the Freedom of Information and Protection of Privacy Act (1996). Permits and contracts issued since that time are discussed below.

The power dynamics inherent in those practices were complex, since individuals and families (aboriginal and non-aboriginal) participated in the round-ups and shooting for various reasons. Many of

the best horse chasers were Tsilhqot'in people, and there were individual differences in personal ethics and conduct with regard to shooting and culling wild horses.

> *You know this ah...Forestry department, they enacted policy guidelines, or whatever, to kill off a lot of these wild horses. They're the ones that gave First Nations some information...they were given the bounty [on] each of the horses. They had to cut off their ears and give it to them. That's how they were paid. And to this day, they still want to destroy all the wild horses out in our country.*
>
> *Interviewer: So when they had the round-up two years ago, they got people from the local community?*
>
> *Basically from the community. But some of my brothers didn't want to chase any horses (IN11).*

> *Some people would gladly shoot horses. I wouldn't do that myself. I like horses myself and don't want to shoot 'em. (IN09).*

Unequal power relations are a part of the internal struggles within communities, as well as between communities and groups. Members of both Xeni Gwet'in and Yuneset'in First Nations recounted incidents of pressure from Provincial government to reduce the number of wild horses on the range. Under pressure to eradicate wild horses from the range, some individuals participated in horse round-ups with reluctance in order to earn much-needed money, and because they felt it was better to do it themselves in a controlled manner than to allow outsiders who were less familiar with the land and the individual horses to remove as many horses as they wished. An excerpt from court testimony by a Xeni Gwet'in man illustrates this sort of tension (names have been omitted in this dissertation) *(Tsilhqot'in Nation v. British Columbia,* Cross-examination Oct. 18, 2004*)*.

> *Q Mr. [__], can you tell me, you had this roundup permit to round up or shoot horses. Can you tell me, why is it that three horses would have been shot rather than rounded up?*
>
> *A Okay, let me put it this way: at that time if I didn't take this job on, they would have brought somebody else in; they would have shot more horses and they would have round up more horses. At that time I didn't have a job. I just got married and I was poor. That's why I took this job.*
>
> *Q I understand -- I'm not -- I understand what you're saying, Mr. [__]. My only question for you is, is my understanding is there's a higher bounty on horses which are rounded up as opposed --*
>
> *THE COURT: And sent off to slaughter.*
>
> *MS. [__]: -- to being shot. That's right.*
>
> *Q And I'm just wondering why some would be shot as opposed to being rounded up. Can you recall?*

A Well, this is just to show proof to the Ministry of Forests that we took some horses off range.

Q I see. Okay.

A We didn't do this on purpose. No, this was hired by the Ministry of Forests. We had to show proof.

Q Right.

A Even if we didn't do it they would have brought somebody else in and more horses would have been shot and more horses would have been tooken off the range.

…A Yes, this was done at a different time. These three horses that were shot, you couldn't even get them in the corrals. They're just too wild.

Court testimony and research participants also indicated that there may have been some internal tensions and power relations within the Xeni Gwet'in community influencing people to participate in round-ups of wild horses during the 1970s. Some people regularly participated in the roundups and shooting of free-ranging horses, while other described it with a grim resignation even as they expressed compassion for those people who needed the financial income from selling or shooting horses (IN11). One witness testified in court that on one occasion used as an example, he signed his name on a round-up permit for wild horses because the Band Chief at that time asked him to, despite there being several people involved in that particular round-up (*Tsilhqot'in Nation v. British Columbia*, testimony of H. Setah, 2004).

By the second half of the twentieth century, free-ranging horses were part of power struggles over the allocation of funds from range fees. Xeni Gwet'in leaders state that their applications for range improvement funds (normally allocated by the MFR for ranch projects such as fence-building) were repeatedly denied, until or unless they removed more or all free-ranging horses from the range (*Tsilhqot'in Nation v. British Columbia*, Testimony of Roger William, October 21, 2003). In response, in 1992 the Xeni Gwet'in chose to stop paying range fees to the provincial government for range use on their own territory, and created their own Nemiah Valley Stockmen's Association in order to gather and re-allocate their own range fees for land management initiatives that they deemed appropriate (IN03).

As described in Chapter 4, permits and contracts by provincial government agencies for round-ups of free-ranging horses have continued to recent years, though with less regularity and a lower profile than in the past. In 2008 the Yuneset'in (Stone) First Nation built corrals and rounded up some free-roaming horses under contract with MFR. However, participants reported continued disagreement over how

many horses should be removed, and logistical problems with chasing wild horses given the time of year and seasonal timeframe for the contract (IN11). In the same year the Xeni Gwet'in rounded up some free-ranging horses under contract with the MFR, some of which were contracted by the MoE to be shot and killed for use as wolf bait (Pynn, 2008). The latter event was controversial and divisive within Nemiah Valley, partly because of how the killings were conducted.

Free-ranging, wild and feral horses have played and continue to play a role in the power struggles over land, resources and wildlife, both in direct and nuanced ways. Different peoples' views and perspectives on whether free-roaming horses are a legitimate presence on the land highlight differences in worldviews among cultural groups, and the credibility given to those worldviews by people from other groups. Throughout the twentieth century free-roaming horses have been contested animals, pawns in struggles for control over the land title, land management, natural resources, and financial resources in the form of range fees. More subtly, knowledge about free-roaming horses is also a part of power relations between local people and government agencies. Provincial government agencies desire to collaborate with local people to chase, round-up and capture free-roaming horses, yet they also rely on the skills and knowledge of local riders to make round-ups successful. Thus local people – First Nations and non-First Nations – can use or withhold the application of their skills selectively, as they see fit. That skill and knowledge gives them considerable power in the relationship when it comes to actually chasing and catching free-roaming horses in the more remote areas of the Chilcotin, and choosing how many horses to catch. Finally, Brittany Triangle horses, themselves, also have some direct agency in power relations related to land and resources, as they choose their own territory (i.e. how remote to be), when to leave and return to the Brittany Triangle, which forage species to eat, and how to interact with other species, including humans. When examining the role of free-roaming horses in power relations among various people and human groups as they relate to land, resources and wildlife management, it is worth remembering that the horses themselves are the direct determinants (in other words they hold some power) of their own interactions with ecosystems and people, in the Brittany Triangle.

Knowledge, Perception and Power in the Chilcotin

Research results and interview participants indicate that current working relationships between the Xeni Gwet'in First Nation Government, the Tsilhqot'in National Government, and provincial government ministries are characterized by good intentions from many individuals, yet continued distrust among all groups, and some enduring misconceptions. Key informants to this study and correspondence by letter and email from provincial government agencies demonstrated positive

intentions to work with First Nations (Pedersen, 2008, IN14; IN12). However, it is unclear how often behavior and practice is consistent with spoken intentions, particularly in situations where well-meaning individuals may be constrained by structural and institutional barriers, limitations, conventions and norms. Provincial government employees with the Ministry of Environment described the challenges of making land and wildlife management decisions under extreme budgetary constraints which limited their ability to gather adequate scientific information.

> *Well, I would imagine that there was anecdotal evidence, or, you know, observations that were passed on. Nothing quantified. So...and then since then I haven't received...you know again capacity issues. I've been dealing with 16 million other things and I don't deal with range management. And so I don't have access to this information that [colleague] talks about, which I probably should. And don't have the capacity to... I'm not out there, essentially. It's not happening.*
>
> *But I don't think we've got a clue. You know we don't really know. No inventory or studies (IN14a).*
>
> *Interviewer: Well yah, and… without the money to support doing studies then it's all...*
>
> *No, and you know, there is some science to go along with it, but you know we don't have...even our biggest species that everybody comes for: mule deer and moose are what everybody comes to the Cariboo to hunt – and yet I don't think we fly one wildlife management unit a year. We've got 15. So there are big [economic incentives to manage], if you will, as far as bringing tens of thousands of people up here to hunt and spread money around and so on. But we don't fly, probably a single WMU a year. And so these poor saps that are put in the position of managing the populations....they gotta resort to going out …Even for our big species, we can't get money to do any inventory, to do any monitoring (IN14b).*

In the same way, they also lacked the budget to spend time on the ground in remote communities establishing professional relationships or gaining first-hand knowledge of local land management decision processes. Hence some provincial government employees tended to make assumptions about the motivations and competence of First Nations communities to manage their land and wildlife based solely on limited observation of some landscapes and features, due partially to the structural barriers that prevented them from establishing the meaningful contact that would have dispelled misconceptions (IN14).

One example of a positive initiative to bridge between communities and cultures was a series of range management workshops held in 2008-2009 in several Tsilhqot'in communities, with the goals of fostering discussion and sharing knowledge about good management practices on Chilcotin range (IN12; IN15). While the range workshops apparently provided some positive opportunities for sharing information and bridging knowledge systems about range management issues, the experience was

recounted by provincial representatives and consultants with enthusiasm as a success (IN12; IN15), while Tsilhqot'in participants in this study did not mention the events. This discrepancy was reminiscent of descriptions by Hugh Brody (1981) and Paul Nadasdy (1999) of consultation processes that may be reported and viewed as a success by government representatives, while First Nations participants may not share the same perception of the interaction.

The persistence of different perceptions and misunderstandings about other forms of knowledge was evident in interviews with one study participant, a provincial government employee, who spoke carefully and with respect about First Nations traditional knowledge. Yet in voicing an interest in how horses were managed, the participant expressed a desire to know only the technicalities, and to leave out the cultural context. While that preference may have stemmed from a personal desire to respect the privacy of First Nations knowledge, it is also indicative of enduring cultural bias about the nature of knowledge, and the assumption that in indigenous ways of knowing, information can be separated and transferred *a priori*, independently of context, and that it can be selectively accessed for the portion deemed relevant by members of a Western scientific audience.

> *They're doing some amazing things...in Nemiah in particular, with their horse herds and... we just need to start to borrow some of that technology. Technology is a cool word, but um...indigenous science, call it what you will, indigenous science or um...First Nations perspective. We need to use and borrow some of that technology. But that's the sensitive part. They don't want us to have that. And I respect that. Um...there's been generations of, of uh...of difficulties between First Nations and non-First Nations. Go anywhere. I don't care if you're in Australia or Canada or if you're in the Americas. There are generations of difficulties, and they're not willing to give up that part. And I respect that. But I don't want to know the whys, or the reasons. I just need to know the tools. And that's I guess, one thing we'd really like to build on, is to use some of those tools and start to manage outside of the influence some of the folks in Nemiah have. Because what I see down there, um...I don't see a lot of the conflict that I see in other places. I don't know why that is. But I'm sure interested to know why (IN12).*

Despite some genuinely positive intentions and initiatives to bridge social and political divides between First Nations and provincial government in the Chilcotin, fundamental cultural differences in perception and ways of knowing continue to influence the relationship. When such misconceptions continue to characterize the ways that one group views the knowledge system of another group, it becomes very difficult to know *how* to treat that group, and their knowledge with true respect. Such differences in perception and ways of knowing can contribute to mutual distrust and ongoing disagreements between groups involved in land management decisions. The lack of trust, in turn contributes to power struggles, skepticism and conflict.

An example of power struggles and conflict arising through different ways of knowing occurred in 2004 when several Tsilhqot'in First Nations disagreed with provincial government estimates over the moose population in their traditional territory. Government counts indicated that there were enough moose to support non-aboriginal hunters hunting "spike-fork" or immature moose. In contrast, Tsilhqot'in estimates indicated that there were not sufficient numbers of moose to support such an open hunting season. Several Tsilhqot'in communities blockaded roads leading into back-country hunting areas, and asked non-aboriginal hunters to hunt in other areas that year, since many local First Nations families rely on moose meat for winter food, and salmon runs (also a staple winter meat supply) had been poor that year (Birchwater, 2004). When asked about the discrepancy in moose population estimates, a Xeni Gwet'in contact explained that provincial government population estimates had relied upon the extrapolation of numbers gleaned from aerial counts of a sample area. Tsilhqot'in population estimates were determined based on ground-truthing, sightings in familiar areas, and consideration of other environmental factors such as the extensive impacts on moose habitat from the 2003 Chilko Fire, and subsequent motorized access by mushroom pickers and other people. While each way of knowing can yield good information under some circumstances, and poor information in others, in this case they led to different conclusions which had immediate and potentially dire consequences for many Tsilhqot'in people. If they estimated wrong, and depressed the moose population too far, there were families that would go hungry. According to the Xeni Gwet'in, moose tend to congregate in large groups during the winter, and there had been a large concentration in the sample area counted by the provincial government. Hence they believed that the extrapolated population estimates were erroneously high (Setah personal communication, 2010). In this instance, a difference in knowledge systems and ways of knowing contributed to open power struggles between cultural groups and a blockade (conflict).

Although there is a history of distrust between various cultural, political and interest groups in the Chilcotin and numerous factors contributing to a continued distrust by First Nations of provincial and federal governments, there are also many individuals who work to bridge cultural and political divides. This research highlighted the crucial role for such individuals in situations where land use and wildlife management decisions are loaded with politicized power relations and influenced by different worldviews. Trust and credibility are built at a personal level. Individuals who bridge differences between groups are those who develop long-term relationships, who are willing to bridge between groups and who have the capacity to demonstrate an understanding of a group's perspective. Planning, knowledge sharing, and collaborative management decisions can be moved forward by the involvement

of a few key individuals. However, political instability, job insecurity, high rates of turn-over, and funding cuts to programs can make it very difficult for these sorts of relationships to develop between individuals within the existing institutional and government infrastructure.

WAYS OF KNOWING

Different types of knowledge about free-roaming horses are framed here as ways of knowing because they incorporate varied types of information, and a number of other elements including cultural values and beliefs; behaviours, practices and interactions with the horses; as well as differences in who the knowledge holder is, how they know what they know, where they spend most of their time. These ways of knowing are linked with livelihoods and lived practice – particularly for those people who spend time on the land. Yet to integrate or incorporate the different ways of knowing about the free-ranging horses successfully requires a deeper understanding than simply considering them as interest groups or stakeholders. These terms imply some common foundations and only superficial differences in interests, whereas addressing different ways of knowing allows for the deeper consideration of diverse, fundamentally different understandings, worldviews, and ways of learning new information even in cases where people may share agreement about more surface-level issues. For example, while provincial government Range Officers and members of Xeni Gwet'in First Nation may both be able to look at the same patch of land and agree on whether it is overgrazed or not (surface-level issue), this research indicates that First Nations members do not necessarily conclude that free-roaming horses are the sole cause and thus a "problem" that require management on a species level.

Ways of knowing overlap with each other, and are not necessarily mutually exclusive. Just as local knowledge often includes some information and knowledge that arise from science and other sources of inquiry, so too do scientists, government employees and others rely on experiential, anecdotal and even intuitive knowledge at times. Scientists and government employees often value and must rely heavily on local, experiential and first-hand knowledge. When funding and capacity constraints prevent them from spending time in the field or on the ground, they may be forced to extrapolate or generalize information based on research in other places or situations, in order to support decisions. Although management that is based in scientifically credible and generalizable research may be satisfactory to governments, people and institutions based in Western and European scientific traditions, it can lead to distrust and conflict with First Nations and other local people, whose ways of knowing establish the credibility of knowledge in a different way.

Consistent with Julie Cruickshank's (2005) characterization of local knowledge, local knowledge about horses in this case study is a varied collection of ways of knowing, including indigenous knowledge, some scientific information, knowledge and ideas from media and other outside sources, and personal experiences, depending on who one is talking to. One common thread through all of the varied forms of local knowledge that characterized this study was that credibility was accorded most highly to experiential knowledge with direct relevance, and to knowledge holders who understood local places, horses, people, and landscape, and who conducted themselves in accordance with local principles of respect and integrity. The sort of professional expertise valued in Western science and professional circles - including government and academic cultures – was not necessarily devalued among local knowledge holders. They simply had to demonstrate local applicability and relevance in order to be considered credible. In other words, new ideas were welcome, but were filtered through people's own experiences and judgment, as well as those of other community members and elders.

The differences in how people accord credibility to information and knowledge holders is one of the elements that must be addressed when taking an integrated approach to managing land use or wildlife, because it can contribute to distrust and skepticism between knowledge holders from different backgrounds. It is important to note that this is not a dichotomy between science and local knowledge. Rather, it is a difference between cultures of grounded experience versus cultures of scholarly expertise (Goulet, 1998). Local knowledge holders are inclined not to trust experts or professionals who assert expertise but have spent little time on the land or with horses, locally. Professionals from outside regions may be inclined to overlook the complexity of local understandings and knowledge if they are distracted by their initial assessment of immediately visible landscapes, and local stories are seen as 'merely' anecdotal.

Temporal Scales and Perception

First Nations participants, and non-aboriginal participants with a long family history in the Chilcotin tended to contextualize current events, decisions and relationships within a longer temporal scale, referring often and easily to events from the past - such as the Chilcotin War in 1864, wild horse slaughters in the 1940s and 1960s, or residential school experiences - as well as to the future. These timeframes and events were not simply "background", but were woven into conversation with direct relevance to the present. In contrast, participants from provincial government agencies rarely referred to events more than twenty years prior or subsequent to the present in the context of cultural relationships, except to mention that grasslands in the Chilcotin had been degraded for at least a century (IN08). The difference in the temporal scales through which current events, relationships and

events are perceived may contribute to a sense of distrust among First Nations of government authorities, since government actions now, no matter how well-intentioned, are seen in the context of over 150 years of attempts to constrain, repress, break down and assimilate aboriginal culture and communities. Similarly, the shorter timeframes and temporal scales at which government agencies tend to operate (e.g. fiscal years, political terms of office, and turnover in employees), and a lack of specific historical awareness may contribute to misunderstandings of First Nations motivations, decision-making, and communication styles. These different temporal scales of perception may also contribute to differences in how wildlife population fluctuations and ecological change are perceived (Reid et al., 2006).

Knowledge, Knowers and Ways of Knowing

Given that knowledge is not always composed of a uniform, static set of information but also at times of context-dependent understandings and practices, it is important to recognize the different epistemological scales at which knowledge, knowledge-holders (or the knowers) and ways of knowing operate. At times it may be useful to distinguish between knowledge, knowers and ways of knowing, and at other times it may be appropriate to merge them. In a discussion of the relationships between knowledge, uncertainty and wisdom, Ommer et al. (2008) state that "to create knowledge is to work with data…testing them until they can become the basis for understanding" (p. 21).

> *"Knowledge, then, is not just 'ideas' but ideas that, although they have been pondered at length, are still embedded in social institutions, structures and cultures, and thus subject to the perceptions, misperceptions, limitations of understanding, biases, and ideologies of a specific society at a specific period of history" (p. 21).*

At a more localized, applied scale than generalized knowledge, are the knowledge holders, or knowers. Lutz and Neiss (2008) point out that knowledge exists in a social context, and often, where it has an experiential component, "it exists in a place" and hence "requires a knower" (p. 8). It is the knowers or knowledge holders who will know how best to apply and determine the contextual relevance of knowledge (Agrawal, 2009; Goulet, 1998). By involving diverse knowers (people of various cultures and perspectives) in research, decisions and planning processes there is more potential to even out the power dynamics between groups and among individuals by giving them a voice (Freidmann, 1993). In addition, knowers can bring their acquired experience and analysis to a given set of circumstances, adapting and verifying information as appropriate. In decision-making, planning and land use management processes, involving the knowers can prevent too much focus on the static inflexibility of "information" that might be perceived as irrelevant by some people, allowing for adaptive applications,

exchanges and the creative generation of new understandings by individuals and groups. Integrating not only knowledge, but knowers, allows for decisions and understandings to be based in wisdom. Wisdom, in this sense, has been explained by Lutz and Neiss (2008) as "…taking decisions, action, and giving advice based on the careful accumulation and selection of knowledge that has been both thoughtfully/theoretically and practically/experientially verified" (p. 278).

At the broader scale than knowledge itself, yet also tied in reflexively to the perception and interpretation of each knower, the concept of ways of knowing crosses scales in knowledge systems because it recognizes diversity not only in what we know about socio-ecological systems, but *how* we know about them (Kendrick, 2003). The explicit recognition and inclusion of diverse ways of knowing, worldviews, and knowledge systems can be difficult in the practice of planning and management with different cultures and groups. It also raises the question of to what extent "integration" is desirable, where it may also be appropriate to focus on including some diversity in how things are known, so that integrated planning and processes do not lead to a cultural or epistemological homogenization. As important as biodiversity is for ecological resilience and adaptation to change, so too is diversity in ways of knowing to the resilience and adaptiveness of socio-ecological systems. At a time when languages and cultural knowledge are disappearing faster globally than species extinctions are occurring (Davis, 2009; Turner et al., 2008), the importance of not only preserving but actively practicing, cultivating and using diverse ways of knowing in land, wildlife and natural resource decisions cannot be overstated.

The term ways of knowing reflects that local knowledge and indigenous knowledge are dynamic, adaptive, changing approaches to learning and understanding, not simply static sets of information or knowledge. By focusing on the ways in which people know the land, the horses, and other aspects of their own relationships with place, it is possible (for researchers, community leaders or land and wildlife managers) to shift the emphasis of discourse away from simple information about places and animals, towards the more influential relationships that people have *with* animals and action *in* places. The concept of ways of knowing is helpful because it acknowledges that local and indigenous knowledge are flexible enough to absorb new information and new types of knowledge (they have adaptive, integrative capacity), while still facilitating crucial discourse about the power relations inherent in real-world attempts to integrate different forms of knowledge.

In the study region, many local people have learned to explicitly articulate – to outsiders – aspects of their culture that are, for Xeni Gwet'in people, implicit. Local leaders in Nemiah Valley recognize and

understand that an integrated approach to managing land use and wild horses that is based in indigenous ways of knowing involves fostering culture, community identity, the Tsilhqot'in language and good stewardship all together, because the relationship that local people have with horses is a part of the social-cultural ecological complex that ties together all these elements. Fostering the relationships between and among these system elements is what allows local and indigenous knowledge systems to continue to develop and evolve as culturally rooted, socially relevant, alive ways of knowing.

The indigenous and local knowledge that contributed to this study are not static or unchanging. This study indicates that local and indigenous knowledge are not only constantly changing (Berkes, 2009) – just as Western science does – but they also tend to be intrinsically integrative. Local ways of knowing demonstrate the capacity of people around the Brittany Triangle, and members of Xeni Gwet'in culture to observe, adapt to, and learn about changing social and environmental systems, and technologies. When horses arrived in the region several hundred years ago, people adapted their knowledge of animals and wildlife to include horses, and also integrated horses into their existing livelihoods and travel patterns. Similarly, local knowledge and practice adapted to the arrival of moose in the region, as well as changes to surface hydrology and fish populations over the years, to name just a few examples. Indigenous and local people also demonstrate that their ways of knowing, understanding and interacting with the landscape have the capacity to absorb and integrate new information from other knowledge systems. Local knowledge now includes the use of technologies such as the Internet and helicopters, as well as the results from Western scientific research to add to local understandings of important issues and phenomena. This sort of integrative, adaptive capacity does not make local and indigenous ways of knowing any less cohesive as knowledge systems, just as Western scientific inquiry is no less cohesive when it includes information from other knowledge systems. Rather, the important questions to explore are those related to how to work with diverse ways of knowing in socially equitable, ecologically appropriate and culturally sensitive ways.

Early attempts at knowledge integration and co-management tended to involve attempts at plugging TEK into Western scientific data gathering and management frameworks (Fabricus, Scholes and Cundill, 2006; Nadasdy, 1999). TEK or indigenous knowledge was seen as complementary information that could help to fill in gaps or supplement the limits of Western scientific knowledge in specific circumstances. Even discussion of problems with these models tended to maintain some epistemological assumptions, by focusing primarily on the difficulty of integrating concepts from one knowledge system directly into the framework of another (i.e. "fitting a round peg into a square hole").

Not only was TEK seen as being primarily information about the past, or relevant only to general observations over long time periods, but the Western science deemed relevant to many co-management and integrative planning exercises was characterized narrowly and inaccurately as a static set of methods and measurements (Brosius 2006). More insightful analysis delves into the organic complexity of knowledge by addressing ways of knowing.

This research supports and contributes to the growing body of research that recognizes that local and indigenous knowledge are evolving, dynamic ways of knowing. It further suggests that both Western scientific approaches and local knowledge are changeable ways of knowing that each have vulnerabilities to cultural change and biases, and that while there are ways in which different ways of knowing can compensate for each other's shortcomings, such complementarity is not necessarily achieved by attempting to completely integrate vastly different knowledge systems or ways of knowing. In some instances, the integrity of indigenous knowledge and local knowledge may depend on conditions which are fundamentally incompatible with, and unknowable by, Western science. In these cases, integration in management will involve the careful development of some shared understandings and common *goals*, an inclusive and equitable *process* for making decisions that is flexible enough to include contributions from both Western scientific perspectives, and local indigenous perspectives. It is important to develop locally appropriate ways to establish the validity and credibility of information and knowledge in a way that is internally acceptable to each system.

It should not be assumed that the best processes or management frameworks for indigenous or remote communities are those that stem from Western scientific and political systems. The issues of what knowledge and information to consider and how decisions are made are social, political matters that will not be answered by improved *methods* of knowledge integration, alone. Those dilemmas also involve the consideration of equity, morality, and which knowledge holders (knowers) have the appropriate wisdom to make good decisions. Hence good integrated approaches to land use and wildlife management – among other things – must focus not only on the integration of information, but also on the integration of good judgment, wisdom and equitable processes or actions from diverse cultures. This broader approach to integrated planning and management stresses the importance of not only questioning how we know what we know, but also how (and why) we do what we do.

In sum, the adaptive and inherently integrative characteristics of local and indigenous knowledge systems and ways of knowing suggest some lessons for approaches to planning and management of land use and free-roaming horses in the study region, and for a broad array of situations beyond that

region. This research does not suggest replacing blind faith in one way of knowing with blind faith in another, different way of knowing. Rather, the lessons from this research suggest that integrated approaches to management go much deeper than simply combining information, to seek new processes for management that are part of, or appropriate to, the social wisdom and culture of local indigenous people. The ability to integrate and filter diverse ways of knowing is something that lies within and among the people who hold and understand knowledge, the knowers. This research supports the suggestion then, that effective integration in land use and wildlife management is as much about integrating individuals with diverse knowledge and appropriate local experience into the decision-making process as it is about the information that they reference. Central to this point is the fact that there must not be a dichotomy between "knowledge holders" and "decision-makers" (Brosius, 2009). Rather, it is important to ensure that decision-making power and processes are appropriately distributed among people who embody diverse ways of knowing. In the Brittany Triangle, a major aspect of local ways of knowing that is central to land use decisions is the sense of responsibility to the land that is part of Xeni Gwet'in cultural identity. This quality of local culture and spirituality is discussed below, as part of the caretaker approach to stewardship.

MANAGEMENT IMPLICATIONS

The linkages between information, inclusivity, ways of knowing and power relations are manifest in management and planning processes, structures, conventions and relationships. A substantial body of literature has already identified common problems and challenges with co-management situations. Attempts to effectively integrate diverse knowledge in functionally effective ways are not new (see Chapter 2). It remains important to identify locally specific challenges and problems, in order to address them effectively in an applied manner, and to generate a rich theoretical understanding that can contribute insight to other similar situations. To move beyond the problems and challenges with knowledge integration identified in the literature, one must address not only the question of *how* to improve integrated management and planning processes but also *how much* of diverse knowledge sets can and should be integrated, and *when*? In other words, knowledge integration may not always be possible or appropriate. When it is possible, the most appropriate integration of diverse ways of knowing in some situations may be only partial, with certain elements of diverse ways of knowing being included on their own terms, without being integrated together with other knowledge systems.

The goal of effectively integrating ways of knowing involves not only including diverse types of information, but also looking at how best to frame issues and processes in such a way that local

strengths and opportunities are recognized and used, while weaknesses and barriers are mitigated, and the various scales of management agencies and systems are reconciled rather than in conflict with each other. Given the court ruling in the *Tsilhqot'in Nation v. British Columbia* case (2007 BCSC 1700), the capacity constraints of provincial government agencies, and the relationship between wild horses and Xeni Gwet'in community, culture, identity, there is an opportunity in this case for local knowledge and cultural perspectives and practices of the Xeni Gwet'in to provide a framework for the integration of knowledge, practices, knowers and ways of knowing. Scientific information, methods and outside help can be incorporated into a framework for integrated ways of knowing that is based in the strengths of local socio-ecological and cultural relationships.

Such a proposal highlights the need to involve not only diverse types of information and knowledge, but the people who understand those types of knowledge, in the processes of management. It is important to avoid a mere inversion of the conventional situations, in which TEK was de-contextualized and reduced to pieces of information in order to fit it into a Western science framework. The goal here is not the misapplication of scientific knowledge within local contexts. In each case, the potential for error and power imbalance comes partially from people attempting to integrate ways of knowing that are somehow separated from the context that allows for appropriate determination of validity and credibility of that knowledge. There is a need to establish and maintain high standards of validity in the ways of knowing and knowledge that informs decisions about how to manage land, ecosystems and free-roaming horses. There may even be some times when it becomes appropriate to allow for some cross-evaluation of relevant information between knowledge systems. However, the involvement of knowledge holders who understand the strengths and limitations of their own ways of knowing is crucial to the successful establishment of validity in management or stewardship processes. There is room for future research on this topic to develop a model for doing so.

One factor constraining the ability of provincial government agencies to understand and manage free-roaming horses in the Brittany Triangle to date has been a lack of formal classification of free-ranging horses in government policy in British Columbia. The lack of policy specific to free-roaming horses has hindered attempts to co-ordinate or integrate knowledge about the horses, by perpetuating a chronic lack of funding and capacity for monitoring and research to support management decisions. The lack of a formal categorization of free-roaming horses has also perpetuated a culture among some resource managers in which free-roaming horses are viewed by default to be a pest species with little or no inherent value. As a result of the policy gap, management decisions by provincial government agencies often have to be made in the absence of sufficient scientific or local knowledge about the systems

elements that they are managing (IN14). Ironically, the "do it yourself" attitude and existing tradition of informal management towards wild horses by Xeni Gwet'in and other Tsilhqot'in First Nations are an opportunity for a new management framework that takes a novel, integrated approach that combines the management of local free-roaming horses with cultural renewal and skills training. From a provincial perspective, there is a gap in policy and management concerning free-roaming horses in the Chilcotin in general that warrants active attention and intervention. From the perspective of many local and First Nations people, there is no need for management of the Brittany Triangle horses in the conventional sense, though interactions with wild horses are appropriate in order to use them, and maintain healthy systemic relationships with them. The key point here is that from a Tsilhqot'in perspective, a lack of management in the Euro-Canadian sense does not necessarily equal "doing nothing, ever". Similarly, conservation and a wild horse "preserve" are initiatives to maintain the socio-ecological system, of which wild horses and people are both a part, but those designations do not necessarily exclude human interactions with horses or the removal and use of some of them.[17]

Is Management a Useful Word?

At one point, my Xeni Gwet'in field assistant and guide (who also acted as a sort of cultural ambassador for me) explained that asking local people about the management of wild horses was controversial, because of the power relations not only between the community and provincial government, but also between individuals and families in the community and some local policies introduced by the Xeni Gwet'in government with regard to horses in Nemiah Valley. In response to some areas of Nemiah Valley being over-grazed, Xeni Gwet'in government leaders had introduced policies that stipulated how people should keep and care for their own horses. For some people in the community, even localized management actions were loaded with connotations about authority and power relationships.

I asked all key informants about their management preferences regarding free-roaming horses in the Brittany Triangle. Most First Nations participants responded with a shrug, and replied that if the number of horses gets too high and they overgraze the land, then they would remove some, but otherwise to "leave them alone". One aspect of this answer that is difficult to convey in academic reports is that the shrug and the surrounding conversation were as important as the direct answer to the question (Basso, 1996; Watson and Huntington, 2008). The myriad of other interactions and conversations that I learned from while in Nemiah provided context for the interviews, and I came to

[17] While these points were emergent from research results, acknowledgement is given to Susan Wismer (personal communication, 2011) for helping to clarify them.

understand that my question reflected some of the pre-conceived assumptions that characterize differences between a Western scientific approach to management of resources, wildlife, and livestock.

The word management can imply a command and control approach to regulating animal populations and human behavior, and is based in Western assumptions about the relationship between authorities, communities and natural resources (including livestock and wild animals). Like many terms, it has been used in the past by provincial and federal government agencies as a euphemism for actions that are experienced by First Nations as heavy-handed, controlling, or unjust. For example, early wildlife management measures in the Chilcotin included putting relatively severe restrictions on hunting seasons and quotas by local First Nations throughout the early twentieth century. While regulations have since changed, those early management actions had a profound effect on the ability of local people to feed their families through the winter months, and on their personal autonomy (Lutz, 2008). When I spoke with government officials and ranchers, the term management seemed to have positive connotations and was well-received, perhaps because it implied the control of free-roaming horse populations that they worried would otherwise overpopulate and overgraze the forage resources shared by cattle and some other herbivores. Participants within the provincial government ministries were comfortable operating within a cultural framework and worldview in which the role of humans and governments is to actively manipulate natural resources and wildlife, to manage them for population numbers, territorial range, acceptable behaviours, and interactions with humans that people deem to be appropriate and desirable (Swart, 2005). Although First Nations and other local participants in the study also actively engage with free-roaming horses in the Brittany Triangle, and historically have even manipulated specific bands of horses by culling some individuals or introducing others, their interactions are not based in the same cultural framework or assumptions about the roles of humans and horses in relation to each other.

First Nations participants brought an entirely different experience of historical power relations, and a different understanding of human-horse relationships to our conversations. The word management was rarely, if ever, used by community members or participants. Local First Nations people spoke more frequently of their role as “caretakers” and the need to “respect” animals and the land. They referred to specific cases when it was necessary to geld stallions, catch horses for personal use, or remove some wild horses from the range. In these instances, local community participants tended to speak with reference to specific bands or individual horses that ranged in certain areas. Xeni Gwet’in community members spoke with an individualized familiarity about horses as one would about other families or neighbours, referring easily to which colts, fillies and yearlings were the offspring of specific free-

roaming horses, and frequently describing bands of horses in terms of the geographical area in which they roamed. This way of perceiving and relating to the horses is consistent with Tim Ingold's (2000) reference to many indigenous cultures relating to animals as non-human persons, and also resembles Clark and Slocombe's (2009) description of the perception of grizzly bears among the Champagne and Aishihik First Nations. Not all community members consistently knew all the horses, but there was a subtle yet clear difference in how they spoke of the animals, in comparison to the non-First Nation participants from outside the area. Discussions with people in the latter category tended to be based in generalizations about "the horses", with little or no distinction made between sub-populations of free-roaming horses.

Livelihoods and the Practice of Local Knowledge as Informal Management

The interactions and practices that have constituted the relationship between local people and free-ranging horses in and around the Brittany Triangle, and throughout much of the Chilcotin, are functionally a system of informal management.[18] In the Chilcotin, practices such as chasing, catching, and training horses for use as saddle horses, culling wild herds, castrating stallions, releasing horses with desirable breeding traits all influenced and managed populations of wild horses. Traditionally and throughout the twentieth century, these activities took place over a broad geographical area including portions of the Brittany Triangle that were near homesteads and ranches.

In recent decades changes in settlement patterns, demographics and the requirements of paid wage labor have tended to limit the distance that local people will travel to capture wild horses, and the frequency with which they do so. Over time, a combination of economic changes, regulations on traditional livelihood practices such as hunting and fishing, and the socio-cultural shift that happens as a result of the combined effects of many economic and political forces, have altered the ways in which people interact with the landscape and with wildlife. In the case of free-roaming horses, the change in livelihood activities and community economies has altered human impacts on horse populations. As people spend more time employed in full-time wage labour, or must leave their home communities for lengthy periods in order to work or take their children to school, they have less time to spend on the land, and less time to develop and maintain traditional skills such as chasing and catching wild horses. The need for saddle horses, and the saleable price for good horses also decreases as people spend less time on the land.

[18] Such relationships were historically present in other regions of BC, too. For example, Wendy Wickwire's ethnographic work with Harry Robinson relates stories of chasing wild horses in the south Okanagan (Robinson and Wickwire, 2005).

One First Nations participant summed up this complex relationship between economics, livelihoods and wild horses in a few words, by responding to a question about why people in his community (Tsilhqot'in people, but not Xeni Gwet'in) stopped chasing wild horses as frequently as they used to:

> *"A few years ago the [lumber] mills came in here. People got rid of their horses and [started working at the mill]... Now the mill's gone there's nothing for them. People are slowly getting back into horses" (IN10).*

This changing relationship has happened in different ways for different communities among the Tsilhqot'in people. The speaker above was a community leader for one of the Tsilhqot'in communities that is located closer to Highway 20 than the Xeni Gwet'in in Nemiah Valley, and which consequently experienced social, economic and cultural changes earlier and more acutely than the Xeni Gwet'in in Nemiah. Some of their experiences provide insight for community leaders in Nemiah, who have only begun to deal with more intense pressures of cultural and social change from the outside world since the 1970s.

As mentioned in Chapter 1, the word management carries with it many different connotations for different people, depending on their experiences or management as the exercise of power and authority. Livelihood practices and even more formalized forms of local knowledge, indigenous interactions with animals, and First Nation governance policies may be discussed using the term management. This usage is primarily aimed at seeking the language to support comparable practices and the development of some shared understandings. However, the term management as it is used here to apply to an alternative framework for interaction between community members, First Nations governments, and the wild horses of the Brittany Triangle need not be based in the same underlying assumptions as management approaches that are based in conventional Western frameworks. The key point here is that in an effective integrated approach to the management of free-roaming horses, it is important to explicitly examine the assumptions and cultural norms and expectations that form management decisions. The convention among provincial agencies acting under a Western management framework in the Chilcotin has been to manipulate system elements to allow for the maximum productivity of rangeland resources to support economic activities such as the raising of beef cattle. Management of land use and wildlife in the Brittany Triangle and Nemiah Valley by Xeni Gwet'in government leaders may not be based in the same set of underlying cultural norms, worldview and assumptions as management of resources by other agencies and other cultures. While this dissertation still uses the term management to discuss decisions about land use, wildlife and free-roaming horses, it also adopts

the terms caretaker and stewardship in the section below, in order to call attention to the potential for an approach based in locally and culturally appropriate ways of knowing.

While cattle ranching in the Chilcotin is itself a tradition and a way of life, the management of range, forests and forage over the last century has resulted in severely degraded range lands in many areas of the Chilcotin surrounding the Brittany Triangle. These effects are not currently evident in the study area for this research, within the Brittany Triangle.

Practices that are part of traditional ecological knowledge (TEK) and indigenous knowledge (IK) systems have been recognized by scholars in many situations to be inclusive of forms of stewardship (Sherman et al. 2010) akin to what Western society would call management (Olsson et al., 2004; Wilson, 2002; Wyatt, 2008). In some cases these practices have been explicitly oriented towards maintaining traits and qualities in landscapes, ecosystems and wildlife that are preferred by human societies (such as burning to maintain plant communities and the prevalence of certain useful species) and in some cases the practices are also associated with taboos or prohibitions on certain types of human behaviour (Colding and Folke, 2001).

The suite of practices through which local people in Nemiah Valley and around the Chilcotin interact with free-ranging horses, and use horses to travel through the landscape has effectively functioned as an informal system of managing the population. Livelihood activities have traditionally required that people regularly travel through the backcountry landscape, and still do to a significant extent. In doing so, local people are able to monitor ecological conditions and wildlife populations, as well as the condition and populations of free-ranging horses. Interviewees and other participants in this research who live in and around Nemiah regularly commented to me about specific bands of free-ranging horses, and individual animals. This familiarity and knowledge of individual horses, their behavior, conformation and markings, and at times their history of ownership differed notably from the way in which people from outside the area talked in general, impersonal terms about free-ranging horses.

With the first-hand local knowledge of ecological conditions, experience, and understanding of free-ranging horses, local people have historically been able to strategically remove animals from herds, and at times add to them in such a way as to manage some free-ranging or wild horse populations. While most human interaction with free-ranging horse populations was not formalized, it was part of a cultural knowledge system that actively maintained knowledge of those horse populations that roamed within each community's territory.

Another aspect of stewardship and informal management is that beyond their direct use of wild horses, Tsilhqot'in and other local people, by participating in livelihood activities on the land such as hunting, fishing, trapping, and ranching, effectively monitor and observe wild horse populations. Time spent traveling or camping in the bush allows people to observe and notice various sub-populations of wild horses, as well as individual animals, and their characteristics. This sort of observation has served as informal monitoring of horse populations.

Although the modern economy and lifestyles of many local residents do not facilitate as much time spent out on the land, people still pay attention to all sorts of wild animals, including horses, and share knowledge of their locations, home ranges, movements, traits and characteristics as part of casual conversation. A relatively large proportion of local dietary needs are still met by hunting, fishing, and using the land. Such knowledge remains evident at the present time among the generation of Xeni Gwet'in and other Tsilhqot'in people who are in leadership positions, despite the fact that modern requirements of the formal economy and lifestyle changes make it increasingly difficult for many people to spend as much time on the land or cover as much distance in the bush as was common even 20 or 30 years ago. One exception to that trend is the Wild Horse Ranger position that is funded by Friends of Nemaiah Valley, and administered by the Xeni Gwet'in First Nation Government. The Wild Horse Ranger is a seasonal, paid employment position for one individual who spends time traversing backcountry landscapes in Xeni Gwet'in territory, monitoring free-roaming horses and other wildlife populations, ecosystem conditions, and human activities, and maintaining trails where appropriate. The Wild Horse Ranger records observations and keeps the Xeni Gwet'in Chief and Council informed of his observations from spending time on the land. The position is held by an individual who also works seasonally as a Park Ranger, who knows the country well. A significant part of the Wild Horse Ranger position during summer months has also come to involve youth training, and some young members of the Xeni Gwet'in Band accompany the Ranger on portions of the work. This position is one example of how seasonal, paid employment can complement local time spent on the land, and to some extent facilitate other livelihood activities.

Changing Livelihoods: Effects on Horse Populations

Within the last 20 to 30 years, horses have been replaced in the Nemiah Valley as the primary form of transportation, and are used less often for ranch work and haying than even 20 years ago (Glavin and PoNV, 1992). Although some Xeni Gwet'in elders warn that one day in the future horses will become

more important again for these purposes (IN03; IN16), for now there is less utilitarian demand for horses than there was in the past. However, ranching, backcountry guiding, hunting and the other activities that use horses remain major parts of the local livelihoods and economy, and horses remain firmly integrated into local culture and youth activities. Hence while there is still some demand for tame and domestic horses for use under saddle, as pack animals, and as work horses, the nature of that demand is changing, and the desirable qualities in domestic horses are changing.

As wage earning and livelihoods activities change for community members in Nemiah Valley, so too do the skill sets of local people. Most people who are experienced with and skilled at chasing wild horses are over the age of 40, with a few notable exceptions. Horse culture is experiencing a resurgence among youth in many Tsilhqot'in communities, to some extent (IN10; IN11; IN03), and is being deliberately cultivated by community leaders in Nemiah as a healthy and positive way of engaging youth in outdoor activities through which they can learn about and experience their own culture and identities. Yet many young adults must leave the Valley for high school and post-secondary education and for wage earning opportunities, and others choose to leave for lifestyle reasons. Even those adults who would like to retain some traditional skills and livelihood practices by spending time on the land often have trouble reconciling the scheduling demands of the industrial work world with the seasonal and flexible timing of hunting, fishing, and other livelihoods activities based around natural environmental factors. Thus it can be difficult for people to spend enough time on the land to become familiar with bands of wild horses, their habits and territories, and their breeding. Horse chasing and capturing is a seasonal activity that is best done under specific winter conditions (IN11), and requires that one have tame horses to ride which are in top physical condition (i.e. already getting regular exercise) and experience on the land. Once wild horses have been caught, they need daily and constant attention to be fed, tamed and trained (IN01a).

There are economic influences on changing livelihoods that also influence wild horse populations. As horses are in less demand for transportation and work in the local economy, so too are prices relatively low for horses, whether they are being sold for use under saddle, as pack horses, or for meat (IN09). With less demand and lower financial returns for wild horses once they have been caught, it is not always worth the time, effort and risk for people to chase wild horses except for their own personal uses and preferences. Chasing wild horses through the bush is dangerous work for horses and riders. For it to be a worth risking the safety of a good saddle horse, the returns must be worthwhile.

Participants also explained that as meat prices for beef fall relative to the cost of living on and operating a ranch, many small ranches can no longer survive (IN03). The shrewd financial decisions for ranchers in a tough market involve cutting costs where possible and using government subsidies and range improvement funds to support their ranching activities (IN04). Many ranches no longer employ regular riders (cowboys) to monitor cattle and move them around in bush range, and rely instead on government subsidized fence-building projects (IN07) to guide cattle movement and forage consumption. This affects both the landscape and horse populations in several ways. Cattle do not naturally move as much as wild horses do between forage areas and territories (IN06), and also tend to stay closer to water sources than horses (Ganskop and Vavra 1986). So when riders are not present to monitor and move herds, cattle tend to stay in one place for longer, and graze the range more intensively. When grazing by unsupervised and unmanaged cattle couples with the cumulative effects of wild horses feeding on the same range, vegetation and soil degradation are intensified. Several participants mentioned the dearth of cowboys and riders, and explained that of those ranches that do employ riders, most focus primarily on private property, but do not necessarily apply the same care to how their cattle graze on open range.

> *And now...with the economy the way it's been for the last seven years, people that used to have a cowboy out there to move their cattle, they no longer have 'em there. They can't afford them. So then the cattle... It's getting worse. They say "Oh it's the horses". It's not the horses. It's the cattle there with no cowboy moving them… They're just getting left to wander. People are just leaving them. And they might put their cattle out... Some ranchers will just put their cattle out and they might go twice in the summer and spread them out, move them (IN06).*

> *Yah so some of the ranchers, they have huge areas, that if they moved their cattle, there would be no problem. But ah... they used to have cowboy- Most of the ranchers, like I'm just thinking back to some of the...the folks my age and that. They, a lot of them did ride range, for ranch. And private property? They're a little more careful with that. Like [Name of Local] Ranch here? They hire riders to move their cattle around, because they don't want to totally destroy their private property (IN07).*

Although these cumulative impacts occur primarily outside of the Brittany Triangle, they affect the most visible and accessible parts of the surrounding landscape, and thus have a significant effect on people's perception of the overall condition of range resources, as well as public opinions about the impacts that free-roaming horses have on the range. Since the Brittany Triangle itself is difficult to access, many people from government agencies and outside communities form opinions about "the wild horses" in general and do not distinguish those in the Brittany Triangle from any other populations.

The lack of cowboys who are regularly riding through the backcountry also means that there are fewer human eyes monitoring wild horses, and fewer people who have the opportunity and expertise to truly know and understand the current wild horse populations, though some local Tsilhqot'in riders do maintain an in-depth knowledge of local horse bands.

There are a number of ways in which the changing livelihoods activities of people in Nemiah Valley and the Chilcotin may affect wild horse populations in the study region, which are summarized in Table 5.

Table 5: Livelihood Changes and Wild Horse Populations.

Livelihood Change	Potential Effect on Horse Populations
Fewer people spending time on the land; less time.	Less "monitoring" of wild horse populations. Less demand for horses. Fewer informal "management" interventions. Possible increase in wild horse population.
Less chasing of wild horses and population culling.	Heavier reliance on natural population controls, including climate and predation. Possible increase in wild horse population. Possible changes to wild horse behaviour.
Fewer horses being turned loose due to fewer work horses being kept.	Possible decrease in wild horse population. Possible changes to breeding influences in wild pops.
Changing predator populations: wolves, cougar, bears.	Fewer predators could result in horse population increase. More predators could result in higher horse mortality and little or no population increase.
Forest clearcuts and fluctuating forage availability.	Forest clear cuts in areas surrounding the Brittany triangle initially result in increased availability of forage for free-roaming horses and cattle. As timber heights increase (approx. 10-15 years after replanting) forage availability drops significantly.

Many locals in Nemiah Valley manage to piece together a combination of short-term employment (e.g. ranching contracts, guiding, forestry work, etc.) with traditional activities (hunting, fishing, ranching, haying). However, this is not easy since industrial work schedules don't accommodate seasonal imperatives. It is socially desirable and important for individual community members in Nemiah Valley to have options to pursue whatever form of lifestyle and work they desire, whether or not they remain in the community. Yet conventional forms of economic development which would replace traditional activities with wage labour entirely, or which hinder people's options and make the local economy more dependent on global economic forces are not necessarily desirable.

> *So our communities in the Tsilhqot'in? They're all like that. They all still hunt; they all still fish. And you know we want to be able to still do that because we can't just survive on the jobs, 'cause here [gestures to the area of a proposed mining project] you're looking at um...25 years you know, to create a big job and lots of money and...you listen to one of our Chiefs from Alexis Creek Indian Band, Tsi Del Del Chief Ervin Charleyboy, 19 years as Chief, Tribal Chair of TNG, Tsilhqot'in National Government. He said [the community in Redstone]… everybody lived off the land, had cattle, horses... Mill came by, they started sawmill, and everybody started working there. Pretty soon they can't live up in their meadows because they gotta go to work all the time. And then everybody ended up off the meadows, in the reserve just to be able to work. And then that mill shut down because of the timber... And now they're all on reserve, but they're not back into the meadows (IN03).*

Community development which offers choices and options to people now and in the future is preferable to that which dictates what people can and cannot do, or places traditional livelihood activities in competition and conflict with wage earning opportunities. The Tsilhqot'in people have long managed to integrate outside economic influences into their own existing lifestyle and economic preferences by fashioning what John Sutton Lutz (2008) refers to as a "moditional economy". Indeed, socially and ecologically resilient and sustainable community development will look for ways to continue this adaptive and flexible mixed economy, which facilitates rather than hinders people's abilities to participate in the cultural and livelihood activities that they wish to maintain.

Managed Wild Horses?

As discussed earlier, cultural perception and ideologies influence the concept of wildness, and how people perceive free-ranging horses as wild or feral. Although the idea of a managed population of free-ranging horses may imply that the animals are not truly wild, there is no inherent contradiction in those terms. To Xeni Gwet'in and other Tsilhqot'in participants in this study, horses that roam freely on the landscape, especially those that are not owned or branded, are wild. The fact that people interact with some of those wild horse populations does not mean they are not wild, any more than it would with moose or deer that had been seen or hunted by people. In the Western cultural traditions wild animal populations are often managed, for example deer, moose, bighorn sheep, and wolf populations. Such interventionist management is achieved in a variety of ways including population culls, hunting, and releasing individuals or transplanting populations in new locations. Some populations of wild animals are even managed so that they retain characteristics that people find desirable in the wild, such as bears in parks that are conditioned to maintain an aversion to humans (Swart, 2005).

The management actions described above with horses in the Brittany Triangle and surrounding areas differ from those applied to wildlife or game management in a key way: the deliberate and strategic actions taken to influence physiological and temperamental characteristics of the population for traits desirable to humans. Wild horses in the Chilcotin have been selectively managed to prevent inbreeding, promote certain characteristics of size, strength, and conformation. While research indicates that human hunting practices have directly influenced the physiological characteristics of various prey species (Darimont et al., 2009), these influences with horses in the Chilcotin have been deliberate and intensive. Indeed, Chilcotin horses are valued by local and First Nations people for the traits they develop by being wild. In other words, some of the animals' wild characteristics are considered a strength as valuable as any that can be bred into them by humans. While an ideal horse is still temperamentally trainable, the wild horses considered best for capture and use as saddle horses have those preferred characteristics outlined earlier in this chapter. Thus a managed population of horses can still be wild, and indeed many are valued by humans because of the traits that they develop by being wild.

Framing the Issues

Direct and Indirect Effects Between Social and Ecological Communities

To date, wild horse populations in the Brittany Triangle, Nemiah Valley and surrounding areas in the Chilcotin have, to varying degrees, been part of a system with local culture, knowledge and practice. Horse populations have been influenced by all those factors, by environmental and ecological factors, and by management actions overseen by the provincial government in the past. These factors are discussed here, and summarized in Table 6.

The social, economic and political context for this milieu is in constant flux and change. At the local scale, the way of life, skill sets and livelihood practices of ranchers, Xeni Gwet'in, other Tsilhqot'in people, and other residents are changing over time. Similarly, community structure and local economies are changing. More broadly, public and societal values and expectations regarding rights, conservation, wildlife and livestock are shifting, as is the ability of a broad public to observe and scrutinize land use and management decisions affecting free-ranging horses in the Chilcotin. Expectations of governments, as well as the relative jurisdiction, power and authority of different governing bodies are also changing. Finally the economic value and market prices for livestock – cattle and horses – are also changing, relative to the cost of raising or maintaining them. All of these factors can influence free-ranging horse populations through a combination of direct and indirect influences.

In a direct way, the changes listed above generally influence the frequency of interaction between people and horses in the Brittany Triangle, and the number of people who interact with those subpopulations of horses. The frequency of horse population culls, and the number of horses removed from and added to herds is directly affected by changes in government policy, livelihood activities and lifeskills, as well as market prices and demand for horses.

Indirectly, free-ranging horse populations are also affected by changes in the control and management of other wildlife species including other ungulates and predators. Land and resource use decisions in regions surrounding the Brittany, such as logging, clear-cuts, range use and cattle grazing, influence wildlife populations and habitat use in remaining habitat within the Brittany Triangle. During the initial years after an area has been logged by clear-cutting, the forage availability increases. Free-ranging cattle, wildlife such as caribou, and free-roaming horses all move to those areas to graze. For a temporary period, the land supports more grazing by all species. However, as tree growth develops, at a certain point the available forage in areas that have been clear-cut drops significantly, and the livestock, wildlife and horses that have been depending on the forage in those areas must re-distribute their grazing on the landscape. This process can cause fluctuations in the overall forage availability, and in the relative grazing pressure on other parts of the regional landscape. Changes in ranching practices such as the amount of fencing constructed on range land, as well as the extent to which riders move cattle on lands leased for grazing, as well as the number of cattle on the range all influence the movement and habitat use, as well as the ecological impacts of free-ranging horses, and the perception of them by various interest groups.

For political, social and economic reasons, provincial government officials and range managers are generally reluctant to reduce the total amount of grazing permitted on Chilcotin landscapes (determined as allowable “animal unit months” or AUMs under grazing tenures and licenses) (IN07). However, the changes in available forage and water that result from landscape use, industrial development, and climate are significant. This research indicated some concern among a variety of participants that the pressure from cattle grazing on range lands and resources is high, and currently has no “buffer” for years of drought or other resource scarcity (IN07; IN14; IN15). Since there are strong and compelling reasons (economic, social and political) for many people to maintain high numbers of cattle on open range, the focus of frustration about grazing impacts is often directed solely at removing free-roaming horses from the range, and considering them as primary determinants of range degradation or overgrazing. While horses undoubtedly contribute to degraded range lands in some regions, the results of this study suggest that grazing by free-roaming horses left unmanaged in a Chilcotin landscape does

not necessarily lead to over-grazing. Thus it suggests that range degradation in other regions is likely due to cumulative effects of numerous factors, and as such, mitigating actions and management interventions will be most effective if they focus on systemic actions to improve range health.

To assume that simply reducing the number of free-roaming horses on the landscape would solve problems associated with overgrazing in areas where there is a cumulative impact from cattle and horses is an over-simplification of the issues, and management interventions based solely on that assumption would fail to address a significant proportion of the other contributing factors. A consulting report by R.E. Salter (1978) describes how grazing relationships and cumulative effects of horses and cattle are complex. "While early spring grazing of dry grasslands by horses could limit forage subsequently available to cattle both by removal of current growth and depression of plant vigour, horses grazed in this habitat at least partly because plant litter had been removed by previous cattle grazing, and because greenup was therefore more rapid" (p. 23).

Table 6: Summary of Effects of Systemic Changes on Horse Populations.

Factors of Change	Direct and Indirect Effects	Effects on Free-Roaming Horses in Brittany Triangle	Effects on Free-Roaming Horses Outside Brittany
Way of life, skill sets and livelihood practices; ranching practices.	Less homesteading activity in Brittany Triangle; reduced backcountry livelihood activities; increased backcountry recreation; more motorized access; fewer riders on the land moving cattle; less need for horses while ranching; larger ranch operations, economic pressure.	Less frequent contact with humans in the study area; more exposure to motorized vehicles; fragmented habitat; less frequent chasing or culling.	More fencing may influence movement; less use of horses; possible reduction in forage availability.
Community structure and local economies	More centralized settlements; less time spent on the land by community members.	Same as above.	Unknown.
Public and societal values and expectations regarding rights, conservation, wildlife and livestock	Concern over humane treatment of animals; more access to information by distant populations concerned with maintaining wild horses; preference by some for sustainable land use and conservation; pressure to develop remaining resources to bolster rural resource economy	Increased publicity, visibility of the horses for people who have not directly witnessed them. Political and social pressure to protect horses.	Increased development and habitat loss (i.e. logging and mining) influence populations and distributions of wildlife; public scrutiny may result in fewer round-ups or culls, hence increasing horse population.
Relative jurisdiction, power and authority of different governing bodies	Court decision recognizing Tsilhqot'in and Xeni Gwet'in rights and title. Political uncertainty over land rights and jurisdiction.	Less direct management action from provincial government. Increased autonomy for Xeni Gwet'in.	Uncertainty about responsibility and management for free-roaming horses in rights and title areas.

Factors of Change	Direct and Indirect Effects	Effects on Free-Roaming Horses in Brittany Triangle	Effects on Free-Roaming Horses Outside Brittany
Economic value and market prices for livestock	Ranchers may increase or decrease the number of cattle they keep (influencing pressure on available forage resources) depending on prices for beef and costs of business.	Not Applicable within Brittany study area.	Fluctuating pressure on shared forage resources and water sources. Fluctuating round-ups of free-roaming horses.
Climate change (short and long term)	Changes in precipitation and temperature affect available water, plant response to grazing pressure, and energy demands on wildlife and livestock in winter.	Unknown effects.	Unknown effects.
Control and management of other wildlife species	Predator control programs alter the populations of wolves, cougar and other wildlife.	Direct effect of predation on horses populations and mortality rates.	Predator control programs could result in less predation on horses populations and lower mortality rates.
Land and resource use decisions such as logging, clear-cuts, range use and cattle grazing	Fluctuations or changes in distribution of available forage, habitat and wildlife populations.	Not applicable within Brittany study area.	Fluctuations in available forage and distribution of livestock and wildlife populations.

Integrated, Inclusive Planning: Removing Structural Barriers

Theoretical and applied literature related to numerous approaches to planning (such as community and economic development, natural resource management, protected areas, and land use planning) attempt to address power inequalities, divergent interests and conflict among stakeholders (see Chapter 2 for a full discussion). From transactive and communicative planning theories to various applied models in land and resource management (Freidmann, 1993; Mitchell, 1997), there has been discourse about power dynamics and the inclusion of marginalized "voices" in planning since at least the 1950s (Lindblom, 1959). Yet when the planning processes also involve cultural differences and historical politics between indigenous peoples and government agencies that are descended from colonial cultures and politics, the power dynamics are particularly deep and complex (Singleton, 2009). The concern becomes more than simply making sure that all voices are heard, though that remains important both within and among groups. Such cross-cultural and post-colonial circumstances also raise a number of other issues:

- How reflexive and flexible is the planning process to local context?
- What are the underlying assumptions, principles and Terms of Reference for the process, and are they shared/agreed upon by all parties?
- Who has final decision-making authority?

- How does the planning process relate to the political, jurisdictional and legal framework and power structures within which it takes place?

There is some evidence of growing recognition within the planning profession of issues specific to Aboriginal communities in Canada. “Indigenous Planning” initiatives are evolving throughout the country (*Plan Canada,* 2008). Yet much of the planning that affects remote or rural Aboriginal communities like the Nemiah Valley takes place outside the formal sphere of professional planners. Communities like the Nemiah Valley and other Tsilhqot’in communities are profoundly affected by decisions made in other sectors, such as industrial resource development (e.g. forestry, mining, hydro power), private conservation initiatives (e.g. land trust organizations), transportation planning (road building and maintenance), wildlife and range management, and protected area planning. Some agencies in those sectors mandate consultation or collaboration with First Nations and put those processes into practice, and others do not.

Procedural and structural barriers to meaningful or truly equal participation by indigenous peoples continue to be identified by scholars and practitioners (Brosius, 2006; O’Flaherty et al., 2008; Sherman et al., 2010). In addition to these challenges, this research affirms that there is a fundamental disconnect between the piecemeal approach to resource management which separates issues into multiple specialized (though overlapping) portfolios, and the attempts of Xeni Gwet’in leaders to approach issues in a culturally appropriate way, which recognizes the interrelationships, effects and interdependencies between a spectrum of issues from community health and economic development to language education, to land use and wildlife management. A locally developed stewardship model which takes an integrated approach to managing livelihoods, ecosystems and socio-ecological change is proposed, below. Applied examples of planning processes among other First Nations communities in British Columbia facing similar or comparable circumstances also provide helpful lessons and a good indication of current practices, such as the two-tiered planning model used in the Great Bear Rainforest (Cullen et al., 2010).

Planning with and within indigenous communities is about bringing together existing local culture and traditions with relevant planning models and processes that can help communities navigate through practical and regulatory frameworks to achieve desired goals for the community and the land. Just as this often requires First Nations cultures to explicitly define and identify their cultural practices and priorities, it must also require that planning processes developed in Western traditions and cultures be reflexively questioned, and assumptions made explicit. In this way, it becomes possible to develop

models and forms of planning that are integrated with the local context and existing cultural worldviews of First Nations and indigenous communities. Such culturally rooted planning models might stand a better chance of strengthening the cultural integrity and socio-ecological resilience of indigenous communities as they interact with external political and economic systems. Culturally embedded processes can build upon local experiential and empirical knowledge as a form of adaptive management, valuing it as a guide and filter for scientific information and inquiry.

The existing discourse and practice of Integrated Resource Management (IRM) offers important considerations for situations where First Nations and provincial governments, as well as variety of stakeholders are all involved in managing or interacting with elements of a complex social ecological system. It is necessary to define *what* is to be integrated, in a given situation. Hanna and Slocombe (2007, p. 7) identify seven "interrelated dimensions or areas for integration: disciplines; information; spatial/ecological units; governments; agencies; interests/sectors; and perceptions, attitudes, and values." Dovers and Price (2007) add that integration has multiple drivers and may involve integration across space and time, as well as numerous other factors. Mitchell and Shrubsole (2007, p. 21) state that integration involves collaboration and coordination; it is a means to an end, not an end in itself." They caution that without a clear direction at the start of a process, it can be difficult to work out what to integrate, who should be working together, and in what sort of relationship. However, an early goal of an integrated planning process might be to jointly develop such a shared vision, and that it may not be realistic to expect disparate interest groups to enter into the process with a common vision or goal, pre-established. In reality, there will be variation in how desirable it is to integrate each of these dimensions, and to what extent. Comprehensive integration may not be possible (Tress, Tress, & Fry, 2005a, 2005b, 2005c), desirable, or appropriate in all dimensions, in all cases. For example, the integration of governments and agencies (and hence their interests) may be limited by legal, policy, or even constitutional constraints (Mabee & Hoberg, 2006).

This study offers the foundation for a complementary, alternative scenario in concept and practice, wherein the integrative, adaptive capacity of indigenous ways of knowing and practices are taken as the basis for an approach to the management or stewardship of social and ecological systems together. There is still an important role for the existing insights of IRM in the processes and outcomes of integrated management. Yet this study suggests that under circumstances like those where the people of Nemiah Valley monitor and steward the free-roaming horses of the Brittany Triangle, it may not be necessary or desirable for the diverse ways of knowing that influence decisions about the horses to be fully integrated, even though they may be considered. The integrity and effectiveness of those ways of

knowing may depend partly on their differences from each other. To the extent that integration is desirable, this research also offers the opportunity to consider a model where the foundations are rooted in indigenous culture, local knowledge and livelihood practices, and other knowledge, information and techniques are adopted into that framework to form a sort of hybrid practice that is context-dependent. Such a prospect would be nothing new to the Tsilhqot'in people, nor to many indigenous communities that have been experiencing and mediating such integrative adaptive practice for years. However, it does represent an approach to integrated resource management that is somewhat different than many of the formalized models available to planners and practitioners who manage resources.

CARETAKERS AND STEWARDSHIP AS RESOURCE MANAGEMENT

The Xeni Gwet'in self-identify as caretakers of their territory, which includes the Brittany Triangle and Nemiah Valley. Indeed, the area of land claimed in the *Tsilhqot'in Nation v. British Columbia* court case (2007, BCSC 1700) is referred to as the Caretaker Area. The cultural identity as caretakers of the land, resources, and animals in the area is part of what it means to be Xeni Gwet'in, and local leaders describe a strong sense not only of their rights and title to the land, but also their responsibility to look after it. Each member nation of the Tsilhqot'in people traditionally had their own geographical area to look after, and protect, though the bands would assist each other in defending territory (Setah, pers. com., 2010). In explaining relationships between people and place, Xeni Gwet'in participants got straight to the heart of the matter, explaining that Xeni Gwet'in are caretakers of their land just as the land provides for them and teaches them who they are.

> *It's who we are. We are Xeni Gwet'in (William in Goddard and Smitten 2002).*
>
> *Xeni Gwet'in, we're part of the Tsilhqot'in. We're actually situated here, in this area of Tsilhqot'in territory, just to be caretakers (Setah quoted in Bhattacharyya et al., Forthcoming 2012).*

From the Chilcotin War of 1864, to protracted negotiations with provincial and federal government agencies over land and resource management decisions, to court cases and blockades, Tsilhqot'in people have repeatedly asserted their responsibility to protect the land and themselves from unwanted or harmful influences. The results are relatively intact ecosystems and culture, and a sense of pride and self-efficacy in their ability to continue caring well for the land.

> *So I think… we are sacrificing a lot. There's a lot of mining jobs, lot of logging jobs that we'd benefit [from]. But for how long? We're looking at the future. Some of us, we sacrifice our future, our present being, you know... as long as we can survive eventually our, keeping our culture passing on our language. Eventually the young*

> *people are going to benefit. Because, **this** is going to be gold [gestures around to lake and mountains] (IN03).*[19]

This role of Xeni Gwet'in as caretakers is not simply a label, but also a practiced reality that has influenced the physical landscape over time. The mountains around Nemiah are devoid of mines, tailings piles, excavations, and forest clear cuts, while rivers and streams run with potable water and fish because of the influence of the Tsilhqot'in people. Ecosystems are relatively intact because Tsilhqot'in people have influenced their physical structure in small ways with creek crossings, springtime fires and other livelihood practices, *and* because they have fiercely protected the land from industrial resource exploitation and large-scale development. The Xeni Gwet'in worldview is one in which people and the land mutually define and co-create each other in an ongoing relationship. [20] The relationships between all these factors – Chilcotin War, cultural identity as Caretakers, and the sense of self-efficacy and pride in protecting the land - is summed up in a quote by David Setah as he describes the Chilcotin War as a part of his sense of pride and responsibility to protect the land from damage.

> *That is how I grew up, knowing all that. That is about as close as I can relate our people and the land. You go back into 1864: the Chilcotin War. They [Tsilhqot'in people] tried working with the people who came in. But they were getting mistreated badly. I mean, if you're actually treated [as though] you're not human at all....If after a hard day's work they tell you, "You want to eat something?" and they throw it on the ground, and tell you to eat. And **they** [Europeans] came over **here**! [They thought] anything they could do was OK. They mistreated the ladies from our nation. Even, the leaders talk about how graves were being disturbed. Those things are talked about. Prior to that, small pox came to our people and it wiped out a lot of our people. And the threat [of the road-builders] while they were building the road was that they threatened to bring that back if we didn't behave. It had already wiped out half our people before. Those kind of threats...I mean they can easily call for War.*
>
> *I think the pride comes from there: that we did something. We didn't just sit back and do nothing. All those warriors and places, they did stand up. All those stories are drilled into us, and the pride in us is that we can always protect the land. That's what I've known about growing up: our people always protect the land (Setah in Bhattacharyya et al., Forthcoming 2012).*

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[19] This participant's reference to the land and water themselves being the "gold" of the future is a deliberate allusion. The Xeni Gwet'in and other Tsilhqot'in Nations are currently fighting to prevent a gold and copper mine proposed by Taseko Mines Ltd. from destroying two freshwater, fish-bearing lakes and the surrounding wetland system and forest habitat within Tsilhqot'in traditional territory. The Xeni Gwet'in argue that the water supply and the land themselves are worth more than gold ore in the long term.

[20] Text in this section is a reduced version of the full discussion in the book chapter titled, "It's Who We Are: Locating cultural strength in relationship with the land" by Jonaki Bhattacharyya, Marilyn Baptiste, David Setah and Roger William, in Parkins and Reed (Forthcoming 2012).

Responsibility

The Xeni Gwet'in cultural identity as Caretakers is interwoven with spirituality, the landscape, and the animals of the region, and it is the basis from which local decisions are made about management and planning of natural resources, land use, conservation, community development, as well as other interactions between people and the wildlife of the region. In this way, local indigenous spirituality and cultural relationships with the land form a framework within which the community and individuals relate to, use and look after their land and wildlife. While these interactions do constitute a form of land management at times, they might more accurately be referred to as stewardship, as in many ways the situation is consistent with other indigenous stewardship models (Sherman et al., 2010). The deep sense of spirituality and identity present in this indigenous approach to stewardship contributes a morality and sense of responsibility to management and planning frameworks that is often missing from conventional Western science management frameworks.

Western approaches to land use and wildlife management usually attempt to remain secular and separate from spiritual, religious, or moral values. While Western management frameworks are inherently and unavoidably influenced by cultural norms and values, the idea of acknowledging and addressing those values as part of the management process, or making them explicit to management frameworks is relatively novel, and not usually part of standardized frameworks or processes. Individual people working in professions related to land use and wildlife certainly have their own sense of responsibility and morality with regard to their work, and the landscapes and animals with which they deal. Yet those values are usually considered to be personal, and not appropriate to formal processes. The result is that Western approaches to land and wildlife management often lack an overarching, articulated morality or responsibility to the land and the wildlife themselves, focusing instead on the goals, mandates or politics of the agencies involved.

While the politics and internal power relations associated with introducing moral responsibility to management and planning exercises are complex and not easily navigated, there is a lesson to be learned from this research. The explicit presence of a collective moral responsibility in land and wildlife management decision processes is something that indigenous ways of knowing can contribute to an integrated approach to management and stewardship. Indigenous approaches to stewardship such as that of the Xeni Gwet'in are open and flexible enough to receive and consider diverse forms of information, yet also guided by an intrinsic sense of responsibility to the land and the places in which they live. This morality and sense of responsibility is based in the relationships that people have with the land and animals, and is maintained through active, ongoing engagement in those relationships.

Hence there is a positive feedback loop in place by which the health of their relationship with the land reinforces the community's capacity to make responsible decisions regarding the management of their lands, which in turn result in the maintenance of those healthy relationships.

For the Xeni Gwet'in people (and some other long-term residents in the Nemiah Valley), responsibilities and rights to ecosystem and place are inseparable from responsibilities to, and rights in society. Concepts of citizenship in most Western cultures focus on human rights and responsibilities within and towards society. Environmental concerns are drawn into a human-centered concept of citizenship only insofar as they can be linked to human rights (e.g. access to clean air and water as a health issue and basic human right) (Jelin, 2000). The Xeni Gwet'in offer a glimpse of what environmental citizenship might look like if it were framed in such a way that people are citizens of a place, inclusive of human society *and* the natural environment.

Politically, the Xeni Gwet'in identity as caretakers of the land and place means that in the face of challenges they repeatedly asserted not only their rights to territory, but the right to *be responsible for and to* "the land". In other words, the struggle to protect First Nations rights is also about protecting responsibilities. Cultural identity, survival, and the health of the Nation are intimately intertwined with the land, and all these concepts are aspects of citizenship. In recent years, the Xeni Gwet'in and other Tsilhqot'in people have had to explicitly articulate and explain the relationship that they have with the land in order to defend it within the context of a Euro-Canadian culture, governance structure, and the English language. This cultural self-awareness creates a highly intentional approach to community development and land management, in which forces of change are mediated by culturally aware decisions about a desirable future.[21]

Opportunity for Locally Developed Stewardship Model

Indigenous stewardship models have been studied in the context of the management and conservation of natural resources, landscapes and animal populations in numerous situations, globally (Manuel-Navarrete et al., 2006; Nadasdy, 2003; Sherman et al., 2010; Turner and Berkes, 2006). Given the jurisdictional finding of the Supreme Court of British Columbia that the Xeni Gwet'in have the right to capture and use free-roaming or wild horses within their territory, and that the provincial Forest Act does not apply in the Brittany Triangle or Nemiah Valley (among other claimed areas), a political opportunity exists to develop a local stewardship model for the land and the horses in particular. The

[21] This discussion is developed in more depth in Bhattacharyya et al. (Forthcoming, 2012).

existing and strong cultural identity of Xeni Gwet'in as caretakers of the land, and as horse people presents a parallel cultural opportunity that would strengthen a stewardship model, and offers the socio-ecological basis for an adaptive model to be embedded and grounded in the existing culture and landscape.

As mentioned above, changing social and economic conditions have influenced and altered the relationships between local people and free-ranging horses, and will continue to do so. In this way, social and economic change, and changes in livelihood practices affect free-ranging and wild horse populations. Yet currently in the Nemiah Valley and surrounding communities, traditions, knowledge and skills exist which could form the basis for an adapted, renewed form of indigenous stewardship. Such a system of stewardship would be rooted in existing practices and skills related to monitoring, chasing, capturing and training horses, and in the Xeni Gwet'in cultural identity as caretakers and stewards of the land and animals.

Influences on free-ranging horse populations have been complex for the past century, and continue to be. There have been many influences affecting population numbers, health, breeding, forage practices, and territorial range of free-ranging horses, including: round-ups, culls, shooting and slaughters; private or local chasing and capture; release of owned or domestic horses; introduction and release of horses from outside regions; climatic conditions and changing availability of water and forage; natural disturbances such as fires; competition for forage from cattle; human landscape change such as forest clearcuts (which temporarily increase available forage), fencing, and road building; and the influence of predation by wildlife. Clearly, livelihood practices of horse chasing, capture and round-ups for sale or personal use are not the sole determinant of wild horse populations. However, these practices represent a suite of skills, knowledge and behaviours that are culturally appropriate and scaled such that they could form the basis for a system by which the Xeni Gwet'in and community members monitor local ecosystems and horse populations, and maintain a responsive, adaptive informal management system which also supports cultural goals of the community.

The research for this study indicates that the Xeni Gwet'in and community in Nemiah Valley are well-situated to create a stewardship model that is based in the Xeni Gwet'in identity and practice of being Caretakers of their land, and which maintains a desired co-existence between people, free-ranging horses, other wildlife and livestock as part of the inter-relationship between local culture, livelihoods and the land. The skills and political space already exist to support such a stewardship. Yet a model could be created which more explicitly links the community's goals to strengthen the cultural roots and

identity of youth while also offering skills and employment training opportunities, and which is adapted to the ongoing socio-ecological changes faced by the community. In order to be flexible, adaptable and strengthened in the face of social transformation and change, it would be somewhat more explicit than past practices, and may involve more deliberate involvement from community leaders and the First Nation government. Such a stewardship model would be a form of social and political hybridization which integrates skills, ways of knowing and practices from different cultures and different time periods in order to adapt to the hybridization of local landscapes and ecosystems open to dynamic changes in structure and composition (Higgs and Hobbs, 2010; Hobbs, Higgs and Harris, 2009).

The idea of such a stewardship model is that it would be envisioned, developed and implemented by the Xeni Gwet'in, and the community in Nemiah Valley as their own process, carried out in their own way. Some aspects of such a system might be fundamentally different from a management plan based in the planning traditions of Western or Euro-Canadian. It may be based more on responsive actions in the field, experiential knowledge, kinship and co-agency with the animals and the land, and different timeframes than the prevalent management system applied by government agencies to other wildlife populations. There is a strong supporting role for scientific information and methods for assessing ecosystem health. However, the scientific information might be integrated into an indigenous framework (if possible) for stewardship, rather than vice-versa.

The success of such a model would depend on a number of factors, including the ability of the community in Nemiah to develop and maintain a viable local economy such that people in the demographic group with the strength, skills and stamina to capture and work with horses are able to live in Nemiah and participate in those activities; access for youth and interest of youth in learning and practicing those skills; the maintenance of the ecological integrity of traditional territory in such a way as to support healthy populations of wildlife, horses and plant communities; a cooperative relationship between people and a suite of predators which also influence wild horse populations. The benefit of such a model, however, is that it could contribute to positive feedback loops in which all of these factors support each other. For example, youth would develop skills in ecosystem and wildlife monitoring at the same time as deepening their understanding of their cultural identity through spending time learning from elders and practicing traditional skills on the land. Wildlife and predator populations could be better monitored and understood as people spend time monitoring horse populations and maintaining an appreciation for the relationships between the species. An economic

feasibility study would be useful to develop realistic prospects and creative approaches to funding such a system.

It is possible to suggest some key elements for a joint livelihoods-ecology stewardship model as it would pertain to free-ranging horses based on the results from this research, as in Table 7.

Table 7: Key factors in a livelihoods-ecology stewardship model.

Stewardship Model	Existing / Traditional	New / Introduced / Emphasized
Monitor horses and ecosystems	Time spent on the land: riding, hunting, gathering, walking. Wild Horse Ranger	Both
Chase, capture and cull horse populations as necessary	Traditional Skills	Train youth in methods. Balance traditional methods with humane treatment of horses
Train and use horses in local community; trade and sell	Existing; specialized local experts	Revitalize among local community members.
Youth involvement	Youth recreation and community activities; mentorship with Wild Horse Ranger	Develop further training opportunities; teach traditional skills, especially horse chasing to young boys and girls; include training in ecosystem science and monitoring, range management and wildlife biology for youth.
Tsilhqot'in language	Existing usage, mainly by older people.	Make Tsilhqot'in language a central part of stewardship discussions, and practice in the field.
Liaise with buyers for culled horses	Trading and private sales; horse auctions; sale for slaughter?	Develop relationships with buyers for trained horses; develop relationship with ethical abbatoir and meat buyers?
Whole ecosystem-livelihoods approach	Community livelihoods depend on the land.	Cultivate community development and stewardship plans that link local economic opportunities with goals for land use and resource management.
Collaboration with horses and predators	Traditional practices of leaving horse survival to the horses, as with other wild animals.	Maintain strong predator populations in the Brittany Traingle and let wild horses winter without assistance.

CONCLUSION

This chapter has demonstrated that many elements of cultural practice and livelihoods have effectively served as an informal management system for wild and free-ranging horse populations in and around the Brittany Triangle. In many parts of the Chilcotin, including the Nemiah Valley and communities surrounding the Brittany Triangle, formal management of land, animals and resources is often associated with antagonistic relationships between locals and the provincial government. In the past, some management actions and policies of the provincial government have been perceived as invasive and disconnected from the experiential knowledge most highly respected on the ground. Despite these

general perceptions, there are individuals within local communities and government agencies who have worked hard to bridge the gaps, and to forge cooperative relationships. However, the idea of formal management of wild horse populations within the study region is one that is met with wariness by some people in the region, and hence tends to exacerbate controversy.

Exploring the role of horses in their relationships with ecological and human communities has led to deeper and broader issues of power relations and questions about how to frame the key issues and better ways to integrate different types of knowledge and information into land use conservation, management and planning. In order to address some of the inherent biases towards certain types of knowledge in our standard Western approaches to management of land and animals, it is necessary to consider the diverse ways of knowing through which people understand and relate to wild horses in the Brittany Triangle. Some of these ways of knowing are inseparably tied to context, place, and cultural practice. Hence it becomes important to consider the knowledge-holders, or knowers, in decision-making processes, not just information. By working to include diverse knowers and ways of knowing in decisions about wild and free-ranging horses, it may be possible to move from reactive and narrow-minded thinking to a more creative and inclusive process which also addresses the political power struggles that have historically characterized debate over wild horses and land use in the Chilcotin.

An opportunity exists in the unique cultural, geographical and political situation in the Nemiah Valley and Brittany Triangle to develop a stewardship model that builds upon existing informal management practices for wild horses, by cultivating some livelihoods traditions through which people understand, monitor and maintain wild horse populations. In such a stewardship model, practices and traditions related to wild horses are really a cultural gateway to the deliberate efforts by local people to maintain valued aspects of Xeni Gwet'in culture, landscape, and wild horses while also reconciling and mediating differences with people from other cultural traditions. Rather than focusing on the management of a single species, issues related to ecosystem health, range management, and free-ranging horses will be more effectively and efficiently dealt with in the Nemiah Valley and Brittany Triangle if the cultural role of Xeni Gwet'in as caretakers and stewards of their land is fostered and adapted to current conditions as a *practice*, not only an identity.

For the Xeni Gwet'in, free-roaming horses are an established part of the complex relationship between culture, community, and environment that influence and mediate the forces of change. Through this relationship, human and non-human communities have historically reinforced each other's ability to withstand shocks and stresses from both external and internal sources, and they continue to do so

(Smith and Stirling, 2010). The issue of whether wild horses should be managed, and if so how, is inextricably tied to the history of land use and power relations in the region. The question of *how* best to manage wild horse populations in the Brittany Triangle raises another question, that of how to appropriately define management in local circumstances. The diversity of land uses and ecosystem characteristics in Tsilhqot'in territory means that some sub-populations of free-roaming horses may require active human interventions while others may not. The Brittany Triangle horses, in particular, are in unique circumstances in terms of their territorial range, habitat, and human limited human contact.

CHAPTER 7 – CONCLUSIONS AND RECOMMENDATIONS

In this chapter I summarize and reflect upon the research conducted for this study, discusses the management implications and recommendations that result from the study, identifies directions and approaches for future research, and places the contributions of this research into academic and applied contexts. The exploratory, transdisciplinary nature of this research has made it a journey of varied experiences, through which my understanding of the research subject and issues has changed, deepened and transformed over time. While the study has remained true to its original purpose, I now have a reframed understanding of the research objectives and questions. This understanding could only have been developed through an open-minded, adaptive approach to research, and it forms the basis for my recommendations for future research.

ADAPTIVE RESEARCH – QUESTIONS REVISITED

One effect of an exploratory, adaptive approach to research is that at the end of the study, the researcher may find herself with a different understanding of the issues than that with which she began. As my understanding of the issues, people, animals and places that are part of this study has deepened, there have been corresponding changes to how I frame questions, characterize priorities and issues, and establish recommendations. The transformation in understanding of the issues was a gradual, iterative process in which experiential and theoretical learning combined to make the research results and the topic itself appear different after five years than it did at the outset of the project. While the research results, findings, and development of my understanding of the issues is reflected in Chapters 4 through 6 of this thesis, it is worth summarizing a few points directly in response to each of the core research questions, prior to discussing the recommendations of the study and suggested directions for future research.

Research Question #1

What do horse diets and observed ecological effects of the horses' feeding indicate about habitat and landscape usage (i.e. feeding patterns, ecological impacts and habitat use)?

Observations

- The temporal and geographical scale of the study, together with financial and logistical capacity for a single graduate student to undertake fieldwork in the study area, make conclusive data challenging to obtain.

- Direct observation of the horses in the study area, coupled with local knowledge from community members and others who have spent time observing the study area, were rich sources of information.
- The heterogeneous landscape makes the spatial generalization of ecological impacts problematic, and representative sampling extremely difficult, particularly since areas that are more accessible to human traffic differ from more remote regions in terms of both landscape ecology and equine populations.
- There are multiple disturbance factors driving and influencing ecosystem change in the study area, including wildfire, annual climate fluctuations, and human land use decisions, forming a complex system of which the horses are one part.

Emergent Issues

- Ecological effects and impacts of the horses are heterogeneous across multiple spatial scales.
- The relative impact of free-ranging horses on vegetation, soil condition, and other wildlife, in conjunction with other ecosystem drivers and disturbance factors, has not been quantified by studies, to date.
- Local knowledge provides important context, explanation and alternative information to quantitative data, and currently presents a more complete understanding of the complex system dynamic in the study area than isolated quantitative studies.
- The ecology of the free-ranging horses, even in the Brittany Triangle, is intricately linked over time with the culture and livelihood practices of people who live in that area.

Research Question #2

What cultural and personal meanings and values are associated with the horses?

Observations

- Socio-political and cultural perspectives appear to have a larger influence on management preferences pertaining to the horses than scientific studies, partly due to a lack of locally specific or relevant scientific information, and a lack of capacity to obtain it (in the case of Provincial Government), as well as a lack of cultural relevance for that sort of information (in the case of First Nations).
- Controversy over the horse populations is inextricably related to differences in values, attitudes and perspectives towards free-ranging horses, and land use.

Emergent Issues

- Differences in people's perceptions of free-ranging horses tend to be indicative of differences in their attitudes, perceptions and values generally towards the human relationship with nature, land use and the role of horses.
- First Nations participants tended to identify with the horses culturally, as they did with the landscape and other animals as multiple agents inhabiting a particular place.

Research Question #3

How can local knowledge and scientific information on the ecology and socio-cultural role of free-roaming horses be integrated to inform conservation planning and land management in the Brittany Triangle region?

Observations

- There are multiple factors at play here: ecological knowledge, socio-cultural knowledge and perspectives, political power relationships and land use decisions. There are also multiple types of information, knowledge and ways of understanding or knowing: scientific inquiry (quantitative and qualitative), as well as experiential and indigenous ways of knowing.
- All of the above factors interact and influence one another, in terms of human perspectives and culture, and in tangible effects on the landscape.
- Different people in the region have different ways of knowing, valuing, understanding and living with the land.
- Political power relations influence the types of knowledge which are deemed to be legitimate, and consequently limit the available information to people making management decisions.

Emergent Issues

- A comprehensive and inclusive study and land-use planning process must grapple with all of the above factors and types of knowledge in a way that is appropriate to the local situation.
- Cultural bias and assumptions tend to have a significant influence on management discussions and preferences, especially in the absence of direct knowledge about the horses or the region.
- Some existing social and cultural strengths that could contribute to successful local management of the landscape and wildlife are currently undermined rather than facilitated by the political processes and institutional infrastructure in place.
- Local knowledge and indigenous knowledge are part of a lived practice and a way of approaching learning and dealing with knowledge, not simply a type of information.

- Integration must be clearly defined if it is to be a goal for combining western science with local knowledge, to avoid the common problem of undermining local knowledge by decontextualizing it in the attempt to integrate it. There may be a more appropriate word or goal, rather than "integration".
- The Tsilhqot'in language and the engagement of youth are two extremely important and powerful unifying factors which are central to the ongoing Xeni Gwet'in efforts to maintain a healthy socio-ecological system. These two factors (language and youth) are often left out of Western environmental planning documents because of cultural bias towards what are related topics. However, they emerged repeatedly from First Nations participants as central factors to be considered as a part of healthy community relationships with "the land".

As was discussed in Chapter 6, the new emergent understandings of the original study objectives and questions highlighted the ways in which the relationships between free-ranging horses, humans, and ecology are characterized by power relations, different ways of knowing, and the changing livelihood practices of local people. Thus, where the original questions focused on the management implications of factors such as vegetation communities, habitat use and population characteristics of the horses, the study wound its way through complex situations to the interplay between human livelihood practices and horse populations, the relative capacity and authority of political institutions and types of knowledge, and the role that horses play as one part of a cultural-ecological complex of the Xeni Gwet'in people. Factual and quantifiable information about the horses' habitat use, population characteristics, and forage use are of no less importance than these other issues. However, their role in influencing management preferences, and controversy pertaining to the free-ranging horses in the Chilcotin in general, appears to be secondary to the more complex socio-cultural and political motivations.

FREE-ROAMING HORSES IN A DYNAMIC SYSTEM

Horses in the study region are not only one piece or node in the social ecological network of relationships. They are also a part of the links in that system, functionally and structurally integrated into many of the other aspects of the social-cultural-ecological system. Traditionally, there has been some fluidity of interaction between wild horses and tame horses used by Tsilhqot'in people and other residents in the Chilcotin. The degree of interaction has varied temporally and spatially, with some bands of wild horses in the remote regions of the Brittany Triangle experiencing little if any interaction with humans, and other free-ranging horse bands in Nemiah Valley and near other communities

experiencing considerably more interaction with humans. As Tsilhqot'in communities experience social, economic and political change, so too does the role of horses in their relational network undergo change (the functional and structural role of horses in the network links), as do wild horse populations (the node) and their environmental impacts. The role of horses in the human-ecological system in that region has always been multi-faceted and dynamic. A changing role is not equivalent to obsolescence. The Xeni Gwet'in, in particular, still consider horses to be part of their healthy relationships with the land, and part of their strong cultural identity.

There is a layered irony to the iconic association of wild horses in the Brittany with landscape and ecological conservation efforts. At first glance, the horses symbolically represent the wild, free and beautiful aspects of the region, the frontier feel of the country, and the unique local relationships between cultures and natural landscape. There is an irony for many people that an introduced species (horses) would be used as an icon for the conservation of wilderness values and natural landscapes. Yet there is an additional level of meaning. The symbolic association of wild horses in the Brittany Triangle with conservation efforts might actually be fortuitous, as the role that the horses play in local culture, society and ecology makes their population numbers and overall health a partial indicator of the health of human-environment relationships in that region.

Free-roaming horses have an extremely visible and significant presence on the land and in the culture of the Chilcotin, and the Xeni Gwet'in people. While horses do not constitute a biological or a cultural keystone species, their presence and role in socio-cultural-ecological relationships in the region do present a unique opportunity to trace, highlight, and better understand those relationships. To be effective and culturally appropriate, any attempts at managing wild horse populations, or other land use decisions in the region must address not only the animal populations, but also the relationships between people, horses and landscape. This exploration of the roles and relationships pertaining to free-ranging horses also highlights the ways in which the local ecosystem is a part of a complex socio-ecological system.

Horses are one example of how local knowledge is related to livelihoods. The case study of free-roaming horses in the Brittany Triangle and Nemiah Valley indicates that changes in people's livelihoods affect not only their *use* of horses, but also the animal populations themselves in terms of numbers, physiology, behavioural adaptation, among other traits. The horses also illustrate or highlight the differences in attitudes, perspectives that people hold towards other people, animals, wildlife, and nature.

In an area where horses remain the most pragmatic, culturally appropriate and least environmentally impactful form of transportation in the bush where there are no roads (aside from walking), they remain strongly related to the ongoing practice of livelihoods activities, and maintenance of local knowledge by First Nations and local people. Since large areas of land in the study region and the traditional territory of the Tsilhqot'in people are not accessible by roads, and excessive use of All Terrain Vehicles contributes to ecological damage and fragmentation, horses represent an important form of transportation and access to backcountry areas. Xeni Gwet'in participants made it clear that formerly wild horses are preferred as saddle and pack animals for travel in the study region. The practice of chasing, capturing and even training those horses keeps local people out on the land, aware of not only the health and characteristics of the horse populations, but also of other landscape elements and wildlife. In turn, working and interacting with those horses facilitates continued relationships between people and the land, the maintenance of experiential knowledge, traditional hunting practices and livelihoods activities, and people's awareness of the health and behavior of wildlife and ecosystems (aka ecosystem monitoring). Attending to management issues and controversy over free-roaming horses as a part of these relationships and activities will help to focus energy and resources on the health and functional relationships of the socio-ecological system, the important relationships between local people and the land.

Agency of the Land and Horses

One major point that emerged from this study was that the issues of uneven power relations and ways of knowing are not only about who gets to make decisions over human use of land and resources, but also about the role that the land itself, and the animals that live on it, will play in those decisions and how they will be represented. Places, the land and animals are co-participants in the ongoing relationship between people and the environments in which they dwell, not just passive backdrops to be acted upon.

First Nations key informants in this study were adept at engaging in dialogue using the common terms and language of non-aboriginal resource management professionals. Yet from the time that I spent with local community members in a variety of settings, a richer understanding of the relationship between people and place emerged. Through quiet conversation, observing people's actions, listening not only to the content of stories that people told to me but also to how and when they were told, and through time spent on the land, interacting with wildlife, I began to understand that to many Xeni Gwet'in and some other people in Nemiah Valley, the land is understood implicitly to be a participant, an actor, and

an active presence in the social-ecological system. Rather than simply being a set of resources or even ecosystem elements that are acted upon and managed by people, the land and wild animals are also parties to be considered in decisions about how people will use and interact with the flora and fauna of the land, and they have agency in those relationships. People's understanding of the land's perspective, and that of other animals, comes from direct personal experience, observation of animals, weather systems, and the land, and knowledge passed through the community by shared experiences and stories. These experiences and observations are filtered or interpreted through teaching by elders, through place names and the Tsilhqot'in language, and through cultural codes of conduct. Scientific knowledge is accepted for the insights and information that it can provide, but it is local people's knowledge of their culture, identity, and the land that guide the understanding and interpretation of information. Beyond the knowledge that people hold about the land and animals, those parts of the system are actors with agency in the ongoing interactions with people. While management from a Western perspective is often considered to be a one-way flow of action by people upon other system elements, this research suggests that in Nemiah Valley, the land itself and the horses are part of a two-way interaction with people and that any stewardship or management actions take place as part of that two-way flow.

With regard to wild horses in the Brittany Triangle and Nemiah Valley, this underlying perception of the agency and role of wild animals characterizes the perspectives of many Xeni Gwet'in people and some other locals in ways that are often not explicitly stated. The horses and other wildlife were talked about as "non-human persons" (Ingold, 2000) who make their own decisions, have their own agency, and rely on many of the same plant and water resources as cattle, people and other wildlife. The issue of whether they should or should not be on the land was a moot point, and largely irrelevant. They are there. The issues related to horses that emerged as more important from conversations with First Nations participants related to how well different bands of horses knew and understood the landscape and available forage, their strength and stamina, the characteristics that they held (physiological and behavioural), and stories of their interactions with people in different situations. The fundamental goal that many First Nations participants attempted to convey might better be understood as co-existence, rather than management. What is sometimes difficult for a Western audience to understand is that the idea of co-existence and respect for horses does not necessarily exclude the chasing, capture, and use of them, nor even occasionally shooting some for population control, as necessary. However, these actions are based in a fundamentally different understanding of the relationship between people and wild horses than the understanding that underlies management by agencies and individuals from different cultural perspectives.

By this way of understanding the situation, humans may co-manage the horses with the animals themselves, and the land (which exerts its own influence), as active agents in the process. People may interact with wild horses to meet their own needs, "tweak" the horses' populations and access to resources as necessary to keep the socio-ecological system functioning well, while respecting the active involvement and autonomy of the other members in the system. There is geographical and political space in the Chilcotin for the Xeni Gwet'in to develop an explicit model of maintaining and stewarding human-horse-land relationships based in this way of co-existing and co-managing with other elements of the natural system where each participant has a recognized form of agency. Such a form of human-animal-land co-management would be similar to the traditional informal management actions that have already characterized these relationships in the past. However, it would need to be more explicit and deliberate in order to adapt to current and future conditions – a hybrid system informed by tradition and current knowledge yet based in local ways of knowing and cultural identity. This idea has implications for the inclusion of diverse knowledge, knowers and ways of knowing in management practice and decisions: since horses and the land don't communicate in written or verbal form, the only way to access their "voices" is through the sort of experiential, non-verbal and grounded ways of knowing that have been discussed above as part of locally credible knowledge.

Wild Horses and Local Knowledge

In Chapter 5, the characteristics of free-roaming horses in the Brittany, Nemiah Valley, and other parts of the Chilcotin, which are valued by local people were described. Many of these characteristics (e.g. knowing what to eat in the bush, sure-footedness and knowledge of the local landscape, reacting intelligently to wildlife and other dangers, etc.) are a form of local knowledge and practice of the horses, themselves. The Xeni Gwet'in and Tsilhqot'in culture implicitly recognizes, values and identifies with this equine local knowledge, and many non-aboriginal people who live in the same area do the same. There is a commonality of skills and knowledge needed to survive, function and thrive in the local landscape which allows some local people to recognize and value the local knowledge of wild horses.

This study has shown that many local people in Nemiah Valley and surrounding areas recognize the valuable local knowledge of free-ranging horses in the Brittany Triangle and beyond, and give credit to the horses' agency in decisions about territorial range and movement, forage and grazing distribution, population dynamics, and interactions with other ecosystem elements and wildlife. This perspective is concistent with Juliet Clutton-Brock's characterization of animals as having culture, in the sense that

specific groups share behaviours and knowledge that are passed down from elder generations, and which assist them in their social and environmental adaptation (Clutton-Brock 1994). In this sense, the wild horses of the Brittany Triangle have adapted to the place, developing a local culture and local knowledge, both of which give them qualities that are valued, respected, and understood within the local culture and way of knowing of the Xeni Gwet'in people. While these perspectives are not likely shared by all Xeni Gwet'in people, they were expressed consistently by participants in this study who have local, experiential knowledge of the wild horses in the Brittany Triangle

Summary of Ecological Implications

This research clearly indicates that the impacts of free-roaming horses in the Brittany Triangle, and in the larger area of the Chilcotin, are heterogeneous on the landscape. Thus the results of any study assessing horse impacts on ecosystems, range, or wildlife will vary, depending on the specific areas studied, and circumstances under which the research was conducted. Quantitative and qualitative data from the research for this dissertation do not indicate a crisis or a significant ecological problem resulting from free-roaming horses in the area of Brittany Triangle studied. There is no immediate evidence of need for management intervention in horse populations in the Brittany Triangle. Evidence of overgrazing was observed, but not measured, in other regions of the Chilcotin outside of the study sample sites, particularly those which are drier ecosystems, and under cumulative impact from grazing by cattle and horses. However, any government resources that are allocated towards maintaining or restoring ecosystem health in the Brittany Triangle would be better spent on the rehabilitation or restoration of machine guards and staging areas cleared as part of the fire-fighting efforts for wildfires in 2003 and 2009, in order to restore ecological continuity and reduce fragmentation and motorized access.

As livelihood and social changes reduce the interactions between people and horses, the number of free-roaming horses removed from the land through human interventions may lessen. In that case, the role of predators, especially wolves and cougars, in population control of free-roaming horses will become increasingly important. Another major limiting factor in local wild horse populations is likely the harsh climate and cold winters of the Chilcotin. The extent and effects of climate change in the region are as yet unknown. Milder winters and changed precipitation patterns could have varied effects on horse populations, available energy stores and requirements for the winter, and availability of forage. Once again, the importance of predators as a natural population control on free-roaming wild horses is of vital importance as climate change has unpredictable effects on population dynamics. Although the Brittany Triangle is a protected area, the historic and current provincial policy of severely

reducing or eliminating wolf populations is counter-productive to the maintenance of wild horse populations. Management interventions that severely reduce wolf populations in and around the Brittany Triangle may have the unintended side-effect of creating a sharp rise in horse populations, which could lead to problematic ecological impacts in areas where horses are not currently a problem (such as the study area) and could potentially exacerbate horse impacts in areas where overgrazing is already a concern.

My experience with the research and analysis for this study lead me to reflect that horses in the Brittany Triangle study area are one of many ecosystem drivers, and although a very visible presence (dung, tracks, trails), they are not necessarily a dominant ecological driver. The effects of fire, climate, precipitation, and human disturbances such as machine guards and staging areas from fighting fires had far greater and more immediate effects on the landscape, wildlife habitat and vegetation. Any policy or management approach to dealing with free-roaming horses, including those concerned with wildlife, land use or conservation in the area should take these cumulative and systemic effects of multiple ecosystem disturbances and drivers into account, rather than attempting to focus on the manipulation of a single species (e.g. horses).

Summary of Social and Research Implications

Wild horses call attention to the power dynamics and assumptions that have been woven throughout the history of land use and controversy in the Chilcotin. They also help to illuminate some inherent assumptions and power dynamics in conventional approaches to management and planning, cultural differences in how wild nature is perceived, and the role of humans in areas labeled as preserves or protected.

Horses are part of a social-ecological milieu in the Brittany Triangle and the nearby Nemiah Valley. They play a role in the links among many other parts of the system: people, economy, culture, the land, livelihoods, spirituality, meaningful symbolism. Horses are part of the place. The issue of whether free-ranging horses *ought* to be there is a matter of human social cultural values, not ecology. I believe it is a waste of time to argue about that particular point, particularly given the history of colonial and post-colonial power relations that have tied that debate to attempts at repressing the Tsilhqot'in people. More important to focus on are questions about how to maintain the health of a whole socio-ecological system in that region, as local people and communities go through a time of rapid economic, social and cultural change.

The culture of the region, and of the Xeni Gwet'in in particular, has involved knowledge and practices that essentially have formed a system of informal adaptive management. A useful focus for future research, and for Xeni Gwet'in community leadership, will be to identify and cultivate key aspects of the relationship between local people and the land that contribute to socio-ecological resilience, integrity and health, strengthening and translating them into forms (e.g. practices, policies, programs) that work in current and future socio-political and ecological contexts. Work in this direction will foster a form of community development that is rooted or embedded in local culture, yet flexible and adaptive.

This research suggests that in some cases, partial rather than a full integration of diverse ways of knowing is the most desirable and appropriate approach to determining and achieving management and planning goals. Not all aspects of different knowledge systems, cultural practices and ways of knowing can be integrated together without losing some of their integrity, richness and contextual wisdom. Management and planning practices related to land use, conservation and wildlife may be best influenced, informed or improved by alternative ways of knowing that are at times conveyed or practiced in their own contexts, without being fully translated into a conventional Western framework. In order for that to happen, planning and management processes must be flexible enough to adapt to localized situations and alternate forms of learning and knowing. Such meaningful inclusion can be implemented partly by including knowledge holders who can credibly apply their own ways of knowing in management situations (discussed below in the Recommendations section), and by including the use of narrative in planning and management processes and documents.

The free-roaming horses of the Chilcotin and the Brittany Triangle represent one set of issues that illustrate the complexity and layers of meaning and experience that characterize many wildlife and conservation management challenges that are social and ecological in nature. The use of narrative in research planning processes and documents can help to convey such complexity. Narrative, whether spoken during meetings and planning exercises, or documented as in this dissertation, helps to communicate the depth and richness of human experience and knowledge, thus elucidating what motivates people, what influences their values and politics, and ultimately what factors affect the success or failure of policy and management decisions. A narrative approach can help to identify and explain the complex factors that fuel conflict and controversy over land use and wildlife management decisions in a way that conventional Western approaches to wildlife management science do not.

Management planning and practice in British Columbia and throughout Canada would be strengthened by an increased use of narrative as part of a transdisciplinary approach to research, and a transactive approach to planning. The true integration and inclusion of local knowledge and diverse ways of knowing into management and planning are not simple exercises in supplementation within the existing epistemological framework. To include diverse voices, those voices must be able to speak as directly as possible in the fora that inform policy development, governance, and management practice. A narrative approach to not only research, but also management and planning, would be one means of truly involving diverse voices and agents in the co-creation of knowledge and in decision-making. Including narrative within management and planning processes and practices would strengthen the ability of managers and planners to inform good policy, and to deal with situations of conflict and controversy.

Summary of Management Implications

This research suggests that in some circumstances, a well-functioning social ecological system can mean that local livelihoods maintain horse populations without the need for formal management intervention. The fact that livelihood practices have functioned effectively as a form of informal management of horses in the Brittany Triangle indicate that there may not be a need for formal, authoritative management interventions if local culture and livelihood practices can be fostered through economic and community development. The adaptable livelihoods and cultural identity of the Xeni Gwet'in people are the basis for a deliberately informal relationship with free-roaming horses in the Brittany Triangle that has functioned well for many years, and that requires less formal investment of money, time and resources from government agencies than conventional Western approaches to management. By cultivating this cultural caretaker model local leaders can develop a culturally-appropriate governance model in which community livelihoods, culture, and land use management remain inherently linked as part of a resilient social ecological system that can continue to adapt to the forces of social and environmental change.

The Xeni Gwet'in culture and perspectives on free-roaming horses discussed within this study bring forth the implicit understanding and recognition that horses, other wildlife, and the land itself are active, dynamic participants in the relationship that local people have with their dwelt environment. In that way the horses, animals, and the land have agency as participants in the livelihoods activities, cultural identity, and processes of interaction that constitute management in practice in the Brittany Triangle and Nemiah Valley. Recognizing the agency of animals and the land challenges some of the taboos that exist in prevailing conventional approaches to management within Western cultures and

governance frameworks, by introducing non-human persons and the land itself as active agents in management. Such agency pushes at the intersection between indigenous approaches to stewardship and conventional management practice, by suggesting an alternate set of underlying assumptions that would have people managing *with* horses, wildlife and the land, rather than the human management *of* other populations. Future research is necessary to explore the implications of this concept within the context of applied land use and wildlife management practice.

This study proposes one approach to management and stewardship that is rooted in indigenous cultural perspectives, particularly the Xeni Gwet'in model of a cultural identity as caretakers. This approach to land use planning and management considers humans in a relationship of co-existence *with* horses and other non-human persons, rather than humans acting upon passive animal populations and landscapes. The traditions of oral exchange and stories in Xeni Gwet'in, Tsilhqot'in and many indigenous cultures are a means of giving voice to those non-human agents in human-environment relationship that do not speak directly around the meeting table. Thus incorporating narrative more directly into management and planning practice and documents is an important method for giving voice to non-human persons and the land itself.

Narrative representation, oral traditions and other such indigenous ways of knowing do warrant careful consideration of credibility and validity within their own epistemological and cultural frameworks. For that reason, this dissertation emphasizes the importance of involving knowers (knowledge holders) who have the wisdom to properly consider and apply their own ways of knowing in management contexts, and the collective sense of responsibility that the Xeni Gwet'in and many indigenous cultures attach to land rights. In the Xeni Gwet'in caretaker approach to stewardship and management, the wise application of knowledge and understanding are interwoven with a moral responsibility among managers to the land, animals, and people with whom they are working, and with recognition of agency among those land and animals in management through careful observation. These qualities already underlie the approach of some Xeni Gwet'in leaders towards the management of their own lands, but could be more explicitly incorporated into a culturally-rooted management framework. In sum, indigenous perspectives and ways of knowing can contribute to conventional Western approaches to management and planning through the recognition of non-human agency, the use of narrative and the involvement of knowledge holders.

RECOMMENDATIONS

Various recommendations emerged from this study, ranging in scope from specific actions and approaches that could be taken by practitioners and agencies responsible for land use decisions, to methodological recommendations for future researchers. These recommendations apply to a variety of audiences, including but not limited to provincial and regional government agencies, First Nations governments and communities, NGOs, private businesses and landowners, researchers, and individuals whose actions affect and are affected by free-ranging horses in the Brittany Triangle and Nemiah Valley. It is hoped that the thesis results and recommendations will be of some interest and benefit, especially to the Xeni Gwet'in First Nation Government (particularly in their dealings with other governance agencies), other governments of the Tsilhqot'in First Nations, community members in Nemiah Valley, and provincial government departments concerned with free-roaming horses, land use, and wildlife in the Chilcotin. There are four general recommendations discussed here, to guide planning and management in areas with indigenous or remote communities that are dealing with wildlife or free-ranging horse populations, and areas where cultures and livelihoods are connected to land use controversy.

First, given the whole social ecological system in the study region, and the role of horses within it, an effective approach to planning and management is to identify key relationships among horse populations, ecological systems, local cultures and socio-ecological change. Then one can ask: what are the elements of local cultural and livelihood practices, and local knowledge that help to maintain horse populations as part of a healthy system? The Xeni Gwet'in cultural identity as caretakers of their territory values healthy ecosystems as part of a healthy community, by definition. Thus, community development and healthy ecological systems are complementary goals that are mutually defining. The existing system and traditional practices can form the foundation for an adaptive indigenous stewardship model. Rather than simply looking to conventional management actions focused entirely on the horse populations, it is preferable for the Xeni Gwet'in to identify and strengthen the elements of their existing culture and livelihoods that help to maintain appropriate numbers and desired characteristics in local wild horse populations. Once these core elements are established, clear roles can be identified for other agencies (MFR, MOE, researchers, ranchers, NGOs and community development initiatives) as extensions and supports for the stewardship model.

Second, as societal and technological changes make horses less central to transportation and economic activities in the Nemiah Valley, there is a need for the local community to explicitly identify which skills and interactions with wild horses they wish to maintain and foster among youth. Numerous

community initiatives already exist that introduce youth to their land and cultural roots through positive interactions with horses, including summer youth programs, gymkhanas, horsemanship and barrel-racing workshops, community backcountry trail rides and wagon trips, the Mountain Race at the annual rodeo, and a youth training component to the Wild Horse Ranger position, among others. If the current informal system of relationships by which the Xeni Gwet'in and residents of Nemiah Valley maintain healthy wild horse populations are to remain viable and effective, it will be important to continue these programs. Further, it will be important to ensure that youth also learn how to capture wild horses in the bush, make good choices about culling and selective breeding, and train wild horses once caught.

Third, this study indicates that outside of the Brittany Triangle there is no clear reference state in the Chilcotin for free-roaming horse population numbers, or rate of increase. The number of horses introduced or turned loose on the landscape, and the number removed from the landscape have fluctuated significantly over the last 150 years. Consequently, there is little precedent or empirical data available to indicate how free-roaming horse populations may change over time in the absence of round-ups and culls. Horse populations will inevitably be influenced by many factors, as discussed in Chapter 6. Given current indicators of range and ecosystem health in areas of the study region outside of the Brittany Triangle, there is some indication of ecosystem degradation, particularly in semi-arid grassland areas that are grazed by both cattle and horses. The qualitative research for this study indicates that some management or stewardship actions will likely be warranted to maintain or restore ecosystem integrity and forage viability in these areas. However, those areas are beyond the geographical area of the quantitative data for this study, and consequently it is not within the scope of the study to make definitive recommendations about management interventions in those areas.

Fourth, in parts of the Chilcotin outside of the Brittany Triangle under management by provincial government agencies, research results lead to the conclusion that if land is degraded, managers need to question not only horse numbers, but also the number of cattle permitted to be on the range (allowable AUMs), the management and movement of cattle (i.e. terms of range licenses) on paper and in practice, and the effects of logging and other land uses on available forage over time. If range health is to be a priority for land management agencies, then the allocation of AUMs for cattle must allow for the estimated number and forage use by free-ranging horses, and for the impact of drought on vegetation growth in some years. Clearly, such a suggestion is not easy to implement in a system where ranchers already face difficult economic conditions. However, the capacity of the natural resource base to compensate for economic market pressures on a ranching industry plagued by low prices for cattle is limited. Range and cattle management that is responsive to ecological and economic conditions is

already practiced by some ranchers and landowners. The precedent exists in British Columbia and elsewhere. Results of this study indicate that policy, enforcement, and incentives by provincial agencies could be improved by a more systemic and precautionary approach. For example, range improvement subsidies and employment programs could be used to encourage people and riders on the land, close tending of cattle and holistic range management practices, rather than focusing on infrastructure and fence-building.

Specific Recommendations

Since this study has found that various human practices such as chasing, capturing and culling wild horse populations have influenced the population dynamics of free-roaming horses that are currently found in the Brittany Triangle, there are eleven recommendations to be made regarding the future stewardship and interactions with those sub-populations of horses.

Recommendation 1: Maintain and restore existing, culturally appropriate factors that contribute to limits on the Brittany Triangle horse population as part of a healthy social ecological system, including periodic human capture by Tsilhqot'in people for their own use, and natural predation by wildlife.

a) *Maintain or build a healthy predator population (i.e. wolves, cougars and bears) in and around the Brittany Triangle.*

b) *Cultivate local livelihood activities and skills for chasing, capturing and training wild horses as part of community development and youth training, particularly in Nemiah Valley.*

Applies to: Xeni Gwet'in First Nation Government; Conservation initiatives and NGOs; provincial government agencies.

This study of vegetation and plant communities in the grazing habitat of free-roaming horses in the Brittany Triangle does not indicate an ecologically significant level of disturbance, enough to warrant management intervention in Brittany horse populations at this time. However, just as there is a long history of human interaction with wild horse populations in the Brittany Triangle (somewhat limited) and Nemiah Valley (more frequent), so there will likely be the cultural and ecological need for future interactions. Horse populations in the Brittany Triangle are likely maintained within an acceptable range of fluctuation in numbers by a combination of climate, human removal, and predation. The effects of climate change are unpredictable and beyond human control. The other two factors are manipulated by human decisions.

If human management intervention is to be kept at a minimum in the Brittany Triangle, then the role of predators in horse mortality is essential. Wolves and cougars may be particularly important to preventing excessive population increase among the horses in the Brittany Triangle. Local populations of these two predator species, in particular should be maintained at viable levels to retain predation on horses.

It is recommended that horse chasing, capture and round-ups in the future be undertaken and overseen by the Xeni Gwet'in First Nation and that individuals engaging in those activities be responsible to the Xeni Gwet'in. This recommendation in no way suggests the continuation of provincial government initiatives to round-up or cull wild horses populations in the Brittany Triangle, though provincial government ministries may play a supporting role to First Nations initiatives where the Xeni Gwet'in deem it to be appropriate.

> *Recommendation 2: Define geographical zones for stewardship and management decisions based on ecosystem characteristics, political and cultural boundaries, human communities, and horse sub-populations.*

Applies to: XGFNG; provincial ministries.

The Brittany Triangle is one such zone, and management concerning horses in that area should be considered distinctly from some other regions with different micro-climates, shared grazing with cattle, and different sub-populations of free-roaming horses. Since this recommendation does not warrant any particular investment of resources, and could help to strategically focus those resources that are devoted to addressing concerns about the ecological impacts of free-roaming horses, it is entirely feasible for all agencies to address in the short term. While provincial government agencies and First Nations governments already effectively speak and plan their monitoring and intervention activities with specific reference to geographical areas, and aerial count units, there is currently inconsistency and discrepancy in how these geographical regions are divided, and little evidence in provincial government documentation of horse populations being considered differently for management between distinct zones.

> *Recommendation 3: Focus management and stewardship actions and decisions around systemic indicators of ecosystem integrity and system-level response, rather than a segmented approach focused on the manipulation of individual species.*

Applies to: Provincial ministries; ranchers and range managers; XGFNG; environmental NGOs.

Best practices and an integrated approach to range management would see provincial range managers and foresters working with ranchers and First Nations representatives to adapt and adjust grazing

tenures for open range lands and the availability of animal unit months (AUMs) – i.e. the number of cattle allowed on the range - in land surrounding Brittany Triangle to be responsive to drought conditions, and to the changing forage availability over time as a result of industrial resource use such as logging and mining activities. This recommendation, while consistent with current land use management theory, is somewhat challenging to enact, simply due to the institutional infrastructure and departmental specializations prevalent in the structure of provincial government departments. Hence while immediate in relevance, this recommendation is a long-term suggestion for provincial agencies. For the XGFNG and environmental NGOs, this recommendation is considerably more feasible, because the organizational structure of the XGFNG leadership (and the small size of localized NGOs) and their cultural attitudes both support an integrated and systemic approach to maintaining ecosystems and horse populations together.

Recommendation 4: Restore or renew the practice of using riders on the land to tend and move domestic cattle (and horses) more frequently, respond to yearly and seasonal fluctuations in range forage availability, and to monitor land use, wildlife and conditions.

Applies to: Ranchers and range managers; provincial agencies responsible for range management and range improvement subsidies; stockmen's associations; XGFNG.

Devote some range improvement funding and subsidies to hiring riders on contract, rather than focusing primarily on infrastructure and fence building. Revisit the range tenure and grazing license systems to identify opportunities for making grazing management practices that concern the frequency of cattle movement more responsive to changing conditions. This recommendation is technically feasible. The most likely challenges to implementation will be the social and cultural changes to desirable work culture, and possibly institutional barriers to the difficult, risky work of range riding being funded through official channels.

Recommendation 5: Cultivate stewardship and monitoring activities as part of the Xeni Gwet'in and Tsilhqot'in tradition of stewardship and caretaking, and support traditional as well as new activities that are part of that.

a) *Continue and develop Wild Horse Ranger position or similar program.*
b) *Support and develop existing livelihoods traditions and activities, cultural responsibility and identity, and skills as basics for monitoring and stewardship of free-roaming horses in the Brittany Triangle.*
c) *Engage youth in specific "caretaking activities" as part of employment skills training and education (e.g. hunting and ecosystem monitoring as complementary)*

d) *Support initiatives that engage youth learning with elders to learn traditional skills and speaking Tsilhqot'in language as part of local land use and stewardship*

e) *Develop opportunities to partner local youth with college and university kids to combine and bridge learning across cultures, based on land: field training for each.*

Applies to: XGFNG; FONV; future researchers.

Seek funding to expand the Wild Horse Ranger program to and formally include skills development and a youth training component. Coordinate the position with other mentorship and ecosystem monitoring activities in the region. Identify culturally appropriate ways for observations on the land through this activity to influence or inform decisions by the Xeni Gwet'in First Nation Government concerning land use, wildlife, and community development. This recommendation is highly feasible, as many of the resources and foundational practices to support it are already in place. They would simply need to be more explicitly and deliberately linked together by community leaders and supporting agencies. This recommendation would likely require that the funding for the Wild Horse Ranger position be diversified in terms of its source (currently the position is entirely dependent upon FONV to gain grant money) and in terms of its specified application (an expanded and enriched program may make it more eligible for funding through a wider array of sources).

Recommendation 6: Give explicit recognition and definitions of socio-cultural values and goals when establishing management objectives.

Applies to: Provincial Ministry of Forests, Lands and Resource Operations; Ministry of Environment; XGFNG; TNG.

While there is a general recognition among practitioners that decisions are made within political and social parameters, statements of social and cultural values often remain peripheral to land use planning and management reports and documents. In decision-making processes, professional foresters and range managers can often speak knowledgably about social and cultural influeces from their personal experience. Yet these insights may fail to be explicitly included in decision-making proceses, as many professionals with technical training exclude them as a form of bias or anecdotal reflection. The point of this recommendation is that bias, experience and cultural factors do influence decisions whether or not they are acknowledged. By explicitly incorporating social and cultural values and goals into planning and management processes, it becomes possible to make deliberate, inclusive decisions about the values that will be relflected in management and stewardship actions. Currently, the expression and consideration of the cultural values that inform decisions about land use, conservation and the management or stewardship of free-roaming horses vary between agencies. The Xeni Gwet'in First Nation Government and Tsilhqot'in National Governments currently express cultural values in relation

to stewardship decisions relatively explicitly. These agencies have the opportunity to continue to develop that practice as a form of integrated stewardship. While provincial ministries appear to recognize the influence of cultural and social values in land use decisions in principle, in practice the departmental specialization and capacity limitations tend to function as barriers to the true consideration of social and cultural values for their influence on technical decisions. For those agencies, this recommendation is more of a long-term change, though in the short term it can be begun by including discussion of social and cultural values as part of existing processes and documentation. The quality and depth of that discourse can be improved over time.

> *Recommendation 7: Develop the local economy in Nemiah Valley to seek flexible employment opportunities and increase localized wage earning capacity in ways that facilitate time spent on the land for traditional livelihood activities.*

Applies to: XGFNG; Province of British Columbia and relevant ministries; local business community. Facilitate economic, social and cultural activities that maintain and cultivate experiential knowledge, and hands-on learning. Cultivate opportunities to learn about new information and integrate them into local knowledge in traditional and culturally appropriate ways. Include Tsilhqot'in language use as part of decision-making processes and stewardship activities wherever possible. Encourage language projects as part of environmental monitoring and youth skills training. Consider local knowledge not only as information, but as processes, practices and actions to be maintained, renewed, and encouraged. This recommendation is a long-term suggestion. However, it has immediate relevance for the community development and ecosystem-based planning processes that are already underway in Nemiah Valley.

> *Recommendation 8: Recognize and include diverse knowledge and* ***people who hold that knowledge*** *in management decisions.*

Applies to: XGFNG; TNG; provincial ministries.

While the decision by the British Columbia Supreme Court (*Tsilhqot'in Nation v. British Columbia*, 2007, BCSC 1700) specifically mentions the rights of Xeni Gwet'in and Tsilhqot'in people to capture and use wild horses, it would still be most efficient for all governance agencies concerned with free-roaming horses to agree about who has decision-making authority concerning the horses in the Brittany Triangle and Nemiah Valley. This authority should rest squarely with the Xeni Gwet'in First Nation governments. As such, the role of other agencies (e.g. NGOs and provincial government ministries) is to provide decision-making support and additional information to the First Nations, and in doing so to supplement the capacity of local governments to access and interpret a diverse range of information

and knowledge. There is the potential for considerably more information sharing from provincial ministries, particularly the Ministry of Forests and Range and Ministry of Environment to First Nations, and between departments. In this regard, the role of provincial government departments relative to the Xeni Gwet'in stewardship of free-roaming horses would be that of a civil service in the literal sense of the term, as a service that provides information and resources to the best of its ability, to those agencies that hold decision-making authority within certain jurisdictions.

Within the XGFNG and TNG this recommendation could be carried out by maintaining the practice of involving diverse community members, leaders, and elders in the process of making decisions about land use management and wild horses, while also integrating input from people and professionals with experience and expertise from other ways of knowing about the horses. Outside of the geographical regions where by Tsilhqot'in governments hold jurisdiction over decisions about free-roaming horses, the provincial government agencies would need to increase the level of person-to-person interaction and knowledge-sharing with First Nations and other groups in various settings, with the genuine goal of developing a different approach to managing not only free-roaming hroses, but the ecological systems and natural resources in the habitats concerned. Precedents for this sort of decision-making do exist, for example, the study team that was convened in the early 1990s to determine the future of the Chilko Lake area was noted by some participants as a positive step (Chilko Lake Study Team, 1993).

> *Recommendation 9: Create a position in the Xeni Gwet'in specifically devoted to research liaison, to coordinate all research activities, inquiries and interview requests, including journalists and filmmakers.*

Applies to: XGFNG; FONV.

During the time that this study has taken place, there has been an increasing demand from outside researchers, journalists, authors, filmmakers, and other interested parties who wish to conduct interviews with community members and leaders in the Nemiah Valley. Xeni Gwet'in leaders generally welcome the publicity, networking and increased cultural understanding or support that results from such diverse interest by outsiders to the community. However, there is an increasing demand on a few people in leadership positions for their time and for interviews with them. In some cases, people researching similar or overlapping topics are simultaneously conducting field work and studies in the same region, interviewing the same people, without knowledge of each other, and with no opportunity to coordinate or streamline their research demands on local community members and Xeni Gwet'in leaders. The creation of a research liaison position within the Xeni Gwet'in First Nation Government would address a number of these issues, and would also help local leaders to establish and follow up on

their own rights and representation within the research conducted by other parties. Such a position would reduce redundancy by different researchers, manage protocols, manage the demand on community leaders and elders for interviews, define and coordinate research needs for the community, and facilitate the clear communication of research results to the Xeni Gwet'in Government. Some aspects of this role are already carried out informally by Friends of Nemaiah Valley. However, their role would be strengthened by a liaison within the Xeni Gwet'in Government.

> *Recommendation 10: Increase awareness among provincial government employees of the historic and local context of culture and power relations within which current resource and land use decisions are made.*

Applies to: BC provincial government employees and politicians (all ranks and professions). Despite the obviously limited capacity, funding and resources available to civil servants working within the provincial government, better resource management practices and relationships with First Nations governments require changes to the professional culture and individual understandings within provincial government agencies of the cultural and historical context within which resource management takes place.

From the level of individuals to the institution as a whole, it is imperative that provincial government employees be aware of the cultural and political history of power relations between the province of British Columbia and First Nations. Resource and range managers who suggest that they are engaging in partnerships and co-management arrangements with First Nations and indigenous communities must have the cultural awareness, training and institutional support to engage in such relationships in practice, and in person, not only on paper. This means that there must be a formal re-allocation of power and authority in decision-making, in this case with regard to free-roaming horses. Civil servants need the budget, available time, and the support from managers to make regular site visits to indigenous communities.

Cultural exchanges and education must become a part of the training required for all government employees in departments and field offices whose work affects First Nations land use and wildlife, including managers and technicians, so that they understand the cultural and political context within which they are operating. Such training alone is not sufficient to effect change in institutional culture or practice. However, similarly to gender sensitivity training, it may be one step towards a shift in the cultural norms among professional practitioners. First Nations representatives should be invited to participate in meetings previously considered internal, where decisions about range management, land

use and free-ranging horse or other wildlife populations are concerned. True co-management and bridging takes place through both informal and formal channels, and can only be effective with new standards for openness and transparency in the provincial agencies that oversee issues related to free-roaming horses in the Chilcotin.

This research suggests that the BC provincial government is afflicted across multiple scales by either ignorance of the historical context within which current decisions regarding free-roaming horses take place, or by a highly politicized working environment that makes it taboo for government employees to openly acknowledge that history. In some cases, individuals may not be required by provincial institutions to fully understand the historical and cultural context within which they are working. In other cases, individuals who do understand the history are hampered by institutional inertia and structural or procedural barriers as they attempt to effect change. Knowledge-sharing – even between government minsitries – is limited by lack of formal capacity, the politicization of knowledge, and an institutional fear of transparency. There are clearly some individuals working within the existing system of provincial government to bridge across cultural and institutional barriers, as well as geographical distances between government departments and First Nations governments. However, there remain a number of biases and barriers in professional culture, management procedures, and governance policy that serve to continue the power imbalances that have characterized conflict between First Nations and external authorities over free-roaming horses for over a century.

> *Recommendation 11: Create provincial policy to classify free-roaming horses in British Columbia.*

Applies to: BC provincial government.

In order for issues related to free-roaming horses to be addressed by provincial government agencies with transparency and accountability and a clear, consistent mandate, there must be a policy change to classify free-roaming horses within the province. Such a policy need not be a blanket classification. It could include a spectrum or variety of possible categories for free-roaming horses, to allow for a variety of situations, animal populations, and potential management actions. However, it is extremely difficult for any government agency to compile adequate information, monitor populations, or make consistent decisions without policy guidelines. Even in cases where jurisdiction of horse populations fall within First Nation territory and decision-making authority, such as in the Xeni Gwet'in territory, there is still a need for a clear provincial policy to guide provincial agencies, facilitate management decisions between governments across political and jurisdictional boundaries, and to increase transparency in decision-making.

FUTURE RESEARCH

A number of themes and suggested directions for further research emerged from this study, some specific to the location and situation in the case study, and others related to the topical areas of research.

Recommendations for Future Research

- Future studies of horse impacts within the Brittany Triangle should consider using British Columbia Range Assessment guidelines.[22]
- Predator-prey study of wolves (and cougar) in the Brittany Triangle and surrounding region, and their dietary relationship with horses.
- Mortality rates and causes for wild horses in the Brittany Triangle.
- Territorial range study of wild horses in the Brittany Triangle.
- Meta study to develop comprehensive data comparing the fluctuations of forage availability and cumulative effects of industrial forestry clearcuts, with population dynamics of wildlife and livestock over time in the Chilcotin.
- Work with the Xeni Gwet'in and community members in Nemiah to develop a program that integrates Tsilhqot'in language training and the traditional Caretaker role with youth skills development, and traditional learning with environmental monitoring of the horses and ecosystems. Such research would need to be driven by the Xeni Gwet'in, or at least structured and oriented around their existing initiatives and ways of learning.
- Explore further the ways in which local livelihoods and cultural traditions can form the foundations of a culturally appropriate approach to land use and wildlife planning and management; develop a framework for indigenous and remote communities to identify the specific aspects of their cultural roots that can serve as the basis for a deliberate approach to dealing with social and environmental change and decision-making.
- Develop the use of narrative in theoretical and applied contexts as a way of conveying and representing complexity in social ecological systems in planning and management frameworks related to land use, wildlife and/or natural resource management.

[22] Within, future studies with the Brittany Triangle could build upon the assessment methods in this research using grazing exclosures and dietary assessment from faecal analysis, horse population densities are not necessarily high enough to warrant such research.

Future Research with Xeni Gwet'in and other First Nations Peoples

A point of emphasis emergent from this research is that there are some important considerations not only for topics of future research, but for *how* future research is to be approached and conducted, within the Nemiah Valley, Tsilhqot'in communities, and in other similar situations elsewhere. Prospective researchers who intend to deal with the Xeni Gwet'in First Nation, indeed any small community but especially First Nations communities, should consider their own research goals in light of contextual factors in their community of focus. With social research involving human participants, researchers should consider a number of issues when designing the research goals and methodology:

- the total amount of research and interview pressure on the community;
- the capacity (not simply willingness) of key informants and community spokes-people to participate in interviews or other forms of social research;
- research redundancy, overlap or duplication by students, scholars, journalists, and other parties (e.g. legal teams, documentary film-makers) who may all be separately seeking information on similar topics from the same community over a number of years;
- the historical legacy, cultural implications, and power relations pertaining to "outsiders" seeking local or indigenous knowledge;

Research initiatives that involve fieldwork on the traditional lands of indigenous people should also consider whether their research design and methodology is respectful of and consistent with the land use practices, principles and ethics of the First Nation:

- consider practical and spiritual taboos or behavioural codes regarding animal and/or plant species of interest;
- design study areas with sensitivity to places of cultural significance;
- ensure that transportation and methods of accessing remote study sites are approved by local governments and/or communities;
- ensure that local First Nations communities or governments are aware of and accepting of any sampling methods that require removal of plant or animal matter.

In all cases, a research protocol can be an important way to establish a dialogue, develop trust and reach agreement on the factors listed above, as well as the issue of how research results will be used. In communities where research protocols are not mandatory, they may still be important and valuable as voluntary agreements

RESEARCH CONTRIBUTIONS

The relationships that I have begun to develop with the Tsilhqot'in people, people of Nemiah Valley, and numerous others who have been involved in this research, benefit me greatly in both a professional and a personal sense. The generosity of the many people who are associated with this research has humbled me, and their contributions to this research process will likely far outweigh any reciprocal contribution that the thesis could make to them in return.

This study serves as a contribution to several communities: to the academic community; to the community of people, agencies and animals concerned with the Brittany Triangle and the study region around it; and to practitioners and others concerned with similar issues of wildlife, conservation and land use planning, and indigenous ways of knowing. Several of the conclusions and recommendations regarding management interventions (or lack thereof) and stewardship actions pertain directly to the sub-population of horses in the Brittany Triangle. However, the social, cultural, political and ecological system of which the Brittany Triangle is a part extends beyond the boundaries created by the Taseko and Chilko Rivers, and hence the social research for this study also pertains to a larger geographical area than just the Brittany Triangle. Beyond the immediate locale of the case study, recommendations from this thesis are intended to contribute to the literature, discourse, and practitioners concerned with the integration of indigenous peoples, their ways of knowing and local knowledge into land use and wildlife management. The dissertation and recommendations also have relevance to scholars and practitioners who deal with free-ranging horses and other controversial, charismatic species in contested landscapes throughout Canada and beyond.

Scholarly and Theoretical Contributions

Currently, there is little scholarly research on free-ranging horses in Canada, despite the fact that the ecological, socio-cultural, and political circumstances of such horse populations in Canada distinguish them from similar populations in other locations around the globe, and that in many cases the horses have a significant regional impact, ecologically and/or culturally. This study is one of very few up-to-date academic research studies of free-ranging horses in Canada, and of the active relationship between indigenous people and horses in British Columbia. It uses a case study to elucidate some of the epistemological and cultural assumptions that underlie management conflicts, and uses a variety of research methods to integrate different ways of knowing into the inquiry about the social, cultural and ecological role of free-roaming horses in the study region. This study provides an example of how socio-cultural information can enrich an understanding of the ecological impacts related to horses in wild ecosystems, and of the management implications of decisions related to the horses.

This study integrates fields of growing importance which are inherently related to Planning as a discipline: cross-cultural perspectives and ways of knowing in land use management and conservation planning; co-management; and the cultural ecology and implications of relationships between First Nations, wildlife and land use management for management of wildlife or livestock populations. It also contributes a place-based discussion of how a First Nations community relates to its environment as a dynamic adaptive process, and the ways in which local livelihood practices can interact with the ecology of local animal populations in an iterative manner. By examining some underlying assumptions about knowledge and power situations where different cultural groups are involved in managing controversial species and landscapes, this thesis contributes to the theoretical discourse of the Planning discipline.

Methodological Contributions

This research suggests an alternative to conventional approaches to integrating traditional ecological knowledge and Western science. It contributes to discourse and practice around indigenous stewardship and land use planning by suggesting that the role of the Xeni Gwet'in as caretakers within their own territory is a model that should be fostered not only as part of local identity, but also in *practice* as part of an indigenous approach to management. Part of that process, and a significant contribution of this thesis, is to push at the edges of disciplinary boundaries and management practice by suggesting that the free-roaming horses, other animals and the land itself have a form of agency in their ongoing interactions with people.

The use of narrative in this dissertation is a methodological contribution to research and practice in planning and management as they concern situations of cross-cultural conflict, and controversy over specific wildlife, resource or land use issues. The processes of direct social contact and listening that are required to record and understand narrative quotations can greatly enrich the understanding that researchers and practitioners have of alternate perspectives and ways of knowing, while also helping to build relationships between people who engage in the research. Narrative can efficiently convey layered, complex meanings and motivating factors that influence communities, individuals, and animal populations, and that ultimately affect the success or failure of management and planning exercises in practice. By providing deep insights and representations of culture, social issues and ecological knowledge, the use of narrative can strengthen management and planning documents.

Applied Contributions

This work contributes to a variety of local decision-makers and agencies dealing with land and resource use. The study provides a relatively comprehensive documentation of ecological and socio-cultural factors that influence and characterize the free-ranging horse population in the Brittany Triangle and surrounding areas of the Chilcotin. As such, it may help to bridge some existing gaps in information and perception, as well as barriers to communication between actors and agencies by providing a common baseline of information from a third party source. The fact that the thesis documents socio-cultural factors that influence the population and ecology of horses on lands where some controversy or contestation exists among First Nations, provincial government agencies and private interests may help First Nations governments to communicate local knowledge to managers from other regions in meetings or discussions that favour written documentation.

Equally important is the contribution of this study to similar situations throughout Canada and globally, where indigenous people continue to develop their own approaches and goals for interacting with their landscapes in a modern context, mediating between cultures and integrating different types of knowledge. This study concludes that the most effective inclusion and application of diverse ways of knowing in land and wildlife management practice may come from partial rather than full integration of different knowledge systems and cultural practices, and recommends that such inclusion be achieved partly by including diverse knowledge holders in the processes of management and planning. In doing so, it contributes a new challenge and way forward to researchers and practitioners.

THE LAST WORD

In the Brittany Triangle there are trails formed by wild horses that lead through dense bush, serving as pathways between meadows, lakes, freshwater springs, and sheltered spruce groves. If you follow a horse trail through that vast landscape, you can always be sure that you'll end up at one of those features. You won't wander aimlessly. But you might not end up where you set out to go. This research was like that. I entered a place that was new, determined to follow wild horses through a landscape rich with natural and human qualities. I embarked on the journey with a destination in mind, some definite research goals and questions. But over the course of five years of following those horses and walking their trails, I realized that they had other places to go, and I was being led in unanticipated directions. The research led me to new ideas, new disciplinary areas of inquiry, and ultimately to a revised mental map of research questions and issues, just as surely as those horse trails led me to new

meadows, surprise wildlife encounters, and a mental map of the landscape that is constantly under revision.

This research has been a personal learning experience in many ways. It has most certainly been a journey of academic discovery and maturation. Yet it has also involved many other forms of learning, from the practical and technical skills needed to carry out the research, to the deep experiences and insights that develop as part of the lived experiences of field work.

I learned the importance of approaching situations and people with the open mind, humility and willingness to learn of a *student*. Especially in regions with a history of conflict or entrenched biases, and when dealing with controversial issues, it is often less confrontational and more constructive to enter as someone who wishes to learn about the situation, rather than as an expert with advice to give. There are advantages to being an independent student from a distant university with no prior ties to the research area or subjects. People could not assume I had any particular biases, and had to base their judgments on my own conduct. It was easy to be an outsider, a third party to the ongoing disputes in the region. Yet the qualities of being a student that really turned out to be important are not a result of any particular affiliation. I was struck by the value of *listening* to people, being willing to let them explain how the world worked for them, and suspending my disbelief in favour of humble empathy in the moment. Full immersion. Experiential learning occurs when one is willing to let go of pre-conceived ideas and biases, and to be open to trying new things, entering new situations. There is time to filter and judge what was learned later on. But there is value for professionals at all levels in remembering how to enter a situation with the mindset and openness of a student, and it is a skill that I hope to retain.

“Bush learning” was as important to me as the “book learning” in this research. There were practical skills to learn in order to make the research happen: driving a 4x4 through the bush, backpacking and camping in bear country, wilderness survival skills, using a chainsaw, and essential skills like making good bannock on a woodstove! Then there was the deep learning that happens from time spent on the land. I quickly realized during my early visits to the field that it would take time to become “literate” on the land in the bush. It takes time to learn to read the weather, landscape, plants, tracks, animals and the air and water for the vital bits of information and insight that a person needs in order to get by in the bush. It helps to have a guide and teacher, and I benefitted from the best possible mentor.

Lastly (of the personal lessons learned that I will describe here – there were many more), I learned that in this case establishing respectful, authentic relationships with my host community, and conducting my research ethically was more important than the information gathered. Of course I made mistakes, but my hosts were invariably warm, forgiving, and open to teaching me. Study results and knowledge contributions are one benefit to academic research. But in an environment where research has too often served as a deliberate or accidental form of neo-colonialism, or sometimes just selfishness, there is an important contribution to be made to the relationship between academia and First Nations communities, in particular, through the *process* by which research is conducted, the behavior and intentions of the researcher. In other words, I learned to appreciate that a research contribution can be behaved, *in situ*, as much as it can be produced as the result of a study.

Rather than representing a conclusive end or completion, I hope that a contribution of this research is that it may be the beginning of a long-term and positive relationship between me the academic researcher, and the community in Nemiah Valley which hosted me. Academic inquiry has established the value of broad comparative studies across space and cultures. But equally insightful, deep learning and insights can be developed though longevity of relationships in socio-ecological research over time.

This research project has taught me – not only in principle but in practice, first-hand – the importance of experiential ways of knowing people, places and ecosystems. There are some experiential ways of knowing that will not and should not be translated into academic media. However, I have learned that just as academics can gain insight and understanding of people and culture through ethnographic inquiry and immersion, so too are there important lessons to be learned from an ethnography of the land: time spent dwelling *in* a place, listening to the insights of people who have dwelt there for a long period of time, attending to the land itself, and developing a sensitivity to the animals that live there year-round. I will never know the Brittany Triangle as well as the Xeni Gwet'in and some other local community members in and around Nemiah. Yet I learned that in the space of only a few years, what initially felt like "wilderness" and a remote cabin in a far, far meadow, could come to feel like home.

Figure 23: Far Meadow, 2009.

BIBLIOGRAPHY

Abrams, D. (1996). *The Spell of the Sensuous: Perception and Language in a More-Than-Human World*. New York: Vintage Books.

Abrams, J., Kelly, E., Shindler, B., & Wilton, J. (2005). Value orientation and forest management: The forest health debate. *Environmental Management, 36*(4), 495-505.

Adams, J. (2009). Parks and Protected Areas: Conserving Lands Across Administrative Boundaries. In R. L. Knight & C. White (Eds.), *Conservation for a New Generation: Redefining Natural Resources Management* (pp. 61-76). Washington: Island Press.

Agrawal, A. (2009). Forum: Why "indigenous" knowledge? *Journal of the Royal Society of New Zealand, 39*(4), 157-158.

Agrawal, A., & Chhatre, A. (2011). Against Mono-consequentialism: Multiple outcomes and their drivers in social-ecological systems. *Global Environmental Change, 21*, 1-3.

Agrawal, A., & Gibson, C. C. (1999). Enchantment and Disenchantment: The Role of Community in Natural Resource Conservation. *World Development, 27*(4), 629-649.

Ajzen, I., & Fishbein, M. (2005). The influence of attitudes on behaviour. In D. Albarracin, B. T. Johnson & M. P. Zanna (Eds.), *The Handbook of Attitudes* (pp. 173-221). Mahwah, NJ: Erlbaum.

Albrechts, L. (2003). Planning and power: towards an emancipatory planning approach. *Environment and Planning C-Government and Policy, 21*(6), 905-924.

Allaby, M. (Ed.) (2005). *Oxford Dictionary of Ecology, Third Edition*. Oxford: Oxford University Press.

Alphonse, J. (2009). Personal Communication. August 2009. Hanceville, BC.

Archer, M. (1971). Preliminary studies on the palatability of grasses, legumes and herbs to horses. *The Veterinary Record, 89*, 236-240.

Armitage, D. R. (2005). Collaborative environmental assessment in the Northwest Territories, Canada. *Environmental Impact Assessment Review, 25*(3), 239-258.

Atleo, E. R. (2004). *Tsawalk: A Nuu-chah-nulth Worldview*. Vancouver: UBC Press.

Babbie, E. (2004). *The Practice of Social Research, Tenth Edition*. Toronto: Thomson Wadsworth.

Badami, M. G. (2005). Transport and urban air pollution in India. *Environmental Management, 36*(2), 195-204.

Bai, Y. G., Broersma, K., Thompson, D., & Ross, T. J. (2004). Landscape-level dynamics of grassland-forest transitions in British Columbia. *Journal of Range Management, 57*(1), 66-75.

Baillargeon, M., & Tepper, L. (1998). *Legends of Our Times: Native Cowboy Life*. Vancouver / Seattle: Canadian Museum of Civilization, in association with UBC Press / University of Washington Press.

Ballard, H. L., Fernandez-Gimenez, M. E., & Sturtevant, V. E. (2008). Integration of Local Knowledge and Conventional Science: a Study of Seven Community-Based Forestry Organizations in the USA. *Ecology and Society, 13*(2). Online: http://www.ecologyandsociety.org/vol13/iss2/art37/

Balsiger, P. W. (2004). Supradisciplinary research practices: history, objectives and rationale. *Futures, 36*, 407-421.

Bandura, A. (1997). *Self-Efficacy: The Exercise of Control*. New York: W. H. Freeman and Company.

Barber, K. (Ed.) (2011) *The Canadian Oxford Dictionary*. Online: Oxford University Press. http://www.oxfordreference.com.proxy.lib.uwaterloo.ca/views/ENTRY.html?subview=Main&entry=t150.e46275

Barnes, S. H. (1986). *Politics and Culture*. Ann Arbor: Institute for Social Research.

Basso, K. H. (1996). *Wisdom Sits in Places: Landscape and Language Among the Western Apache*. Albuquerque: University of New Mexico Press.

Bastian, C. T., Van Tassell, L. W., Cotton, A. C., & Smith, M. A. (1999). Opportunity costs related to feral horses: a Wyoming case study. *Journal of Range Management, 52*(2), 104-112.

BC Communities.ca (2011). *City Profile, Williams Lake, BC Communities.ca* Retrieved October 29, 2011, from http://bccommunities.ca/Home/City%20Profiles/Cariboo%20Chilcotin/Williams%20Lake

Beatley, T. (2000). Preserving biodiversity - Challenges for planners. *Journal of the American Planning Association, 66*(1), 5-20.

Becker, C. D., & Ghimire, K. (2003). Synergy between traditional ecological knowledge and conservation science supports forest preservation in Ecuador. *Conservation Ecology, 8*(1).

Beever, E. A. (2003). Management implications of the ecology of free-roaming horses in semi-arid ecosystems of the western United States. *Wildlife Society Bulletin, 31*(3), 887-895.

Beever, E. A. (2008). Personal Communication. March 4, 2008.

Beever, E. A., & Brussard, P. F. (2000a). *Charismatic megafauna or exotic pest? Interactions between popular perceptions of feral horses (Equus Caballus) and their management and research.* Paper presented at the Vertebrate Pest Conference, University of California, Davis.

Beever, E. A., & Brussard, P. F. (2000b). Examining ecological consequences of feral horse grazing using exclosures. *Western North American Naturalist, 60*(3), 236-254.

Beever, E. A., & Brussard, P. F. (2004). Community- and landscape-level responses of reptiles and small mammals to feral-horse grazing in the Great Basin. *Journal of Arid Environments, 59*(2), 271-297.

Beever, E. A., & Herrick, J. E. (2006). Effects of feral horses in Great Basin landscapes on soil and ants: Direct and indirect mechanisms. *Journal of Arid Environments, 66*, 96-112.

Beever, E. A., Swihart, R. K., & Bestelmeyer, B. T. (2006). Linking the concept of scale to studies of biological diversity: evolving approaches and tools. *Diversity and Distributions, 12*, 229-235.

Beever, E. A., Tausch, R. J., & Thogmartin, W. E. (2008). Multi-scale responses of vegetation to removal of horse grazing from Great Basin (USA) mountain ranges. *Plant Ecology*. *196(2*), 163-184.

Belovsky, G. E. (1986). Generalist Herbivore Foraging and Its Role in Competitive Interactions. *American Zoologist, 26*(1), 51-69.

Bengston, D. N. (1994). Changing Forest Values and Ecosystem Management. *Society and Natural Resources, 7*, 515-533.

Berger, J. (1977). Organizational systems and dominance in feral horses in the Grand Canyon. *Behavioural Ecology and Sociobiology, 2*, 131-146.

Berger, J. (1985). Interspecific interactions and dominance among wild Great Basin ungulates. *Journal of Mammology, 66*(3), 571-573.

Berger, J. (1986). *Wild Horses of the Great Basin*. Chicago: University of Chicago Press.

Bergerud, A. T., & Elliot, J. P. (1986). Dynamics of caribou and wolves in northern British Columbia. *Canadian Journal of Zoology, 64*, 1515-1529.

Berkes, F. (1999). *Sacred Ecology: Traditional Ecological Knowledge and Resource Management*. Philadelphia: Taylor and Francis.

Berkes, F. (2004). Rethinking community-based conservation. *Conservation Biology, 18*(3), 621-630.

Berkes, F. (2008). *Sacred Ecology, Second Edition*. New York: Routledge.

Berkes, F. (2009). Indigenous Ways of Knowing and the Study of Environmental Change. *Journal of the Royal Society of New Zealand, 39*(4), 151-156.

Berkes, F., Colding, J., & Folke, C. (2000). Rediscovery of traditional ecological knowledge as adaptive management. *Ecological Applications, 10*(5), 1251-1262.

Berkes, F., & Turner, N. J. (2006). Knowledge, learning and the evolution of conservation practice for social-ecological system resilience. *Human Ecology, 34*(4), 479-494.

Bertolas, R. J. (1998). Cross-cultural environmental perception of wilderness. *Professional Geographer, 50*(1), 98-111.

Bhattacharyya, J., Slocombe, D.S., Murphy, S.D. (2011). The "Wild" or "Feral" Distraction: Effects of Cultural Understandings on Management Controversy Over Free-Ranging Horses (*Equus ferus caballus*). *Human Ecology 39*(5), 613-625.

Bhattacharyya, J., Baptiste, M., Setah, D. and William, R. (Forthcoming 2012). "It's Who We Are: Locating cultural strength in relationship with the land." In John Parkins and Maureen Reed

(Eds.) *The Social Transformation of Canada: New Insights into Community, Culture and Citizenship.* Vancouver: UBC Press.

Binkley, C. S. (1999). Ecosystem Management and Plantation Forestry: New Directions on British Columbia. *New Forests, 18*, 75-88.

Birchwater, S. (2004). Chiefs threaten to blockade hunters in the Chilcotin, *Williams Lake Tribune*. Retrieved from http://www.huntshoot.com/forums/f5/first-nations-road-blocks-cariboo-3373/

Bisson, P. A., Rieman, B. E., Luce, C., Hessburg, P. F., Lee, D. C., Kershner, J. L., . . . Gresswell, R. E. (2003). Fire and aquatic ecosystems of the western USA: current knowledge and key questions. *Forest Ecology and Management, 178*(1-2), 213-229.

Blackstock, M. D., & McAllister, R. (2004). First Nations perspectives on the grasslands of the interior of British Columbia. *Journal of Ecological Anthropology, 8*, 24-46.

Blake, D. E., Guppy, N., & Urmetzer, P. (1996). Being Green in BC: Public attitudes towards environmental issues. *BC Studies*(112), 41-61.

Bode, M., Probert, W., Turner, W. R., Wilson, K. A., & Venter, O. (2011). Conservation Planning with Multiple Organizations and Objectives. *Conservation Biology, 25*(2), 295-304.

Bolen, E. G., & Robinson, W. L. (1999). *Wildlife Ecology and Management* (Fourth Edition ed.). Upper Saddle River, NJ: Prentice Hall.

Bonner, V., Bliss, I. E., & Litterick, H. H. (1995). *Chilcotin: Preserving Pioneer Memories*. Surrey, BC: Heritage House Publishing Company Ltd.

Booth, A. L., & Skelton, N. W. (2011). "There's a Conflict Right There": Integrating Indigenous Community Values into Commercial Forestry in the Tl'azt'en First Nation. *Society and Natural Resources, 24*, 368-383.

Bouchard, E. A. (1971). *Memorandum - Attention: Grazing*. G.R.I. Horse Control North. (July 9, 1971). Ministry of Forests, British Columbia.

Boyd, L. (1998). The 24-h time budget of a takh harem stallion (*Equus ferus przewalskii*) pre- and post-reintroduction. *Applied Animal Behaviour Science, 60*(4), 291-299.

Boyles, J. S. (1986). Managing America's wild horses and burros. *Journal of Equine Veterinary Science, 6*, 261-265.

Brant Castellano, M. (2004). Ethics of Aboriginal Research. *Journal of Aboriginal Health*, 98-114.

Bratton, S. (1986). Genetics and Birth Control. *Park Science, 7*, 23.

Brechin, S. R., Wilhshusen, P. R., Fortwangler, C. L., & West, P. C. (Eds.). (2003). *Contested Nature: Promoting International Biodiversity Conservation with Social Justice in the Twnty-first Century*. New York: State University of New York Press.

Brews, P., & Devavrat, P. (2007). Strategic Planning in Unstable Environments. *Long Range Planning, 40*, 64-83.

Brody, H. (1981). *Maps and Dreams: Indians and the British Columbia Frontier*. Vancouver and Toronto: Douglas and McIntyre.

Brosius, J. P. (2006). What Counts as Local Knowledge in Global Environmental Assessments and Conventions? In W. V. Reid, F. Berkes, T. J. Wilbanks & D. Capistrano (Eds.), *Bridging Scales and Knowledge Systems: Concepts and Applications in Ecosystem Assessment* (pp. 129-144). Washington: Island Press.

Bührs, T. (2009). *Environmental Integration: Our Common Challenge*. Albany, NY: State University of New York Press.

Bull, J. R. (2010). Research with Aboriginal Peoples: Authentic Relationships as a Precursor to Ethical Research. *Journal of Empirical Research on Human Research Ethics, 5*(4), 13-22.

Cameron, E. Z., Linklater, W. L., Stafford, K. J., & Minot, E. O. (2003). Social grouping and maternal behaviour in feral horses (*Equus caballus*): the influence of males on maternal protectiveness. *Behavioral Ecology Sociobiology, 53*, 92-101.

Cameron, E. Z., Linklater, W. L., Stafford, K. J., & Veltman, C. J. (1999). Birth sex ratios relate to mare condition at conception in Kaimanawa horses. *Behavioral Ecology, 10*(5), 472-475.

Campbell, S., & Fainstein, S. S. (2003). *Readings in Planning Theory* (Second ed.). Malden, MA: Blackwell.

Card, K. (2010). *Assessing Stakeholder Interests: A Strategy for Best Management Practices of Free-Roaming Horses, Chilcotin, British Columbia.* Master of Natural Resource Management, University of Manitoba, Winnipeg.

Carlsson, L., & Berkes, F. (2005). Co-management: concepts and methodological implications. *Journal of Environmental Management, 75*(1), 65-76.

Carp, J. (2004). Wit, style, and substance - How planners shape public participation. *Journal of Planning Education and Research, 23*(3), 242-254.

Castleden, H., Garvin, T., & Nation, H.-a.-a. F. (2009). "Hishuk Tsawak" (Everything is One/Connected): A Huu-ay-aht Worldview for Seeing Forestry in British Columbia, Canada. *Society and Natural Resources, 22*(9), 789-804.

Castleden, H., Morgan, V. S., & Neimanis, A. (2010). Researchers' Perspectives on Collective/Community Co-Authorship in Community-Based Participatory Indigenous Research. *Journal of Empirical Research on Human Research Ethics, 5*(4), 23-32.

Caughley, G. (1974). Bias in Aerial Survey. *Journal of Wildlife Management, 38*(4), 921-933.

[CCEA] Canadian Environmental Assessment Agency. (2010a). *Considering Aboriginal Traditional Knowledge in Environmental Assessments Conducted under the Canadian Environmental Assessment Act -- Interim Principles*. Retrieved November 22, 2011, from http://www.ceaa.gc.ca/default.asp?lang=En&n=4A795E76-1

[CEAA] Canadian Environmental Assessment Agency. (2010b). *Report of the Federal Review Panel: Prosperity Gold-Copper Mine Project*. (CEAA Reference Number 09-05-44811). Ottawa: Canadian Environmental Assessment Agency.

Chambers, C. (2009). Mixing methodologies: the politics of research techniques. *Journal of the Royal Society of New Zealand, 39*(4), 197-199.

Chilko Lake Study Team. (1993). *Consensus Report of the Chilko Lake Study Team: Final Report*. Williams Lake. ISBN: 0-7726-1920-4.

Choi, Y. D. (2004). Theories for ecological restoration in changing environment: Toward 'futuristic' restoration. *Ecological Research, 19*(1), 75-81.

Clapp, R. A. (2004). Wilderness ethics and political ecology: remapping the Great Bear Rainforest. *Political Geography, 23*, 839-862.

Clark, D. A., & Slocombe, D. S. (2009). Respect for Grizzly Bears: an Aboriginal Approach for Co-existence and Resilience. [Research]. *Ecology and Society, 14*(1), 42.

Clayton, S., & Myers, G. (2009). *Conservation Psychology: Understanding and Promoting Human Care for Nature*. West Sussex, UK: Wiley-Blackwell.

Clewell, A., & Rieger, J. P. (1997). What practitioners need from restoration ecologists. *Restoration Ecology, 5*(4), 350-354.

Clutton-Brock, J. (1994). The Unnatural World: Behavioural aspects of humans and animals in the process of domestication. In A. Manning & J. Serpell (Eds.), *Animals and Human Society: Changing Perspectives* (pp. 23-35). New York: Routledge.

Coates, K. P., & Schemnitz, S. D. (1994). Habitat Use and Behavior of Male Mountain Sheep in Foraging Associations with Wild Horses. *Great Basin Naturalist, 54*(1), 86-90.

Cochran, P. A. L., Marshall, C. A., Garcia-Downing, C., Kendall, E., Cook, D., McCubbin, L., & Gover, R. M. S. (2008). Indigenous Ways of Knowing: Implications for Participatory Research and Community. *American Journal of Public Health, 98*(1), 22-27.

Colding, J., & Folke, C. (2001). Social Taboos: "Invisible" Systems of Local Resource Management and Biological Conservation. *Ecological Applications, 11*(2), 584-600.

Collins, J. (1995). Mange on the Range: The Chilcotin's wild horses are judged to be a nuisance, *British Columbia Report,* April 24, 1995. p. 42.

Cooke, B., & Kothari , U. (Eds.). (2001). *Participation: The New Tyranny?* New York: Zed Books.

Coughenour, M. B. (1991). Spatial components of plant-herbivore interactions in pastoral, ranching, and native ungulate ecosystems. *Journal of Range Management, 44*(6), 530-542.

Cowdrey, M., Martin, J., & Martin, N. (In-Press 2011). *Horses and Bridles of the American Indians*. Nicasio, California: Hawk Hill Press.

Crane, K. K., Smith, M. A., & Reynolds, D. (1997). Habitat selection patterns of feral horses in southcentral Wyoming. *Journal of Range Management, 50*(4), 374-380.

Crosby, A. W. (2004). *Ecological Imperialism: The Biological Expansion of Europe, 900-1900, 2nd Edition*. Cambridge: Cambridg University Press.

Cruikshank, J. (1997). Negotiating with narrative: Establishing cultural identity at the Yukon International Storytelling Festival. *American Anthropologist, 99*(1), 56-69.

Cruikshank, J. (1998). *The Social Life of Stories: Narrative and Knowledge in the Yukon Territory*. Vancouver: UBC Press.

Cruikshank, J. (2005). *Do Glaciers Listen? Local Knowledge, Colonial Encounters, and Social Imagination*. Vancouver: UBC Press.

Cullen, D., McGee, G. J. A., Gunton, T. I., & Day, J. C. (2010). Collaborative Planning in Complex Stakeholder Environments: An Evaluation of a Two-Tiered Collaborative Planning Model. *Society and Natural Resources, 23*, 332-350.

Cumming, G. S., Cumming, D. H. M., & Redman, C. L. (2006). Scale mismatches in social-ecological systems: Causes, consequences, and solutions. *Ecology and Society, 11*(1), [online].

Cundhill, G., & Fabricus, C. (2010). Monitoring the Governance Dimension of Natural Resource Co-management. *Ecology and Society, 15*(1), online.

Cunningham, C., & Berger, J. (1986). Wild horses of the Granite Range. *Natural History: the Journal of the American Museum, 95*(4), 32-39.

Darimont, C. T., Carlson, S. M., Kinnison, M. T., Paquet, P. C., Reimchen, T. E., & Wilmers, C. C. (2009). Human predators outpace other agents of trait change in the wild. *(PNAS) Proceedings of the National Academy of Sciences of the United States of America 106*(3), 952-954.

Darimont, C. T., Paquet, P. C., Reimchen, T. E., & Crichton, V. (2005). Range expansion by moose into coastal temperate rainforests of British Columbia, Canada. [Article]. *Diversity and Distributions, 11*(3), 235-239.

Davidson-Hunt, I. J., & Berkes, F. (2003). Nature and society through the lens of resilience: toward a human-in-ecosystem perspective. In F. Berkes, J. Colding & C. Folke (Eds.), *Navigating Socio-Ecological Systems: Building Resilience for Complexity and Change* (pp. 53-82). Cambridge: Cambridge University Press.

Davis, W. (2009). *The Wayfinders: Why Ancient Wisdom Matters in the Modern World*. Toronto, ON: House of Anansi Press Inc.

Dayer, A. A., Stinchfield, H., & Manfredo, M. J. (2007). Stories about wildlife: Developing an instrument for identifying wildlife value orientations cross-culturally. *Human Dimensions of Wildlife, 12*(5), 307-315.

de Neufville, J. I. (1983). Planning Theory and Practice: Bridging the Gap. *Journal of Planning Education and Research, 3*(1), 35-45.

De Stoppelaire, G. H., Gillespie, T. W., Brock, J. C., & Tobin, G. A. (2004). Use of remote sensing techniques to determine the effects of grazing on vegetation cover and dune elevation at

Assateague Island National Seashore: Impact of horses. *Environmental Management, 34*(5), 642-649.

Dearden, B. L., Pegau, R. E., & Hansen, R. M. (1975). Precision of microhistological estimates of ruminant food habits. *Journal of Wildlife Management, 39*(2), 402-407.

Dearden, P., & Rollins, R. (Eds.). (1993). *Parks and Protected Areas in Canada: Planning and Management*. Toronto: Oxford University Press.

Deconchat, M., Gibon, A., Cabanettes, A., de Warnaffe, G. d., Hewison, M., Garine, E., . . . Balent, G. (2007). How to set up a research framework to analyze social-ecological interactive processes in a rural landscape. [online]. *Ecology and Society, 12*(1), 15.

Deguise, I. E., & Kerr, J. T. (2006). Protected areas and prospects for endangered species conservation in Canada. *Conservation Biology, 20*(1), 48-55.

Deitz, T., Fitzgerald, A., & Schwom, R. (2005). Environmental Values. *Annual Review of Environmental Resources*. DOI: 10.1146/annurev.energy.1130.050504.144444.

Delgamuukw v. British Columbia (1997). 3 S.C.R. 1010. In Mahoney, H. (2008). *Tsilhqot'in Nation v. British Columbia: Cultural Security and the Promise of Site-Specific Rights*. Paper presented at the Continuing Legal Education Society of British Columbia, Victoria, BC.

Dell, C. A., Chalmers, D., Dell, D., Sauve, E., & MacKinnon, T. (2008). Horse as healer: An examination of equine assisted learning in the healing of First Nations youth from solvent abuse. *Pimatisiwin: A Journal of ABoriginal and Indigenous Community Health, 6*(1), 81-105.

Demarchi, D. A. (1973). Relationship of Range Quality to Range Condition in Chilcotin Region, British-Columbia. *Journal of Range Management, 26*(5), 345-348.

Denzin, Norman K. and Yvonna Lincoln, eds. Handbook of Qualitative Research 2nd Edition. Thousand Oaks, California: Sage Publications, 2000.

Detling, J. K. (1998). Mammalian herbivores: ecosystem-level effects in two grassland national parks. [Article]. *Wildlife Society Bulletin, 26*(3), 438-448.

Dinwoodie, D. W. (2002). *Reserve Memories: The Power of the Past in a Chilcotin Community*. London: University of Nebraska Press.

Dobb, A. (2010). *Issues Related to Restricting Cattle Access to Valhalla Lands at Captain George Town: Final Report*. Prepared for: Valhalla Foundation for Ecology and Social Justice. Victoria, British Columbia.

Donlan, C. J., Berger, J., Bock, C. E., Bock, J. H., Burney, D. A., Estes, J. A., . . . Greene, H. W. (2006). Pleistocene rewilding: An optimistic agenda for twenty-first century conservation. *American Naturalist, 168*(5), 660-681.

Donlan, C. J., & Martin, P. S. (2004). Role of Ecological History in Invasive Species Management and Conservation. *Conservation Biology, 18*(1), 267-269.

Douglas, G. W., Meidinger, D., & Pojar, J. (Eds.). (2001). *Illustrated Flora of British Columbia* (Vol. 6-8). Victoria, BC: British Columbia Ministry of Sustainable Resource Management, Ministry of Forests.

Dovers, S., & Price, R. (2007). Research and the integration imperative. In K. S. Hanna & D. S. Slocombe (Eds.), *Integrated Resource and Environmental Management: Concepts and Practice* (pp. 36-55). Toronto: Oxford University Press.

Drew, J. A. (2005). Use of traditional ecological knowledge in marine conservation. [Article]. *Conservation Biology, 19*(4), 1286-1293.

Drew, J. A., & Henne, A. P. (2006). Conservation biology and traditional ecological knowledge: Integrating academic disciplines for better conservation practice. *Ecology and Society, 11*(2).

Duncan, S. L., McComb, B. C., & Johnson, K. N. (2010). Integrating Ecological and Social Ranges of Variability in Conservation of Biodiversity: Past, Present and Future. *Ecology and Society, 15*(1), 5.

Dunlap, R. E., & Van Liere, K. (1978). The new environmental paradigm. *The Journal of Environmental Education, 9*, 10-19.

E-Flora BC. (2010). *Electronic Atlas of the Plants of British Columbia*. University of British Columbia Herbarium. Retrieved 2010, from http://www.geog.ubc.ca/biodiversity/eflora/index.shtml

Ellis, C., & Bochner, A. P. (2000). Autoethnography, Personal Narrative, Reflexivity: Researcher as Subject. In N. K. Denzin & Y. Lincoln (Eds.), *Handbook of Qualitative Research* (2nd Edition ed., pp. 733-768). Thousand Oaks, California: Sage Publications.

Ellis, S. C. (2005). Meaningful consideration? A review of traditional knowledge in decision making. *Arctic, 58*(1), 66-77.

Emerson, R. M., Fretz, R. I., & Shaw, L. L. (1995). *Writing Ethnographic Fieldnotes*. Chicago: University of Chicago Press.

Environment Canada. (2011). *National Climate Data and Information Archive*. Retrieved July 25, 2011, 2011, from http://climate.weatheroffice.gc.ca/advanceSearch/searchHistoricDataStations_e.html

Evernden, N. (1992). *The Social Creation of Nature*. Baltimore: The Johns Hopkins University Press.

Fabricus, C., Scholes, R., & Cundill, G. (2006). Mobilizing Knowledge for Integrated Ecosystem Assessments. In W. V. Reid, F. Berkes, T. J. Wilbanks & D. Capistrano (Eds.), *Bridging Scales and Knowledge Systems: Concepts and Applications in Ecosystem Assessment* (pp. 165-182). Washington: Island Press.

Fahnestock, J. T., & Detling, J. K. (1999a). The influence of herbivory on plant cover and species composition in the Pryor Mountain Wild Horse Range, USA. *Plant Ecology, 144*(2), 145-157.

Fahnestock, J. T., & Detling, J. K. (1999b). Plant responses to defoliation and resource supplementation in the Pryor Mountains. *Journal of Range Management, 52*(3), 263-270.

Fainstein, S. F. (2000). New Directions in Planning Theory. In B. Campbell & S. F. Fainstein (Eds.), *Readings in Planning Theory* (Second Edition ed., pp. 173-195). Oxford: Blackwell Publishing.

Fazey, I., Fazey, J. A., & Fazey, D. M. A. (2005). Learning More Effectively from Experience. *Ecology and Society, 10*(2). [Online] http://www.ecologyandsociety.org/vol10/iss2/art4/

Fazey, I., Fazey, J. A., Salisbury, J. G., Lindenmayer, D. B., & Dovers, S. (2006). The nature and role of experiential knowledge for environmental conservation. [Article]. *Environmental Conservation, 33*(1), 1-10.

Feist, J. D., & McCullough, D. R. (1976). Behavior Patterns and Communication in Feral Horses. *Zeitschrift Für Tierpsychologie-Journal of Comparative Ethology, 41*(4), 337-371.

Filmon, G. (2004). *Firestorm 2003: Provincial Review*. Victoria, BC: Province of British Columbia.

Findlay, A., & Halley, P. (2005). Mustang Valley. *Canadian Geographic, 125,* 46-62.

Findlay, A. (2003). The Wild Bunch. *Westworld, Fall 2003,* 24-27, 29.

First Voices. (2011). Tsilhqot'in (Xeni Gwet'in). *First Voices: Language Legacies Celebrating Indigenous Cultures* Retrieved November 22, 2011, from http://www.firstvoices.com/

Fischer, F. (2006). Participatory governance as deliberative empowerment - The cultural politics of discursive space. *American Review of Public Administration, 36*(1), 19-40.

Fischler, R. (2000). Communicative planning theory: A Foucauldian assessment. *Journal of Planning Education and Research, 19*(4), 358-368.

Fiske, S. T., & Taylor, S. E. (1984). *Social Cognition*. Reading, MA: Addison-Wesley Publishing Co.

Flores, D. (2008). Bringing Home All the Pretty Horses: The Horse Trade and the Early American West, 1775-1825. *Montana: The Magazine of Western History*, 3-21.

Flyvbjerg, B. (2002). Bringing power to planning research - One researcher's praxis story. [Article]. *Journal of Planning Education and Research, 21*(4), 353-366.

FONV. (2007-2011). *Friends of the Nemaiah Valley* Website. Retrieved December 11th, 2007, from http://www.fonv.ca/

[FPHLCC] First Peoples' Heritage Language and Culture Council. (2011). *Xeni Gwet'in First Peoples' Language Map of British Columbia* Retrieved October 29, 2011, from http://maps.fphlcc.ca/xeni_gwetin

Frankowski, B. L., Leader, I. C., & Duncan, P. M. (2009). Strength-Based Interviewing. *Adolescent Medicine, 20*, 22-40.

Fraser, D. (2007). *A Baseline Evaluation of Rangeland Health in The Haines Creek Range Unit of Chilcotin Forest District*. September 26, 2007. British Columbia: Range Branch, Ministry of Forests and Range.

Friedmann, J. (1993). Toward a Non-Euclidian Mode of Planning. In S. Campbell & S. F. Fainstein (Eds.), (2003) *Readings in Planning Theory* (Second Edition, pp. 75-80). Oxford: Blackwell Publishing.

Fuhlendorf, S. D., Engle, D. M., Kerby, J., & Hamilton, R. (2008). Pyric Herbivory: Rewilding Landscapes through the Recoupling of Fire and Grazing. *Conservation Biology, 23*(3), 588-598.

Ganskopp, D., & Vavra, M. (1986). Habitat use by feral horses in the Northern Sagebrush Steppe. *Journal of Range Management, 39*(3), 207-212.

Garibaldi, A., & Turner, N. (2004). Cultural keystone species: Implications for ecological conservation and restoration. [Article]. *Ecology and Society, 9*(3).

Gayton, D. (2007). Personal communication. Summerland, BC and Waterloo, ON.

[GCC] Grasslands Conservation Council of British Columbia. (2010). Cariboo-Chilcotin and Central Interior: In Depth Retrieved May 9, 2010, 2010, from http://www.bcgrasslands.org/cc_cidigdeeper.htm

George, T. L., & Zack, S. (2001). Spatial and temporal considerations in restoring habitat for wildlife. *Restoration Ecology, 9*(3), 272-279.

Gilchrist, G., Mallory, M., & Merkel, F. (2005). Can local ecological knowledge contribute to wildlife management? Case studies of migratory birds. *Ecology and Society, 10*(1).

Glavin, T., & People of Nemiah Valley. (1992). *Nemiah: The Unconquered Country*. Vancouver: New Star Books.

Gleitman, H., Gross, J., & Reisberg, D. (2011). *Psychology, Eighth Edition*. New York: W.W. Norton and Company, Inc.

Goddard, L., & Smitten, S. (Writers). (2002). Wild Horses, Unconquered People [DVD]. In B. Hamilton (Producer). Canada: Omni Film Productions, Ltd.

Goodall, J., Maynard, T., & Hudson, G. (2009). Tahki or Przewalski's Horse *Hope for Animals and Their World: How Endangered Species are Being Rescued from the Brink.* (pp. 60-62). New York: Grand Central Publishing.

Goulet, J.-G. A. (1998). *Ways of Knowing: Experience, Knowledge and Powr among the Dene tha*. Lincoln, Nebraska: University of Nebraska Press.

Green, T. L. (2007). Improving Human Wellbeing and Ecosystem Health on BC's Coast: The Challenge Posed by Historical Resource Extraction. *Journal of Bioeconomics, 9*, 245-263.

Greyling, T., Cilliers, S. S., & Van Hamburg, H. (2007). Vegetation studies of feral horse habitat in the Namib Naukluft Park, Namibia. *South African Journal of Botany, 73*(2), 328-328.

Grindlay, L. (1995, June 18, 1995). Trouble on the Range, *The Province,* pp. A24-A25.

Gross, M., & Hoffmann-Riem, H. (2005). Ecological restoration as a real-world experiment: designing robust implementation strategies in an urban environment. *Public Understanding of Science, 14*(3), 269-284.

Gudmundsson, O., & Dyrmundsson, O. R. (1994). Horse Grazing Under Cold and Wet Conditions: A Review. *Livestock Production Science, 40*, 57-63.

Gunder, M. (2003). Passionate planning for the others' desire: an agonistic response to the dark side of planning. [Review]. *Progress in Planning, 60*, 235-319.

Gunderson, L., & Holling, C. S. (Eds.). (2002). *Panarchy: Understanding Transformations in Human and Natural Systems*. London: Island Press.

Hamilton, N. (2010). *Chilcotin Feral Horse Count Surveys: 1991-2009*. Unpublished Report. Ministry of Forests and Range, British Columbia. Alexis Creek, BC.

Hanley, T. A., & Hanley, K. A. (1982). Food resource partitioning by sympatric ungulates on Great Basin rangeland. *Journal of Range Management, 35*(2), 152-158.

Hanley, T. A., & Page, J. L. (1981). Differential Effects of Livestock Use on Habitat Structure and Rodent Populations in Great Basin Communities. *California Fish and Game, 68*(3), 160-174.

Hanna, K. S. (2000). The paradox of participation and the hidden role of information: A case study. *Journal of the American Planning Association, 66*(4), 398-410.

Hanna, K. S., Clark, D. A., & Slocombe, D. S. (Eds.). (2008). *Transforming Parks and Protected Areas: Policy and Governance in a Changing World*. New York: Routledge.

Hansen, R. M. (1976). Foods of free-roaming horses in Southern New Mexico. *Journal of Range Management, 29*(4), 347.

Hansen, R. M., Clark, R. C., & Lawhorn, W. (1977). Foods of wild horses, deer, and cattle in the Douglas Mountain Area, Colorado. *Journal of Range Management, 30*(2), 116-118.

Hauer, G., Cumming, S., Schmiegelow, F., Adamowicz, W., Weber, M., & Jagodzinski, R. (2010). Tradeoffs Between Forestry Resource and Conservation Values Under Alternate Policy Regimes: A Spatial Analysis of the Western Canadian Boreal Plains. *Ecological Modeling, 221*, 2590-2603.

Hayes, T. (2007). *A Brief Examination of History, Policy and Practice in the Management of Feral Horses with particular reference to The Chilcotin Plateau. Draft*. Prepared for Stonefield Consulting. British Columbia, March 2007.

Heady, H. F. (1964). Palatability of herbage and animal preference. *Journal of Range Management, 17*, 76-82.

Healey, P. (1999). Institutionalist analysis, communicative planning, and shaping places. *Journal of Planning Education and Research, 19*, 111-121.

Herrick, J. E., Van Zee, J. W., Havstad, K. M., Burkett, L. M., & Whitford, W. G. (2005). Monitoring Manual for Grassland, Shrubland and Savanna Ecosystems (Vol. Volume I: Quick Start). Las Cruces, New Mexico: USDA - ARS Jornada Experimental Range.

Higgs, E. (2003). *Nature By Design: People, Natural Process, and Ecological Restoration*. Cambridge, Massachusetts: MIT Press.

Higgs, E. (2005). The two-culture problem: Ecological restoration and the integration of knowledge. *Restoration Ecology, 13*(1), 159-164.

Higgs, E. S. (1997). What is good ecological restoration? *Conservation Biology, 11*(2), 338-348.

Higgs, E. S. (2006). Restoration goes wild: A reply to Throop and Purdon. *Restoration Ecology, 14*(4), 500-503.

Higgs, E., & Hobbs, R. J. (2010). Wild Design: Interventions and ethics in protected areas. In D. Cole & L. Yung (Eds.), *Beyond Naturalness: Rethinking park and wilderness stewardship in an era of change*. Washington, D.C.: Island Press.

History, N. S. M. o. N. (2001). Sable Island: Free as the Wind Retrieved December 2, 2007, from http://museum.gov.ns.ca/mnh/nature/sableisland/english_en/nature_na/horses_ho/index_ho.htm

Hobbs, R. J., & Harris, J. A. (2001). Restoration ecology: Repairing the Earth's ecosystems in the new millennium. *Restoration Ecology, 9*(2), 239-246.

Hobbs, R. J., Higgs, E., & Harris, J. A. (2009). Novel Ecosystems: Implications for Conservation and Restoration. *Trends in Ecology and Evolution, 24*(11), 599-605.

Hobson, R. P. (1955). *Nothing Too Good for a Cowboy*. Toronto: McClelland and Stewart Ltd.

Hochtl, F., Lehringer, S., & Konold, W. (2006). Pure theory or useful tool? Experiences with transdisciplinarity in the Piedmont Alps. *Environmental Science and Policy, 9*(2006), 322-329.

Hoff, B. (1983). *The Tao of Pooh*. New York: Pengiun Books.

Holl, K. D., Crone, E. E., & Schultz, C. B. (2003). Landscape restoration: Moving from generalities to methodologies. [Article]. *Bioscience, 53*(5), 491-502.

Holling, C. S., & Chambers, A. D. (1973). Resource Science: The Nurture of an Infant. *BioScience, 23*(1), 13-20.

Holling, C. S., & Meffe, G. K. (1996). Command and Control and the Pathology of Natural Resource Management. *Conservation Biology, 10*(2), 328-337.

Hovardas, T., & Stamou, G. P. (2006). Structural and narrative reconstruction of rural residents' representations of 'nature', 'wildlife' and 'landscape'. *Biodiversity and Conservation, 15*(5), 1745-1770.

Hubbard, R. E., & Hansen, R. M. (1976). Diets of wild horses, cattle, and mule deer in the Piceance Basin, Colorado. *Journal of Range Management, 29*(5), 389.

Huntington, H. P. (2000). Using Traditional Ecological Knowledge in science: Methods and applications. [Article]. *Ecological Applications, 10*(5), 1270-1274.

Huntington, H. P., Brown-Schwalenberg, P. K., Frost, K. J., Fernandez-Gimenez, M. E., Norton, D. W., & Rosenberg, D. H. (2002). Observations on the workshop as a means of improving communication between holders of traditional and scientific knowledge. *Environmental Management, 30*(6), 778-792.

Hurtubia, J. (1973). Trophic diversity measurement in sympatric predatory species. *Ecology, 54*(4), 885-890.

Hussein, K., & Nelson, J. (1998). Sustainable Livelihoods and Livelihood Diversification: IDS Working Paper 69. Sussex: The Institute of Development Studies and the Poverty Research Unit, University of Sussex. Sustainable Livelihoods Research Programme (SLP), International Institute for Environment and Development.

Huxley, M., & Yiftachel, O. (2000). New paradigm or old myopia? Unsettling the communicative turn in planning theory. *Journal of Planning Education and Research, 19*, 333-342.

[INAC] Indian and Northern Affairs Canada. 2009. *Pronunciation guide to First Nations in British Columbia*. Accessed December 7, 2010. Online: http://www.ainc-inac.gc.ca/ai/scr/bc/fnbc/fsnst/prnfn-eng.asp.

Inglehart, R. (1990). *Culture Shift in Advanced Industrial Society*. Princeton, NJ: Princeton University Press.

Ingold, T. (1992). Culture and the Perception of the Environment. In E. Croll & D. Parkin (Eds.), *Bush Base: Forest Farm: Culture, Environment and Development*. London: Routledge.

Ingold, T. (2000). *The Perception of the Environment: Essays on Livilihood, Dwelling and Skill*. London: Routledge, Taylor and Francis Group.

Ingold, T. (2004). Building, Dwelling, Living: How animals and people make themselves at home in the world. In N. Thift & S. Whatmore (Eds.), *Cultural Geography: Critical Concepts in the Social Sciences, Vol. II Practicing Culture* (pp. 266-284). New York: Routledge.

Innes, J. E. (1995). Planning theory's emerging paradigm: Communicative action and interactive practice. *Journal of Planning Education and Research, 14*, 183-189.

Iverson, P. (1994). *When Indians Became Cowboys: Native Peoples and Cattle Ranching in the American West*. Norman: University of Oklahoma Press.

Jackson, T., & Curry, J. (2002). Regional development and land use planning in rural British Columbia: Peace in the woods? [Review]. *Regional Studies, 36*(4), 439-443.

Janssen, M. A., Bodin, O., Anderies, J. M., Elmqvist, T., Ernstson, H., McAllister, R. R. J., . . . Ryan, P. (2006). Toward a network perspective of the study of resilience in social-ecological systems. *Ecology and Society, 11*(1).

Janssen, M. A., Walker, B. H., Langridge, J., & Abel, N. (2000). An adaptive agent model for analysing co-evolution of management and policies in a complex rangeland system. *Ecological Modelling, 131*, 249-268.

Janssen, M. A., Bodin, O., Anderies, J. M., Elmqvist, T., Ernstson, H., McAllister, R. R. J., . . . Ryan, P. (2006). Toward a Network Perspective of the Study of Resilience in Social-Ecological Systems. *Ecology and Society, 11*(1), 15. [Online]. http://www.ecologyandsociety.org/vol11/iss1/art15/

Jelin, E. (2000). Towards a Global Environmental Citizenship? *Citizenship Studies, 4*(1), 47-63.

Jensen, M. E., & Bourgeron, P.S. (Eds.) (2001). *A Guidebook for Integrated Ecological Assessments*. New York: Springer Verlag.

Johnson, C. Y., Bowker, J. M., Bergstrom, J. C., & Cordell, H. K. (2004). Wilderness values in America: Does immigrant status or ethnicity matter? *Society & Natural Resources, 17*(7), 611-628.

Jones, R. E., & Dunlap, R. E. (1992). The social bases of environmental concern: Have they changed over time? *Rural Sociology, 57*, 28-47.

Jones, R., Rigg, C., & Lee, L. (2010). Haida Marine Planning: First Nations as a Partner in Marine Conservation. *Ecology and Society, 15*(1), 12. [Online] http://www.ecologyandsociety.org/vol15/iss1/art12/

Kahn, P. (2001). *The Human Relationship with Nature: Development and Culture*. Cambridge, MA: MIT Press.

Kaplan, R., & Kaplan, S. (1995). *The Experience of Nature*. Ann Arbor, Michigan: Ulrich.

Karban, R., & Huntzinger, M. (2006). *How to Do Ecology: A Concise Handbook*. New Jersey: Princeton University Press.

Kauffman, J. B. (2004). Death rides the forest: perceptions of fire, land use, and ecological restoration of western forests. *Conservation biology, 18*(4), 878-882.

Kavar, T., & Dovc, P. (2008). Domestication of the Horse: Genetic Relationships Between Domestic and Wild Horses. *Livestock Science, 116*, 1-14.

Keddy, P. (2005). Putting the plants back into plant ecology: Six pragmatic models for understanding and conserving plant diversity. *Annals of Botany, 96*(2), 177-189.

Kellert, S. (1993). The Biological Basis for Human Values of Nature. In S. Kellert & E. Wilson (Eds.), *The Biophilia Hypothesis*. Washington, DC: Island Press.

Kellert, S., & E. Wilson (Eds.) (1995). *The Biophilia Hypothesis*. Washington, DC: Island Press.

Kellert, S. R., Black, M., Rush, C. R., & Bath, A. J. (1996). Human culture and large carnivore conservation in North America. *Conservation Biology, 10*(4), 977-990.

Kendrick, A. (2003). Caribou co-management in northern Canada: fostering multiple ways of knowing. In F. Berkes, J. Colding & C. Folke (Eds.), *Navigating Social-Ecological Systems: Building Resilience for Complexity and Change* (pp. 241-270). Cambridge: Cambridge University Press.

Kimura, R. (2001). Volatile substances in feces, urine and urine-marked feces of feral horses. *Canadian Journal of Animal Science, 81*(3), 411-420.

King, S. R. B. (2002). Home range and habitat use of free-ranging Przewalski horses at Hustai National Park, Mongolia. *Applied Animal Behaviour Science, 78*, 103-113.

Kirkpatrick, J. F., & Fazio, P. M. (2010). Wild Horses as Native North American Wildlife Retrieved April 28, 2010, from http://www.awionline.org/ht/d/sp/i/18457/pid/18457

Kneital, J. M., & Chase, J. M. (2004). Trade-offs in community ecology: Linking spatial scales and species coexistence. *Ecology Letters, 7*, 69-80.

Kreuger, W. C. (1972). Evaluating animal forage preference. *Journal of Range Management*, 471-475.

Krysl, L. J., Hubbert, M. E., Sowell, B. F., Plumb, G. E., Jewett, T. K., Smith, M. A., & Waggoner, J. W. (1984). Horses and cattle grazing in the Wyoming Red Desert, I. Food habits and dietary overlap. *Journal of Range Management, 37*(1), 72-76.

Langerak, J. (2001). Fencing to keep horses in hills, *Penticton Herald,* April 6, 2001. p. 1.

Leach, M., Mearns, R., & Scoones, I. (1999). Environmental Entitlements: Dynamics and Institutions in Community-Based Natural Resource Management. *World Development, 27*(2), 225-247.

Lebel, L., Anderies, J. M., Campbell, B., Folke, C., Hatfield-Dodds, S., Hughes, T. P., & Wilson, J. (2006). Governance and the capacity to manage resilience in regional social-ecological systems. *Ecology and Society, 11*(1).

Lee, N., & Elliott, G. (2005). *Klondike Cattle Drive: The Journal of Norman Lee*. Surrey, BC: Touchwood

Leibold, M. A., Holyoak, M., Mouguet, N., Amarasekare, P., Chase, J. M., Hoopes, M. F., . . . Gonzalez, A. (2004). The meta-community concept: A framework for multi-scale community ecology. *Ecology Letters, 7*, 601-613.

Leonard, S., Kirkpatrick, J., & Marsden-Smedley, J. (2010). Variation in the Effects of Vertebrate Grazing on Fire Potential between Grassland Structural Types. *Journal of Applied Ecology, 47*, 876-883.

Lescureux, N., & Linnell, J. D. C. (2010). Knowledge and Perceptions of Macedonian Hunters and Herders: The Influence of Species Specific Ecology of Bears, Wolves and Lynx. *Human Ecology, 38*(3), 389-399.

Levin, P. S., Ellis, J., Petrik, R., & Hay, M. E. (2002). Indirect effects of feral horses on estuarine communities. *Conservation Biology, 16*(5), 1364-1371.

Lewis, J. L. (2008). Perceptions of landscape change in a rural British Columbia community. *Landscape and Urban Planning, 85*, 49-59.

Lewis, J. L., & Sheppard, S. R. J. (2005). Ancient values, new challenges: Indigenous spiritual perceptions of landscapes and forest management. [Article]. *Society & Natural Resources, 18*(10), 907-920.

Lewis, K. P. (2006). Statistical power, sample sizes, and the software to calculate them easily. *Bioscience, 56*(7), 607-612.

Leys, A. J., & Vanclay, J. K. (2011). Social Learning: A knowledge and capacity building approach for adaptive co-management of contested landscapes. *Land Use Policy, 28*, 574-584.

Lindblom, C. E. (1959). The Science of "Muddling Through". In B. Campbell & S. F. Fainstein (Eds.), (2003) *Readings in Planning Theory* (Second Edition, pp. 196-209). Oxford: Blackwell Publishing.

Lindenmayer, D. B., Manning, A. D., Smith, P. L., Possingham, H. P., Fischer, J., Oliver, I., & McCarthy, M. A. (2002). The focal-species approach and landscape restoration: a critique. *Conservation Biology, 16*(2), 338-345.

Linklater, W. L. (2007). Equine learning in a wider context - Opportunities for integrative pluralism. *Behavioural Processes, 76*, 53-56.

Linklater, W. L., & Cameron, E. Z. (2002). Escape behaviour of feral horses during a helicopter count. *Wildlife Research, 29*, 221-224.

Linklater, W. L., Cameron, E. Z., Stafford, K. J., & Veltman, C. J. (2000). Social and spatial structure and range use by Kaimanawa wild horses (*Equus caballus*: Equidae). *New Zealand Journal of Ecology, 24*(2), 139-152.

Linklater, W. L., Stafford, K. J., Minot, E. O., & Cameron, E. Z. (2002). Researching feral horse ecology and behavior: turning political debate into opportunity. *Wildlife Society Bulletin, 30*(2), 644-650.

Loucougaray, G., Bonis, A., & Bouzille, J. B. (2004). Effects of grazing by horses and/or cattle on the diversity of coastal grasslands in western France. *Biological Conservation, 116*(1), 59-71.

Lubow, B. C., Ransom, J. L., & Singer, F. J. (2004). *Aerial population estimation techniques for wild horses and burros: Work Plan*. USGS Colorado State University.

Lutz, J. S. (2008). *Makuk: A New History of Aboriginal-White Relations*. Vancouver, BC: UBC Press.

Lutz, J. S., & Neis, B. (Eds.). (2008). *Making and Moving Knowledge: Interdisciplinary and Community-based Research in a World on the Edge*. Montreal & Kingston: McGill-Queen's University Press.

Lyver, P. O. B., Jones, C., & Moller, H. (2009). Looking past the wallpaper: considerate evaluation of traditional environmental knowledge by science. *Journal of the Royal Society of New Zealand, 39*(4), 219-223.

Mabee, H. S., & Hoberg, G. (2006). Equal partners? Assessing comanagement of forest resources in Clayoquot Sound. *Society & Natural Resources: An International Journal, 19*(10), 875-888.

Mahoney, H. (2008). *Tsilhqot'in Nation v. British Columbia: Cultural Security and the Promise of Site-Specific Rights*. Paper presented at the Continuing Legal Education Society of British Columbia, Victoria, BC.

Manfredo, M. J. (2008). *Who Cares About Wildlife? Social Science Concepts for Exploring Human-Wildlife Relationships and Conservation Issues*. New York: Springer.

Manuel-Navarrete, D., Slocombe, S., & Mitchell, B. (2006). Science for Place-Based Socioecological Management: Lessons from the Maya Forest (Chiapas and Peten). *Ecology and Society, 11*(1), 8 [online].

Manzo, L. C., & Perkins, D. D. (2006). Finding common ground: The importance of place attachment to community participation and planning. *Journal of Planning Literature, 20*(4), 335-350.

Margerum, R. D., & Born, S. M. (1995). Integrated environmental management: Moving from theory to practice. *Journal of Environmental Planning and Management, 38*(3), 371-391.

Mascarenhas, M., & Scarce, R. (2004). "The intention was good": Legitimacy, consensus-based decision making, and the case of forest planning in British Columbia, Canada. *Society & Natural Resources, 17*(1), 17-38.

Mascia, M. B., Brosius, J. P., Dobson, T. A., Forbes, B. C., Horowitz, L., McKean, M. A., & Turner, N. J. (2003). Conservation and the social sciences. *Conservation Biology, 17*(3), 649-650.

McAvoy, P. V., Driscoll, M. B., & Gramling, B. J. (2004). Integrating the environment, the economy, and community health: A community health center's initiative to link health benefits to smart growth. *American Journal of Public Health, 94*(4), 525-527.

McCrory, W. (2002). Preliminary Conservation Assessment of the Rainshadow Wild Horse Ecosystem, Brittany Triangle, Chilcotin, British Columbia, Canada. New Denver, BC: McCrory Wildlife Services Ltd.

McCrory, W. (2005). *Roads to Nowhere: Technical Review of Ecological Damage and Proposed Restoration Related to BC Ministry of Forests Control Actions - 2003 Chilko Wildfire, BC*. March 2005. New Denver, BC: McCrory Wildlife Services, Ltd.

McCune, B., & Grace, J. B. (2002). *Analysis of Ecological Communities*. Gleneden Beach, Oregon: MjM Software Design.

McGee, G. J. A., Cullen, A., & Gunton, T. (2010). A new model for sustainable development: a case study of The Great Bear Rainforest regional plan. *Environment Development and Sustainability, 12*, 745-762.

McGuirk, P. M. (2001). Situating communicative planning theory: context, power, and knowledge. [Article]. *Environment and Planning A, 33*(2), 195-217.

McInnis, M. L., & Vavra, M. (1987). Dietary relationships among feral horses, cattle, and pronghorn in Southeastern Oregon. *Journal of Range Management, 40*(1), 60-66.

McNaughton, P., & Urry, J. (1998). *Contested Natures*. London: Sage Publications.

McNaughton, S. J., Milchunas, D. G., & Frank, D. A. (1996). How can net primary productivity be measured in grazing ecosystems? *Ecology, 77*(3), 974-977.

Meidinger, D., & Pojar, J. (1991). Sub-Boreal Pine Spruce Biogeoclimatic Zone (SBPS). *Ecosystems of British Columbia* Retrieved November 22, 2011

Meine, C., Soule, M., & Noss, R. F. (2006). "A mission-driven discipline": the growth of conservation biology. *Conservation Biology, 20*(3), 631-651.

Menard, C., Duncan, P., Fleurance, G., Georges, J.-Y., & Lila, M. (2002). Comparative foraging and nutrition of horses and cattle in European wetlands. *Journal of Applied Ecology, 39*, 120-133.

Mendis-Millard, S., & Reed, M. G. (2007). Understanding Community Capacity Using Adaptive and Reflexive Research Practices: Lessons From Two Canadian Biosphere Reserves. *Society and Natural Resources, 20*(6), 543-559.

Merriam-Webster Dictionary. (2011). "cayuse." Retrieved November 22, 2011, from *Encyclopaedia Brittanica* http://www.merriam-webster.com/dictionary/cayuse?show=0&t=1321975382

MFR Wildfire Management Branch. (2009). *Very Large Wildfires*. Ministry of Forests and Range, British Columbia. Retrieved September 9, 2010, from http://bcwildfire.ca/History/LargeFires.htm

Mihesuah, D. A. (Ed.). (1998). *Natives and Academics: Researching and Writing about American Indians*. Lincoln Nebraska: University of Nebraska Press.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative Data Analysis: And Expanded Sourcebook* (2nd Edition ed.). London: Sage.

Miller, J. R., & Hobbs, R. J. (2002). Conservation where people live and work. *Conservation Biology, 16*(2), 330-337.

Miller, R. (1980). *The Ecology of Feral Horses in Wyoming's Red Desert.* PhD, University of Wyoming, Laramie, Wyoming.

Miller, R. (1983). Seasonal movements and home ranges of feral horse bands in Wyoming's Red Desert. *Journal of Range Management, 36*(2), 199-201.

Miller, A. M., J., D.-H. I., & Peters, P. (2010). Talking about fire: Pikangikum First Nation elders guiding fire management. *Canadian Journal of Forest Research, 40*, 2290-2301.

Mills, L. S., Soule, M. E., & Doak, D. F. (1993). The Keystone Species Concept in Ecology and Conservation. *BioScience, 43*(4), 219-224.

Mills, L. S., Soule, M. E., & Doak, D. F. (1993). The Keystone-Species Concept in Ecology and Conservation. *BioScience, 43*(4), 219-224.

Miraglia, N., Costantini, M., Polidori, M., Meineri, G., & Peiretti, P. G. (2008). Exploitation of a natural pasture by wild horses: comparison between nutritive characteristics of the land and the nutrient requirements of the herds over a 2-year period. *Animal, 2*(3), 410-418.

Mitchell, B. (1997). *Resource and Environmental Management*. Essex: Longman.

Mitchell, B., & Shrubsole, D. (2007). An overview of integration in resource and environmental management. In K. S. Hanna & D. S. Slocombe (Eds.), *Integrated Resource and Environmental Management: Concepts and Practice* (pp. 21-35). Oxford: Oxford University Press.

[MOF] Ministry of Forests. (2003). *Fire Review Summary of the Chilko Fire (C50214)*. Protection Branch. Ministry of Forests, British Columbia. Retrieved from http://bcwildfire.ca/History/ReportsandReviews/2003/Chilko_Fire_Review_C50214.pdf

[MOFL] Ministry of Forests and Lands. (circa 1980s). Aerial Photographs. British Columbia. Retrieved from personal files of landowner, D. Williams.

[MOF] Ministry of Forests. (1982). *Bounty Form*. (760-C1 (81-82)). Forest Service, British Columbia. May 7, 1982. Retrieved through Freedom of Information request to Ministry of Forests and Range July 2009. Alexis Creek, BC.

Moller, H., Berkes, F., Lyver, P. O., & Kislalioglu, M. (2004). Combining science and traditional ecological knowledge: Monitoring Populations for co-management. *Ecology and Society, 9*(3).

Molles Jr., M. C. (2005). *Ecology: Concepts and Applications, 3rd Edition*. Montreal: McGraw-Hill.

Morrison, M. L., Marcot, B. G., & Mannan, R. W. (1998). *Wildlife-Habitat Relationships: Concepts and Applications* (2nd Edition ed.). Madison, Wisconsin: The University of Wisconsin Press.

Murphy, S. D. (2004, August 24-26, 2004). *Assembly methods for ecological restoration of forest communities.* Paper presented at the 16th International Conference Society for Ecological Restoration, Victoria, BC, Canada.

Nadasdy, P. (1999). The politics of TEK: Power and the "integration" of knowledge. *Arctic Anthropology, 36*(1-2), 1-18.

Nadasdy, P. (2003a). *Hunters and Bureaucrats: Power, Knowledge, and Aboriginal-State Relations in the Southwest Yukon*. Vancouver: UBC Press.

Nadasdy, P. (2003b). Reevaluating the co-management success story. *Arctic 56*(4), 367-380.

Nader, L. (Ed.). (1996). *Naked Science: Anthropological Inquiry into Boundaries, Power, and Knowledge*. London: Routledge.

Naidoo, R., & Hill, K. (2006). Emergence of indigenous vegetation classifications through integration of traditional ecological knowledge and remote sensing analyses. *Environmental Management, 38*(3), 377-387.

Nakken, P. (1982). *1981-82 Horse Control Program*. File No. 760-4 (May 7, 1982). Chilcotin Forest District, British Columbia. Retrieved from Freedom of Information request, July 2009, Ministry of Forests and Range. Alexis Creek, BC.

Namgail, T., Fox, J. L., & Bhatnagar, Y. V. (2007). Carnivore-Caused Mortality in Trans-Himalaya. *Environmental Management, 39*, 490-496. DOI 10.1007/s00267-005-0178-2

National Research Council. (1982). *Wild and free-roaming horses and burros: final report.* In Committee on Wild and Free-Roaming Horses and Burros. National Academy Press, Washington, D.C.

Naughton-Treves, L., Buck Holland, M., & Brandon, K. (2005). The Role of Protected Areas in Conserving Biodiversity and Sustaining Local Livelihoods. *Annual Review of Environmental Resources, 30*, 219-252.

Naveh, Z. (1995). Interactions of landscapes and cultures. *Landscape and Urban Planning, 32*, 43-54.

Naveh, Z. (1998). Ecological and cultural landscape restoration and the cultural evolution towards a post-industrial symbiosis between human society and nature. *Restoration Ecology, 6*(2), 135-143.

Naveh, Z. (2000a). The total human ecosystem: Integrating ecology and economics. *Bioscience, 50*(4), 357-361.

Naveh, Z. (2000b). What is holistic landscape ecology? A conceptual introduction. *Landscape and Urban Planning, 50*(1-3), 7-26.

Naveh, Z. (2005). Epilogue: Toward a transdisciplinary science of ecological and cultural landscape restoration. *Restoration Ecology, 13*(1), 228-234.

Nichols, G. (1971). *Field Trial: Snowmobiles on Horse Round-up*. Memorandum from Gordon Nichols, Deputy Ranger to Attention - M.T. Wallace. July 9, 1971. GRI Horse Control North, Forest Service, Department of Lands, Forests and Water Resources, British Columbia.

Nimmo, D. G., & Miller, K. K. (2007a). Ecological and human dimensions of management of feral horses in Australia: a review. *Wildlife Research, 34*(5), 408-417.

Nimmo, D. G., Miller, K. K., & Adams, R. (2007b). Managing Feral Horses in Victoria: A Study of Community Attitudes and Perceptions. *Ecological Management and Restoration, 8*(3), 237-243.

O'Flaherty, R. M., Davidson-Hunt, I. J., & Manseau, M. (2008). Indigenous Knowledge and Values in Planning for Sustainable Forestry: Pikangikum First Nation and the Whitefeather Forest Initiative. *Ecology and Society, 13*(1), 1-6.

Olsen, F. W., & Hansen, R. M. (1977). Food relations of wild free-roaming horses to livestock and big game, Red Desert, Wyoming. *Journal of Range Management, 30*(1), 17-20.

Olsson, P., Folke, C., & Berkes, F. (2004). Adaptive comanagement for building resilience in social-ecological systems. [Article]. *Environmental Management, 34*(1), 75-90.

Ommer, R. E., Coward, H., & Parrish, C. C. (2008). Knowledge, Uncertainty, and Wisdom. In J. S. Lutz & B. Neis (Eds.), *Making and Moving Knowledge: Interdisciplinary and Community-based Research in a World on the Edge*. Montreal & Kingston: McGill-Queen's University Press.

Orians, G., & Heerwagen, J. (1992). Evolved Responses to Landscapes. In J. Barkow, L. Cosmides & J. Tooby (Eds.), *The Adapted Mind: Evolutionary Psychology and the Generation of Culture*. New York, NY: Oxford University Press.

Oxley, T., & Lemon, M. (2003). From social-enquiry to decision support tools: towards an integrative method in the mediterranean rural environment. [Article]. *Journal of Arid Environments, 54*(3), 595-617.

Paine, R. T. (1969). A Note on Trophic Complexity and Community Stability. [Letter to the Editor]. *The American Naturalist, 103*(929), 91-93.

Palang, H., Mander, U., & Naveh, Z. (2000). Holistic landscape ecology in action. *Landscape and Urban Planning, 50*(1-3), 1-6.

Parkins, J., and Reed, M. (Eds.) (Forthcoming 2012). *The Social Transformation of Canada: New Insights into Community, Culture and Citizenship*. Vancouver: UBC Press.

Pedersen, M. C. (2008). Personal Letter *File: 292-30/General, 15640-04*. Chilcotin Forest District: Ministry of Forests and Range, British Columbia.

Petraitis, P. S., Latham, R. E., & Niesenbaum, R. A. (1989). The maintenance of species diversity by disturbance. *The Quarterly Review of Biology, 64*(4), 393-418.

Phillips, D. (2008). *Beyond the Chilcotin: On the Home Ranch with Pan Phillips*. Madeira Park, BC: Harbour Publishing.

Pickett, S. T. A., Kolasa, J., Armesto, J. J., & Collins, S. L. (1989). The ecological concept of disturbance and its expression at various hierarchical levels. *Oikos, 54*(2), 129-137.

Pickett, S. T. A., & White, P. S. (Eds.). (1985). *The ecology of Natural Disturbance and Patch Dynamics*. Toronto: Academic Press, Inc.

Pimm, S. L. (1984). The complexity and stability of ecosystems. *Nature, 307*, 321-326.

Pincetl, S. (2006). Conservation planning in the west, problems, new strategies and entrenched obstacles. [Article]. *Geoforum, 37*(2), 246-255.

Pinkerton, E., Heaslip, R., Silver, J. J., & Furman, K. (2008). Finding "Space" for Comanagement of Forests within the Neoliberal Paradigm: Rights, Stratgies, and Tools for Asserting a Local Agenda. *Human Ecology, 36*, 343-355.

Plan Canada. (2008). Issue on Indigenous Planning. June 2008. Canadian Institute of Planners.

Platten, S., & Henfrey, T. (2009). The cultural keystone concept: Insights from ecological anthropology. *Human Ecology, 37*, 491-500.

Ploger, J. (2001). Public participation and the art of governance. *Environment and Planning B-Planning & Design, 28*(2), 219-241.

Pohl, C. (2005). Transdisciplinary collaboration in environmental research. *Futures, 37*(10), 1159-1178.

Preston, M. A., & Harcourt, A. H. (2009). Conservation implications of the prevalence and representation of locally extinct mammals in the folklore of Native Americans. *Conservation and Society, 7*(1), 59-69.

Preston, S. K. (1984). *A habitat-use and dietary analysis of a monogastric versus a ruminant herbivore, on forested range.* Master of Science, University of British Columbia, Vancouver, BC.

Pye, C. (1992). Language Loss among the Chilcotin. *International Journal of the Sociology of Language*(93), 75-86.

Pynn, L. (2009). Wild-horse cull unjustified, aboriginal leader says. *Vancouver Sun*. January 27, 2009. Retrieved from http://www.canada.com/vancouversun/news/westcoastnews/story.html?id=eed98bdc-a9af-4777-ab7c-c5e994dbaae6

Rabinow, P. (Ed.). (1984). *The Foucault Reader*. New York: Pantheon Books.

Raits, P. (1995, March 29, 1995). Snares Threaten Horses and Wildlife: Snare traps in Chilcotin also endanger people, *Williams Lake Advocate,* p. 3.

Rangeland Management Branch. (1997). Animal Unit Month. *Range Management Terminology*. Created June 1997. Edmonton, Alberta: Alberta Sustainable Resource Development, Lands Division.

Reed, C. M. (2008). Wild Horse Protection Policies: Environmental and Animal Ethics in Transition. *International Journal of Public Administration, 31*(3), 277-286.

Reed, M. (2007). Uneven Environmental Management: A Canadian Perspective. *Environmental Management, 39*, 30-49.

Reed, M., & Peters, E. J. (2004). Using an Ecological Metaphor to Build Adaptive Resilient Research Practices. *ACME: An International E-Journal for Critical Geographies, 3*(1), 18-40.

Reid, J. (2008/09). The Grasslands Debates: Conservationists, Ranchers, First Nations, and the Landscape of the Middle Fraser. *BC Studies*(160), 93-118.

Reid, W., Berkes, F., & Wilbanks, T. (2006). *Bridging Scales and Knowledge Systems: Concepts and Applications in Ecosystem Assessment*: Island Press.

Resh, L. W. (1989). Letter to Wanda Gust. [File No. 760-4]. June 14, 1989. Cariboo Forest Region, Ministry of Forests and Lands, British Columbia.

Resilience Alliance. (2002). Resilience . Written October 29, 2002. Retrieved November 22, 2011, from http://www.resalliance.org/index.php/resilience

Reynolds, K. M., & Hessburg, P. F. (2005). Decision support for integrated landscape evaluation and restoration planning. *Forest Ecology and Management, 207*(1-2), 263-278.

Rheinhardt, R. D., & Rheinhardt, M. C. (2004). Feral horse seasonal habitat use on a coastal barrier spit. *Journal of Range Management, 57*(3), 253-258.

Rikoon, J. S. (2006). Wild horses and the political ecology of nature restoration in the Missouri Ozarks. *Geoforum, 37*(2), 200-211.

Rinfret, S. (2009). Controlling Animals: Power, Foucault, and Species Management. *Society and Natural Resources, 22*, 571-578.

Robert, N., Walzer, C., Ruegg, S. R., Kaczensky, P., Ganbaatar, O., & Stauffer, C. (2005). Pathologic Findings in Reintroduced Przewalski's Horses (Equus caballus przewalskii) in Southwestern Mongolia. *Journal of Zoo and Wildlife Medicine, 36*(2), 273-285.

Robinson, H. and Wickwire, W. (Ed.). (2005). *Living by Stories: A journey of landscape and memory*. Vancouver: Talonbooks.

Rogers, G. M. (1991). Kaimanawa feral horses and their environmental impacts. *New Zealand Journal of Ecology, 15*, 49-64.

Rokeach, M. (1973). *The Nature of Human Values*. New York, NY: Free Press.

Ryden, H. (1970). *America's Last Wild Horses*. Guilford, Connecticut: The Lyons Press.

Sagoff, M. (2005). Do non-native species threaten the natural environment? *Journal of Agricultural and Environmental Ethics, 18*, 215-236.

Salter, R. E. (1978). Distribution, Ecology and Management of Free-Ranging Horses in Alberta. In D. o. A. Science (Ed.). Edmonton: University of Alberta.

Salter, R. E., & Hudson, R. J. (1978). Distribution and management of feral horses in Western Canada. *Rangeman's Journal, 5*(6), 190-192.

Salter, R. E., & Hudson, R. J. (1979). Feeding ecology of feral horses in Western Alberta. *Journal of Range Management, 32*(3), 221-225.

Sandbrook, C., Scales, I. R., Vira, B., & Adams, W. M. (2010). Value Plurality Among Conservation Professionals. *Conservation Biology, 25*(2), 285-294.

Sanderson, E. W. (2006). How many animals do we want to save? The many ways of setting population target levels for conservation. *Bioscience, 56*(11), 911-922.

Sankey, C., Richard-Yris, M.-A., Leroy, H., & Henry, S. (2010). Positive Interactions lead to lasting positive memories in horses, *Equus caballus*. *Animal Behaviour, 79*, 869-875.

Sarr, D. A., Hibbs, D. E., & Huston, M. A. (2005). A hierarchical perspective of plant diversity. *The Quarterly Review of Biology, 80*(2), 187-212.

Saskatchewan Party Caucus. (2009). *Media Release: Saskatchewan's Wild Horses Receive Protection*. Retrieved September 25, 2011, 2011, from http://www.skcaucus.com/index.php?pageid=ArchiveDetail&archiveid=52

Schenk, A., Huntziker, M., & Kienast, F. (2007). Factors influencing the acceptance of nature conservation measures - A qualitative study in Switzerland. *Journal of Environmental Management, 83*(1), 66-79.

Schmidt, J. J., & Dowsley, M. (2010). Hunting with Polar Bears: Problems with the Passive Properties of the Commons. *Human Ecology, 38*(3), 377-387.

Scott Jones, J., & Watt, S. (Eds.). (2010). *Ethnography in Social Science Practice*. New York: Routledge: Taylor and Francis Group.

Schwartz, K. Z. S. (2005). Wild horses in a 'European wilderness': imagining sustainable development in the post-Communist countryside. *Cultural Geographies, 12*, 292-320.

Scoones, I. (2009). Re-energising livelihoods approaches: New focus, new priorities? *Sustainable livelihoods viewpoints, July 2009*. Retrieved from www.id21.org/viewpoints/SLAJuly09.html

Selby, C. J., & Pitt, M. D. (1984). Classification and Distribution of Alpine and Sub-Alpine Vegetation in the Chilcotin Mountains of Southern British-Columbia. *Syesis, 17*, 13-41.

Setah, D. (2010). Personal Communication. Nemiah Valley, British Columbia. June 2010.

Sherman, K. P., Van Lanen, J., & Sherman, R. T. (2010). Practical Environmentalism on the Pine Ridge Reservations: Confronting Structural Constraints to Indigenous Stewardship. *Human Ecology, 38*(4), 507-520.

Siebenhuner, B., Dedeurwaerdere, T., & Brousseau, E. (2005). Introduction and overview to the special issue on biodiversity conservation, access and benefit-sharing and traditional knowledge. *Ecological Economics, 53*(4), 439-444.

Siipi, H. (2004). Naturalness in biological conservation. *Journal of Agricultural and Environmental Ethics, 17*, 457-477.

Simberloff, D. (2005). Non-native species *do* threaten the natural environment! *Journal of Agricultural and Environmental Ethics, 18*, 595-607.

Sinclair, A. R. E., Fryxell, J. M., & Caughley, G. (2006). *Wildlife Ecology, Conservation, and Management* (Second ed.). Oxford: Blackwell Publishing.

Singer, F. J., & Schoenecker, K. A. (2000). *Manager's Summary - Ecological studies of the Pryor Mountain Wild Horse Range, 1992-1997*. U.S. Geological Survey.

Singleton, S. (2009). Native People and Planning for Marine Protected Areas: How "Stakeholder" Processes Fail to Address Conflicts in Complex, Real-World Environments. *Coastal Management, 37*(5), 421-440.

Skinner, K., Hanning, R. M., & Tsuji, L. J. S. (2006). Barriers and supports for healthy eating and physical activity for first nation youths in northern Canada. [Article]. *International Journal of Circumpolar Health, 65*(2), 148-161.

Slocombe, D. S. (2001). Integration of physical, biological and socioeconomic information. In M. E. Jensen & P. S. Bourgeron (Eds.), *A Guidebook for Integrated Ecological Assessments* (pp. 119-132). New York: Springer-Verlag.

Slocombe, D. S., & Hanna, K. S. (2007). Integration in resource and environmental management. In K. S. Hanna & D. S. Slocombe (Eds.), *Integrated Resource and Environmental Management: Concepts and Practice* (pp. 1-20). Toronto: Oxford University Press.

Smith, A., & Stirling, A. (2010). The Politics of Social-ecological Resileince and Sustainable Socio-technical Transitions. [Online]. *Ecology and Society, 15*(1), 11.

Spence, M. D. (1999). *Dispossessing the Wilderness: Indian Removal and the Making of National Parks*. New York: Oxford University Press.

Spindler, G. (2006). Living and writing ethnography: an exploration in self-adaptation and its consequences. In G. Spindler & L. Hammond (Eds.), *Innovations in Educational Ethnography: Theory, Methods, and Results* (pp. 65-81). Mahwah, NJ: Lawrense Erlbaum Associates.

Stein, S. M., & Harper, T. L. (2003). Power, trust, and planning. *Journal of Planning Education and Research, 23*(2), 125-139.

Steiner, F. (2002). *Human Ecology: Following Nature's Lead*. London: Island Press.

Steiner, G., & Posch, A. (2006). Higher education for sustainability by means of transdisciplinary case studies: an innovative approach for solving complex, real-world problems. *Journal of Cleaner Production, 14*(9-11), 877-890.

Stephenson, J. (2007). Many Perceptions, One Landscape. *Landscape Review, 11*(2), 9-30.

Stephenson, J. (2008). The Cultural Values Model: An integrated approach to values in landscapes. *Landscape and Urban Planning, 84*, 127-139.

Stephenson, J., & Moller, H. (2009). Cross-cultural environmental research and management: challenges and progress. *Journal of the Royal Society of New Zealand, 39*(4), 139-149.

Stohlgren, T. J., Schell, L. D., & Vanden Heuvel, B. (1999). How grazing and soil quality affect native and exotic plant diversity in Rocky Mountain grasslands. *Ecological Applications, 9*(1), 45-64.

Stokes, J. S. (1975). *Permit* (File 052130). Horse Control Program. Ministry of Forests British Columbia. Retrieved from Freedom of Information request. July 2009. Alexis Creek, BC.

Storrar, J. A., Hudson, R. J., & Salter, R. E. (1977). Habitat Use Behavior of Feral Horses and Spatial Relationships with Moose in Central British-Columbia. *Syesis, 10*, 39-44.

Strang, R. M., & Parminter, J. V. (1980). Conifer Encroachment on the Chilcotin Grasslands of British-Columbia. *Forestry Chronicle, 56*(1), 13-18.

Struass, S. Y., Lau, J. A., & Carroll, S. P. (2006). Evolutionary responses of natives to introduced species: what do introductions tell us about natural communities? *Ecology Letters, 9*, 357-374.

Suding, K. N., Gross, K. L., & Houseman, G. R. (2004). Alternative states and positive feedbacks in restoration ecology. *Trends in Ecology and Evolution, 19*(1), 46-53.

Swart, J. A. A. (2005). Care for the Wild: An Integrative View on Wild and Domesticated Animals. *Environmental Values, 14*, 251-263.

Symanski, R. (1994). Contested realities: Feral horses in outback Australia. *Annals of the Association of American Geographers, 84*(2), 251-269.

Symanski, R. (1996). Dances with Horses: Lessons from the Environmental Fringe. *Conservation Biology, 10*(3), 708-712.

Taggart, J. B. (2008). Management of Feral Horses at the North Carolina National Estuarine Research Reserve. *Natural Areas Journal, 28*(2), 187-195.

Takeda, L., & Ropke, I. (2010). Powr and Contestation in Collaborative Ecosystems-Based Management: The Case of Haida Gwaii. *Ecological Economics, 70*, 178-188.

Tedlock, B. (2000). Ethnography and Ethnographic Representation. In N. K. Denzin & Y. Lincoln (Eds.), *Handbook of Qualitative Research* (2nd Edition ed., pp. 455-486). Thousand Oaks, California: Sage Publications.

Teel, T. L., Manfredo, M. J., & Stinchfield, H. (2007). The need and theoretical basis for exploring wildlife value orientations cross-culturally. *Human Dimensions of Wildlife, 12*(5), 297-305.

Thistle, J. (2008/09). Accommodating Cattle:British Columbia's 'Wars' with Grasshoppers and 'Wild Horses'. *BC Studies*(160), 67-92.

Thompson, D. (Ed.). (1996). *The Pocket Oxford Dictionary of Current English* (Revised Eighth Edition ed.). Oxford: Clarendon Press.

Thomson, A. J. (2000). Elicitation and representation of Traditional Ecological Knowledge, for use in forest management. *Computers and Electronics in Agriculture, 27*(1-3), 155-165.

Thrift, N., & Whatmore, S. (2004). Introduction. In N. Thrift & S. Whatmore (Eds.), *Cultural Geography: Critical Concepts in the Social Sciences, Volume I - Mapping Culture* (Vol. 1, pp. 1-17). London, New York: Routledge.

Tippett, J. (2004). "Think like an ecosystem" - Embedding a living system paradigm into participatory planning. *Systemic Practice and Action Research, 17*(6), 603-622.

Tress, G., Tress, B., & Fry, G. (2005a). Clarifying integrative research concepts in landscape ecology. *Landscape Ecology, 20*(4), 479-493.

Tress, B., Tress, G., & Fry, G. (2005b). Integrative studies on rural landscapes: policy expectations and research practice. *Landscape and Urban Planning, 70*(1-2), 177-191.

Tress, B., Tress, G., & Fry, G. (2005c). Researchers' experiences, positive and negative, in integrative landscape projects. *Environmental Management, 36*(6), 792-807.

Tri-Council Panel on Research Ethics. (2011). *Research Ethics Involving the First Nations, Inuit and Metis Peoples of Canada*, March 1, 2011. Retrieved November 19, 2011, from http://www.pre.ethics.gc.ca/eng/policy-politique/initiatives/tcps2-eptc2/chapter9-chapitre9/#toc09-intro

Trigger, D., Mulcock, J., Gaynor, A., & Toussaint, Y. (2008). Ecological restoration, cultural preferences and the negotiation of 'nativeness' in Australia. *Geoforum, 39*, 1273-1283.

Tsilhqot'in Nation v. British Columbia: Argument of the Plaintiff, No. BCSC 1700 Registry No. 90-0913 (British Columbia Supreme Court 2007).

Tsilhqot'in Nation v. British Columbia: Reasons for Judgment, No. 90-0913, BCSC 1700 (British Columbia Supreme Court 2007).

Tuan, Y.-F. (2004). Rootedness versus Sense of Place. In N. Thrift & S. Whatmore (Eds.), *Cultural Geography: Critical Concepts in the Social Sciences, Volume I - Mapping Culture* (Vol. 1, pp. 263-271). London, New York: Routledge.

Turkel, W. J. (2007). *The Archive of Place: Unearthing the Pasts of the Chilcotin Plateau*. Vancouver: UBC Press.

Turner, J. W., Liu, I. K. M., Flanagan, D. R., Rutberg, A. T., & Kirkpatrick, J. F. (2007). Immunocontraception in Wild Horses: One Inoculation Provides Two Years of Infertility. *Journal of Wildlife Management, 71*(2), 662-667.

Turner, J. W., & Morrison, M. L. (2001). Influence of predation by mountain lions on numbers and survivorship of a feral horse population. *The Southwestern Naturalist, 46*(2), 183-190.

Turner, J. W., Wolfe, M. L., & Kirkpatrick, J. F. (1992). Seasonal mountain lion predation on a feral horse population. *Canadian Journal of Zoology, 70*, 929-934.

Turner, M. G. (1987). Effects of grazing by feral horses, clipping, trampling, and burning on a Georgia salt marsh. *Estuaries, 10*(1), 54-60.

Turner, M. G. (1988). Simulation and Management Implications of Feral Horse Grazing on Cumberland Island, Georgia. *Journal of Range Management, 41*(5), 441-447.

Turner, N. J., & Berkes, F. (2006a). Coming to understanding: Developing conservation through incremental learning in the Pacific Northwest. [Article]. *Human Ecology, 34*(4), 495-513.

Turner, N. J., & Berkes, F. (2006b). Developing resource management and conservation. [Editorial Material]. *Human Ecology, 34*(4), 475-478.

Turner, N. J., Davidson-Hunt, I., & O'Flaherty, M. (2003). Living on the Edge: Ecological and cultural edges as sources of diversity for social-ecological resilience. *Human Ecology, 31*(3), 439-461.

Turner, N. J., Gregory, R., Brooks, C., Failing, L., & Satterfield, T. (2008). From Invisibility to Transparency: Identifying the Implications. *Ecology and Society, 13*(2), 1-7.

Turner, N. J., Marshall, A., Thompson, J. C. E., Hood, R. J., Hill, C., & Hill, E.-A. (2008). "Ebb and Flow": Transmitting Environmental Knowledge in a Contemporary Aboriginal Community. In J. S. Lutz & B. Neis (Eds.), *Making and Moving Knowledge: Interdisciplinary and Community-based Research in a World on the Edge* (pp. 45-63). Montreal & Kingston: McGill-Queen's University Press.

Van Liere, K. D., & Dunlap, R. E. (1981). Environmental Concerns: Does it make a difference how it's measured? *Environment and Behavior, 13*, 651-684.

Van Maanen, J. (1988). *Tales of the Field: On Writing Ethnography*. Chicago: University of Chicago Press.

Van Sittert, L. (2005). Bringing in the wild: The commodification of wild animals in the Cape colony/province c.1850-1950. *Journal of African History, 46*, 269-291.

Vega-Pla, J. L., Calderon, J., Rodriguez-Gallardo, P. P., Martinez, A. M., & Rico, C. (2006). Saving feral horse populations: does it really matter? A case study of wild horses from Donana National Park in southern Spain. *Animal Genetics, 37*(6), 571-578.

Vernon, C. (2007). A Political Ecology of British Columbia. *Capitalism Nature Socialism, 18*(4), 54-74.

Wagner, F. H. (1983). *Status of wild horse and burro management on public rangelands.* Paper presented at the Transactions of the Forty-eighth North American Wildlife and Natural Resources Conference, Washington, D.C.

Walker, P. A. (2005). Political ecology: where is the ecology? *Progress in Human Georgaphy, 29*(1), 73-82.

Wallace, M. T. (1965). *Chief Forester - Attention: Grazing*. (File No. 052130). Ministry of Forests, British Columbia. Retrieved from Freedom of Information request, July 2009. Alexis Creek, BC.

Watson, A., & Huntington, O. H. (2008). They're *here* - I can *feel* them: the epistemic spaces of Indigenous and Western Knowledges. *Social & Cultural Geography, 9*(3), 257-280.

Westoby, M. (1974). An analysis of diet selection by large generalist herbivores. *American Naturalist, 108*, 290-304.

Westoby, M., Walker, B., & Noy-Meir, I. (1989). Opportunistic Management for Rangelands Not at Equilibrium. *Journal of Range Management, 42*(4), 266-274.

White, J. R. (1970). *Memorandum - Attention: Grazing* (Vol. G.R.I. Horse Control). Forest Agrologist, Kamloops BC: Ministry of Forests, British Columbia.

WHOAS. Wild Horses of Alberta Society (2007). November 22, 2007 Retrieved from http://northernhorse.com/wildhorses/

Willems-Braun, B. (2004). Buried Epistemologies: The Politics of Nature in (post)Colonial British Columbia. In N. Thrift & S. Whatmore (Eds.), *Cultural Geography: Critical Concepts in the Social Sciences, Volume II - Practicing Culture* (Vol. 2, pp. 327-363). London, New York: Routledge.

Williams, D. (2006-2011). Personal communication. Victoria, BC; Nemiah Valley, BC; Waterloo, ON.

Williams, D. (2011). *Wild Horses: Notes from the Field*. Friends of Nemaiah Valley E-Newsletter. March 2, 2011.

Williams Lake Tribune. (1995). Feral Horses a Problem. *Williams Lake Tribune*. August 10, 1995.

Wilson, P. I. (2002). Native Peoples and the management of natural resources in the Pacific Northwest: A comparative assessment. *The American Review of Canadian Studies 32*(3), 397-414.

Wismer, S. (2011). Personal Communication. Waterloo, Ontario.

Wismer, S., & Mitchell, B. (2005). Community-based Approaches to Resource and Environmental Management. *Environments, 33*(1), 1-4.

Wolfe, B. B., Armitage, D., Wesche, S., Brock, B. E., Sokal, M. A., Clogg-Wright, K. P., . . . Edwards, T. W. D. (2007). From Isotopes to TK Interviews: Towards Interdisciplinary Research in Fort Resolution and the Slave River Delta, Northwest Territories. *Arctic, 60*(1), 75-87.

Wong, C., Sandmann, H., & Dorner, B. (2004). *Historical Variability of Natural Disturbances in British Columbia: A Literature Review*. Report published by Forest Research Extension Partnership (FORREX), Kamloops, BC.

Wood, C. J. B. (Ed.). (2001). *British Columbia, The Pacific Province: Geographical Essays* (Vol. 36). Victoria, BC: Western Geographical Press.

Woodward & Company, LLP. (2007). *Decision Reached in Historical Land Claim Case: Tsilhqot'in Nation v. British Columbia, 2007 BCSC 1700.*

Woodward, J., Hutchings, P., & Baker, L. A. (2008). *Rejection of the "Postage Stamp" Approach to Aboriginal Title: The Tsilhqot'in Nation Decision*. Paper presented at the Continuing Legal Education Society of British Columbia, Victoria, BC.

Worster, D. (1994). *Nature's Economy: A History of Ecological Ideas, Second Edition*. New York: Cambridge University Press.

Wyatt, S. (2008). First Nations, forest lands, and "aboriginal forestry" in Canada: from exclusion to comanagement and beyond. *Canadian Journal of Forest Research, 38*, 171-180.

[XGFNG] Xeni Gwet'in First Nation Government. (1989). Nenduwh Jid Guzit'in Declaration. Nemiah Aboriginal Wilderness Preserve. Retrieved from, http://fonv.ca/nenduwhjidguzitindeclaration/ August 13, 2011.

[XGFNG and FONV] Xeni Gwet'in First Nation Government and Friends of Nemaiah Valley. (2002). ?Elegasi Qiyus Wild Horse Preserve Declaration. June 6, 2002. Nemiah Valley, BC. Retrieved from, http://www.fonv.ca/wildhorses/ August 13, 2011.

Yow, V. R. (1994). *Recording Oral History: A Practical Guide for Social Scientists*. London: Sage.

Yu, K. J. (1995). Cultural Variations in Landscape Preference - Comparisons among Chinese Subgroups and Western Design Experts. *Landscape and Urban Planning, 32*(2), 107-126.

Zalba, S. M., & Cozzani, N. C. (2004). The impact of feral horses on grassland bird communities in Argentina. *Animal Conservation, 7*, 35-55.

APPENDICES

APPENDIX A: RESEARCH PROTOCOL WITH XENI GWET'IN

MEMORANDUM OF AGREEMENT: RESEARCH PROTOCOL

Between:
Xeni Gwet'in First Nation Government
General Delivery
Nemaiah Valley, British Columbia V0L 1X0

(the "Xeni Gwet'in")

And:
Jonaki Bhattacharyya
PhD Candidate, University of Waterloo
School of Planning, Faculty of Environmental Studies
200 University Avenue West, Waterloo, ON
N2L 3G1

(the "Researcher")

WHEREAS:

A. Jonaki Bhattacharyya, under the supervision of Dr. Stephen Murphy, University of Waterloo, Ontario, will carry out fieldwork towards the completion of a graduate (doctoral) degree, in the Brittany Triangle, BC, Canada (see Summary Proposal, attached as Schedule "A");

B. The Brittany Triangle is within that part of the traditional territory of the Tsilhqot'in for which the Xeni Gwet'in are caretakers;

This Research Protocol Agreement (the "Agreement") records the mutual understandings of the Parties, as of the day and year recorded below.

1. The Xeni Gwet'in agree that Jonaki Bhattacharyya and any other researchers she uses (the "Researchers"), under the supervision of Dr. Stephen Murphy, may undertake the work set out in the attached Summary Proposal (Schedule A).

Communication Protocol

2. The Researcher will comply with the research intent, methodology and timeframe as set out in the attached Summary Proposal (Schedule A).

3. After the collection and analysis of data, a presentation on the research may be made to the Xeni Gwet'in and their community, should the Xeni Gwet'in wish it, at a location chosen by the Xeni Gwet'in.

4. The information and data gained about horses and any other plant and wildlife species will be made available to the Xeni Gwet'in.

5. A draft copy of the thesis and summary report of relevant data will be provided to the Xeni Gwet'in First Nation prior to the final draft, for their review and comments. The Xeni Gwet'in will have a period of three months to provide comments to the researcher. It is understood by

both parties that while research results cannot be changed, any difference of interpretation between the two parties can be noted and explicitly represented in the documents.

6. A copy of the final thesis and a summary report of relevant data will be provided to the Xeni Gwet'in.

Research Conduct and Knowledge

7. All research activities associated with this study, including the handling, storage and publication of data, shall be conducted with clearance from the University of Waterloo's Office of Research Ethics, according to their guidelines.

8. Whenever possible, local members of the Xeni Gwet'in First Nation community will be engaged in the research project (i.e. employed or volunteering as field assistants, translators, and in other roles).

9. The Researcher shall keep the identity of individual participants and interviewees anonymous in all published documents and public research presentations, except where permission to identify an individual is explicitly granted by that individual, either in writing or by verbal consent on an audio recording.

10. Raw interview data shall be kept confidential by the Researchers. Interview transcripts will be sent to interviewees for their review and approval, with the opportunity for interviewees to clarify or change wording, to ensure that their intended meaning has been communicated and correctly interpreted.

11. Interview recordings will be kept in confidence by the Researcher for seven years after the research has been conducted. After that time, a copy of the audio recordings and transcripts will be provided to the Xeni Gwet'in First Nation, should they wish it.

Publication and Research Results

12. It is understood and recognized that the people of the Xeni Gwet'in First Nation and the Tsilhqot'in First Nation are the owners and keepers of their traditional knowledge about the horses, other wildlife, plants, and all other aspects of their land use and management and cultural practices. The Researcher will explicitly recognize First Nations ownership of this knowledge in all publications of research results.

13. It is understood by all parties that any interpretations, analysis, and opinions regarding research results and data expressed in the thesis and other published documents reflect views held by the Researcher.

14. The Xeni Gwet'in understand that data gathered as part of this study may be summarized in report form by the Researcher, for use in the thesis, publications, and presentations for academic and professional purposes. Direct narrative quotations from interviews may be used after interviewees have reviewed and approved the interview transcripts.

15. The Xeni Gwet'in will be notified regarding any popular media (i.e. television, radio, or journalistic print publication) exposure that occurs with respect to the study.

16. It is understood by all parties that the research results, in the form of a doctoral thesis, academic publications, and public presentations, will be publicly available and accessible in accordance with university practices.

17. This Agreement is intended to support the efforts of the Xeni Gwet'in and the Researcher in their common objective of understanding the horses and conserving habitat in the Brittany Triangle; and

    a. Nothing in this Agreement shall abrogate or derogate from any aboriginal title or aboriginal rights of the Xeni Gwet'in or Tsilhqot'in people;

    b. Nothing in this Agreement shall be taken to mean that the Xeni Gwet'in First Nation or the Tsilhqot'in Nation has in any way abandoned or given up its rights.

18. This Agreement may be signed in counterpart.

The parties have signed below to witness entering into this Agreement,
this _____ day of _____, 2009.

_____ _____

Chief Marilyn Baptiste
for the Xeni Gwet'in First Nations Government

Witnessed and co-signed by:

_____ _____

Jonaki Bhattacharyya
PhD Candidate, University of Waterloo

Witnessed and co-signed by:

SCHEDULE "A" - SUMMARY PROPOSAL

Purpose of the Research Project

The purpose of this study is to analyse the ways in which socio-cultural and ecological information about free-roaming (wild) horses in the Brittany Triangle region of British Columbia (BC) can be combined to inform conservation planning initiatives in that area.

Research Objectives

- Quantify the ecological effects of free-roaming horses' feeding practices, and identify factors that influence ecological consequences of their habitat use
- Document local socio-cultural knowledge and perceptions of free-roaming horses
- Explore how ecological analysis and socio-cultural perspectives can be integrated to inform conservation planning and land use management in the study area.

Methodology

In keeping with the principles of transdisciplinary research, the study will be approached with respect for scientific integrity, local knowledge, First Nations culture, knowledge and livelihoods, and community preferences. The Researcher will use motorized access (ATV when possible, otherwise truck) on established trails and roads to transport materials and field assistants to the research cabin (Far Meadow), and occasionally beyond, to haul field materials. Whenever possible, the use of motorized access will be avoided.

Vegetation monitoring procedures will include using a line-point intercept method to sample and measure vegetation in 10 meadows within the study area in the northern portion of the Brittany Triangle (Nuntsi Provincial Park). Grazing exclosures (constructed of burned timber and fencing wire) will be constructed to effect ungrazed plots in 5 meadows. Transects will be temporarily marked with tent pegs and flagging tape at random locations throughout the sampled meadow sites. Fecal samples of free-roaming horse dung may also be collected and tested as a supplementary method for determining the composition of horse diets. All exclosures, flags and transect markers will be removed by the Researcher after the study is complete unless the Xeni Gwet'in, the BC Ministry of Environment, and the Researcher agree otherwise.

Socio-cultural data collection will include observations and field notes by the Researcher, a review of existing publicly available interview data from previous studies, and key informant interviews. Semi-structured interviews will seek to build upon previously documented information, and to represent diverse perspectives, with specific reference to ecology and cultural perceptions of horses in the Brittany Triangle region. Interviews will be recorded with permission from interviewees.

Research Outputs

Raw data (field measurements and interview data) will be analysed and synthesized by the Researcher. Study results will be summarized and presented in academic publications and presentations in an aggregate form, with some narrative quotations from interviews included.

Research outputs will include a PhD thesis, associated peer reviewed publications and academic conference presentations. A summary report, together with a presentation of results will be made available to the Xeni Gwet'in First Nation, community members, and FONV, and may be shared with other parties upon request.

Agreements and Protocols

Scientific data collection for this study within Nuntsi Provincial Park has received approval from the BC Ministry of Environment (Park Use Permit # CA0710381). Social data collection will also be subject to approval from the University of Waterloo Office of Research Ethics.

Timeframe

Field research will be conducted during 2008-2009. Thesis completion and defense is tentatively scheduled for August 2010. The timeframe completion of the thesis and subsequent reports, publications, and presentations is an estimate, only.

APPENDIX B: QUANTITATIVE METHODS FRAMEWORK

Research Question	Specific Questions[2]	Collection Method (Data Gathering)	Analysis Method (Data Analysis)	Info Yielded
What are the vegetation species and plant community composition in the horses' feeding habitat?	Identify: What are the horses eating?	Dung/fecal samples: - Gather composite fecal samples near each sample site. - CAN control for: location where sample is collected; # of piles sampled from for each composite; and date of collection. - CAN'T control for: exact age of dung; # of individual horses (vs. repeat samples from one horse); or where contents were eaten.	Microhistological analysis of dung samples. Data incomplete due to cost of lab tests, trouble storing and transporting samples from field site and during fire evac.	Vegetation consumed by horses - good to 5% composition - yields type of vegetation to level of genus
		Observation / Evidence of grazing. Note of locations and characteristics of heavily grazed plants, versus those not so intensely grazed.	Identification of grazed stems, grazing patterns and intensity, vegetation communities	Plants (genus, perhaps species) showing evidence of grazing.
	Measure and Quantify: What are the species of vegetation where horses are feeding? Direct effects=vegetation measurements. Indirect effects=soil measurements.	Measurement and Monitoring of vegetation in comparable grazed and ungrazed areas: 4 exclosures in different locations @ ~4.5m diameter. - 5 transects in each exclosure - Buffer from exclosure fence: internal 50cm Dealing with edge effect in exclosures: - collect data to edge, throw out edge data; - OR compare edge data to core data to see whether they differ; - OR throw out data on wind-dispersed spp.	Data Incomplete due to: - Limited equipment for construction of exclosures resulting from distance from transportation by foot; - Collapse of exclosures prior to first field season (winter 2007-2008) as a result of snow and wildlife interference.	N/A
		Measurement of vegetation in 8 sample meadows (4 selected for accessibility and 4 randomly selected). - 10 transects in each meadow; stratified random design. Point Line Intercept; measure points at 20cm intervals along transect. - Length of transects: 10m - Buffer from exclosure fence: external 10m. Measurements (metrics) to record along transect: - Plant identification (to genus or spp.) - Height of plant where it contacts point marker - Soil disturbance / compaction (1m intervals). - General conditions of soil and vegetation; evidence of grazing; proximity to landscape features..	Frequency analysis. Analysis of Variance (ANOVA) Multivariate ANOVA (MANOVA) - Comparing between meadows, seasons, and meadows 1-4 vs. 5-8. Regression and correlation between litter layer, plant height and "no live veg" measurements.	Comparison of community composition between treatments. - plant ID to genus or spp. - variance in vegetation between meadows grazed by horses, affected by fire - variance in vegetation between seasons

APPENDIX C: INTERVIEW FRAMEWORK

#	CORE INTERVIEW QUESTIONS*	PROMPTS
1	Can you tell me what the horses eat?	• Seasonally
2	Where do you think the horses prefer to live?	• Seasonally – forest, meadows, both?
3	Can you tell me how far the individual bands of horses roam?	• Brittany Triangle bands • Do they mix with Nemiah Valley horses? • Do they cross the rivers out of the Brittany?
4	How many horses do you believe there are in the Brittany?	• How did you arrive at that #? • For all: Clarify between personal knowledge/observation and things participants have heard from other sources. Ask them how they know...
		•
5	How do you think the horses affect the plants, other animals, and the land?	• For govt workers, just ask: what ecological effects do the horses have in the Brittany Triangle? • Interactions or competition with moose, wolves, etc.
6	Have you seen wild horses in the Brittany Triangle?	• Elsewhere in the Chilcotin? • When? • Can you tell me about it? • What do you feel when you see them? (Like them being there? Annoyed? Mixed?) • How do you feel about them being there, when you aren't seeing them? (same prompts)
7	Do the wild horses have meaning to you personally, your community, to your cultural heritage, to your future?	• Are they important to you? Do you dislike them? • Do you think they have symbolic meaning? • Modify wording for FN versus Govt, slightly.
8	How have wild horse populations in the Brittany been managed, in the past?	
9	How would you like to see the horse population managed, if at all?	
10	Who do you think should be involved in making these decisions, and how?	

*Note: The interviews were semi-structured. Hence the discussion followed the flow of conversation, and at times other questions were asked in response to new information volunteered by participants. Questions listed here are simply an indication of the core topics that were covered in most interviews.

APPENDIX D: QUALITATIVE ANALYSIS CODING STRUCTURE

START (CATEGORY) CODES – ORGANIZATIONAL AND DESCRIPTIVE FOR OPEN CODING

CULTURAL-ECOLOGICAL COMPLEX			
CE:	TRADITIONAL MANAGEMENT AND ACTIVITIES		
CE:	Traditional Activities (+ H = with Horses)	CE: TRAD-ACT	
CE:	Hunting; Fishing; Seasonal Movement; Gathering		
CE:	Transportation; Haying	CE: H-TRANS	
CE:	Land Use (People)	CE: LANDUSE	
CE:	Meadows	CE: LANDUSE-Meadows	
CE:	Rivers	CE: LANDUSE-Rivers	
CE:	Integrated Livelihoods		
CE	Wild Horses - Traditional Management		
	Release Domestic Horses; Round-Up; Breeding		
CE:	WILD HORSES CULTURAL COMPLEX		
CE:	Wild Horse Chasing / Catching	CE: WILDH-CH	
CE:	Corrals; Baiting	CE: WILDH-CH Corral	
CE:	Snares	CE: WILDH-CH Snare	
	Round-Up		
CE:	Wild Horse Training	CE: WILDH-TRAIN	
CE:	Wild vs. Domestic Horses	CE: WILDvsDOM	
	Cultural Perspectives		
	Wild Horse Icon		
	Symbolism; Iconic;		
	Personal / Individual Values		
CE:	COMMUNITY / CULTURE / LAND / PLACE		
CE:	Language	CE: LANG	
CE:	Culture, Community, Identity	CE: COMM	
	Responsibility		
CE:	Elders / Youth & Future	CE: EL-YOU	
CE:	Spirituality & Power	CE: SPIR	
CE:	Specific Places (of Interest to Study)	CE: PLACE	
CE:	Brittany Triangle	CE: PLACE-BT	
CE:	Far Meadow	CE: PLACE-FM	
CE:	Nunsti Park	CE: PLACE-Nunsti	
HORSE ECOLOGY			
HE:	Horse Population	HE: H-POP	
	Numbers		
	Specific bands/ types/ places		
HE:	Horse Forage/Feeding	HE: H-FEED	
	Domestic vs. Wild		
	Seasonal		
HE:	Horse Habitat & Range Use	HE: H-HAB	
	Seasonal		
	Territory; Range; Spatial/Terrain Preferences		

HE:	Wild Horse Characteristics / Behaviour	HE: WH-CHAR	
HE:	Horses as Agents		
	Wild Vs. Domestic		
	Inbreeding		
HE:	Horse-Wildlife Interaction	HE: H-WILDLF	
HE:	Horse-Livestock Interaction	HE: H-LIVSTK	
LANDSCAPE ECOLOGY			
LE:	ECOSYSTEM HEALTH	LE: ECO-HLTH	
LE:	ECOSYSTEM CHARACTERISTICS	LE: ECO-CHAR	
LE:	Plant Communities;Vegetation		
LE:	Ecological Drivers	LE: ECO-DRV	
LE:	Climate Conditions	LE: CLIM	
	Precipitation; Drought; Zone;		
LE:	WILDLIFE / LIVESTOCK	LE: WILDLF; LE: LIVSTK	
	Predators	LE: PRED	
	Wolves; Cougar; Bears		
	Cattle	CATTLE	
	Grazing Practices; Range Use; Behaviour		
	Feral Cows		
LE:	ANIMAL-LAND INTERACTION	LE: ANIM-LND INT	
LE:	Range Health	LE: RNG-HLTH	
	Carrying Capacity; Overgrazed Areas		
POLITICS & MANAGEMENT			
PM:	KNOWLEDGE SYSTEMS AND INFORMATION		
PM:	Definitions of Wild	PM: DEF-WILD	
	Information Needed; Gaps		
	Local Knowledge		
	Different Perspectives; Understandings		
	Research		
PM:	DECISION-MAKING, POWER & PROCESS	PM: DEC-POW	
	Capacity		
	Collaboration; Integration		
	Enforcement		
	Attitudes; Values; Perspectives; Priorities		
	Public Relations		
	Politics		
	Pressure and Coercion		
PM:	STRUCTURES	PM: STR	
PM:	Government / Governance	PM: GOV	
	Policy		
PM:	Legislation	PM: LEG	
	Classification (of horses)		
PM:	Jurisdiction and Court Case	PM: JURIS	

PM:	MANAGEMENT		
	Challenges; Approaches; Priorities		
	Units of Management		
	Ecosystem / Land Management		
	Wildlife Management		
	Fire Management		
	Wild Horse Management – Historic		
	Round-Up		
	Bounty; Slaughter		
PM:	Range Management and Practice	PM: RG-MGMT	
	Historically; Currently;		
	Comparative Practices		
PM:	Ranching	PM: RANCH	
	Moving Cattle; Range Riders		
	Fencing		
PM:	Range Fees and Organizations	PM: RG-FEES/ORG	
PM:	Forestry	PM: FOR	
	Clearcuts		
PM:	ECONOMICS	PM: ECON	
	Market Conditions		
	Subsidies		
METHODS			
MD:	Aerial Count	MD: AER-COUNT	
MD:	Exclosures	MD: EXCL	
QUERIES			
	To Check		

Groupings:

CON	Conditions/Context
PLC	Places
PERS	Perspectives - Ways of Thinking/Seeing Others
STRAT	Strategies
TECH	Techniques
REL	Relationships and Social Structure
EVT	Events
ACT	Activities
STOR	Stories
LIVH	Livelihoods

PATTERN CODES

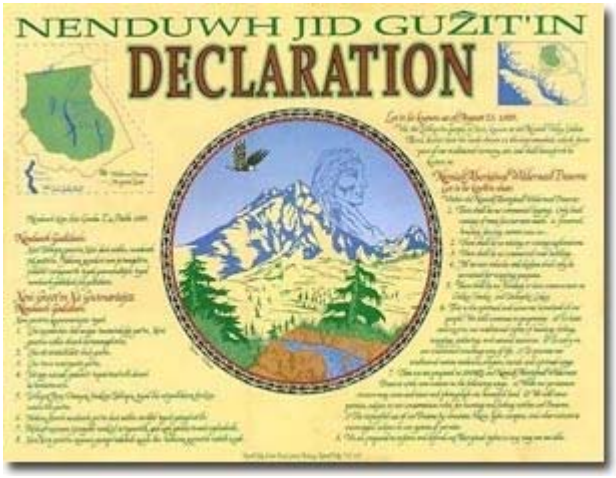
	Ecosystem Drivers	THM: DRIVER
	Wild Horse Ecology / Habitat Use	THM: WH-HAB
	Wildlife / Horse / Livestock Interaction	THM: ANIM-INT
	Wild Horse Behaviour / Characteristics	THM: WH-CHAR
	Horse and Cultural Uses	
	Perceptions (of other people, groups)	THM: PERC
	Cultural Values / Attitudes / Beliefs	THM: CUL-VAL / ATT / BEL
	Symbolism / Meaning	THM: SYMBOL
	Identity	THM: ID
	Place	THM: PLACE
	Techniques / Strategies	THM: TECH / STRAT
	Cultural Practice	THM: CUL-PRAC
	Land Use (Historic)	
	Power Relations	THM: POW-REL
	Politics (Historic)	THM: POL (HIST)
	Information Needed / Gaps	THM: INFO-GAP
	Knowledge Systems / Type	THM: KNOWL SYST
	Planning and Management	THM: PLAN-MGMT
	Management (Historic)	THM: MGMT (HIST)

APPENDIX E: NENDUWH JID GUZIT'IN DECLARATION
Nemiah Aboriginal Wilderness Preserve

Let it be known that:
Within the Nemiah Aboriginal Wilderness Preserve:

- There shall be no commercial logging. Only local cutting of trees for our own needs. i.e.firewood, housing, fencing, native uses, etc.
- There shall be no mining or mining explorations.
- There shall be no commercial road building.
- All terrain vehicles and skidoos shall only be permitted for trapping purposes.
- There shall be no flooding or dam construction on Chilko, Taseko, and Tatlayoko Lakes.
- This is the spiritual and economic homeland of our people. We will continue in perpetuity:
    - To have and exercise our traditional rights of hunting, fishing, trapping, gathering, and natural resources.
    - To carry on our traditional ranching way of life.
    - To practice our traditional native medicine, religion, sacred, and spiritual ways.
- That we are prepared to SHARE our Nemiah Aboriginal Wilderness Preserve with non-natives in the following ways:
    - With our permission visitors may come and view and photograph our beautiful land.
    - We will issue permits, subject to our conservation rules, for hunting and fishing within our Preserve.
    - The respectful use of our Preserve by canoeists, hikers, light campers, and other visitors is encouraged subject to our system of permits.
- We are prepared to enforce and defend our Aboriginal rights in any way we are able.

Declared August 23, 1989



(Xeni Gwet'in First Nations Government, http://xeni.ca/Home/Documentation/tabid/66/Default.aspx, 2008)
(Friends of Nemiah Valley, http://fonv.ca/nenduwhjidguzitindeclaration/ Retrieved August 13, 2011)

APPENDIX F: ?ELEGESI QIYUS WILD HORSE PRESERVE DECLARATION

Let it be known as of June 6th, 2002.

We the Tsilhqot'in people of Xeni, known as the Xeni Gwet'in First Nations Government, declare the following in accordance with the Nemiah Aboriginal Wilderness Preserve Declaration:

1. The traditional relationship between the Xeni Gwet'in and wild horses shall continue, and the Xeni Gwet'in First Nations Government, while recognizing and affirming the rights and traditional practices of other members of the Tsilhqot'in Nation, shall be the authority and steward on all matters concerning wild horses within the lands delineated by the Nemiah Aboriginal Wilderness Preserve Declaration, which is hereby declared the ?Elegesi Qiyus Wild Horse Preserve.
2. The ?Elegesi Qiyus Wild Horse Preserve shall, subject to the Nemiah Aboriginal Wilderness Preserve Declaration and the exercise of traditional Tsilhqot'in practices, be protected from human related disturbance.
3. Wild horses are sensitive to disruption of the natural environment and their preservation and security requires protection of their habitat; therefore, disruption of the environment, including flora and fauna, in the ?Elegesi Qiyus Wild Horse Preserve, is prohibited unless authorized or consented to by the Xeni Gwet'in First Nations Government.

?Elegesi is the Tsilhqot'in name for Eagle Lake Henry, and Qiyus is Tsilhqot'in for cayuse. Eagle Lake Henry is the English language name for a well known Tsilhqot'in forebear of many Xeni Gwet'in. He ranched extensively in and around the Brittany Triangle and pre-empted the land upon which the FONV research cabin now sits. Cayuse is the word for horse, or mustang, derived from the name of a now vanished tribe of natives who inhabited the present day north west United States.

(Xeni Gwet'in First Nations Government, http://xeni.ca/Home/Documentation/tabid/66/Default.aspx, 2008)
(Friends of Nemiah Valley, http://www.fonv.ca/wildhorses/ Retrieved August 13, 2011)

APPENDIX G: MAP OF XENI GWET'IN TERRITORY