

Charting a New Course

**Collaborative Environmental Health Mapping
with the Isga Nation in Alberta, Canada**

By

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ABSTRACT

Many Indigenous communities around the world are facing a health crisis aggravated by environmental degradation and dispossession. Through community-based participatory research, we examined barriers to land use, declining environmental health and human health implications for the *Isga* People in west-central Alberta, Canada. Through interviews, land use-and-occupancy and traditional and local knowledge of environmental change was spatially documented. Key concerns including declining wildlife health and water quality were largely attributed to the petroleum and forestry industries. Barriers included the encroachment of industry, agriculture and urban development, and a legacy of state-imposed assimilation policies. Human health concerns were associated with these barriers and environmental degradation along with a loss of connection to land and cultural practices. However, community resilience was also evident in the persistence of land use and cultural revival. Underlying environmental and sociopolitical factors are crucial for the health and wellbeing of the *Isga* and Indigenous Peoples worldwide.

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DEDICATION

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TABLE OF CONTENTS

ABSTRACT	ii
ACKNOWLEDGEMENTS	iii
DEDICATION	v
TABLE OF CONTENTS	vi
LIST OF TABLES	viii
LIST OF FIGURES	viii
LIST OF PLATES	viii
1 ABA WASHDED: INTRODUCTION	1
1.1 Environmental and Human Health in Indigenous Lands and Communities	1
1.2 Oil Country and Indigenous Peoples: The Intensity of Industry in Alberta	3
1.3 In-Land-and-Life and the Mapping Study	5
1.4 Research Purposes and Objectives	6
1.5 Chapter References	8
2 LITERATURE REVIEW	14
2.1 Indigenous Health and Environmental Justice	14
2.2 Integrative Health Approaches	18
2.2.1 One Health	19
2.2.2 Social-Ecological Systems	20
2.2.3 EcoHealth	21
2.3 Wildlife Health Risk Assessment and Communication	24
2.4 Integrating Knowledge and Research Paradigms: Traditional Knowledge and Western Science	27
2.4.1 Indigenous, Traditional and Local Knowledge	29
2.4.2 Land Use-and-Occupancy Mapping	32
2.4.3 Participatory Mapping and Geospatial Technologies	34
2.5 Chapter References	40
3 THE ISGA NATION IN ALBERTA	56
3.1 The <i>Isga</i> Nation: the <i>Isga</i> of Alexis Nakota Sioux Nation and Paul First Nation ...	56
3.2 Political Context	58
3.3 <i>Yusbemakina: Isga Ways of Knowing</i>	59
3.4 Chapter References	63
4 METHODOLOGY	65
4.1 Methodological Approach	65
4.2 Evolution of the Study Design	67
4.3 Data Collection, Analysis and Ethical Considerations	69
4.4 Chapter References	73

5	ISGA LAND USE AND OCCUPANCY	75
5.1	Abstract	75
5.2	Introduction	75
5.2.1	Indigenous Land Justice	75
5.2.2	Barriers to Indigenous Land Use and Occupancy in Alberta, Canada	78
5.2.3	The <i>Isga</i> People and Territories	80
5.3	Purpose and Objectives	82
5.4	Methodology	83
5.4.1	Methodological Approach	83
5.4.2	Research Design and Methods	84
5.5	Findings	87
5.5.1	The Land from an <i>Isga</i> Perspective	87
5.5.2	Barriers to Land Use and Occupancy	93
5.5.3	Responses to Barriers	101
5.6	Discussion	105
5.7	Conclusion	114
5.8	Chapter References	118
6	ENVIRONMENTAL AND HUMAN HEALTH WITHIN THE ISGA NATION	127
6.1	Abstract	127
6.2	Introduction	127
6.2.1	Indigenous Environmental Justice	127
6.2.2	One Health and EcoHealth	128
6.2.3	Indigenous Knowledge Systems and Traditional Knowledge in Research	130
6.2.4	The <i>Isga</i> People and Changing Environmental Health	132
6.3	Purpose and Objectives	134
6.4	Methodology	136
6.4.1	Methodological Approach	136
6.4.2	Research Design and Methods	137
6.5	Findings	139
6.5.1	<i>Mini</i> (Water)	140
6.5.2	<i>Wadezha</i> (Animals)	141
6.5.3	Health of the <i>Isga</i> People	144
6.5.4	Land-use Impacts	146
6.5.5	Cumulative Impacts on the Health of Land and People	157
6.6	Discussion	161
6.7	Conclusion	169
6.8	Chapter References	173
7	CHARTING A NEW COURSE	185
	APPENDIX - Consent form	193

LIST OF TABLES

Table 6.1 Number of participants that discussed concerns about each major land-use type	146
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LIST OF FIGURES

Figure 3.1 Eagle River Singers practice at <i>Wakâ Mne</i> (Lac Ste. Anne)	56
Figure 3.2 <i>Isga</i> women cut and prepare moose meat for drying and smoking	59
Figure 6.1 Progressions of cumulative impacts to environment and health on the <i>Isga</i> lands	160

LIST OF PLATES

Plate 5.1 <i>Isga</i> land use and occupancy across central Alberta, Canada	88
Plate 5.2 The <i>Wapta Mnode/Nuba</i> (Whitcourt) region	90
Plate 5.3 <i>Isga</i> place names in the Cynthia, Lodgepole and Drayton Valley region	92
Plate 5.4 The Rocky Mountains and foothills of the <i>Isga</i> traditional territories	95
Plate 6.1 Harvest locations of sick and/or abnormal moose in the <i>Isga</i> territories	143
Plate 6.2 Lodgepole area with high density roads and oil and gas developments	148
Plate 6.3 Lake Wabamun, the Paul First Nation Reserve and surrounding industrial impacts	153
Plate 6.4 Industrial and other disturbances documented in the <i>Isga</i> territories	158
Plate 6.5 Forestry, oil and gas and agriculture in the south-central region of the <i>Isga</i> territories.....	159

***ABA WASHDED*¹: INTRODUCTION**

We need to look at who we are and where we are. We're in the largest empire and we consume a third of the world's resources. That requires constant intervention into other people's lands, and constant violations of other people's human rights.

– Winona LaDuke, 2010

1.1 Environmental and Human Health in Indigenous Lands and Communities

Indigenous Peoples around the world are among those most affected by injustice resulting from declining environmental health (Adeola 2000; Shrader-Frechette 2002). Indigenous communities are often vulnerable to environmental degradation associated with pollution, deforestation, water shortages and declines in culturally important species upon which they depend for food, among other uses (Weinberg 2010; Durigan et al. 2013; Turner et al. 2013). From the concentration of waste disposal sites near Indigenous and other racialized and low-income communities (UCC 1987; Bullard 1990) to reduced access to clean water (Reading et al. 2011; White et al. 2012), these communities often disproportionately bear the burden of environmental contamination. Access to healthy food is another key issue where traditional foods are no longer abundantly available (Muir and Booth 2012; Turner et al. 2013) or contain high levels of contaminants from industrial sources (Kuhnlein and Chan 2000; Van Oostdam et al. 2005; Miller and McLachlan 2012; McLachlan 2014). Wild harvested foods remain central to many Indigenous cultures and traditions and are important for both food security and food sovereignty in these communities (Arquette et al. 2002; Thompson et al. 2012). However, many Indigenous Peoples in Canada are concerned about increases in environmental contaminants in traditional animal and plant food sources, which undermines their confidence in and consumption of wild-caught foods (AFN 2007). Exposure to pollution and also wildlife disease (Harper and Harris 2008) are of increasing concern among Indigenous communities.

¹ *'Aba washded'* is a greeting in the *Isga* language, meaning 'good day'.

The overall health of Indigenous Peoples is a concern around the globe. Indigenous populations have consistently poorer health indicators than non-Indigenous populations worldwide (Stephens et al. 2006; Nettleton et al. 2007). In Canada and other wealthy countries with a colonial history, the disparities between Indigenous and non-Indigenous health status are particularly extreme (Ring and Brown 2003; Waldram et al. 2006). While the health of Indigenous Peoples is extensively researched and monitored in countries such as Canada, Australia and New Zealand, the role of the environment in Indigenous health has only relatively recently been discussed in 'western' scientific health literature (Stephens et al. 2006).

Indigenous Peoples typically have a fundamental connection to their land that is vital to their health and wellbeing. There is a common thread in Indigenous conceptualizations of health as being holistic and relational, encompassing the interrelated aspects of individual, family and community health; traditional foods and medicines; culture and language; and the land and environment (Adelson 1998, 2000; Stephens et al. 2006; Nettleton et al. 2007; King et al. 2009; Kirmayer et al. 2009). Even for Indigenous Peoples that have been displaced or have become dependent on dominant colonial and economic forces within their territories, maintaining connections to traditional lands is crucial to cultural identity, as well as physical, mental and spiritual health (King et al. 2009). Because of this essential connection to land and ecosystems, Indigenous communities are particularly vulnerable to displacement and dispossession of their traditional lands as well as environmental change caused by development and industrial activity (Stephens et al. 2006).

Despite the profound implications of environmental degradation for the health of Indigenous Peoples, they are seldom involved in decision-making regarding these issues. Environmental research and land use management in modern states has typically excluded the input of Indigenous Peoples, and shown little consideration for their land-based harvesting, economies and cultures (Lane 2006; McGregor

2011). However, there is a growing awareness of the importance of collaborating with Indigenous communities in land and resource management, from a social and environmental justice perspective (Lane 2006; Reed 2009). Land-based Indigenous Peoples have a great deal of knowledge about ecosystem components and processes as well as long-term landscape change in their traditional lands (Berkes 2012). This knowledge has made valuable contributions to environmental research, natural resources conservation, and land use planning and management practices (e.g. Ferguson and Messier 1997; McNay et al. 2008; Treseder and Krogman 2008; De Freitas and Tagliani 2009). Indigenous management or co-management of natural resources and protected areas is becoming a more common approach in some countries, including in Canada (e.g. Hunn et al. 2003; Natcher 2008; Thomlinson and Crouch 2012). Particularly in northern Canada, environmental health research and resource management are now often initiated and conducted in collaboration with Indigenous communities (e.g. Kendrick 2003; Armitage 2005; Berkes et al. 2007). On the other hand, many of these initiatives are criticized as inadequate and creating an undue burden for these communities (Nadasdy 2005), whereas in more southern parts of the country Indigenous Peoples have had significantly less opportunity for involvement in land use decision-making and natural resources management (AAS 2014; Thompson 2006).

1.2 Oil Country and Indigenous Peoples: The Intensity of Industry in Alberta

The province of Alberta is home to a broad diversity of Indigenous Peoples, including 45 officially-recognized First Nations, including Cree, Dene, Stoney/Nakota, Blackfoot and Saulteaux Peoples, as well as eight Métis settlements (AANDC 2014; Government of Alberta 2014). Through federal treaties, colonization and development activity, all of these communities have experienced the appropriation of much of their traditional land base for the economic activities of the dominant society.

Alberta is reliant on industrial resource extraction and processing activities, especially those associated

with the petroleum industry. Between oil and gas wells and oil sands mining in northern Alberta, the province has become one of the world's largest oil and gas producing regions (Evans and Garvin 2009; Johnson and Coderre 2011). Nearly 500 000 oil and gas wells have been drilled in the province, with an associated 400 000 kilometres of pipelines (Lee et al. 2009). The extraction of unconventional oil and natural gas, including coalbed methane and shale gas using controversial hydraulic fracturing technology, is also on the rise (Government of Alberta 2012; AER 2014; Bennett 2014). Forestry is another major industry in Alberta, and 64 000 – 82 000 hectares of forests have been harvested every year since the mid-1990s (CCFM 2012). Almost all logging in the province is done by clearcutting (98.6% in 2007) and nearly all of this in primary forests (Lee et al. 2009). Coal mining and electricity generation are more localized but also represent significant land uses. Alberta mines and consumes more coal than any other province in Canada (Jardine et al. 2007; Lee et al. 2009), and 36.9 million tonnes of coal were produced in 2011 (Alberta Energy 2011).

Agriculture is another major land use in Alberta. Beginning in the late 1800s, agricultural activity including livestock grazing and cultivation dramatically altered prairie and parkland regions (Van Tighem 1993; Bradley and Wallis 1996). As of 2005, nearly 38% (25 million ha) of Alberta's land base was being used for agriculture (Stelfox 2010), with most of this under private ownership (Government of Alberta 2008). Along with agriculture came non-Indigenous population expansion and settlement. The expansion of settled and urban areas has occurred continuously in central Alberta since the late 1800s, and in more recent decades following the booms of the resource extraction-based economy (Stamp 2014). In the last half century, the population of Alberta has nearly tripled (Statistics Canada 2011). Residential properties now cover a total of 225 000 ha in the province, in turn representing an average annual growth rate of ~3% (Stelfox 2010).

This rapid land use change in Alberta has had serious repercussions for Indigenous communities across

the province. The situations of the Lubicon Lake Nation in north-central Alberta and the Athabasca Chipewyan and Mikisew Cree First Nations in northeastern Alberta are some of the more well-publicized examples of communities whose health and livelihoods have been profoundly impacted by the petroleum industry (Timoney 2007; Passelac-Ross and Buss 2011; Bork 2012; Huseman and Short 2012; McLachlan 2014). However, there are many other Indigenous Peoples in Alberta whose livelihoods and wellbeing have been heavily impacted by resource extraction industries. The *Isga* people of the Alexis Nakota Sioux Nation (ANSN) and the Paul First Nation (PFN) in west-central Alberta have also experienced serious declines in the environmental health of their traditional lands concurrently with dramatic increases in the intensity of industrial land uses (Arai 2007; Potts-Sanderson 2010).

1.3 In-Land-and-Life and the Mapping Study

Isga Elders and hunters have observed that the health and abundance of moose and other wildlife have declined in recent decades in their traditional territories in west-central Alberta. Moose are used extensively as a food source and for ceremonies, and arguably represent a cultural keystone species for the *Isga* (Misty Potts-Sanderson 2010, pers. comm.). However, community members are often reluctant to bring these kinds of concerns to provincial wildlife management officials and in most cases actively distrust these agencies. The In-Land-and-Life partnership was born out of discussions between *Isga* Elders and other community members and researchers at the University of Manitoba about these wildlife health concerns. The In-Land-and-Life partners included the Alexis Nakota Sioux Nation (ANSN), the Paul First Nation (PFN), the Yellowhead Tribal Council, and researchers from the Universities of Manitoba, Calgary and Saskatchewan, as well as the Justice Institute of British Columbia. Academic researchers who participated in this collaboration included social scientists, ecologists, wildlife biologists, and veterinary pathologists. The *Isga* communities invited these researchers to help them study changes in wildlife and environmental health from both a Traditional Knowledge (TK) and scientific perspective.

One component of In-Land-and-Life was a collaborative mapping study that helped to describe changing environmental health and also traditional land use within the *Isga* territories. I facilitated this mapping project from 2010-14. Participants in the study included *Isga* Elders, hunters, and other community members who hunt, fish, cut and dry meat, camp, pick berries, harvest plants, or otherwise have a familiarity with some of the traditional lands of their families and communities. The study also included the participation of several non-Indigenous people who live and harvest within the *Isga* traditional lands.

1.4 Research Purposes and Objectives

The goals and components of the mapping study evolved substantially over the course of the research. Initially, I focused on documenting spatio-temporal changes to the health of moose and other wildlife harvested for food. As I became more familiar with community concerns, this focus expanded to include a wider range of environmental health issues, including water and air quality, and vegetation. Many *Isga* also identified connections between changing environmental health and human health in their communities. It was also important to the community members that land use and occupancy be documented, including important camping and harvesting areas, wildlife habitat, *Isga* place names, and stories and history of significant places on the land. Thus, the intent of the mapping study grew considerably in scope as I incorporated these various components. Ultimately, the overall goal was to explore the connections between environmental health, human health, and the cultural survival of the *Isga* People in the face of multiple pressures and disturbances to the ecology of their traditional lands as well as to their relationships with these lands.

Chapter 5 details the land use and occupancy component of the mapping study, through the following objectives:

- Characterize past and present land use and occupancy in the *Isga* traditional territories, including *Isga* language place names, descriptions and associated stories and history;

- Identify and describe barriers that the *Isga* have faced in practicing land use and occupancy, including access to land and resources as well as other challenges to maintaining livelihoods and cultural practices; and
- Characterize the impacts of these barriers on the wellbeing and cultural survival of the *Isga* People, as well as responses by the *Isga* to deal with and adapt to the barriers.

Chapter 6 explores the relationships between landscape disturbance, environmental health and human health in the *Isga* communities, through the following objectives:

- Characterize spatio-temporal variations in environmental health in the traditional territories of the *Isga*;
- Assess how environmental and human health are affected by changes in surrounding land use, including activities such as industrial resource extraction, development and other anthropogenic disturbance; and
- Describe the cumulative impacts of development and disturbance on environmental and human health and wellbeing within the *Isga* territories and communities.

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2 LITERATURE REVIEW

2.1 Indigenous Health and Environmental Justice

There is increasing awareness of the importance of environmental health for the health and wellbeing of Indigenous Peoples around the world. However, the concept of 'Indigeneity', and who is considered to be 'Indigenous' is often highly contested (Smith 1999; Kuper 2005; Stephens et al. 2006). There is no universally accepted definition of 'Indigenous Peoples', due to the cultural and linguistic diversity and distinctiveness of various Indigenous communities as well as the complexity of the political contexts within which they are embedded (Smith 1999; United Nations 2004; Stephens et al. 2006). One commonly cited understanding of the term was reached by the United Nations Study of the Problem of Discrimination Against Indigenous Populations in the 1980s (the Martinez Cobo study):

Indigenous communities, peoples and nations are those which, having a historical continuity with pre-invasion and pre-colonial societies that developed on their territories, consider themselves distinct from other sectors of the societies now prevailing on those territories, or parts of them. They form at present non-dominant sectors of society and are determined to preserve, develop and transmit to future generations their ancestral territories, and their ethnic identity, as the basis of their continued existence as peoples, in accordance with their own cultural patterns, social institutions and legal system (United Nations 2004:2).

This historical continuity may consist of the continuation of the occupation of ancestral lands, common ancestry with the original occupants of these lands, culture, language, residence or other relevant factors. The Martinez Cobo study emphasized that Indigeneity is determined on an individual basis through self-identification, and also affirmed the right of Indigenous communities to decide who belongs without any external interference (United Nations 2004). The United Nations Working Group on Indigenous Populations, in the Draft Declaration on the Rights of Indigenous Peoples, concluded that Indigenous Peoples could not be universally defined, but have explicitly included the right to identify as Indigenous and to be recognized as such (United Nations 2004).

In North America, the distinctions between 'Indigenous' and 'non-Indigenous' are generally more clear than in some other parts of the world (Stephens et al. 2006); however, there is still much controversy about who should have Indigenous status and who should be included as members of particular communities (Lawrence 2003). In Canada, the terms Indigenous and Aboriginal are generally used to include three groups: First Nations (status or non-status), Inuit, and Metis (RCAP 1996). Federal laws and policies have imposed criteria determining who has Indigenous status, and who is eligible for band or Nation membership (Lawrence 2003; Hanson 2009). Also, there is much debate about the location and extent of many Nations' traditional territories, as colonialism caused migrations of Indigenous groups and shifts in territorial locations and boundaries across North America (e.g. McLoughlin 1993; Botting 2005; Potts-Sanderson 2010).

Indigenous communities frequently are faced with multiple disturbances to their traditional lands and ecosystems. These disturbances are typically the result of economic activities of the dominant societies that now control the land (e.g. Nutall 1998; Munsterhjelm 2002; Connor et al. 2008; Schlosberg and Carruthers 2010) including mining, oil and gas extraction and refining, hydro-development, forestry, commercial fishing, agriculture, manufacturing, recreation and tourism, among other land uses (e.g. Mascarenhas 2007; Connor et al. 2008; Lawrence 2009; Schlosberg and Carruthers 2010; Parlee et al. 2012; Rudolph and McLachlan 2013). The cumulative impacts of such industrial land use combined with population expansion and urbanization have had devastating consequences for many species and ecosystems around the globe (e.g. Harris 1988; Schneider et al. 2003; Xue et al. 2004; Schindler and Smol 2006). These cumulative environmental impacts are also increasingly affecting the health of people, although such health impacts are disproportionately greater for some communities and cultures than others (Morello-Frosch et al. 2011). Typically, Indigenous Peoples are among those most closely tied to and dependent on the healthy functioning of the ecosystems in their traditional lands (Nettleton et al. 2007; King et al. 2009). Thus, they are also among those most vulnerable to the cumulative impacts of

environmental degradation, including declining water quality and the reduced availability and quality of country foods (Tollefson and Wipond 1998; Weber et al. 2012; Turner et al. 2013).

Environmental justice has been widely recognized as an important concept in North America since the 1980s, when high-profile studies found strong correlations between the locations of racialized and low-income communities (mainly African-American and Hispanic communities) and the placement of toxic and hazardous waste dumps (UCC 1987; Bullard 1990). Race and socioeconomic status are key determinants of poor environmental health (Morello-Frosch et al. 2011). The global environmental justice movement has since also focused on environmental health issues affecting Indigenous Peoples, whose concerns are frequently marginalized (Adeola 2000; Agyeman et al. 2009; Schlosberg and Carruthers 2010; Holifield 2012). It is becoming increasingly clear that the health of Indigenous Peoples is particularly closely tied to underlying declines in the quality of the environment (Nettleton et al. 2007; Agyeman et al. 2009; King et al. 2009). A related concept also of great relevance for Indigenous communities is that of land or territorial justice (Lane 2006; Anderson et al. 2008; Kolers 2009). Those Peoples who endure forced displacement or are otherwise alienated from their traditional lands often experience health issues similar to those who are dealing with environmental degradation; indeed some of the roots causes, especially those related to intensive resource extraction and industrial development, are the same for both (Durie et al. 2009; King et al. 2009; Richmond and Ross 2009).

Land-justice issues have far-reaching implications for the health and wellbeing of Indigenous Peoples. In addition to the human-health impacts of environmental decline, damage to ecosystems combined with alienation from traditional lands and cultures greatly reduces the autonomy and self-sufficiency of Indigenous Peoples (Pimbert 2009). Connections to land, traditional harvesting and other land-based activities are fundamental to Indigenous identity and are crucial for mental as well as physical health and wellbeing (Durie et al. 2009; King et al. 2009; Kirmayer et al. 2009). Indigenous cultures and languages

are closely tied to land-based living and livelihoods (Ballard 2012; Biddle and Swee 2012; Brown et al. 2012). Self-determination is also vital for Indigenous community health (Warry 1998; Kirmayer et al. 2000; King et al. 2009) and is achieved through land and food sovereignty as well as self-governance (Kirmayer et al. 2000; Cornell 2006; Anderson et al. 2008; Thompson et al. 2012).

In the worldviews of many Indigenous cultures, community health and wellbeing is inseparable from the health of and connection to the land (Nettleton et al. 2007; King et al. 2009; Kirmayer et al. 2009). Land, water, animals, plants, people, ancestors and spirits are all interrelated and inextricable as living components of the natural world that are inseparable from each another (Snow 1977; Settee 2007; Wilson 2008; Potts-Sanderson 2010). Health and wellbeing are often viewed as holistic, encompassing physical, mental, emotional and spiritual health for overall wellbeing (Simpson 2000, 2002; King et al. 2009; Potts-Sanderson 2010). Individual health is also reflective of health and social cohesion among family and community members. Likewise, the health and wellbeing of communities depends on ready access to healthy land, animals, plants, air and water and also on balance and good relationships between people and the other living beings (Kirmayer et al. 2000; King et al. 2009).

For example, the Inuit understanding of the person has been called 'ecocentric', as the identity of an individual person is formed through relationships and interactions with family, community, animals, and the physical environment, particularly through hunting, fishing, eating traditional 'country foods', camping and traveling on the land (Stairs 1992; Stairs and Wenzel 1992; Dorais 1997; Kirmayer et al. 2009). Kirmayer et al. (2009) describe how in the Inuit worldview, land and country foods are of central importance for the health of the people. The harvesting, consumption and ceremonial use of country foods is seen as vital to physical, mental and cultural wellbeing. A sense of place is very strong among the Inuit and engaging in land-based practices is important for self-esteem and overall health. Along with land and country foods, social relationships and the company of family are also considered to be an

integral part of achieving and maintaining health and wellbeing (Kirmayer et al. 2009). The Inuit perspectives on identity, connection to land and health are similar to those of other Indigenous Peoples in Canada. In Cree culture, identity is closely tied to land, education systems, economics, governance, language, values and spirituality (Weber-Pillwax 2003). Wellness is a holistic concept in which good relations, with family as well as with an extended community of human and nonhuman living beings and the land, play a central role (Settee 2007). Also important is the harvesting, preparation and consumption of traditional foods, as well as political autonomy at the community level (Adelson 1998, 2000). These understandings of health and wellness, identity, relationships, connection to land, and traditional foods and livelihoods are also closely reflected in the Anishinaabe concept of 'mino bimaadiziwin' or 'living the good life' (Simpson 2008, 2011; Pawlowska-Mainville 2014).

2.2 Integrative Health Approaches

Conventional 'western' science and medicine typically operate under a very different epistemological paradigm from those of traditional Indigenous cultures. Conventional science is often reductionist and disciplinary in orientation, with different fields working largely in isolation and focusing separately on very specialized subjects or phenomena (Gallagher and Appenzeller 1999; Beresford 2010). Medical research and practice generally also function in this manner, through highly specialized fields with an approach to treating illness largely through physical treatments and with a limited focus on wellness promotion and illness prevention (Swarbrick 2006; OHITF 2008; Beresford 2010; Hueston et al. 2013). However, there is increasing recognition among health professionals in various fields of the profound interconnectedness of people, animals and the environment, and of the importance of looking at the health of living systems in a holistic way (Hueston et al. 2013; Shomaker et al. 2013). This shift in thinking forms the basis of the global 'One Health' movement.

2.2.1 One Health

One Health has been defined as “the collaborative efforts of multiple disciplines working locally, nationally, and globally, to attain optimal health for people, animals, and our environment” by the American Veterinary Medical Association’s One Health Initiative Task Force (OHITF 2008). Increasing pressures on ecological systems and animal populations, combined with rising human health risks (due to the expansion of infectious diseases affecting both humans and animals as well as toxic environmental contaminants) are creating an awareness among professionals of various disciplines of the interdependence and connections between humans, animals and the ecosystems that sustain them (OHITF 2008; Mackenzie et al. 2013). For example, at the National Centre for Emerging and Zoonotic Infectious Diseases (NCEZID) in the United States, research into infectious disease ecology, including for food-borne, water-borne, zoonotic and vector-borne diseases, integrates human, animal and environmental domains to address threats of infectious disease to public health (OHITF 2008; CDC 2013). Also, joint and cooperative surveillance systems for animal and human zoonotic diseases have aided efforts to monitor and control the spread of diseases including avian influenza and the West Nile virus (Kahn 2006). The surveillance of chronic wasting disease (CWD) in cervids represents another example of cooperative efforts between animal and human health researchers, and bears particular relevance for Indigenous communities that depend on wild cervid populations for food (see also section 2.3) (Potapov et al. 2013; Kuznetsova et al. 2014; Parlee et al. 2014).

Also, the field of comparative medicine, which is the study of the anatomic, physiologic, and pathophysiologic processes across species including humans, dates back to the nineteenth century. Using a comparative medicine approach, teams of physicians and veterinarians have made valuable discoveries regarding infectious diseases, including the cause of cattle fever, and more recently, discovering how the immune system distinguishes between normal and virus-infected cells (Wilkinson 1992; Kahn 2006). However, in recent decades comparative medicine and biomedical research have been de-emphasized

by funding agencies, fewer physicians and veterinarians are pursuing careers in research, and even fewer are collaborating on interdisciplinary research to confront emerging zoonoses and other human-animal health issues (Kahn 2006). However, as the One Health movement has been endorsed and promoted by veterinary medical professionals (OHITF 2008), perhaps momentum can be built to once again foster innovative collaborations to investigate and address contemporary health concerns.

Interestingly, commonalities between Indigenous conceptions of health and principles found in the One Health movement, particularly aspects that deal with environmental health, have been recognized in research on and discourses about Indigenous health (e.g. Nettleton et al. 2007; Stephens et al. 2007; Parkes 2010).

2.2.2 Social-Ecological Systems

In the environmental and social sciences, parallels with One Health thinking can also be found in social-ecological systems (SESs) theory. Social and ecological systems have conventionally been considered to be distinct and the issues in each have typically been studied separately (Berkes and Folke 1998). However, researchers from diverse fields have increasingly pointed to linkages between these systems and the usefulness of considering them together as larger integrated systems (e.g. Berkes and Folke 1998; Levin 1999; Gunderson and Holling 2002; Berkes et al. 2003; Norberg and Cumming 2008). Berkes and Folke (1998) have argued that human and natural systems are highly interconnected and that any delineation between them is artificial and arbitrary. Looking at SESs as a whole is an approach that is increasingly employed in analyzing the resilience and adaptive capacity of these systems and in finding solutions to address issues of sustainability and societal health (e.g. Gunderson and Holling 2002; Berkes et al. 2003; Norberg and Cumming 2008). Because of the complexity of SESs, Berkes et al. (2003) emphasize the role of qualitative analysis as a complement to quantitative approaches and also the importance of drawing from a multiplicity of perspectives in better understanding and managing these

systems.

The study of SESs has primarily been based in the ecology and social science realms, although there is some interest from within the medical field as well. A number of studies have investigated land-use impacts and the health and resilience of Indigenous communities within the context of SESs. A 2009 study of the Yamal-Nenets SES in western Siberia, which includes an Indigenous population of reindeer herding people called the Nenets, found this system to be quite resilient to a number of stressors and shocks, including petroleum development, climate change and socioeconomic upheaval. Forbes et al. (2009) used both quantitative and qualitative methods to evaluate resilience and also limits of the system's capacity to respond to change. They found that the free movement of both people and animals across a wide range of habitats was crucial in sustaining the system as a whole and warn that increased intensity of development, environmental degradation and climate change may threaten future resilience (Forbes et al 2009). SESs approaches can also be incorporated into environmental assessment processes. In 2007, to assess the potential impacts of oil and gas development on public health among the Inupiat in Alaska's North Slope region, the first ever Health Impact Assessment was conducted as part of the United States' Environmental Impact Statement process. Using qualitative methods and analysis, potential health and socioeconomic effects and outcomes were identified, and a number of public health mitigation measures were recommended (Wernham 2007). Some assessments of cumulative effects have also looked at impacts to SESs as a whole. Using a number of case studies from forest SESs throughout the Americas, Weber et al. (2012) developed a multidisciplinary framework for cumulative effects assessment that incorporates social as well as ecological dimensions, and discuss approaches for the identification of thresholds and targets for land use planning.

2.2.3 EcoHealth

The concept of 'EcoHealth', or ecosystem approaches to health, is another field in which similarities

among Indigenous and 'western' holistic conceptions of health have been explored. EcoHealth is a participatory, action-research framework to address human health issues by studying the environmental and social determinants of health, from both ecological and socioeconomic perspectives (Charron 2012). The integration of different approaches and types of knowledge, including local knowledge, is a fundamental principle of EcoHealth (Lebel 2003; Charron 2012).

Several studies and reviews have highlighted similarities between Indigenous knowledge, worldviews and perspectives on health and EcoHealth approaches to understanding the complex relationships and interactions between social and ecological systems. In an investigation of the connections between Indigenous health and land in northern Australia, Johnston et al. (2007) found that Indigenous Peoples in the region consider land and people to be profoundly interconnected. Healthy traditional foods, land-based physical activity, traditional environmental management practices, identity, culture, spirituality and the transmission of environmental knowledge and practices to younger generations were all discussed as important for health and well-being in these communities. Also, a recent review of health policies also in northern Australia identified the need to draw upon Indigenous notions of health, which emphasize connections between individual and community health and the health of land or 'country', when developing health strategies to address the impacts of climate change (Green and Minchin 2014). An international study with Indigenous Peoples from Cambodia, Laos, Burma, Namibia and Guatemala found that among this diverse range of cultural perspectives, conceptions of health were also holistic in nature. Although there were many differences among the cultures and circumstances of the various Indigenous communities, there were shared and close ties of health and wellbeing to physical and spiritual relationships with family, community and the environment (Nettleton et al. 2007). EcoHealth approaches have been used to explore and respond to health concerns in diverse rural and Indigenous communities. For example, in northern Malawi an interdisciplinary team of researchers and health, nutrition, and agriculture specialists along with a local Farmer Research Team established the Soils, Food

and Healthy Communities (SFHC) partnership to address food security issues facing agricultural communities. Based on knowledge of successful legume intercropping techniques in central Malawi, the team implemented a legume cultivation project to increase soil fertility. Within several years of increased legume cultivation in the region, soil fertility, crop yields, crop diversity, and child nutrition had all improved (Bezner Kerr et al. 2012).

An increasing number of Canadian EcoHealth studies have involved Indigenous Peoples when investigating and addressing human and environmental health issues. For example, in 2002 a community-based wildlife health research and monitoring program was established in the Sahtu Settlement Area in the Northwest Territories of Canada. Dene Elders, hunters and other community members across the Settlement Area participated in many aspects and stages of the research, and disease risk in caribou and moose was assessed using both scientific and Indigenous knowledge (Brook et al. 2009). Another example is the establishment of a partnership in 2009 between the Rigolet Inuit Community Government in Nunatsiavut (Labrador) and university researchers, public health practitioners and community storytelling facilitators to study the impacts of climate change on health in Nunatsiavut communities. The study used digital, multimedia storytelling as well as interviews and surveys to explore Inuit knowledge of climate change and community health impacts (Harper et al. 2012).

Parkes (2010) suggests that integrative EcoHealth approaches actually represent a resurgence of long-standing Indigenous knowledge paradigms and understandings of health and wellbeing in social-ecological systems. She and others assert that the common ground between Indigenous and EcoHealth perspectives provides much opportunity for learning and exchange, and ultimately for more effective promotion and protection of both human and environmental health (Nettleton et al. 2007; Parkes 2010).

2.3 Wildlife Health Risk Assessment and Communication

Many Indigenous cultures and communities are concerned about increases in disease and toxic contamination of wildlife, which undermines their consumption of wild-caught or country foods (AFN 2007). These concerns are aggravated by ineffective risk communication regarding wildlife health (Wheatley 1997; Suk et al. 2004). Risk communication, conventionally the provision of information about the potential risks of consuming traditional foods, disseminated by scientists and health officials to local Indigenous communities, is often ineffective and leads to confusion and even worry about contaminant sources and any health implications associated with these foods (Furgal et al. 2005; Van Oostdam et al. 2005). For example, the perceived risks of food-chain contamination have caused changes in diet for some northern residents in Canada (Dewailly et al. 1994; Wheatley 1997; Furgal et al. 2005). Also, the nutritional and other health benefits as well as the cultural importance of harvesting and consuming wild-caught foods has not always been considered in overall risk-benefit assessments by non-Indigenous researchers and outside health officials (Arquette et al. 2002; AFN 2007). Even today, very little is known about the vulnerability of Indigenous communities to wildlife diseases south of the Arctic Circle (Donatuto and Harper 2008). These incomplete approaches to understanding and communicating risks about the consumption of wild-caught foods often serve to undermine the traditional livelihoods of Indigenous Peoples (Van Oostdam et al. 2005; Loring and Gerlach 2008; Trainor et al. 2009).

One major wildlife health concern in the Canadian Prairie Provinces that has great implications for Indigenous communities and traditional cultures is chronic wasting disease (CWD). CWD is a type of transmissible spongiform encephalopathy (TSE), a class of prion diseases that also includes bovine spongiform encephalopathy (BSE) in cattle and Creutzfeldt-Jakob disease in humans. It is a degenerative and fatal infectious disease that affects wild and farmed cervids (i.e. members of the deer family) including white-tailed deer (*Odocoileus virginianus*), mule deer (*Odocoileus hemionus*), elk (*Cervus*

elaphus), moose (*Alces alces*) and potentially caribou (*Rangifer tarandus*) (Potapov 2013; Parlee et al. 2014). The disease first appeared in the western United States in the 1960s and has since spread to some of the eastern states and the Canadian provinces of Saskatchewan and Alberta (Adamowicz et al. 2010; Kuznetsova et al. 2014) as well as several zoos across North America (Travis and Miller 2003; Dubé et al. 2006; City of Saskatoon 2011). CWD has been present in farmed elk and both farmed and wild deer in southern Saskatchewan and southeastern Alberta since at least the early 2000s and it is continuing to expand across this region, threatening the northern parts of these provinces and also Manitoba (Arnot et al. 2009; Kuznetsova et al. 2014). In 2012 in southeastern Alberta, one moose (the first in Canada) was identified to be infected with CWD (Government of Alberta 2013). That CWD could spread into caribou populations has extreme implications for both wildlife and human populations in northern Canada (Kuznetsova et al. 2014; Parlee et al. 2014).

Much of the human-related literature concerning the implications of CWD in Canada and the United States has focused on the impacts and potential impacts to the cervid farming and related industries (e.g. Seidl and Koontz 2004; Arnot et al. 2009; Petigara et al. 2011) and also to recreational hunting (e.g. Bishop 2004; Pascoe 2011; Zimmer et al. 2011, 2012). Very few studies have meaningfully investigated the impacts to Indigenous Peoples' health and livelihoods (exceptions include Adamowicz et al. 2010; Odunuga 2014; Parlee et al. 2014). Also, widespread distrust among Indigenous Peoples of government officials compromises attempts to communicate and understand risks and responses associated with CWD as with other wildlife diseases and contaminants (Arquette et al. 2002).

Another wildlife health concern affecting Indigenous Peoples in Canada and Alberta is environmental contamination by trace metals, particularly mercury in water bodies and fish. Deposition of mercury and other trace metals including arsenic, cadmium, and selenium in aquatic ecosystems is a concern because of their persistence, toxicity and bioavailability (Chan et al. 1995; Donahue et al. 2006). Since the 1950s,

members of Indigenous communities in Ontario (i.e. the Ojibwa communities of Grassy Narrows and Whitedog) and Quebec (i.e. James Bay Cree communities and also the Mohawk community of Kahnawake) have been exposed to high levels of methylmercury in fish due to industrial pollution and hydroelectric development (Wheatley and Paradis 1995; Wheatley 1997; Chan and Receveur 2000). Exposure to mercury and other trace metals is also a concern in the Arctic because of the global distribution of these contaminants and the bioaccumulation of methylmercury in marine fish and mammals (Wheatley 1997; Chan and Receveur 2000; Valera et al. 2013).

Over the past 150 years, even remote and rural lakes in North America have typically experienced a 2- to 4-fold increase in mercury flux (Donahue et al. 2006). A number of lakes in Alberta have had mercury advisories for fish consumption since the 1990s (Government of Alberta 2009a, 2009b). Within the territories of the two *Isga* communities in west-central Alberta, three large lakes (Lake Wabamun, Lac Ste. Anne and Lac La Nonne), all of which were traditionally important to the *Isga* for subsistence fishing, now have fish species that contain high enough levels of mercury to warrant caution (Schindler et al. 2004; Government of Alberta 2009a; Miller and McLachlan 2012). A major source of mercury pollution in the region is coal-fired electricity generation. There are three active coal-fired generation stations in the Lake Wabamun area, and another that was decommissioned in 2010 (Mazur et al. 2009; Sanei et al. 2010). The so-called Sundance plant on the southern shore of the lake is the largest in western Canada, and is also the largest mercury emitter of any Canadian power plant (CEC 2011; Donahue et al. 2006). Mercury and other trace metals as well as polycyclic aromatic hydrocarbons (PAHs) have increased significantly in Lake Wabamun water and sediments in the decades since the power plants have been in operation (Schindler et al. 2004; Donahue et al. 2006).

Industrial accidents have also had serious impacts on the *Isga* lands and water bodies. In 2005, there was a devastating railway oil spill in 2005 into Lake Wabamun, in which ~ 149 500 L of heavy fuel oil spilled

into the lake from a derailed train (Wernick et al. 2009), prompting advisories for drinking water and wildlife consumption in and around the lake (MPWGSC 2007) and further undermining the use of the lake for subsistence fishing and harvesting by members of PFN on the eastern shore of the lake (Bernice Bull 2010, pers. comm.; Geraldine Bearhead 2010, pers. comm.). The sour gas industry has also been of particular concern in west-central Alberta, with a legacy of serious sour gas well blowouts (ACPC 1978; Lewis 2010). Most recently, in October 2013, a massive coal slurry leak from the Obed Mountain Coal Mine near Hinton discharged 1 million cubic metres of waste water and sediments, containing mercury, arsenic and carcinogenic PAHs, into the Athabasca River (Schindler 2014; Wohlberg 2014). The Athabasca is one of the most important rivers for the *Isga* and courses through much of the western and northern areas of their traditional lands. This accident raised concerns for downstream communities that rely on the river for drinking water and fish (Schindler 2014), and prompted an investigation by ANSN into the environmental impacts of the leak.

2.4 Integrating Knowledge and Research Paradigms: Traditional Knowledge and Western Science

Researchers have a very poor legacy regarding the way they have engaged with and represented Indigenous Peoples around the world since colonization by Europeans (Smith 1999). Conventional ‘western’ science and research privileges Eurocentric philosophies and understandings of the nature of knowledge and reality, and tends to exclude those of other cultures (Battiste and Henderson 2000). Throughout the past 500 years, Indigenous Peoples around the world have been studied, classified and categorized through a Eurocentric lens, and have been written about and portrayed in distorted, disrespectful and dehumanizing ways (Smith 1999; Battiste and Henderson 2000; LaRocque 2010). Maori scholar Linda Tuhiwai Smith (1999), among other Indigenous scholars including Marie Battiste, James (Sa’ke’j) Youngblood Henderson and Leanne Simpson, argue that Eurocentric science, often lauded as the universal and objective approach to acquiring knowledge and understanding of the world, is actually

very subjective and also deeply embedded in the framework and mechanisms of European imperialism. For centuries, science and much of the knowledge generated by physical, life and social scientists have served as an instrument of Euro-colonial powers to justify the subjugation and oppression of Indigenous Peoples and the dismissal of their knowledge systems, values and ways of life (Smith 1999; Battiste and Henderson 2000; Simpson 2004).

Much of the research conducted in and around Indigenous communities has thus served the interests of dominant society, with little or no relevance or benefit, and indeed sometimes much harm, to these communities. As a result, many Indigenous Peoples hold a great deal of cynicism and resentment towards science and research (Smith 1999; Wilson 2008). However, in recent years, researchers from a variety of fields have begun to recognize the importance and value of working with Indigenous communities to investigate and address issues that affect them and broader humanity (e.g. Arquette et al. 2002; Kwiatkowski et al. 2009; Ferreira and Gendron 2011). A growing interest in collaborations with Indigenous communities and the incorporation of Indigenous perspectives in research has also been fostered and influenced by the growing number of Indigenous people in academia who are bringing their own ways of knowing and knowledge acquisition into their research approaches. Increasingly, Indigenous scholars and writers are seeking culturally relevant and appropriate ways to research and address issues facing their own communities and those of other Indigenous Peoples (Smith 1999; Wilson 2008; LaRocque 2010).

An increasing number of research projects undertaken by both Indigenous and non-Indigenous researchers have collaborated with and included the input of Indigenous communities in various aspects and stages of the research process (e.g. Armitage 2005; Kwiatkowski et al. 2009; Ferreira and Gendron 2011). Yet, such projects vary greatly in the nature and the degree of participation by Indigenous community members, and also in the extent of the incorporation of Indigenous perspectives and

knowledge systems in the research approaches. Some strive to operate as collaborative partnerships between Indigenous communities and university researchers, with the participation, input and feedback of community members informing and guiding the research process through all stages (e.g. Arquette et al. 2002; Mitchell and Baker 2005; Brook et al. 2009; Parlee et al. 2014). Others seek to involve Indigenous Peoples only in certain aspects of the research, most commonly as informants in the collection of data (Brook and McLachlan 2005). Researchers from various fields differ in the ways and extent to which they attempt to involve Indigenous and other marginalized communities in research. In ecology and environmental science, Indigenous participation is often limited to the contributions of Traditional Ecological Knowledge (TEK), if it is considered at all (Simpson 2004; Brook and McLachlan 2008). For example, very few wildlife disease-related studies adequately consult with Indigenous communities, much less incorporate their rich knowledge systems and active input in understanding, managing, and communicating disease-associated risks (Brook and McLachlan 2008; Parlee et al. 2014).

2.4.1 Indigenous, Traditional and Local Knowledge

In recent decades there has been a growing interest in the knowledge and cultures of Indigenous Peoples, within 'western' scientific communities as well as mainstream society (Simpson 2001a, 2004; Simeone 2004). The knowledge and knowledge systems of Indigenous Peoples are most commonly and collectively referred to as Traditional Knowledge (TK) (Tester and Irniq 2008; Berkes 2012). There are many different approaches to TK, and as with 'Indigenous Peoples' there is no internationally accepted definition (Berkes 2012; WIPO 2012). One general understanding of TK is as:

knowledge that is dynamic and evolving, resulting from intellectual activities which is passed on from generation to generation and includes but is not limited to know-how, skills, innovations, practices, processes and learning and teaching, that subsist in codified, oral or other forms of knowledge systems. Traditional knowledge also includes knowledge that is associated with biodiversity, traditional lifestyles and natural resources (WIPO 2012:43(Annex)).

TK encompasses diverse aspects of life and culture, including the environment, agriculture, weather,

medicine, architecture, arts, spirituality, and various forms of cultural experience and expression including language, stories, music and dance (Simeone 2004; Settee 2007). Several other related terms are used in North America, including Indigenous Knowledge (IK), Traditional Ecological Knowledge (TEK), Local Ecological Knowledge (LEK), Traditional and Local Ecological Knowledge (TLEK), and in the Canadian Arctic, Inuit Quajimajatuqangit (IQ) (Brook and McLachlan 2008; Tester and Irniq 2008; Murray et al. 2011). Definitions of these terms vary, often depending on how much emphasis is placed on spiritual knowledge, cosmologies and the use of Indigenous languages, or conversely how narrowly focused they are on ecology and natural resource management concerns (Tester and Irniq 2008).

Yet it is undeniable that land-based Indigenous Peoples have a wealth of knowledge about the ecosystems in which they live and practice land use and occupancy. Generations of extensive experience on the land make for a rich understanding of ecological components and processes as well as long-term landscape change (Berkes 2012). Recognition by researchers of the value of the ecological knowledge of Indigenous and other rural, land-based peoples has led to an increasing use of Traditional and Local Ecological Knowledge (TLEK) in environmental research. This knowledge has contributed to an understanding of a variety of ecological phenomena, most notably, wildlife population dynamics (e.g. Ferguson and Messier 1997; Fall et al. 2013), wildlife distribution (Stronen et al. 2007) and climate change (e.g. Berkes 2012; Ignatowski and Rosales 2013). The use of TLEK has also been valuable for natural resources conservation and land use planning and management. Applications for which TLEK has been incorporated include at-risk species and wildlife conservation (e.g. McNay et al. 2008; Benoit et al. 2010; Tidemann and Gosler 2010), forest management (e.g. Treseder and Krogman 2008; Pei et al. 2009), fisheries management (e.g. De Freitas and Tagliani 2009; Murray et al. 2011), co-management of wildlife and protected areas (e.g. Hunn et al. 2003; Hill 2006) and community-based monitoring (e.g. Berkes et al. 2007; Brook et al. 2009; Parlee et al. 2014).

However, despite the increased incorporation and acceptance of TLEK in environmental health research and management, most Indigenous communities are still not adequately involved in much, if any, of the environmental research conducted within their traditional lands (Brook and McLachlan 2008). The credibility of TLEK and other kinds of TK is still questioned in some academic and public spheres, or is perceived to be incompatible with knowledge produced through a conventional 'western' scientific approach (Agrawal 1995, 2009; Berkes 2012). There is also considerable discussion around issues of the appropriate contextualization and use of TK. As Indigenous worldviews, languages and knowledge systems typically differ substantially from those of the dominant society, it can be very difficult to accurately interpret and represent TK for a wider audience, while adequately reflecting the values embedded in the knowledge (Simpson 2001a; Tester and Irniq 2008). There is a danger of simplifying, distorting or reducing the knowledge just to fill in knowledge gaps left unexplained by science, or using only the TK that is readily compatible with and supported within conventional scientific paradigms (Simpson 1999, 2001a; Tester and Irniq 2008). Interestingly, the conceptualization and use of these knowledge systems by researchers and governments is increasingly criticized as culturally inappropriate, bureaucratic and opportunistic (Nadasdy 2003). Indeed, the interest in and use of TK in research has largely served the agendas of dominant society researchers and decision-makers (Simpson 1999, 2004). Much TK has been misused to justify dominant society policies that are not in the best interests of the Indigenous knowledge holders and communities, and has also been appropriated by outsiders for financial and personal gain without permission or compensation (Simpson 1999, 2004; Hollenberg and Muzzin 2010). However, in recent years an increasing number of Indigenous researchers have been developing research methodologies for the appropriate use of TK to address issues facing Indigenous communities (e.g. Smith 1999; Simpson 2002; Settee 2007; Wilson 2008; Potts-Sanderson 2010; Ballard 2012).

Indigenous Peoples have the right to the protection, preservation and control of their cultural heritage

(Simeone 2004; Pearce and Louis 2008). However, current intellectual property rights systems and legislation make it difficult for Indigenous Peoples to protect their TK as collective intellectual property both in Canada and internationally (Munzer and Raustiala 2009). Indigenous Peoples are thus burdened with the responsibility of proactively protecting their TK from threats of misappropriation (Simeone 2004). Research involving TK must be conducted with respect for the inherent Indigenous ownership of intellectual and cultural property as well as an understanding of the issues around its use in research outcomes. When research is designed, carried out, analyzed, presented and utilized by or in active collaboration with Indigenous communities, TK is much more likely to be interpreted, contextualized and used in accurate, ethical and culturally appropriate ways (Ferreira and Gendron 2011; Fraser et al. 2006; Shackeroff and Campbell 2007).

2.4.2 Land Use-and-Occupancy Mapping

More indigenous territory has been claimed by maps than by guns. This assertion has its corollary: more indigenous territory can be reclaimed and defended by maps than by guns.

- Bernard Nietschmann, 1994:37

One application for which TK is used extensively is Indigenous land use-and-occupancy mapping. Indigenous Peoples around the world have recognized the value and importance of spatially documenting their resource use and occupancy of their ancestral territories for the purposes of asserting claim to and protecting their lands from dominant society and outside interests (Flavelle 2002; Herlihy and Knapp 2003; Chapin et al. 2005). In Canada, Indigenous Peoples have been making use-and-occupancy maps for more than fifty years. The first mapping projects took place in the 1950s and 60s, and in the 1970s became part of the standard approach in land claims negotiations with the federal government and in response to large-scale development projects (Chapin et al. 2005; Tobias 2009). There have since been hundreds of use-and-occupancy surveys across the country and most Indigenous communities in Canada have conducted some type of mapping of cultural and resource geography

(Tobias 2000, 2009; CIER 2010). Such maps are created for a variety of purposes, some of which include settling treaty and land claims, establishing Indigenous rights and title, long-term community planning, resource management, negotiating co-management agreements, environmental and livelihood protection, negotiating benefits and compensation for industrial development, and the documentation of oral history and cultural knowledge (Tobias 2000; Pearce and Louis 2008; CIER 2010).

However, the use of conventional cartographic traditions in Indigenous territorial mapping is also inherently problematic. 'Western' cartography is a field that is deeply embedded in Eurocentric knowledge systems and much of the past 500 years of its development has been shaped through its use as a tool to further European colonial exploits (Chapin et al. 2005; Johnson et al. 2006). Mapping is an intrinsically political endeavour. The use of conventional cartographic methods necessitates a critical understanding of how and why these techniques have been used in the past as well as the potential they have to either serve or undermine the interests of affected communities (Johnson et al. 2006). The mapping of Indigenous knowledge, land use and cultural heritage using 'western' methods and technologies is viewed by many as a double-edged sword (Harris and Weiner 1998; Louis 2007; Pearce and Louis 2008). 'Western' style maps are often the only form of spatial representation recognized by governments and courts in negotiations of land and resource rights (Nahwegahbow 2000; Pearce and Louis 2008). However, the documentation of Indigenous knowledge using such techniques represents a danger of decontextualizing this knowledge as well leaving it vulnerable to misuse (Herlihy and Knapp 2003; Pearce and Louis 2008).

Thus, some Indigenous cartographers have called for the recognition of Indigenous Peoples' own distinct and diverse traditions of cartography and spatial representation, and the acceptance and encouragement of multiple cartographic traditions (Johnson et al. 2006; Pearce and Louis 2008). Indigenous responses to conventional mapping in their territories have included 'counter-mapping'

(Peluso 1995) and Indigenous land and vegetation classifications, the latter being developed primarily in Africa (Omotayo and Musa 1999; Verlinden and Dayot 2005). Counter-mapping movements first emerged in lower-income countries such as Indonesia, Tanzania, South Africa, Nicaragua and Belize for the purposes of confronting intensive natural resource exploitation, contesting state-sanctioned mapping that undermined Indigenous land and resource use (Peluso 1995), and to make claim to land, resources and rights to self-determination (Hodgson and Schroeder 2002; Wainwright and Bryan 2009). Over the years, the idea of counter-mapping has become more widely used in efforts to contest power relations, asymmetries and biases with respect to cartographic products, conventions and processes (Harris and Hazen 2006). Although different terminology is used, counter-mapping by Indigenous Peoples is often similar to the use-and-occupancy mapping typically undertaken by Indigenous communities in Canada, in terms of the kinds of information documented and also the overall goals of establishing and protecting the land and resource rights of these communities.

2.4.3 Participatory Mapping and Geospatial Technologies

Today, most cartography and spatial analysis is carried out using geospatial technologies including geographic information systems (GIS), satellite imagery, remote sensing, global positioning systems (GPS) devices and Internet-based applications such as Google Earth (Monmonier 2007; Haklay 2010). GIS is one of the primary tools of spatial analysts and has been used extensively in ecological and environmental research, as well as by business and government over the past 30 years (Harris and Weiner 1998; Haklay 2010). There has been much debate about the social implications of GIS, as the ways in which the technology is employed play a large role in determining who benefits from its use (e.g. Aitken and Michel 1995; Pickles 1995; Abbot et al. 1998; Harris and Weiner 1998). In the case of 'community' or 'development' projects with marginalized communities, GIS projects may disrupt or exacerbate existing power dynamics (Harris and Weiner 1998). Also, as Indigenous Peoples typically have conceptions of knowledge, space and property that differ greatly from that of the dominant society, the

relevance and appropriateness of some GIS applications involving Indigenous communities has been criticized (Harris and Weiner 1998; Elwood 2006).

In response to some of these issues, a variety of participatory and community-based GIS approaches have developed. Terms used to describe such approaches include Participatory GIS (PGIS), Public Participation GIS (PPGIS), Community-integrated GIS, Bottom-Up GIS, Collaborative GIS, GIS 2, Geocollaboration, and Web-based GIS (WGIS) (Harris and Weiner 1998; Sieber 2004, 2006; Rattray 2006; Dunn 2007). Collaborative approaches are important in many contexts in order to understand and address concerns and priorities within communities affected by research and policy outcomes. Calls for the 'democratization of GIS' (Harris and Weiner 1998; Dunn 2007) have stressed the importance of access to and ownership of technology and data by local communities. A truly participatory GIS requires constant reflection on "who is participating, controlling, owning, understanding, analyzing, and benefiting from the process" (Dunn 2007:626; see also Abbot et al. 1998; Rambaldi et al. 2006).

Among collaborative approaches to GIS-based research, the nature and amount of participation of local community members is highly variable (Craig et al. 2002). As GIS software use typically requires a certain amount of technical know-how, trained technicians (usually from outside organizations) are frequently employed to run the GIS part of a project (Abbot et al. 1998; Harris and Weiner 1998). Even when Indigenous or local people participate as consultants or informants in data collection, typically a small number of outside researchers consolidate, analyze and present the data (e.g. Verlinden and Dayot 2005; McKinnon 2010; Bethel et al. 2011). This may be a more feasible or expedient approach, but it raises questions about how the research outcomes have been influenced by 'western' or non-Indigenous worldviews, their relevance and usefulness to the communities, and also about the perpetuation of dependency on outsider consultants (Harris and Weiner 1998; Elwood 2006). Conversely, many studies that strongly emphasize community participation have avoided highly technical GIS use, and instead

used sketch mapping and other more accessible methods. However, hand-drawn maps and other forms of non-digital spatial information may not be recognized or accepted by officials in land-use planning and decision-making processes (Chapin et al. 2005; Fox et al. 2006). One effective approach to PGIS emphasizes the training of local people in software use and data analysis methods, to better integrate community perspectives into the analysis and outcomes. This approach fosters community capacity building of technical and research skills, and may also support the long term integration and sustainability of GIS projects within community organizations (Barndt 2002; Dunn 2007).

Another advantage of a PGIS approach is that it may actually facilitate more meaningful inclusion of TK in mapping and GIS-based research. Dunn (2007) identifies the potential to incorporate a wider sphere of knowledge and knowledge systems on more equitable terms, if Indigenous Peoples are active research partners (see also Tripathi and Bhattarya 2004). Indigenous partners can also provide guidance as to if and how TK can be appropriately represented in a digital context. Sieber (2004) identifies a need to modify conventional GIS software to allow for greater representation of distinct cultural and lingual ideas of space and place, and also for disagreement among individuals. There is already now more opportunity for integrating diverse forms of spatial information using GIS and qualitative analysis software together in innovative ways (Fielding and Cisneros-Puebla 2009; Jung and Elwood 2010). Some qualitative analysis programs have also recently developed capabilities that support direct integration with geospatial programs. For example, through the use of the qualitative data analysis program ATLAS.ti, spatial data documented in Google Earth can be linked to and integrated with various other kinds of qualitative data by embedding the Google Earth program directly into the ATLAS.ti interface (Fielding and Cisneros-Puebla 2009).

There are significant challenges to successfully implementing an effective PGIS research project. Computers, software, and training can be expensive and hardware may be difficult to store both securely

and accessibly (Abbott et al. 1998; Rattray 2006). Also, it may be difficult to adapt the use of the technology to accommodate local realities and worldviews (Fox et al. 2006) and there may be competing interests within communities that can be difficult to reconcile (Kyem 2004; Sieber 2006). As well, it can be challenging to secure long term funding for a PGIS project, without compromising the goals of local communities and organizations (Kyem 2001).

Despite these challenges, many Indigenous Peoples around the world utilize GIS technology for mapping, research, community planning, networking and advocacy of environmental health and justice (Pearce and Louis 2008; Kyem and Saku 2009). Indigenous communities in the Amazon Basin have been particularly successful in incorporating GIS into conservation planning. In the Anchar territory of Peru, the Corrientes River Federation (FECONACO) implemented a system of Monitoring Environmental Liabilities through PGIS (MELPGIS) in 2005. FECONACO developed their own methodology to map and monitor areas affected by the petroleum industry, and through this research and subsequent media attention, compelled the Peruvian government to better supervise the industry and oil companies to improve their environmental practices (Orta-Martinez and Finer 2010). As another example, the Brazilian Chapter of the Amazon Conservation Team (ACT), a partnership of Indigenous communities, governments and non-governmental organizations throughout the Amazon Basin, released a multi-year, 140 million acre rainforest conservation strategy in 2008. Working with 20 ethnic groups, ACT has trained Indigenous cartographers and mapped Indigenous place names, traditional resource use and culturally important sites, with the goal of securing Indigenous land rights and establishing a foundation for long term sustainable forest management and protection (ACT Brazil 2008).

There are also examples within Canada of Indigenous participatory mapping and the use of GIS in environmental health research. In the 1990s, the EAGLE (Effects on Aboriginals for the Great Lakes Environment) Project, a collaboration between the Assembly of First Nations (AFN) and 61 First Nations

communities in the Great Lakes Drainage Basin in Ontario, documented fishing sites to assess the risk of exposure to persistent environmental toxins through the consumption of fish (Bird 1995). EAGLE also carried out a socio-cultural pilot project in four of the communities that included a land-use mapping component (Simpson 2001b). This socio-cultural study experienced many challenges, including running out of time and funding. In the end, only one cultural atlas was completed, for Long Lake #58 First Nation. The study attempted to integrate Indigenous and 'western' scientific research approaches, but greater prioritization of the 'western' scientific aspects left insufficient time and resources to complete the qualitative socio-cultural component, which was the only component to present the perspectives of community members (Simpson 2001b).

Another partnership, between the Haisla Nation on the northern coast of British Columbia, the Nanakila Institute and Ecotrust Canada, produced a collaborative environmental assessment of the Kawesas watershed in 1996, in response to threats of logging within the Haisla traditional territory (Schoonmaker and Wolf 1996). Ecosystem components were analyzed for vulnerability to damage by timber extraction and other disturbances. Also, land use and occupancy, terrain, vegetation, wildlife and fish habitat, and Indigenous place names were documented. This comprehensive watershed assessment represents another innovative early approach to integrating TK and 'western' science in environmental research in Canada. However, the majority of the assessment report focuses on the biophysical components and only a small number of interviews (four) with Haisla Elders were conducted for the traditional use component. The report calls for a cooperative management plan between the Haisla Nation, the provincial government, regional forestry companies, landowners and other stakeholders (Schoonmaker and Wolf 1996).

More recently in northern Alberta, the Little Red River Cree Nation (LRRCN), in partnership with the Sustainable Forest Management Network, has undertaken a number of natural and social science

research projects (Natcher and Hickey 2008) including a study of the TEK of critical wildlife habitat that was completed in 2005 (Schramm 2005; Schramm et al. 2008). This interdisciplinary research forefronts Indigenous knowledge including extensive TEK of ungulate ecology, critical habitat and the impacts of disturbances, as well as the importance of ungulate species including caribou, bison and moose in local Cree culture, diets and livelihoods. This study provides management recommendations as part of the efforts of the LRRCN to establish their forest co-management agreement with the Alberta government (Schramm 2005; Treseder and Krogman 2008).

2.5 Chapter References

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3 THE *ISGA* NATION IN ALBERTA



Figure 3.1 Eagle River Singers practice at *Wakâ Mne* (Lac Ste. Anne)

Photo credit Katie Peterson, May 2010

3.1 The *Isga* Nation: the *Isga* of Alexis Nakota Sioux Nation and Paul First Nation

The *Isga* Nation² is a term that has been used to describe all *Isga* people from both the Alexis Nakota Sioux Nation (ANSN) and the Paul First Nation (PFN) in west-central Alberta. The *Isga* are a distinct cultural group of Indigenous People, related linguistically to the ‘Siouan’³ Peoples (Dakota, Lakota and Nakota) of the North American Great Plains (Parks and DeMallie 1992). They are also known as ‘Stoney’,

² In her 2010 Master’s thesis, Misty Potts-Sanderson describes the ‘*Isga* Nation’ as including all *Isga* people from both the ANSN and PFN. I have chosen to follow her precedent in using this term, while recognizing that ANSN and PFN are distinct First Nations, with the PFN including *Isga* and people of other Indigenous cultures as well.

³ ‘Sioux’ (or ‘Siouan’) is the most commonly-recognized term used to describe this large linguistic and cultural grouping of Indigenous Peoples in central North America; however this term is rejected by many as it was imposed by outsiders and the origins of the word are considered derogatory (Potts-Sanderson 2010).

'Nakota/Nakoda', and 'Assiniboine'; however, '*Isga*' is the term by which they refer to themselves in their own language (Potts-Sanderson 2010). The *Isga* have a land use and occupancy area covering most of west-central Alberta, from around what is now the city of Edmonton west into Jasper National Park, and from around Rocky Mountain House in the south to at least as far north as Lesser Slave Lake. Family groups tended to live in different parts of this large region, but also traveled within and among smaller regions according to seasonal harvesting as well as for social and cultural purposes. The *Isga* traditional lands are comprised of aspen parkland, boreal forest, foothills and mountain ecosystems. Traditional diets include moose, elk, deer, bear, fish, beaver, muskrat, rabbit, grouse and other animals as well as berries and edible plants. Bison were also important in the *Isga* diet until the herds were overhunted and exterminated to make way for cattle ranching and farming (Barsh 1990; Shane Potts 2010, pers. comm.; Francis Alexis 2011, pers. comm.). The *Isga* share similarities in language and culture with the Stoney of southwestern Alberta, but have an even greater linguistic similarity to the Stoney from Lodge Pole, Montana, in the Fort Belknap Indian Reservation (Percy Potts 2014, pers. comm.).

Following the signing of an adhesion to Treaty 6 in 1877, the *Isga* were assigned to what is now known as the ANSN Reserve (No. 133) on the north shore of *Wakâ Mne* (Lac Ste. Anne). Shortly after, part of the band moved to Lake Wabamun, establishing the PFN Wabamun Reserve (No. 133A and B) on the eastern shore of the lake. The PFN also has a small reserve southeast of Buck Lake (No. 133C), as some families have a history of occupancy in the area (Andersen 1970). In 1995, through their Treaty Land Entitlement, the ANSN established three additional reserves: Alexis Whitecourt (No. 232), Alexis Elk River (No. 233) and Alexis Cardinal River (No. 234) in other important parts of their traditional territories (Schramm 2007). *Isga* is the primary cultural background of most members of the ANSN, while the PFN is comprised of *Isga*, Cree, and Saulteaux Peoples (Potts-Sanderson 2010).

3.2 Political Context

The *Isga* have witnessed profound change to their environment and way of life in just a few generations. They have also experienced a dramatic reduction in access to much of their traditional lands and resources. Beginning with European settlement in the 1800s, Indigenous Peoples in the region (as throughout the country) were allotted and restricted to reserve lands that are a very small fraction of the size of their traditional lands (Samson and Cassell 2013). Much of the *Isga* traditional lands are now privately owned by non-Indigenous people. Much of this landscape has also been heavily impacted by agriculture and industrial activity. The *Isga* territories are rich in natural resources that have been intensively exploited over the last half-century. Oil and gas activity is prevalent throughout much of the land base and clearcutting has deforested much of the western boreal forest region. The eastern parts of the *Isga* territories are in the aspen parkland and mixed wood regions of central Alberta that are dominated by agriculture and settlement. Much of the Edmonton Capital Region, as well as many towns and smaller settlements, are on land that was traditionally occupied by the *Isga*. Since the beginning of colonization, there has been a continual western encroachment of urban, suburban, residential and recreational developments into the *Isga* territories.

Despite environmental health concerns and barriers to land use, many *Isga* continue to practice traditional land use including camping, hunting, fishing, trapping, harvesting of berries and medicinal plants, social gatherings and ceremonies. However, the new dominant land uses have affected the ability of the *Isga* to practice their traditional livelihoods and culture. Many *Isga* are also concerned that the intensity of industrial development is affecting the health of water, air, and the wildlife they depend on for food (Arai 2007; Potts-Sanderson 2010).

In addition to the expropriation of the vast majority of their land base, the *Isga* along with Indigenous Peoples throughout Canada, have endured generations of racist assimilation policies and state-

sanctioned cultural oppression. The residential school system and laws banning traditional religious practices were widely implemented for the purposes of eradicating Indigenous cultures and ways of life, and converting Indigenous Peoples to Eurocentric ways of living, speaking and thinking (Milloy 1999; Hanson 2009; Elias et al. 2012). The legacy of the Canadian residential school system continues to have profound intergenerational impacts in Indigenous communities, and is strongly associated with addictions, domestic violence, and mental health issues experienced by community members (Stout and Kipling 2003; Elias et al. 2012). The *Isga* have struggled to maintain and reclaim their cultural identity, practices and social cohesion in the wake of this colonial oppression.

3.3 *Yusbemakina*⁴: *Isga* Ways of Knowing



Figure 3.2 *Isga* women cut and prepare moose meat for drying and smoking

Photo credit Katie Peterson, August 2013

⁴ '*Yusbemakina*' is an *Isga* phrase describing the process of what was learned and taught (Potts-Sanderson 2010).

Isga knowledge systems differ dramatically from those embedded in the dominant 'western' scientific epistemological paradigm. Many Indigenous knowledge systems, including those of the *Isga*, are closely tied to environment and culture and have developed and evolved over thousands of years of close interaction with the natural world. Accumulated knowledge has been passed down orally across many generations and through experiential learning (Simpson 2000, 2011; Settee 2007; Potts-Sanderson 2010; Ballard 2012).

For this section I have used the phrase "*Isga* Ways of Knowing", as first described by Misty Potts-Sanderson (2010) of ANSN in characterizing *Isga* worldviews in her Master's thesis '*Ina makoce daca yusbemakina: identifying environmental impacts and changes within Alberta's Isga Nation*'. Misty describes *Isga* knowledge systems as comprehensive, including spiritual understandings as well as ecological knowledge and the know-how of traditional land use practices. In fact, all knowledge is conceptualized within, and does not exist apart from, the spiritual foundations that are a fundamental part of living and learning. *Isga* knowledge systems are also process-oriented, as experiences that give rise to teaching, learning, knowing and understanding are an integral part of everyday life (Potts-Sanderson 2010). Misty discusses ceremonies, singing, storytelling and land-based practices as important processes through which knowledge is derived and shared among the *Isga* (Potts-Sanderson 2010). While much knowledge is collective, individuals and clans within the *Isga* Nation hold specialized knowledge which they contribute to a larger body or web of knowledge for the benefit of the whole society. In the *Isga* worldview there is an emphasis on relationships and wholeness among all living things, with a much broader definition of what is considered to be 'living' than what is recognized as such by conventional 'western' science. There is also an understanding of the wholeness of an individual person as encompassing the physical, mental, emotional and spiritual aspects of their functioning and wellbeing (Potts-Sanderson 2010).

These fundamental characteristics of the *Isga* ways of knowing are also reflected in many other Indigenous cultures and knowledge systems. The late Chief John Snow writes of similar lifeways and educational practices among the Stoney of southwestern Alberta. Snow (1977) describes Stoney traditional oral and experiential learning that is interwoven through all aspects of life. With religion as the basis for education, knowledge can be received through dreams and visions as well as from Elders, relatives and other tribal members (Snow 1977).

Close parallels also exist in Anishinaabe learning systems, as discussed by Anishinaabe (Ojibway) researcher and writer Leanne Simpson. Anishinaabe education is rooted in spiritual foundations and is considered to be a lifelong process based on personal and collective experience (Simpson 2000, 2002, 2011). She also describes Indigenous learning as the integration of intellectual, spiritual, physical and emotional realms in holistic education systems (Simpson 2000, 2002). Closely related to Anishinaabe knowledge systems is the concept of ‘mino bimaadiziwin’ or ‘living the good life’, that is, living in balance, maintaining good relationships, and following a set of ethics, values and practices that promote holistic wellbeing in individuals and communities (Simpson 2008, 2011; Pawlowska-Mainville 2014).

In Cree cultures, very similar terms are used to describe these concepts. Cree scholar Priscilla Settee from northern Saskatchewan describes the Cree concept of ‘pimatisiwin’ as the collective “ancient knowledge for community life, well-being, and sharing of values” (Settee 2007:10). ‘Miyo-wichihtowin’ is another core value that is concerned with “having good relations” (Settee 2007:11). For another Cree community (in northern Quebec), the term ‘miyupimaatisiun’ means ‘being alive well’, which encompasses aspects of identity, knowledge, values, relationships, land, food and livelihoods, and refers to social, political and physical wellbeing (Adelson 1998, 2000).

Within many Indigenous knowledge systems, all information gathered and experienced is considered valid and nothing is discarded, regardless of whether the information came from visions, dreams, stories

or the natural world (Deloria 1999). The existence of multiple realities or truths is also accommodated in many Indigenous philosophies. Thus, Anishinaabe scholar Shawn Wilson (2008) writes about Indigenous knowledge as relational, that knowledge is based on and exists within the context of relationships. The relationships between individuals, and with animals, plants, spirits, the earth, the cosmos, and even ideas, constitute and define knowledge and reality. As each individual's web of relationships is unique, so is their experience of truth and reality. In his book 'Research is Ceremony', Wilson emphasizes the importance of and issues around doing research from an Indigenous perspective, arguing that the spiritual underpinnings of Indigenous knowledge systems must form the basis of an Indigenous research methodology (Wilson 2008).

In her research and writing, Misty Potts-Sanderson (2010) developed a unique methodology that reflected and honoured her cultural and spiritual identity and the *Isga* ways of knowing. In this thesis I also hope to honour the *Isga* ways of knowing, albeit in a manner that is appropriate as a non-Indigenous outsider to the culture.

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4 METHODOLOGY

4.1 Methodological Approach

The overall approach of In-Land-and-Life was community-based and participatory. Community-Based Participatory Research (CBPR) has been described as “a collaborative approach involving community and partners in all phases of the research, (which) aims to produce empowering outcomes including increased community capacities, broader stakeholder participation in decision-making and promotes social justice” (Tremblay 2009:1). CBPR is community-centred, focusing on research topics of importance to communities using flexible, culturally-appropriate approaches, and engaging local expertise and knowledge in the research design and processes. It is also an iterative process of investigation and reflection, where ongoing communication and feedback between academic and community research partners act to ensure that community priorities and values are reflected in the research goals and methods (Tremblay 2009; Minkler and Wallerstein 2010; Israel et al. 2013). Following these principles of CBPR, the *Isga* communities provided the primary guidance for In-Land-and-Life research questions, processes and logistics. The environmental health concerns of *Isga* community members gave rise to the research partnership, and community members were involved in many aspects and stages of the project. Community Principal Investigator Misty Potts-Sanderson was the primary liaison between the *Isga* communities and the other academic researchers and graduate students including myself. Misty and also her mother Daisy Potts, an Elder in ANSN, provided me with invaluable guidance on *Isga* culture and protocols for conducting research activities in a respectful and effective way.

CBPR and other forms of collaborative research are approaches that can help address the problematic history of academia as an elitist realm of professional researchers having little understanding of or regard for local people's knowledge, perspectives, values, concerns and goals. Science and research, as tools of the Euro-colonial powers, have historically provided the theoretical foundations that have facilitated and

tried to justify the dismissal and domination of colonized peoples around the globe (Smith 1999) and that arguably still inform most university research projects in Canada. Many researchers underestimate the extent to which colonial values have been embedded in the dominant society's worldview and in conventional research approaches. An exploration of the “underlying assumptions, motivations, and values which inform research practices” (Smith 1999) is essential for researchers engaging in CBPR, particularly with Indigenous communities. Ideally, CBPR recognizes the inherently political nature of research and attempts to address issues of equity and power relations among the collaborating partners, as more conventional research approaches often ignore or even exacerbate inequalities and unjust conditions for marginalized communities where their research is located (Potts and Brown 2005; Minkler and Wallerstein 2010).

However, there are also significant challenges to implementing truly participatory CBPR. DeFilippis (2014) notes that since CBPR studies tend to take longer to complete than more conventional ones, researchers using primarily CBPR approaches will publish less frequently, which is discouraged at the institutional level. Also, as participatory research methodologies have become more widely employed, there is concern that in many cases, the use of CBPR has become entrenched in status quo thinking and hierarchical research paradigms. Peterson and Gubrium (2011) differentiate between ‘transformative’ CBPR and ‘instrumental’ CBPR. Transformative CBPR is community-led and controlled, recognizes diversity and complexity within communities, is process oriented, and tends to incorporate local knowledge. Conversely, in instrumental CBPR, participation is viewed as a tool to achieve community buy-in, with participation framed in terms of ‘consultation’ or ‘cooperation’ rather than full control, and where evidence- or science-based approaches are privileged (Peterson and Gubrium 2011). Despite the lip service given to participation, in instrumental CBPR community concerns tend to be structurally determined rather than emerging through community engagement and research processes. In some cases, participatory approaches have been appropriated within top-down, reductionist models as a tool

to make communities feel that their issues and perspectives are being prioritized, when in fact, they are made peripheral and subordinate to predetermined dominant interests (Cooke and Kothari 2001; Peterson and Gubrium 2011). Peterson and Gubrium (2011) also found that community capacity building is often geared towards acquiring skills to help communities cooperate with researchers, and instead creates relationships of dependency with research institutions.

I have become more aware of the persistence of Eurocentric colonialism within Canada since I began working with the *Isga*. I was raised within the *Isga* traditional territories, less than 30 kilometres from *Wakâ Mne* (Lac Ste. Anne) and the main ANSN reserve. Despite this, I had not once visited this or any reserve until returning as an adult and a research collaborator with In-Land-and-Life. The only person I had known during my youth from either of the *Isga* communities was a child in foster care with a non-Indigenous family. There were very few Indigenous children in the primary and secondary schools I attended, and we were hardly taught even a rudimentary history of the land we lived on, and the people that had been displaced from it. Thus, my understanding of the realities and challenges facing the *Isga* was quite limited at the outset, especially considering that I had grown up on their traditional lands. Through spending time with people at campouts, participating in ceremonies and community events, and visiting people's homes and workplaces, I gradually formed relationships with many community members and gained a deeper understanding of *Isga* culture and values, political realities and the challenges that they are facing. I also gradually learned about the complexities of participating in and facilitating research as an outsider (of largely non-Indigenous, European descent), especially in terms of navigating relationships personally and professionally as I became more involved in the communities.

4.2 Evolution of the Study Design

The collaborative mapping research project that I facilitated as part of In-Land-and-Life was a mixed-methods study (Creswell and Plano Clark 2007), combining qualitative Traditional and Local Ecological

Knowledge (TLEK) with science-based non-traditional mapping and digital spatial technologies and imagery. The health of cervids, particularly moose, was initially identified as our primary focus. In the beginning, we collected samples of harvested moose for disease and contaminant analysis, to compare the locations of healthy and unhealthy animals. However, there were many challenges with this sampling component. The veterinary pathologists we were working with unexpectedly withdrew from the project and moved out of the country and in the end we were unable to recover any detailed health or location data for individual samples that had been submitted, in turn reflecting some of the challenges and shortcomings reflected by such team-based interdisciplinary research projects. In any case, some of the harvested moose locations and health observations were documented on maps in the interviews. Initially, we were marking locations for both healthy and unhealthy/abnormal moose. However, because the maps and overlays were challenging and cumbersome to work with, documenting harvest locations took a considerable amount of time. Most hunters had also harvested many more healthy animals than unhealthy ones. I soon found that it was difficult to document even just the locations for unhealthy moose and still have time to cover all the other important interview questions.

Because of these difficulties in obtaining moose health and location data, and also because of the wide range of environmental and human health concerns shared in the interviews, we gradually expanded our focus to a more holistic view of environmental health. Many people were sharing information and expressing concerns about a variety of animal species, including fish, waterfowl, beavers, muskrats, grouse, rabbits, and songbirds, as well as other aspects of environmental health including water and air quality, and the health and abundance of berries and medicinal plants. Looking at a fuller picture of environmental and health issues soon seemed to be a more effective and appropriate way to address and explore community concerns.

Isga community members also expressed interest in using the mapping project to document their land

use and occupancy. Some Elders and other community members emphasized that documentation of past and present land use is very important for negotiating land use rights and protections with governments and industry. Maps provide evidence of land use and occupancy in a form that is considered valid and recognizable to dominant society authorities making land use decisions (Tobias 2000, 2009). Out of this community priority grew another major component of the mapping study⁵. In addition to documenting land use and occupancy, we also investigated barriers to land and resource use, as well as responses by the *Isga* to the barriers they have faced.

4.3 Data Collection, Analysis and Ethical Considerations

The environmental health mapping study was carried out primarily through interviews with *Isga* traditional land use harvesters and other community members with a connection to their lands, livelihoods and/or land-based cultural practices. With guidance and suggestions from community research partners, I interviewed Elders, hunters, fishers, people who cut and dry meat, berry and plant harvesters, and youth who are learning these traditional skills of their culture. I tried to meet potential interview participants, often informally at events or through other community members, before discussing the project or the possibility of an interview with them. The more time I spent getting to know people in the communities, the more voices were added to the research. I also interviewed several non-Indigenous hunters and residents of rural areas within the *Isga* traditional territories. In total, twenty-eight *Isga* community members and five non-Indigenous people were interviewed. Many interviews took place in the ANSN training centre or in the homes of participants, and the rest were held during an In-Land-and-Life campout in 2010. Additionally, during the summer of 2011 we documented berry and

⁵ On the outsider/academic side, we were concerned about the potential dangers of mapping traditional land use, especially sensitive areas, such as sacred places and important harvesting areas (see Johnson et al. 2006; Pearce and Louis 2008; Laituri 2011). Through further conversation with Elders and other community members, I realized that many *Isga* were well aware of many of these dangers. Participants, in sharing culturally important spatial information with me, had already decided what information they wanted to share publicly and felt that the benefits of documentation outweighed the potential risks. Those that I spoke with, and showed how I was planning to represent these places/knowledge on the digital map, all agreed that it was important to include all of the types of areas that had been shared with me.

medicinal plant harvest sites around ANSN with local harvesters and youth summer students as part of a related traditional land use study. I also kept a journal with observations and reflections on the interviews, campouts and other research and community activities in which I participated, and on the challenges and successes of my own cross-cultural learning experience.

For all interviews, the same basic protocol and structure was followed. Tobacco was offered to each *Isga* participant before the start of the interview as recommended by In-Land-and-Life Cultural Advisor Daisy Potts. Next I explained our consent process, going through the consent form (Appendix) with each participant and emphasizing that consent could be altered or withdrawn at any time during or after the interview. The interviews were semi-directed and designed to each take about one hour to complete, although the actual time taken varied considerably between participants. Most interviews were individual, although several included two or three participants together. One-on-one or very small group interaction proved to be the most effective way to discuss and document detailed wildlife and environmental health information. In addition to spoken responses, much of the spatial information was documented on plastic overlays on maps of various scales. Twenty of the interviews were audio-recorded, respecting that some participants did not wish to be recorded at all. I also took notes during most of the interviews, especially when audio-recording were precluded. At the end of each interview I gave a cash honorarium of \$50 to each participant as a thank-you for the time taken and the knowledge shared.

I transcribed the interview recordings for analysis together with the spatial data. Initially, to digitize the map overlays, I had them scanned and then georeferenced them to basic hydrology and road network data using the program ArcGIS. I investigated various options for acquiring additional spatial data that would show the nature and density of disturbance in the study area, including air photos, satellite imagery and digital shapefile data layers showing resource extraction and other dominant land use

activities. I discovered that all of these data types are extremely expensive to purchase, whether through the Government of Alberta or a private company, especially for an area as large as the traditional territories of the *Isga*. At that point, I turned to Google Earth (GE) as a free and relatively up-to-date source of satellite imagery. Conveniently, GE can also be embedded within the qualitative data analysis program ATLAS ti (Fielding and Cisneros-Puebla 2009).

I used ATLAS ti (version 7.1.7) to code the interview transcript texts according to themes, and also added hyperlinks from all spatially-referenced text to their corresponding locations in GE. From these spatial references in the interview texts, as well as from community sharing circles, less formal conversations and my field notes, I created a spatial database in GE of traditional land use and environmental change in the *Isga* territories. This database file will be given to the *Isga* communities and can be opened and viewed using any computer that has GE installed.

With respect to data management, the collaborators of In-Land-and-Life chose to work within the guidelines of OCAP: Ownership, Control, Access and Possession, as developed by the National Aboriginal Health Organization (Schnarch 2004; FNC 2007). A comprehensive framework designed to bring self-determination into the realm of research and information management, OCAP asserts that First Nations have the right to make decisions regarding all aspects of research projects that affect them. This includes questions of what, why, how and by whom research is conducted and information is collected, as well as how it will be used and shared. First Nations (and all Indigenous Peoples) inherently have ownership of all of their cultural knowledge, and as such must have easy access to, and possession of, any data collected about themselves and their communities (FNC 2007). Formal ethics approval for this research was also obtained from the University of Manitoba Joint-Faculty Research Ethics Board (Protocol #J2008:164).

Isga research partners have been involved in every step of the mapping research process. After the interviews were completed I continued to share and discuss results and incorporate feedback from key community partners, particularly Misty Potts-Sanderson and her father Percy Potts, during the analysis and writing phases. Misty also provided community perspective as an informal member of my thesis committee (although her graduate student status had initially prevented her from being an official member).

In presenting research outcomes it is important to appropriately credit those who have shared knowledge and information, but also to respect anonymity if desired (Wilson 2008). For this thesis, all participants were consulted before using their names and direct quotes to ensure that they were comfortable with the use of their knowledge, the context in which it was used, and the manner in which they were credited. Another important consideration was how and where to share and store the data over the long term. All participants whose interviews were audio-recorded received a copy of the transcript. All participants will be offered a paper and/or digital copy of this thesis, and will also be notified and provided with copies of any future publications or research outcomes of which they would like to receive a record. The spatial database will be retained by the ANSN and PFN Lands Departments, as well as Misty Potts-Sanderson, for future reference and use by the *Isga* communities.

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5 ISGA LAND USE AND OCCUPANCY

5.1 Abstract

Indigenous Peoples typically have a fundamental connection to their lands that is crucial to identity, health and wellbeing. However, many communities around the world have been displaced from their traditional lands and dispossessed of their environmental resources and cultural heritage. This study investigates barriers to the land use of the *Isga* People in central Alberta, Canada, through a community-based land use-and-occupancy mapping project. Barriers include land use and harvesting regulations and restrictions notably in parks and protected areas; the expanding footprint of private property, agriculture, industry, and urban and residential developments; the destruction and commercialization of sacred places and traditional resources; and a history of federal assimilation policies and also religious persecution. As a result, many *Isga* no longer practice traditional livelihoods and have become disconnected from their traditional lands and culture. However, some responses to these barriers are more hopeful and proactive, including the continuation and adaptation of land use and harvesting, as well as the revival of language and spiritual practices. As a whole, these responses reflect the tremendous resilience that exists within the *Isga* communities. In this research, the themes of land justice and self-determination emerged as key, crucial elements for the health and wellbeing of the *Isga*. Addressing these underlying sociopolitical factors is crucial to improving the health and wellbeing of the *Isga* and more generally Indigenous Peoples across the rest of Canada and for that matter around the globe.

5.2 Introduction

5.2.1 Indigenous Land Justice

Land, the foundation and finite resource that sustains human life, has become increasingly contested with the growth of the world's human population and the modern colonial economic powers that jockey

for control of nearly every part of the globe. The world's Indigenous Peoples are among those most profoundly affected by the increasing human pressures on the global land base. Large-scale appropriation and exploitation of Indigenous lands is a centuries-old reality in much of the world. During the past 500 years the American continents, Australia, New Zealand, most of Africa, and parts of Asia were appropriated and colonized by European states (Kohn 2012). Many Indigenous lands were intensively exploited right from the early stages of the European colonial project while full-scale exploitation is still intensifying to this day in less accessible regions. This intensive resource exploitation has had devastating impacts on the surrounding environments and Indigenous communities and other populations that are vulnerable to these changes.

During the last few decades, the concepts of environmental racism and more recently environmental justice have developed in response to the unfair distribution of the environmental costs of industrial pollution and resource use (UCC 1987; Adeola 2000). The related and overarching concepts of land justice, territorial sovereignty and self-determination have long been relevant for Indigenous Peoples, but have only relatively recently been explored seriously within academic and geo-political forums. Through environmental justice research, clear links have been made between disproportionate environmental impacts and the reduced health and wellbeing of Indigenous and other marginalized peoples (e.g. Wheatley 1997; Van Oostdam et al. 2005; Metcalfe et al. 2011). Land justice includes environmental concerns as well as the more fundamental issues of land and territorial rights (Lane 2006; Kolers 2009; Schlosberg and Carruthers 2010). Land justice issues are often extremely contentious because of their far-reaching implications for modern day colonial states. Much research addressing land justice is approached from within an environmental health or environmental justice framework. However, it is becoming increasingly evident that broader issues of land justice and land rights are also of fundamental importance to the health and wellbeing of Indigenous Peoples.

Many Indigenous communities maintain connections with their traditional lands, these ties forming an important part of their cultural identities (Greenwood and de Leeuw 2007; King et al. 2009). A common thread of understanding in many Indigenous cultures is that land and people are inseparable, and that humans are just one component in a living system that also includes land, water, animals, plants, spirits and ancestors, all bound together through kinship, history and intricate ecological relationships (Samson and Pretty 2006; Kirmayer et al. 2009a). Land-based Indigenous cultures typically include the interrelated dimensions of language, spirituality and traditional livelihoods (Nettleton et al. 2007; Biddle and Swee 2012). Language is a vital part of culture and identity, and the primary means of communicating history, stories, values, spiritual practices, ideas, philosophy, environmental knowledge, skills and expertise through the generations. Indigenous languages that have developed in specific social and environmental contexts are used to maintain and transmit complex place-based knowledge systems (Weber-Pillwax 2001; Amrhein 2010; Ballard 2012). Likewise, land-based livelihoods are highly specific to landscapes and environmental conditions. Many Indigenous Peoples still practice the hunting, fishing and gathering of food and medicines that have sustained them through many generations (Berkes et al. 1995; Ruiz Perez and Arnold 1996; Forbes et al. 2009; Schuster et al. 2011). There is growing recognition of the health benefits of traditional diets, which have nutritional and medicinal qualities that cannot be obtained from processed foods (Samson and Pretty 2006; Kuhnlein et al. 2013). Also, engaging in harvesting, gathering and food processing activities contributes to physical fitness as well as the affirmation of cultural values, identity, and mental and spiritual health (AFN 2007; Kirmayer et al. 2009a).

The health of Indigenous Peoples is a serious global concern (Montenegro and Stephens 2006; Nettleton et al. 2007). However, researchers and health officials have largely focused on the immediate physical and socioeconomic determinants of health, without adequately considering the underlying issues that influence economic status, community health, social cohesion and self-esteem. These latter issues include environmental, social and cultural connections, which are disrupted by the loss of land and

environmental dispossession (Richmond and Ross 2009). Sustaining connections to land is particularly challenging for urban Indigenous populations, which are growing rapidly in many countries (King et al. 2009; AANDC 2010). However, maintaining distinctive identity and community as well as ties to land can all play important roles in the health and wellbeing of Indigenous Peoples in diverse environments and circumstances (King et al. 2009; Kirmayer et al. 2009b).

5.2.2 Barriers to Indigenous Land Use and Occupancy in Alberta, Canada

Many Indigenous Peoples have experienced a wide and pervasive array of barriers to accessing their traditional lands, the practice of their traditional livelihoods, and the maintenance of their land-based cultures. One major barrier has been land appropriation by states, municipalities, and as private property for economic purposes and settlement. In Canada, many Indigenous communities were subjected to a systematic Treaty-making process in which their entire land base was ceded to the colonial state, while they were restricted to federally-regulated reserves representing a tiny fraction of the size of their traditional territories (Samson and Cassell 2013). From the 1880s until at least the 1930s, many communities in the Prairie Provinces were confined to these reserves through an illegally imposed 'pass system', in which they ran the risk of arrest or the denial of food rations if they left their reserve without a pass stating the duration and reason for their travel, signed by the government Indian Agent assigned to their reserve (Purich 1986; Barron 1988). During this time, large scale agricultural settlement encroached on these reserves and converted much of the land throughout the traditional territories to private ownership (Van Tighem 1993; Bradley and Wallis 1996).

Another form of land appropriation during this time was the creation of national and provincial parks and protected areas. In the late 1800s and early 1900s, much of the western mountainous region in the province of Alberta was converted to national parks for the purposes of recreation and tourism, and later, for conservation. In both Jasper and Banff National Parks, Indigenous Peoples were evicted from

their homes and forced to live elsewhere (Binnema and Niemi 2006; Angela Jones and Christine Paintedstone 2010, pers. comm.; MacLaren 2011). A number of provincial parks have also been established across Alberta, many of which either prohibit or heavily regulate the practices of land use and occupancy by Indigenous Peoples (Stanley Alexis 2011, pers. comm.; Alberta Parks 2014).

Another major barrier to the survival and practice of Indigenous culture and land use in Canada came in the form of assimilation policies and cultural repression by the dominant society. State-sanctioned assimilation legislation and policies were introduced starting with the Gradual Civilization Act of 1857. In the 1880s, Indigenous traditional ceremonies and religious practices were made illegal across Canada (Hanson 2009). One of the most invasive and damaging assimilation techniques was the residential school system that began in the late 1800s and extended until 1996 (Elias et al. 2012). During this time, Indigenous communities throughout Canada were forced to send their children to Christian boarding schools, where they were removed from their families and homelands, prohibited from speaking their native languages, indoctrinated with the religion of the colonizers, shamed of their cultural identity, and often physically and sexually abused by the religious authorities (Milloy 1999; Elias et al. 2012). The legacy of the Canadian residential school system continues to have a profound intergenerational impact on the survivors, their families and communities. Addictions, domestic violence, and mental health problems in Aboriginal communities are all strongly associated with and attributed to the residential school legacy (Stout and Kipling 2003; Elias et al. 2012).

The most recent threat to Indigenous land use and occupancy in Alberta has been intensive industrial resource extraction activity. The province is reliant on industrial resource extraction and processing activities, especially those associated with the petroleum industry. Between oil and gas wells and oil sands mining in northern Alberta, the province has become one of the world's largest oil and gas producing regions (Evans and Garvin 2009; Johnson and Coderre 2011). Nearly 500 000 oil and gas wells

have been drilled in the province, with an associated 400 000 kilometres of pipelines (Lee et al. 2009). The oil sands region alone made up 56% of Canada's oil production in 2012, with a total area of 715 square kilometers of boreal forest disturbed as of January 2013 (Pembina 2014). Forestry is another major industry in Alberta, and 64 000 – 82 000 hectares of forests have been harvested every year since the mid-1990s (CCFM 2012). Coal mining and electricity generation are more localized but also represent significant land uses, particularly in central and western Alberta (Donahue et al. 2006; Lee et al. 2009).

Agriculture and settlement are other major and expanding land uses in Alberta. Particularly in the late 1800s and early 1900s, agricultural activity including livestock grazing and cultivation dramatically altered prairie and parkland regions (Van Tighem 1993; Bradley and Wallis 1996), and transformed more land in Alberta than any other land use. As of 2005, nearly 38% (25 million ha) of Alberta's land base was being used for agriculture (Stelfox 2010), most of this under private ownership (Government of Alberta 2008). Along with agriculture came non-Indigenous population expansion and settlement. This expansion has occurred continuously in central Alberta since the late 1800s, and in more recent decades following the booms of the resource extraction-based economy (Stamp 2014). In the last half century, the population of Alberta has nearly tripled (Statistics Canada 2011). Residential properties now cover a total of 225 000 ha in the province, in turn representing an average annual growth rate of ~3% (Stelfox 2010).

5.2.3 The *Isga* People and Territories

In the midst of all of this colonial, regulatory and industrial activity in Alberta are the *Isga* People. The *Isga* are a distinct cultural group of Indigenous People in what is now known as west-central Alberta, related linguistically to the 'Siouan' Peoples (Dakota, Lakota and Nakota) of the North American Great Plains (Parks and DeMallie 1992). They are also known as 'Stoney', 'Nakota/Nakoda', and 'Assiniboine'; however, '*Isga*' is the term by which they refer to themselves in their own language (Potts-Sanderson

2010). The *Isga* People have a land use-and-occupancy area covering most of what is now known as west-central Alberta, from around what is now the city of Edmonton west into Jasper National Park (JNP), and from around Rocky Mountain House in the south to at least as far north as Lesser Slave Lake (Plate 5.1). Family groups tended to live in different parts of this large region, but also traveled within and among smaller regions according to seasonal harvesting as well as for social and cultural purposes.

Following the signing of an adhesion to Treaty 6 in 1877, the *Isga* were assigned to what is now known as the Alexis Nakota Sioux Nation (ANSN) Reserve (No. 133) on the north shore of *Wakâ Mne* (Lac Ste. Anne). Shortly after, part of the band moved to Lake Wabamun, establishing the Paul First Nation (PFN) Wabamun Reserve (No. 133A and B) on the eastern shore of the lake. The PFN also has a small reserve southeast of Buck Lake (No. 133C), as some families have a history of occupancy in the area (Andersen 1970). In 1995, through their Treaty Land Entitlement, the ANSN established three additional reserves: Alexis Whitecourt (No. 232), Alexis Elk River (No. 233) and Alexis Cardinal River (No. 234) in other important parts of their traditional territories (Schramm 2007). *Isga* is the primary cultural background of most members of the ANSN, while the PFN is comprised of *Isga*, Cree, and Saulteaux Peoples (Potts-Sanderson 2010).

All of the previously described land uses by dominant society have a significant presence in the *Isga* lands. Oil and gas activity is prevalent throughout much of the *Isga* territory and clearcutting has also deforested much of the western boreal forest region. The eastern part of the *Isga* territory is in the aspen parkland and mixed wood regions of central Alberta that are dominated by agriculture and settlement. Much of the Edmonton Capital Region, as well as many towns and smaller settlements, are on land that was traditionally occupied by the *Isga*. Since the beginning of colonization, there has been a continual western encroachment of urban, suburban, residential and recreational developments further into the *Isga* territory. Despite barriers to land use and environmental health concerns, many *Isga*

people continue to practice traditional land use activities including hunting, fishing, trapping, harvesting of berries and medicinal plants, ceremonies and spiritual practices. However, the new dominant land uses have affected and will continue to affect the ability of the *Isga* to practice their traditional livelihoods and culture (Arai 2007; Potts-Sanderson 2010).

5.3 Purpose and Objectives

The In-Land-and-Life project was initiated in response to *Isga* observations of declining environmental health. In-Land-and-Life is a collaboration between ANSN, PFN and academic researchers, primarily through the University of Manitoba. I was invited to facilitate the mapping component of the study, to spatially document changes to wildlife and environmental health in the *Isga* traditional territory, with hunters and other traditional land use harvesters. Through conversation and discussion with *Isga* researchers and community members, another priority became apparent - to document land use and occupancy within the *Isga* territories. The *Isga* have already done some formal documentation of land use, including in the process of establishing the ANSN Treaty Land Entitlement, as well as through the Alexis Nakota History Program (Schramm 2007). This research builds on the knowledge already documented through these previous initiatives. As well, this study is the first spatial documentation of land use and occupancy by the *Isga* People as a whole, including both ANSN and PFN.

Throughout the research and interviews, barriers to land use emerged as a prominent theme. Thus, I have documented these barriers and their impacts on the *Isga* traditional land use harvesters and communities. We were also interested in learning about the responses of the *Isga* to environmental change, barriers to land use and other challenges to maintaining cultural practices, language, traditional livelihoods and healthy communities. Understanding more about the challenges, adaptations and successes of the *Isga* in maintaining land use and culture may provide insight into the adaptive strategies of these and other Indigenous communities in fostering community health and cultural survival in the

face of economic and political pressures and landscape change. Thus, our purpose was to examine *Isga* land use and occupancy in the context of these challenges, impacts and responses, through the following objectives:

- Characterize past and present land use and occupancy in the *Isga* traditional territories, including *Isga* language place names, descriptions and associated stories and history;
- Identify and describe barriers that the *Isga* have faced in practicing land use and occupancy, including access to land and resources as well as other challenges to maintaining livelihoods and cultural practices; and
- Characterize the impacts of these barriers on the wellbeing and cultural survival of the *Isga* People, as well as responses by the *Isga* to deal with and adapt to the barriers.

5.4 Methodology

5.4.1 Methodological Approach

The In-Land-and-Life project, including the land use-and-occupancy study, was designed collaboratively, within the framework of Community-Based Participatory Research (CBPR) (Tremblay 2009). *Isga* community members were involved in most aspects of the overall research process, including the initial identification of research questions and areas of investigation; wildlife sampling for contaminant analysis; hosting, setup and logistics of campouts to conduct research and share traditional skills; participation in interviews; and ongoing feedback during the analysis and reporting of results.

Community Principal Investigator Misty Potts-Sanderson from ANSN was the primary liaison between the *Isga* communities and the other academic researchers and graduate students including myself. Misty and also the In-Land-and-Life Cultural Advisor Daisy Potts provided me with invaluable guidance on *Isga* culture and protocols for conducting research activities in a respectful and effective way.

In developing our approach to mapping land use and occupancy, we made use of several sources of

information and protocols for mapping traditional territories and land use. The most important reference was *Chief Kerry's Moose: a guidebook to land use and occupancy mapping, research design and data collection* by Terry Tobias (2000), as well as his expanded and updated book *Living Proof: the essential data-collection guide for Indigenous use-and-occupancy map surveys* (2009). In conducting land use-and-occupancy research and mapping with the *Isga*, we largely followed the methods recommended in these books, particularly in terms of interviewing and the logistics of physically documenting spatial data with participants. These two books also provided a valuable overview of ethical considerations and best practices with respect to spatial data collection, management and use. Another important resource was *Maps and Dreams* by Hugh Brody (1981). His approach demonstrates the usefulness of mapping land use-and-occupancy extent by traditional harvesters, and gave me insight into the possibilities for mapping land use and environmental impacts together to better understand the effects of environmental change on Indigenous communities and traditional harvesting.

In terms of data management, the In-Land-and-Life collaborators chose to follow the principles of OCAP (Ownership, Control, Access and Possession) as outlined by the National Aboriginal Health Organization (Schnarch 2004; FNC 2007). The OCAP framework emphasizes the right of Indigenous communities to make the decisions about what, why, how and by whom research is conducted and information is collected in their communities, as well as how it will be used and shared. In the case of this land use-and-occupancy study, interview transcripts will be given to participants whose interviews were audio-recorded, and the spatial database will be retained by the ANSN and PFN Lands Departments and Misty Potts-Sanderson for future reference and use by the *Isga* communities.

5.4.2 Research Design and Methods

Data Collection

The land use-and-occupancy study was primarily carried out through interviews with *Isga* community

members. I also interviewed several non-Indigenous hunters and residents of rural areas within the *Isga* traditional territories, for the environmental health mapping component. In total, from 2010-2013, interviews were conducted with twenty-eight *Isga* people, including Elders, hunters, and other traditional land use harvesters, and also five non-Indigenous residents. Many of these interviews took place in the ANSN Training Centre or in the dhomes of participants, and the rest were held during one of several In-Land-and-Life campouts. Additionally, during the summer of 2011 we documented berry and medicinal plant harvest sites around ANSN with local harvesters and youth summer students. I also kept a journal with observations and reflections on the interviews, campouts and other research and community activities in which I participated, and on the challenges and successes of my own cross-cultural learning experiences.

The interviews were semi-directed, with a format that evolved over the course of the research as patterns of responses emerged and community priorities became apparent. For the land use-and-occupancy component, I asked participants where their land use areas are and what kinds of hunting and harvesting they practice. Participants had the option to document land use on plastic overlays of maps at three scales (a provincial base map from Alberta Sustainable Resource Development at 1: 1 000 000 and topographic maps from the Canada Centre for Mapping at 1: 250 000 and 1: 50 000) depending on the size of the participants' land use areas. Different coloured markers were used to represent different sites and areas, depending on the types of land use described. Nineteen people used these maps to document spatial information about land use and environmental health. In many cases, I asked them to outline the geographic extent of their land use area(s), for use-and-occupancy documentation and also to get a sense of the total size of the study area. Although the interview questions largely centred on environmental health, land use topics and issues emerged as well, especially barriers to land use. I also asked about individual and community responses to changes in environmental health and other barriers to land use, whether and how people have been able to adapt to the changes, and if these

changes have affected the wellbeing of the *Isga* and their ability to practice traditional livelihoods. Most of the interviews were individual, although several included two or three participants at a time. Twenty of the interviews were audio-recorded. I also took notes during most of the interviews, especially those for which the participants had indicated consent for note-taking but did not wish to be audio-recorded.

Analysis

I transcribed the interviews that had been audio-recorded and then coded the interview text and my field note summaries according to a series of emerging themes, including types of traditional land use practices, barriers to land use and occupancy, environmental and human health concerns, and responses to barriers and environmental change. The transcript texts were coded using the qualitative data analysis software ATLAS.ti (version 7.1.7). To incorporate the map data, I created a spatial database using Google Earth (GE). The spatial data from the map overlays and the oral interview data (i.e. significant places and areas mentioned or drawn on the map overlays) were digitized by drawing points and areas onto the satellite imagery provided in GE. These sites and areas were often associated with many different types of land use, although for clarity a single icon and colour was used in most cases. When multiple land use types occurred, icons were colour-coded according to the most frequently or extensively described use, but also to visually represent the full range of land use types documented within larger areas. I then embedded the GE database as a document directly within the ATLAS.ti project. Using the spatial analysis capabilities in ATLAS.ti, hyperlinks were created in the margins of the interview transcripts to link text passages directly to the geographic sites and areas in GE to which they refer. I also wrote and embedded brief descriptions of areas and sites in the GE database that had been discussed during the research, that include such information as the types of land use and harvesting practiced, the cultural significance to the *Isga*, and barriers to land use and occupancy, including environmental impacts and access issues.

In compiling the spatial land use data, as well as through discussion with *Isga* participants, we identified

several key regions of land use and occupancy for the *Isga* communities. Within the GE database, I also created a digital map of all *Isga* place names that had been shared with me. In summarizing the interview data, I identified a number of themes within the discussions of barriers. I examined these barriers within several categories in the findings, according to the types of restrictions and challenges to the practices of land use and occupancy and maintaining connections to land. I also identified themes within the individual and community responses to these barriers. I have examined these responses according to whether they represent a loss of land use practices and connections; adaptations to the barriers experienced; or the continuation, maintenance and revival of land use and cultural practices among the *Isga*. In following up with participants about the results of the study and in receiving feedback about the way I had used the information they had shared with me, I asked several people about these themes to confirm if they were an accurate reflection of these barriers and responses. Everyone I discussed this with affirmed that I had adequately covered the range of barriers experienced by the *Isga* and had written about them in an accurate way. These same participants also seemed satisfied with the way I had represented responses to the barriers, and a few elaborated further on the types of responses I had described. Responses among the *Isga* to land use barriers are diverse and this thesis describes only a few examples.

5.5 Findings

5.5.1 The Land from an *Isga* Perspective

Land Use and Occupancy

The *Isga* research partners and participants shared and documented many sites and areas of land use and occupancy throughout their traditional territory (Plate 5.1). These locations represent a wide range of land-use activities and landscape features, including camps and cabins; hunting, fishing, berry picking, and medicinal and edible plant harvesting areas; springs and other water bodies; and places of cultural

and spiritual importance. Some people also documented important wildlife habitat, for moose and other species important as food sources, as well as other notable species including birds of prey.

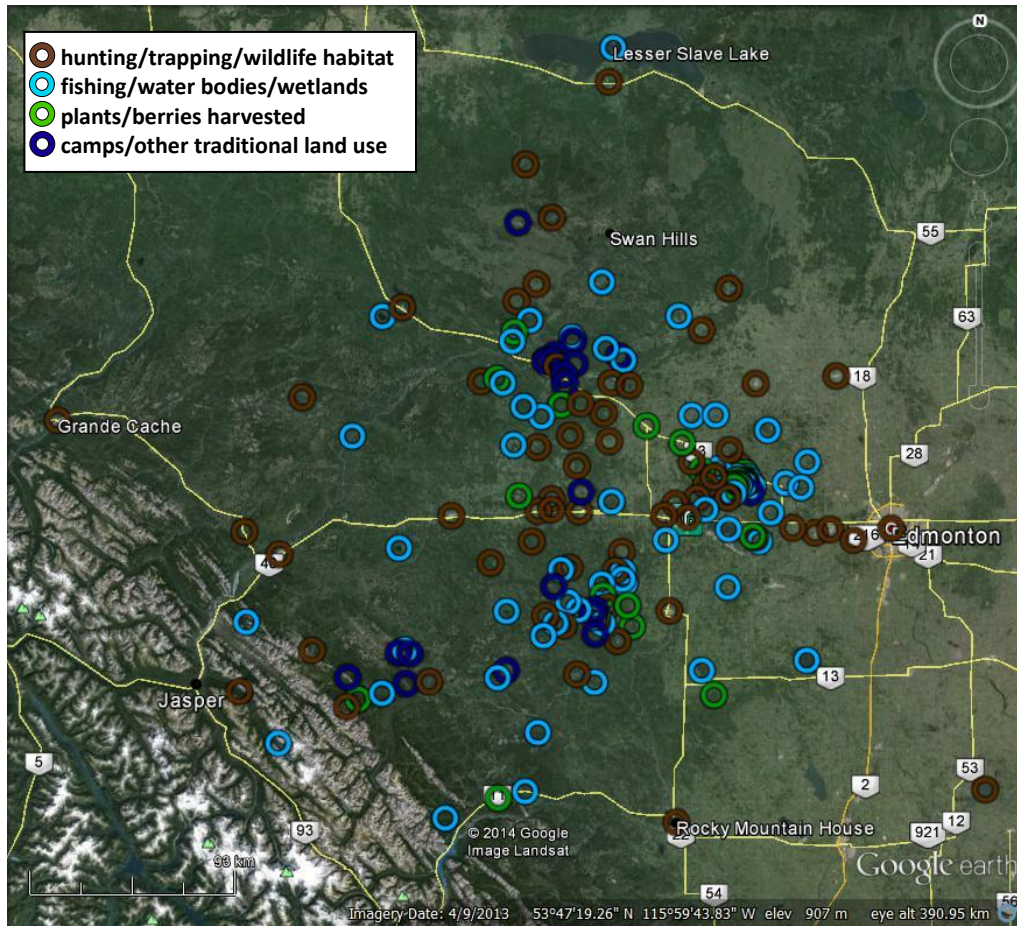


Plate 5.1 *Isga* land use and occupancy across central Alberta, Canada⁶

Most of the land use and occupancy documented was in the eastern half of the *Isga* territorial area. This concentration of land use is likely due at least in part to the location of the ANSN and PFN principle reserves, along with most of the *Isga* population in recent generations, in the east-central parts of the territories. Many *Isga* talked about their land use and occupancy areas as being part of, or in conjunction

⁶ Image courtesy of Google Earth and Landsat.

Officially-recognized traditional territory boundaries may be found on the ANSN and PFN websites.

The Alexis source map is titled *Alexis Nakota Sioux Nation Traditional Land Use Area* and can be found at: http://www.alexisnakotasioux.com/userimages/Traditional_use_Alexis_8x11.pdf (last accessed July 2014).

The Paul First Nation source map is titled *Paul First Nation Traditional Territory* and can be found at: <http://www.paulfirstnation.com/default.aspx?ID=Maps> (last accessed July 2014).

with, the traditional use and occupancy areas of their ancestors and extended families. Historically, *Isga* families tended to live primarily in certain regions, but traveled among regions as well. Four main regions were most frequently discussed in terms of ancestral ties, and land use and occupancy: the area around *Wakâ Mne* (Lac Ste. Anne) and *Wihne Mne* (Wabamun Lake); *Wapta Mnode/Nuba* (the Whitecourt area); the area around and west of the town of Drayton Valley; and the western foothills and Rocky Mountain region extending into what is now Jasper National Park (JNP). The most densely documented land use was in the areas around *Wakâ Mne* and *Wihne Mne*, since the ANSN and PFN reserves are located on the shores of these two lakes. The most extensive documentation was in and around the ANSN Reserve, where the majority of the *Isga* research participants live.

Many of the *Isga* participants spoke of having grown up in, or having ancestral roots in, the region around the small settlements of Cynthia and Lodgepole, west of Drayton Valley (Plate 5.3). Several Elders had been raised on this land and spoke of it as their home. Many *Isga* hunt, camp, and pick berries and medicines, and several participants and other family members still manage trap lines in this area:

If you go west of Drayton Valley, that's where we go and we manage... the trap line, my trap line. That's where we make our sweats, up there, that's our traditional berry picking, medicine, herbs, everything on this area.

Fred Alexis, ANSN

Some extended families lived mainly in the western foothills region, including the Kootenay family (Christine Paintedstone 2010, pers. comm.). The Rocky Mountains were also an important part of the *Isga* lands, particularly as sacred and culturally important places:

That lake, with a little island in the middle ... that's where, a long time ago, they used to fast. That's the one they call Maligne Lake. ... And the hot springs. That's where they used to go sit when they had arthritis and skin rashes and stuff like that... . Yes, our territory went right into Jasper, because the mountains were the place where they had vision quests, fasting and stuff like that. We had places in the mountains they held as sacred.

Francis Alexis, ANSN

Many *Isga* also documented extensive land use and occupancy in the *Wapta Mnode/Nuba*⁷ (Whitecourt) region, including areas of camping, hunting, fishing, trapping, medicinal plant harvesting, fasting and burial grounds (Plate 5.2). *Wapta Mnode/Nuba* and Blue Ridge are very important areas in the *Isga* territories. In the *Isga* language, *Wapta Mnode/Nuba* refers to the area around the convergence of three rivers: *Shu/Cashe Wapta* (Athabasca R.), *Waxobi Owab Wapta* (McLeod R.) and *Casga Wapta* (Eagle/Sakwatamau R.). Some of the land use and occupancy in this region is described in greater detail in subsequent sections of this chapter.

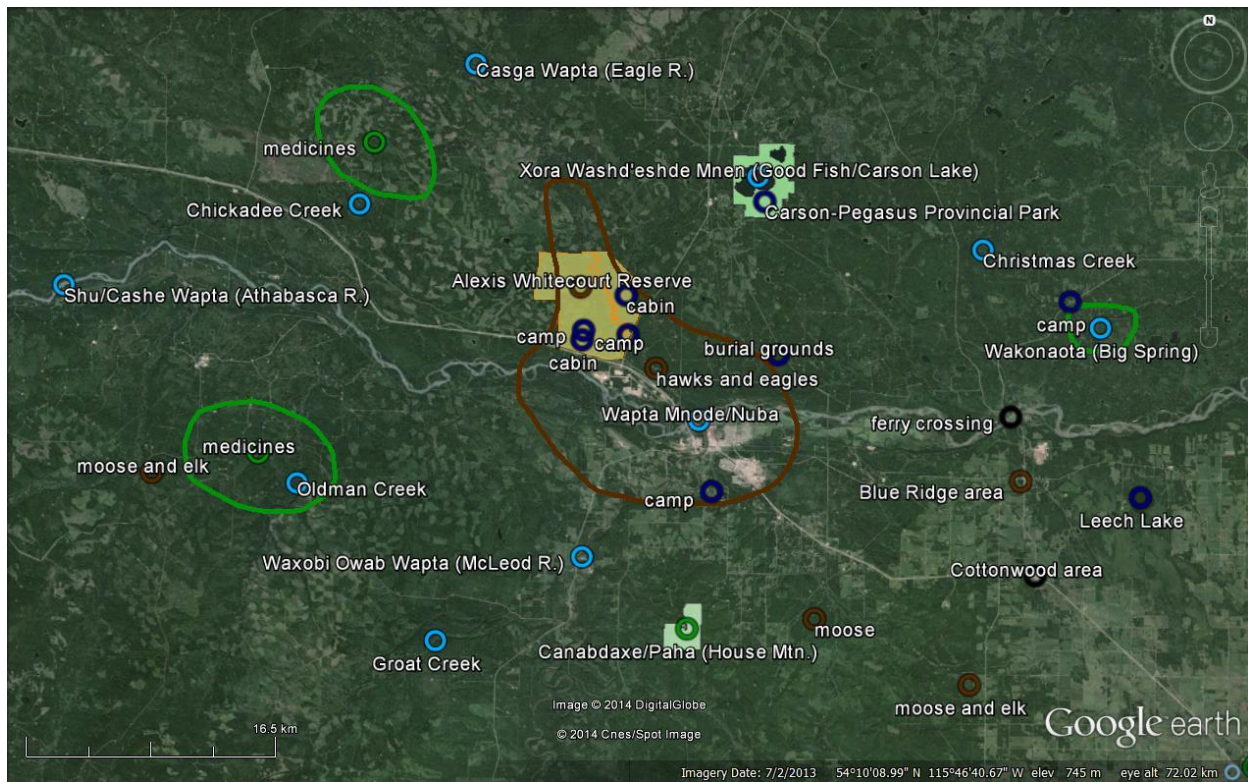


Plate 5.2 The *Wapta Mnode/Nuba* (Whitecourt) region⁸

⁷ *Wapta* means 'river' in the *Isga* language. An alternate spelling of '*wapta*' is '*wabda*'. Alternate spellings and pronunciation of words in the *Isga* language can be attributed to the different dialects spoken among different families, as well as to the complexity of representing an Indigenous oral language in a written form using the Latin alphabet (Brenda Kootenay and Ronald Potts 2014, pers. comm.). Also, different families use different names for some places (e.g. *Wapta Mnode* and *Wapta Nuba* are two different terms that both refer to the Whitecourt area; *Shu Wapta* and *Cashe Wapta* both refer to the Athabasca River; and *Canabda Paha* and *Canabdaxe* both refer to House Mountain). Currently ANSN is preparing to publish an *Isga* language dictionary, which will be a much more comprehensive reference for *Isga* terminology.

⁸ Image courtesy of Google Earth, DigitalGlobe and Cnes/Spot Image.

Alexis Whitecourt Reserve boundary by Geobase 2012. Contains information licensed under the Open Government Licence – Canada: <http://open.canada.ca/en/open-government-licence-canada>.

Alberta parks and protected areas boundary data by Alberta Parks 2012.

***Isga* Place Names: Indigenizing the Maps**

Throughout the *Isga* territories, community members including the *Isga* and Cree among others, described and named places in their own languages long before European settlement. As Europeans began settling in the area, these new residents assigned their own names to these places. These predominantly English and French names have now largely become the only official names recognized by the Canadian state, appearing on published maps of the region. As a result, few Albertans are aware of the Indigenous names for lakes, rivers, mountains, hills, plains and even settlements where they now live. Without official recognition of Indigenous place names it becomes easier to overlook the continuing Indigenous relationship to the land that far predates that of the current dominant society.

In the mapping interviews, several participants shared *Isga* place names with me. I was directed to Elder Francis Alexis for the specific purpose of putting *Isga* names on the map, as well as documenting stories and history of these places. Two other participants, including Elder Ronald Potts, shared several place names without my asking or mentioning anything about them, because they felt it was important to recognize these names and to keep this knowledge alive:

One of the concerns I have right now is the naming of these places. Our people have their own names. They [dominant society] have never, ever used the names that we have for them. Like, Pembina River. It's called *Wisa Wapta*, which is Saskatoon Willow River.

Ronald Potts, ANSN

Isga place names were documented throughout the *Isga* territories, and include lakes, rivers, creeks, springs, mountains, hills, sacred places, areas, and settlements. Many of these names are actually short descriptions of the places in the *Isga* language. Sharing the *Isga* name or description often also involved sharing the story of how the places got their names.

The area for which the greatest number of *Isga* names was documented in this study was the boreal forest region around Cynthia, Lodgepole and Drayton Valley, north of the Brazeau Reservoir. This region

is still one of the most important for the *Isga*, for hunting, camping, trapping, and gathering berries and medicines. The following image (Plate 5.3) shows the *Isga* place names and their locations documented in this region. The *Isga* names are followed in brackets by the English names most commonly used in existing published maps:

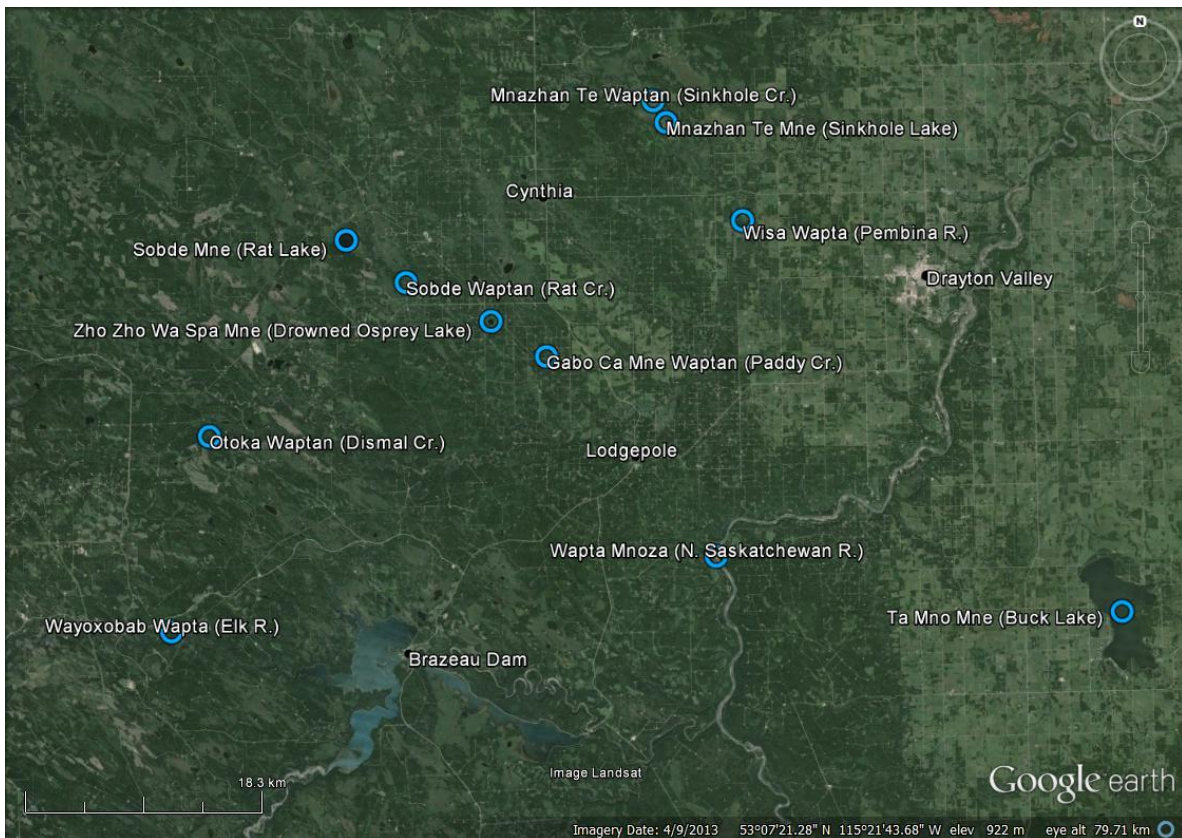


Plate 5.3 *Isga* place names in the Cynthia, Lodgepole and Drayton Valley region⁹

I have included fuller descriptions in the Google Earth database of many of the *Isga* place names and other land use-and-occupancy areas throughout the *Isga* territories, so that this information will be available for use by the *Isga* communities, and as directed by some of the participating Elders. These descriptions include information such as the significance of the places, land uses practiced, and English translations and meanings of the *Isga* names.

⁹ Image courtesy of Google Earth and Landsat.

5.5.2 Barriers to Land Use and Occupancy

One major theme that emerged from the research was barriers to land use and the practices of a traditional livelihood. Some of these barriers were associated with declining environmental and wildlife health, while others pertained more to reduced access to land and resources, and also a loss of connection to land and culture. In this section, I examine some of these barriers to land use and occupancy as they have affected the *Isga*.

Land Use and Harvesting Regulations and Restrictions

One commonly discussed issue was the interference of government in the practices of land use, particularly camping, hunting and fishing. Many talked about previous and current regulations and restrictions with respect to a variety of land use activities. Notably, a pass system restricted movement from the late 1800s through until at least the 1930s (Purich 1986; Barron 1988). Elder Fred Alexis also talked about the great difficulty in maintaining a traditional diet and lifestyle since the *Isga* were first assigned and restricted to reserves.

Some related concerns about access to and the use of public lands, which have been important camping and hunting areas. A few talked about increasing restrictions on the amount of time that can be spent living on public lands, which are generally the only traditional lands outside of the reserves where it is even still possible to live on the land to some extent. Six participants specifically discussed problems with maintaining registered traplines, which are located on public lands and which have typically been passed down through generations within families. A few participants spoke of traplines within their families that had been lost over the years, at least one due to a late fee payment. Two people also talked about the increasing cost of provincial government fees that now must be paid annually in order to maintain their traplines:

Even the traplines. The government has told me... to pay them every year now. It's getting

higher every year, the traplines. There are 365 days in a year, now you can't- you're only allowed to stay there about 200 days a year.

Fred Alexis, ANSN

Another concern is laws pertaining to hunting and harvesting. Some spoke specifically about how a fear of poaching charges and fines is discouraging people from hunting and fishing. One hunter explained that economic incentives given to people to turn in "poachers" causes traditional land use harvesters to be followed and watched while they are hunting. One woman spoke of being afraid to fish even in creeks on her own reserve, for fear of being fined. A few talked about the intimidation they and other *Isga* have experienced in dealing with government officials, particularly Fish and Wildlife officers. They also discussed gun control as a barrier to hunting:

I prefer wild meat than I would bought meat. That's why I encourage my partner to go hunting all the time. Even that's a problem, because you have to have a FAC [Firearms Possession and Acquisition License]... The government's trying to interfere in our way of life- we were never given those restrictions before. I mean- it was for our own survival that we were able to hunt whenever we want.

Brenda Kootenay, ANSN

The federal and provincial laws and regulations that affect land use, hunting and harvesting have created substantial barriers to land use and occupancy for the *Isga*.

Parks and Protected Areas

Another major concern with respect to government land management has been the restrictions and regulations to land use imposed on lands designated as parks and protected areas. Many parks and protected areas have been established on the *Isga* traditional lands, especially in the western mountainous regions (white and light green areas, Plate 5.4). Jasper National Park (JNP) in particular covers a huge portion of the Rocky Mountains within the *Isga* territories:



Plate 5.4 The Rocky Mountains and foothills of the *Isga* traditional territories¹⁰

The *Isga* living in what is now JNP were forced off their lands when the park was created in 1907 (Angela Jones and Christine Paintedstone 2010, pers. comm.). The late Elder Stanley Alexis described the present-day situation with respect to the use of land designated as parks in the mountains and foothills, including William A. Switzer Provincial Park, north of Hinton (Plate 5.4):

Most people, they have cabins around Cynthia. And they stay around the cabins and go from there. Go hunting from there. Towards the mountains. If it's not a park. If it's a park, we can't go there. ... We used to go north of Hinton, too, but it's a park now north of Hinton.

Stanley Alexis, ANSN

Ronald Potts related that a number of provincial parks had been created in areas that were traditional camping and gathering places for the *Isga*. He discussed in particular the lakes and land within Carson-

¹⁰ Image courtesy of Google Earth and Landsat.

Alexis Cardinal River and Elk River Reserve boundaries by Geobase 2012. Contains information licensed under the Open Government Licence – Canada: <http://open.canada.ca/en/open-government-licence-canada>. Alberta parks and protected areas boundary data by Alberta Parks 2012.

Pegasus Provincial Park, north of the *Wapta Mnode/Nuba* (Whitecourt) area (Plate 5.2). This area is an important part the *Isga* lands, and for his family in particular:

Grandma called it, in our language: *Xora Washd'eshde Mnen*. Good Fish Lake is what she called it, and that's what our Stoney name is, and they called it McLeod Lake and now they changed it to Carson Lake. The reason why she called it that, it had some beautiful whitefish in there. And... they killed all the natural fish and they put in trout. ... There were a lot of artefacts found in that camp, and nobody said anything. They made it into a provincial park, that was our traditional area, and they never even consulted anybody, they just went in there and they made a provincial park and even some of the trapline holders weren't even notified.

Ronald Potts, ANSN

Ronald and also one of the non-Indigenous participants, who is a long-time resident of the Whitecourt area, expressed frustration about the use of the toxic chemical rotenone in the elimination of good quality native fish populations, as well as dissatisfaction with the subsequent trout stocking program, at *Xora Washd'eshde Mnen* (Good Fish/Carson/McLeod Lake). *Xora Washd'eshde Mnen*, which was called McLeod Lake by early European settlers, was renamed Carson Lake and then changed back to McLeod in the mid-1980s (Bradford and Hanson 1990). Carson-Pegasus Provincial Park, which completely surrounds *Xora Washd'eshde Mnen*, was created in 1982. In 1976, native fish populations were exterminated through a Fish and Wildlife program, with the use of the chemical rotenone, in order to subsequently stock the lake with non-native rainbow trout for sport fishing (Makowecki et al. 1978). Rotenone in fisheries management and as a pesticide has been widespread in North America since the second half of the twentieth century but there is a growing body of evidence of its adverse effects on a variety of aquatic species (e.g. Melaas et al. 2001; Billman et al. 2012). Rotenone exposure has also been linked to Parkinson's disease in humans and other animals (Dhillon et al. 2008; Tanner et al. 2011).

Industry and Agriculture

Industrial activity, including oil and gas, forestry, agriculture, and mining, is causing dramatic change to the lands as well as the ability of the *Isga* to practice their traditional livelihoods (Arai 2007; Potts-

Sanderson 2010). Environmental impacts of industry are the focus of Chapter 6 of this thesis. The other major concern was barriers to land use and occupancy imposed through resource extraction, industrial developments and agriculture. Five *Isga* participants specifically discussed experiencing restricted access to their land use areas in terms of physical barriers and hunting prohibitions imposed by industry and grazing lease holders, as well as associated and sustained environmental decline:

I guess it's just too much activity. They're not leaving the land in the way it should be. They're just taking everything out, like our berry patches, our hunting areas, it's all slowly deteriorating, it's slowly going away. And other places where it's coming back, our access to it is- they've restricted it. The oil companies try to keep us out, or hunting associations try to keep us out and stuff like that and I don't think that should be because that's our traditional lands, and that's where we hunt.

Ronald Potts, ANSN

Importantly, this initial industrial use facilitated a series of other perhaps more sustained land uses:

So now that thing is clearcut, and after they clearcut then they seed it, and then they put fertilizers on it and stuff like that, and then they bring the cows and the horses and whatever in there. And then it says "No Hunting", "No Trespassing", so we lose our connection to the land, we can't go hunt or pick berries or gather from the land- we no longer benefit.

Francis Alexis, ANSN

A couple of people talked also about reduced accessibility in clearcut areas where 'waste' tree trunks had been left lying haphazardly. One *Isga* hunter also related experiences of harassment and intimidation by industry workers while hunting in areas where resource extraction activity has become prevalent.

Destruction of Sacred Places

The combination of industry, development and a lack of awareness and respect for Indigenous cultures can have devastating consequences. Francis Alexis shared some history of places of cultural and spiritual importance for the *Isga* that had been completely destroyed or severely damaged by industrial and

development activities. He related the history and cultural significance of *Opabin Mima Nhami Paha*, a stone circle on top of a mountain in the western foothills that was destroyed by coal mining:

By Pembina River, and then Lovett River... there used to be another mountain. And on top of that mountain was a stone circle. When they strip mined that mountain, that one is gone. So the stone circles and the sacred places that used to be there are not there anymore... *Opabin Mima Nhami Paha*: it's like a descriptive thing, a stone circle. ... It's like a calendar. You would have 20 spokes, and it tells stories about the sunrises, the moons and the stars. At certain times a certain star would sit this way and that's what the rock was telling, telling stars. It's like a map of the sun, the moon and the stars. But it also tells stories about our people and how we're connected to the seasons, so the stone circle will tell you which day, if you know how to read it, which day is the longest day of the year, which day is the shortest day of the year, which days even out again. All those things were written in there.

Francis Alexis, ANSN

There are sacred and spiritually important places throughout the *Isga* lands. Francis also shared the cultural significance and history of the damage done to *Canabda Paha*, known also as House Mountain, south of *Wapta Mnode/Nuba* (Whitecourt):

Our family, we call it *Canabda Paha* because there are a lot of, when you're climbing that hill, along the way you'll find a lot of that *canabda* [willow fungus]. ... And on top of that hill was a big, round rock. That hill, people used to go fast on top of it. And when young boys became 12 or 13 years old they had to go and sit on top of there for four days and four nights. And that was rites of passage from when they were little boys to young men. ... When you're high on top of that hill, you can see the stars. There were no lights then. And then, a few years back, they started putting those towers; telephone towers or satellite towers or TV towers on top of that thing. They built a road on top of there. And that rock, they took it. ... So it's been developed and it's been done without consulting us. It was a sacred place.

Francis Alexis, ANSN

Opabin Mima Nhami Paha and *Canabda Paha* are just two of the sacred places that have been destroyed or damaged by dominant-society economic activities. Francis and a few other *Isga* also talked specifically about the connections between healthy land, sacred places, spiritual connection, and the health of the *Isga*. Impacts on spiritual health will be further discussed in the following sections and will be touched on again in Chapter 6.

Commercialization of Traditional Resources and Sacred Places

A related concern is the commercialization of traditional natural resources and culturally important sites. In particular, several participants spoke about the appropriation of sacred springs and water sources that had been used by their families and communities for generations. Four talked about an important spring north of Cynthia that has been fenced off and commercialized by the private company Voda Springs:

We used to be able to go to this one spring to get water. And we can't anymore. It's closed off, and not too far from it, there's a water plant or something where they take in water from that spring, and... they're selling the water, spring water. ... See, I thought that place was open- was part of the area where we're able to go, you know, they call it crown land. But they fenced it off, and we can't go get water there anymore.

Geraldine Bearhead, PFN

Two also talked about a hot spring in Jasper National Park, now called Miette Hot Springs, that has been commercialized for tourism. The *Isga* know the hot spring as *Mini Hinape Kaden* and it is a sacred, medicinal spring that has been used for generations by their people (Francis Alexis 2011, pers. comm.). Elder Christine Paintedstone discussed *Mini Hinape Kaden* within the context of the appropriation of the entire region and the displacement of the people living there:

That hot spring... they called it a sacred place because of that hot water. And then they [*Isga* People] made a cabin there, they were guarding it, and the government found out [about] the hot spring there and they moved them out and they made a park. ... They should give it back to them, that's where they live.

Christine Paintedstone, ANSN

Several also talked about their traditional economy that has been disrupted and forced to adapt within the constraints of the new dominant economic and legal system. This traditional economy includes the trade of wildlife meat. Ronald Potts expressed frustration about the hunting industry and companies that profit from the hunting and sale of wildlife from within the *Isga* territories, while the *Isga* themselves are subject to restrictions and numerous regulations on the trade and sale of wildlife products (Government of Alberta 2009) including dry meat, which is an important part of their traditional economy:

Big game hunting is a big industry out there. And for me to feed my family and, say, to get \$50 off of somebody and sell a piece of meat, I'll go to jail for it, and I'll be prosecuted. But then, these big companies, guiders and outfitters, they're selling the meat, they're selling the whole animal and yet, nothing happens to them, and that really makes me wonder, where's the justice in it?

Ronald Potts, ANSN

Encroachment of Residential and Urban Development

Throughout the *Isga* territories and particularly in the eastern regions, the amount of land consumed by residential and urban settlements continues to grow. In addition to the land designated as private and municipal property, community access to and use of surrounding public lands has also been affected. The expansion of the settler population has resulted in residents who have little knowledge of and respect for the long-standing relationships of the *Isga* with the land. Two *Isga* women Elders related changes over time in the nature of interactions with settlers on the *Isga* traditional lands. Both said that settlers used to be kinder and did not harass traditional land use harvesters, but that this has changed in recent years. Additionally, Elder Daisy Potts described a recent negative interaction with settlers while fishing in a creek that adjoins with *Wakâ Mne* (Lac Ste. Anne) that is traditionally used by the *Isga*:

In Lac Ste. Anne, we get whitefish from that creek. ... We used to fish there all the time and nobody said anything. And this last time we went to fish over there, these white people came on quads and they chased us away from there. You know, they just swore at us and told us to get the hell away from here, we're going to call the cops and everything. Like, we're not allowed there anymore. Fish and Wildlife, they were going to call. It's not free for us to just go and get them anymore.

Daisy Potts, PFN/ANSN

Other *Isga* harvesters commented on the cost of gas and the amount of driving that is now necessary to get to many of the more remote hunting and gathering areas that are still accessible to them.

Assimilation Policies and Religious Persecution

Another pervasive influence that has affected the relationship between the *Isga* and their land is cultural oppression by the Canadian state. This oppression was particularly brutal during the era of systematic

persecution of Indigenous spiritual practices by religious and colonial authorities. Residential schools were one of most invasive tools used in Canada to disrupt and destroy Indigenous cultures and ties to a land-based spirituality (Milloy 1999; Elias et al. 2012). Although cultural oppression was not a topic specifically targeted by the interview questions, several people discussed residential schools and cultural persecution in the context of disruptions of connections to land and culture. Four participants talked about their own personal experiences in residential schools. Two in particular strongly emphasized the negative and repressive experiences they had endured. Elder Fred Alexis spoke of his residential school experience in the context of the overall systematic repression of *Isga* spiritual practices:

Even the sweat lodges and everything, they outlawed it as if we were praying to the devil, we're not even- they don't know. Our prayers are our language, the way we pray in our language. Who in the hell do they think they are to tell us to pray **this** way? ... And it still bothers me, that convent system, and then dominant system... I went out of school when I was 13 years old because I was getting more disciplined than learning.

Fred Alexis, ANSN

Language is another component of culture that was severely disrupted by the residential school regime. Many talked about the loss of the *Isga* language in their communities and how this is undermining their connection to traditional culture and the land. Annette Paintedstone thus talked about how her and her sisters' experiences of language repression in the residential school they attended adversely affected their language retention and these connections:

I think I may have been 6 or 7, I went ... it was sort of like a convent and we were never, ever able to talk my language, but I just totally refused, I talked to my little sisters like that, and- one forgot her language, eventually.

Annette Paintedstone, ANSN

5.5.3 Responses to Barriers

Discontinuing or Changing Land Use Practices and Locations

Many *Isga* talked about a decline in traditional land use among their community members. The most common response when asked about if and how the *Isga* are adapting and responding to barriers was

that maintaining land use practices is now much more challenging, and as a result there is much less frequent camping, hunting, fishing and gathering on the land than in the past. Many also talked about having to travel farther or even find new areas to hunt, harvest and camp when the ones they are familiar with have been appropriated as private property or for activities that are incompatible with traditional land use. Several mentioned that young people are not eating as much wild meat now and that it is mostly Elders who are still maintaining a more traditional diet. Some spoke about an increased dependency on the dominant system, particularly in terms of food sources, income and health care.

People attributed decreasing traditional land use to declining environmental health as well as to reduced access to the land. Elder Bernice Bull of the Paul First Nation discussed how environmental contamination from a massive railway oil spill into *Wihne Mne* (Wabamun Lake) in 2005 (Wernick et al. 2009), combined with decades of coal-fired electricity generation and mercury emissions from plants around the lake (Donahue et al. 2006), has caused people in her community to stop practicing traditional land use in and around the lake and even within the PFN reserve on the eastern shore of Wabamun Lake:

People were afraid to eat anything. They stopped eating the ducks and they even stopped killing moose in this area here. Stopped eating the berries; there were a lot of blueberries, saskatoons, raspberries, all the berries in this bush, this area here. Everything came to a halt... People used to eat rabbits, snare rabbits a lot. Smoked the rabbits. But they even stopped eating that, too. They've stopped eating rabbits, ducks, muskrats, beavers...

Bernice Bull, PFN

Many had concerns about the health and quality of wildlife, berries and other traditional resources that have been exposed to environmental contaminants from industrial and agricultural sources. Several talked about observed declines in the quality of fish in many of the lakes in the region around the reserves in the eastern part of the *Isga* traditional lands, and the need to travel farther now to catch good quality fish:

Even the fishing has changed, because we have to go further into the forested areas to do

some decent fishing. Up in the settled areas there are so many chemicals, pesticides, whatever they dump into there. And it's not healthy anymore.

Ronald Potts, ANSN

Some also spoke about changing their harvesting patterns to adapt to the changing landscape. Bernice Bull talked about travelling long distances and also going to privately-owned berry farms to pick berries that are part of the *Isga* traditional diet:

They traveled distances as far north as northern Alberta and Saskatchewan to go pick their berries and stuff for part of their food survival. And I, too, went that one year. About three years ago we were way up in, past Cold Lake, to go pick berries. And ... now we're going to these tame farms. U-pick.

Bernice Bull, PFN

Many also spoke of an underlying traditional conservation ethic, particularly with respect to hunting moose and other large game. Some spoke about an even greater need to practice the conservation of wildlife and plants because of declining populations and habitat loss. One hunter described the loss of wetlands and with them the aquatic plants that are a staple food source for moose. He related his practice of leaving moose alone whenever he sees them eating these plants in an intact wetland habitat in his hunting area. A couple of *Isga* harvesters also described practices of conserving medicinal plant populations, particularly in areas where a population has been affected by disturbance.

Maintaining Traditional Land Use and Culture

Throughout this research, many *Isga* described how their culture and land use practices are surviving and adapting to changing circumstances and landscapes. Some talked about continuing to hunt and gather, and the importance of maintaining a traditional lifestyle despite the uncertainty they often feel about the safety and quality of traditional foods. Also, the residential school survivors talked about continuing to practice traditional land use and culture despite their experiences, and how this acted as a way of responding to and resisting the losses in language and connection to the land:

Now I can't even remember, like a birch tree, right. Like, that stuff I forgot. So I'm

eventually relearning it again, now that I started coming back into the bush.

Annette Paintedstone, ANSN

Others talked about continuing land use and occupancy despite the physical and legal barriers that have been imposed. Elders Angela Jones and Christine Paintedstone talked about their continuing relationships with the land within Jasper National Park, even during the time when access to and land use in the region had been made illegal, this as a form of resistance to the invasive laws and regulations:

AJ: What do you call it- Jasper. And the other place there, going to Calgary. Banff. That one, too. Well, Jasper, our ancestors stayed there. And Morley [Stoney People in southern Alberta] used to stay in Banff.

CP: They never really stopped us, we still go. We're going to go anyway. [laughter]...

Angela Jones and Christine Paintedstone, ANSN

However, one recent positive development has been a recognition and renewal of Indigenous land use within Jasper National Park. Park management has expressed a commitment to reconciling with First Nations that historically lived in and occupied the region, through the work of the Jasper Aboriginal Forum (Parks Canada 2012). Francis Alexis talked about having better access now to the lands and sacred places within JNP for ceremonies and also the gathering of some resources including medicinal plants.

Many harvesters talked about continuing to teach young family members traditional skills including hunting, fishing, making dry meat and gathering and preparing medicinal and edible plants. Many hunters, including a few young men, also talked about hunting as a regular practice and a fundamental part of their livelihood. Some talked about persisting despite dramatic environmental change and barriers to land use, and an intention to continue hunting in spite of these increasing challenges. Ronald Potts talked about the new generation of *Isga* traditional land use harvesters who are learning and practicing their skills in a landscape that is very different from the one he himself grew up in:

There's a lot of interference from the oil companies, denying access to the traditional areas. And we're still maintaining the traditional lifestyle that we're teaching our kids, like my youngest daughter, she probably knows more about hunting than I do right now.

Ronald Potts, ANSN

Some also talked about a need to work effectively with industry to protect key resources, and also to improve practices that affect traditional land use harvesters. Some also talked about how their own traditional knowledge might be used to influence and mitigate the impacts of these industrial activities:

You know, when they're clearcutting... just push the trees together and they should give it to somebody who can use [them]. If you just pile them up like this somebody will go get it and make a use out of it. Meat rack, whatever. Tipi poles- they'll make a use out of them.

Christine Paintedstone, ANSN

A few talked also about a continuing responsibility on the part of the federal government to protect Treaty rights. They felt that in allowing such widespread and intensive industrial activity, the government has been negligent in protecting their traditional lands and land use rights. As a more general response to these infringements, the *Isga* have been actively involved in the Confederacy of Treaty Six First Nations, which advocates for the protection of treaty rights and also the right of self-determination of member Nations (CTSFN 2013).

5.6 Discussion

In documenting and discussing traditional land use and occupancy among the *Isga*, many barriers were identified by participants. Indeed, all spoke of barriers, most discussing multiple barriers to their land use and land-based cultural practices. Physical and regulatory barriers included state-imposed displacement and restrictions, and the encroachment of industrial resource extraction activities, agriculture and settlement. The severing of ties to land, language and culture through colonial assimilation policies and religious persecution was also identified as a significant barrier to traditional land use as well as a serious challenge to cultural survival.

These findings are consistent with the experiences of many other Indigenous Peoples in Canada and internationally. Indigenous communities around the world have endured displacement by colonizing settlers (Thomas 2003; Richmond and Ross 2009; Kohn 2012), for resource extraction and economic

activity (Adeola 2000; Schlosberg and Carruthers 2010; Samson and Cassell 2013), and also for the creation of parks and protected areas (Stevens 1997; Poirier and Ostergren 2002; Binnema and Niemi 2006; Korir Sing' Oei and Shepherd 2010). There are also many examples of where this displacement has been justified by racist ideology and claims of cultural superiority (Fairweather 2006; Kohn 2012; Samson and Cassell 2013), and reinforced through the use of assimilation strategies and techniques that amount to cultural genocide (Richmond and Ross 2009; Davidson 2012; Woolford 2013).

Through the interviews and analysis as well as less formal discussion with participants, the related themes of land justice and self-determination emerged as key issues for the *Isga*. Many emphasized the importance of land justice mainly through discussions of Treaty rights and the obligation of the federal government to protect Indigenous lands, resources and livelihoods. These Aboriginal rights were recognized and entrenched in Canadian law as early as the Royal Proclamation of 1763, and have been reaffirmed in the Treaty negotiations, in Section 35 of the 1982 Canadian Constitution (Slattery 1987), in court cases, and now also internationally in the United Nations Declaration on the Rights of Indigenous Peoples (Collins and Murtha 2010; Samson and Cassell 2013). Some land use rights, and arguably, the protection of Indigenous livelihoods, were also recognized in the Natural Resources Transfer Agreements (NRTAs) in 1930 (Tough 2004), when jurisdiction over public lands and natural resources was transferred from the federal to the provincial governments of Alberta, Saskatchewan and Manitoba. However, the nature and extent of these rights and protections at the provincial level have been heavily contested in litigation and in many cases simply ignored by governments and industry, with often unfavorable consequences for Indigenous Peoples (Tough 2004). Importantly, the NRTAs also only affirmed the rights of subsistence hunting and harvesting, as opposed to the more general hunting and harvesting rights asserted in the Treaties (Woodward 1989; Tough 2004). This more restrictive legislation, aggressively enforced by the Alberta government, is undermining the traditional economy and livelihoods of the *Isga* (Daisy Potts 2014, pers. comm.). The NRTAs were also enacted without the consent of Indigenous

Peoples, despite the direct and profound impact on their lives and also the relevance of this legislation in the context of previous Treaty agreements made with the federal government (ANSN 2007). Many *Isga* expressed that the federal government has not done enough to protect their lands, resources, and livelihoods from intrusive land uses and environmental degradation. These concerns are echoed by Indigenous Peoples throughout Canada (Purich 1986; Collins and Murtha 2010; Samson and Cassell 2013).

Alongside land justice, self-determination was another key issue for many *Isga*. This was apparent in discussions of the Treaties, the Indian Act, assimilation policies, residential schools, religious repression and the increasing provincial restrictions on Indigenous land use and occupancy. Participants linked the systematic attack on Indigenous self-determination by the Canadian state with the decline of land-based livelihoods, culture and language retention, as well as the deterioration of mental health, social cohesion and general wellbeing among their community members. Indigenous Peoples in Canada have never recognized the extinguishment of their rights to autonomy and self-determination, and there is also much legal evidence to support these claims of Aboriginal sovereignty (Slattery 1987; Anderson et al. 2008; Samson and Cassell 2013). Yet, many have been forced to give up or compromise key aspects of self-determination, including traditional governance, education systems, land title and livelihoods. One of the most formidable barriers to Indigenous self-government is the overarching jurisdiction of the federal government, particularly through the Department of Aboriginal Affairs and Northern Development. Provisions of the Indian Act have imposed a municipal and 'western' style of leadership selection on First Nations (Bork 2012), a system which does not allow for much flexibility in the way First Nations are able to govern themselves and one that denies the importance of traditional forms of leadership (Moss and Gardner-O'Toole 1987).

Another key concern with respect to both land justice and self-determination was the destruction and

commercialization of sites and places sacred to the *Isga*. The loss of and damage to sacred places through industrial activity, resource extraction, tourism and even cultural appropriation, has occurred and is a threat to many Indigenous lands (e.g. Herz 1993; Marcus 1997; Deloria 2003; Griswold and Scoll 2012). The lack of awareness and disregard for the spiritual and cultural importance of sacred places is a serious problem faced by the *Isga* and indeed by many other Indigenous Peoples.

Also problematic are some of the conventional and science-based approaches to the conservation of ecosystems and landscape. A goal increasingly touted in biodiversity conservation and the sustainability of social-ecological systems is the concept of 'no net loss'. This idea is applied most frequently as a strategy in maintaining ecological values, habitat and biodiversity through the creation of new habitat such as wetlands to replace habitat that is destroyed for development (BBOP 2012). However, conceptions of 'no net loss' generally do not take into account the social and cultural values of places that are of particular importance to Indigenous Peoples. A sacred site of central (and geographic) importance to the identity and cultural practices of an Indigenous community (i.e. for the *Isga*, the stone circle *Opabin Mima Nhami Paha*, that happened to be sitting on top of a coal seam), cannot simply be 'replaced' elsewhere in the landscape. Economic approaches frequently try to quantify the relative values of resources, but this is not always possible and is also inappropriate for some landscape components, particularly sacred places (BBOP 2012; Ehrlich 2012; Temper and Martinez-Alier 2013).

Some development planning in Canada is starting to take into consideration the cultural significance of landscape features and areas (e.g. Lewis and Sheppard 2005; Ehrlich 2012). In the *Isga* territories, some industries are now required to consult with Indigenous communities before beginning operations in new areas in order to avoid or mitigate damage to sites of cultural importance. However, some *Isga* have questioned the effectiveness of these consultation procedures in protecting their cultural heritage. Also, this kind of consultation typically applies only on public lands, so there is little recourse when sacred

places are located on lands that are now privately owned. As well, during previous decades when no such consideration was given at all, many places sacred to the *Isga* were completely destroyed (i.e. *Opabin Mima Nhami Paha*) or severely damaged (i.e. *Canabda Paha*). Others, including *Mini Hinape Kaden* (Miette Hot Springs) and *Inuk Widan Mne* (Maligne Lake) were appropriated for tourism and 'western'-style conservation within Jasper National Park.

The onslaught of dominant society culture and land uses has taken and is still taking a serious toll on the traditional land use and overall wellbeing of the *Isga*. Even so, the responses of many of the participants indicated considerable resilience within the communities. Many, including young people, continue to camp, hunt and gather in various parts of their traditional lands, and have adapted their practices to work around the barriers they have encountered. Some even spoke of following conservation practices that they have adapted to new environmental conditions. Furthermore, the *Isga* communities are working to sustain and strengthen their culture and connection to the land in many ways, including through culture camps, ceremonies, language revival, involvement in protected areas management, land use-and-occupancy documentation and environmental health research.

Many *Isga* talked about community efforts to maintain their language and culture. There is an *Isga* (Stoney) language program at the Alexis school, through which all students take Stoney language classes. There is also an adult Stoney language course taught by ANSN member Brenda Kootenay at the Yellowhead Tribal College in Edmonton. I attended this course, and it helped me greatly in understanding some basics about the *Isga* language, culture and the naming of places. Some also talked about the revival of spiritual ceremonies and practices in recent years, some of which I have had the privilege of witnessing and experiencing personally during my time with this work.

The concept of community resilience has not received a great deal of attention in the literature; indeed, Indigenous communities are generally characterized as victims, as vulnerable, and even as quaint and

from the past. Resilience most often refers to individuals, and more recently, ecosystems and social-ecological systems at larger scales of organization (Forbes et al. 2009; Ross and Berkes 2014). Moreover, much of the research that has looked at community or social resilience has focused on recovery from natural disasters rather than those caused by human disturbance, even though in recent history anthropogenic forces have caused the destruction of many more communities than natural catastrophe (Wilson 2012). Research around the world has documented damage to, and the dissolution of, Indigenous and other marginalized communities and populations due to environmental dispossession, losses of habitat and biodiversity, pollution and climate change (e.g. Locke et al. 2000; Kelkar et al. 2008; Wilson 2012; Rudolph and McLachlan 2013). However, some communities and social-ecological systems have demonstrated a great deal of resilience in dealing with environmental stresses (e.g. Sendzimir et al. 2011; Imai 2012) and changes in land use and management (e.g. Forbes et al. 2009; Ross et al. 2010). Studies that have examined this resilience to anthropogenic environmental change reflect in various ways the experiences of the *Isga*, who have suffered a grave loss of land-based culture and community cohesion, but also have shown adaptability and resilience at an individual and community level. Parallels between the *Isga* experience and that of other resilient communities include the ability to adapt and diversify livelihood practices (Forbes et al. 2009; Sendzimir et al. 2011), as well as the maintenance and revival of connections to land-based and other cultural practices, especially among youth (e.g. Forbes et al. 2009; Ross et al. 2010).

Another positive development for the *Isga* has been the recent renewal of relationships with Jasper National Park (JNP) management and of traditional land use within the park. In recent years Parks Canada has been making efforts to reconnect and reconcile with Indigenous Peoples who were forcibly displaced during the creation of many national parks in Canada. Through the Jasper Aboriginal Forum, park staff are working with the *Isga* and other Indigenous Peoples with a history of land use and occupancy in the region to establish new policies regarding land use and management of the park. JNP

management has expressed a commitment to the development of ongoing, mutually beneficial relationships with Indigenous communities, including the incorporation of Traditional Knowledge into decision-making and collaboration on the protection and presentation of Indigenous heritage in the park (Parks Canada 2012). Many *Isga* have participated in cultural events and camps within JNP since an initial reconciliation ceremony with ANSN in 2011. Despite the bitterness of a century-long legacy of eviction and prohibition of Indigenous land use and occupancy, many *Isga* are hopeful and encouraged by these recent developments, choosing to see them as an opportunity to renew their connection with these lands, particularly in terms of cultural practices. Within these mountains are places of great cultural and spiritual importance for the *Isga*, whereas other regions were more important for hunting and harvesting for food (Percy Potts 2014, pers. comm.). Fortunately, some of the land uses that the *Isga* are most keen to renew are now being accommodated at least to some extent within JNP. However, the Jasper Aboriginal Forum is still a very new process and it remains to be seen how far-reaching and sustainable these changes will be over the longer term. Also, some communities have been more actively engaged in the Forum than others. PFN has been less involved than ANSN, even though JNP is also a part of their traditional lands. As a result, some members of PFN are still paying for park passes when entering the park and are unsure whether they are able to enter without paying a fee (Bernice Bull 2014, pers. comm.). Indigenous communities have also expressed interest in participating in management and economic activities within the park (Parks Canada 2010) but it is still unclear in what form and to what extent these steps will be taken.

Collaboration and co-management with Indigenous Peoples in the governance of parks, protected areas and resources is seen as an important approach for addressing issues of land justice and self-determination in many parts of Canada and internationally (Stevens 1997; Nepal 2002; Thomlinson and Crouch 2012). Indigenous involvement in protected areas management has also contributed valuable perspectives and approaches to land stewardship and the conservation of resources (e.g. Stevens 1997;

Nepal 2002; Hunn et al. 2003). However, the experiences of co-management of some Indigenous communities, (e.g. in northern Canada), have been less than empowering and have arguably served to reinforce existing power relations between these communities and the state (Feit 1998; Nadasdy 2003, 2007). Great care must be taken to learn from these experiences, to address the root causes of the injustices facing Indigenous communities and to address community needs and priorities in meaningful, flexible and truly collaborative ways.

In the case of the *Isga*, initiatives such as the Jasper Aboriginal Forum, as well as programs to revive and maintain language and culture, are indications that progress is being made to address some aspects of land justice and self-determination. Also, this land use-and-occupancy study and the larger In-Land-and-Life project represent research initiated by the *Isga* to address concerns of land justice and environmental health, and exemplify some of the changes in the ways that some university research is being undertaken. Although these changes are hopeful, much more can and needs to be done to address the disruptions to traditional ways of life and livelihoods that are a part of the wider systemic oppression of Indigenous communities throughout Canada.

Limitations

One notable challenge we faced in the interviews was the complexity of using paper maps to document spatial information. The standard federal topographic maps available to us were quite out of date (from the 1980s and 90s), especially in this region where industrial activity has radically altered the landscape over the past thirty years. Participants frequently pointed out roads, developments or other changes on the landscape that were not depicted on the maps. Many were also much more comfortable in knowing their way around while traveling through the landscape itself, rather than in orienting themselves to a two-dimensional map. It was also cumbersome to work with the maps. I ended up taping several together to adequately cover the extent of most participants' land use areas, and then pulled out smaller

scale maps when we wanted to view a particular area in greater detail. When I transferred the spatial data into Google Earth, the satellite imagery often showed a much different picture than what had been visible in the paper maps. Working directly in Google Earth (or with satellite imagery in another format) in the interviews could have been an alternate approach, although a lack of internet connection where much of the research was conducted was a barrier to working within Google Earth with many of the participants.

Also, this land use-and-occupancy study grew and evolved out of the In-Land-and-Life environmental and wildlife health research process. Environmental health was the main topic of focus in the interviews, and discussions of historic and current land use mainly took place within the context of the mapping component. We did not set out to comprehensively map the land use-and-occupancy of the *Isga*. The collection and mapping of this data was often incidental and not as systematic as would have occurred if this project had been dedicated to land use-and-occupancy mapping. Also, the interview questions were largely aimed towards understanding changes to environmental health. However, any identified environmental health issues themselves often posed significant barriers to land use and occupancy, and were frequently discussed as such by participants. Many talked about other barriers as well, some of which were also directly related to industrial activity and other dominant society land uses, and some of which have been created through broader colonial policies and hegemonic forces.

In a study specifically geared towards examining the nature of barriers to land use and occupancy, it is likely that even more thorough and varied responses could have been elicited. Likewise, a greater emphasis could have been placed on understanding individual and community responses to the barriers. Some interviews had already been conducted when I began asking participants how they and their communities were responding and adapting to environmental change. Because environmental health is associated with many of the barriers faced by the *Isga*, a diversity of responses to a variety of barriers

was shared. However, these responses were of a smaller sample size and I feel that a deeper examination of this topic would have provided a fuller picture and more pronounced patterns of the *Isga* responses to land use barriers.

5.7 Conclusion

The *Isga* have a large territorial area consisting of several natural regions and diverse ecosystem types in west-central Alberta. Families lived in different parts of these territories, travelling according to seasonal resource needs, food supply, and for social and cultural events and gatherings. Placement on reserves has severely disrupted the livelihoods and way of life of the *Isga*. This has been the case for many Indigenous Peoples across Canada, who have a consistently and dramatically lower health and socioeconomic status than non-Indigenous Canadians (Waldram et al. 2006). There are not enough resources within the small reserve lands to sustain these communities. Employment or other economic opportunities on or around the reserves are also inadequate, forcing members to leave their communities for urban centres, which creates its own host of problems (Peters 2005). It is clear that the government goals and policies of assimilation and integration have had a devastating impact on Indigenous people across the country, leaving a great many stripped of their lands, economically impoverished, and with myriad social problems created by the disruption of self-governance, familial ties as well as Indigenous languages, spiritual practices and cultural values (Moss and Gardner-O'Toole 1987; Hanson 2009; Elias et al. 2012; Samson and Cassell 2013; Woolford 2013).

150 years of overt assimilation policies and the unrelenting encroachment of settlement, industry and other dominant land uses has displaced and alienated the *Isga* from most of their land base. Despite these immense challenges, many *Isga* persist in practicing traditional land use and occupancy, and maintain strong connections with some of the lands that are important for their families and communities. Indeed, many individuals, families and the community as a whole have demonstrated

considerable resilience in the face of numerous obstacles to maintaining traditional livelihoods and cultural practices.

In the course of this land use-and-occupancy study, the related issues of land justice and self-determination arose as key, crucial elements for community health and wellbeing for the *Isga*. Indeed, there is much evidence that these two factors are highly important for the health, wellbeing and cultural survival of Indigenous Peoples throughout the world (Warry 1998; King et al. 2009; Richmond and Ross 2009).

These findings suggest that a radically different approach is needed by the Canadian state, the provinces and dominant society in relating to Indigenous Peoples. Indigenous governance systems are highly diverse and generally incompatible with the federally-imposed chief and council structure that currently must be adhered to in order to be recognized by the state as legitimate (Long 1990; Bork 2012). With respect to land management, Indigenous communities must be recognized as more than mere 'stakeholders'. Indigenous Peoples are not simply another minority ethnic group in Canada; they are the original occupants of the land with inherent rights to land and self-determination (Kulchyski 2013). They have their own distinct knowledge systems, worldviews and ways of relating to the land and its resources that have developed over thousands of years. To honour Treaty obligations as well as emerging international standards of ethical relationships with Indigenous Peoples, land use planning and consultations must be conducted, at the very least, within a frame of reference that recognizes Indigenous Nations as equal partners with the Canadian state in sharing and managing the lands within their traditional territories. A 'Nation to Nation' framework is a far cry from the current Canadian reality of Indigenous communities being colonially governed under the Department of Aboriginal Affairs and Northern Development.

The concept of Indigenous Peoples as sovereign Nations with inherent land rights has far-reaching

implications for land governance, title and management in Canada. Each province has a responsibility to address access restrictions and land management practices that currently infringe on Treaty rights to a sustainable land and resource base that will support Indigenous harvesting and livelihoods over the long term. It is apparent that there also needs to be more public awareness of the long-standing and continuing relationships that the Indigenous communities have with their traditional lands. Resources must be devoted to educating people living within, or relocating to, these various territories (i.e. everyone living in Canada) as to which Nations' lands they are living on, as well as a history of the politics and land use in the area from the perspective of these Nations.

There is progress being made in some areas and with some institutions. The renewal of relationships and Indigenous land use within national parks in Canada is one example. The commitment made by Parks Canada to improve relationships with Indigenous communities throughout Canada, and the Jasper Aboriginal Forum in particular, are encouraging developments for the *Isga* and other communities that were displaced from national parks and protected areas. Initiatives from within Indigenous communities that promote self-determination are also extremely important. The *Isga* language programs are an excellent example of community-led education to foster cultural identity and ultimately, community health, especially in the context of a widespread education crisis facing First Nations in Canada (SSCAP 2011).

It is my hope that research such as this land use-and-occupancy study will also contribute to *Isga* goals for land justice. The database of spatially-documented land use-and-occupancy, including *Isga* place names and culturally significant areas could potentially be compiled with existing land use-and-occupancy information held by ANSN and PFN, or used in other ways according to community priorities. Some of the impacts of the current land use, barriers that facilitate and perpetuate these impacts and the resilience of these communities in the face of such oppression also need to be shared. In any case,

initiatives based on principles of land justice or self-determination, to address the health and wellbeing of Indigenous Peoples, must reflect the values and priorities of the communities themselves.

Community-led projects, and those that meaningfully and extensively involve members, have the greatest likelihood of making genuine contributions to community empowerment.

5.8 Chapter References

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6 ENVIRONMENTAL AND HUMAN HEALTH WITHIN THE *ISGA* NATION

6.1 Abstract

The health of Indigenous Peoples is a serious global concern, as is environmental decline on Indigenous lands. There is an increasing global awareness of the importance of healthy ecosystems and especially traditional food sources for Indigenous health, yet these insights are seldom considered in decision-making. Through Community-Based Participatory Research (CBPR), this study explores and characterizes changing environmental health and implications for human health among the *Isga* People and their traditional territories in west-central Alberta, Canada. Through interviews with *Isga* traditional land users and other local harvesters, Traditional and Local Ecological Knowledge (TLEK) of environmental change was spatially documented. Declines in water and air quality as well as in wildlife and vegetation health were associated with industrial activity, primarily the petroleum and forestry industries, but also open-pit coal mining, coal-fired electricity generation, agricultural practices and urban expansion. Health concerns among the *Isga*, including diet-related diseases, asthma and addictions were attributed directly and indirectly to cumulative impacts of environmental decline and also to a loss of traditional diets, ways of life and connection to land. As these outcomes reflect a broader environmental injustice that confronts Indigenous Peoples worldwide, it is evident that underlying decline in environment must be addressed to improve the health and wellbeing of these Peoples wherever they reside.

6.2 Introduction

6.2.1 Indigenous Environmental Justice

Environmental injustice and associated environmental degradation, particularly of water, wildlife and other traditional food sources on Indigenous lands is widespread across Canada and around the globe (Adeola 2000; Agyeman et al. 2009). At the same time, Indigenous Peoples worldwide are facing a human health crisis (Montenegro and Stephens 2006; Nettleton et al. 2007). In many wealthier nations

including Canada, there are extreme disparities in health indicators between Indigenous and non-Indigenous populations (Ring and Brown 2003; Waldram et al. 2006). In many parts of the world, both environmental injustice and disparities in health status are long-standing, but only relatively recently have academics begun to recognize and study the links between environmental decline and the health of Indigenous Peoples.

For Indigenous communities, however, environment and health are inextricably connected. In the worldview of many Indigenous cultures, the health and wellbeing of the people is inseparable from the health of, and connection to, the land (King et al. 2009; Kirmayer et al. 2009). Traditional foods play a central role in this connection; however, the abundance as well as health and safety of traditional food sources have become concerns for many communities. Environmental contaminants in animals harvested for food are a well-documented issue in northern Canada (e.g. Kuhnlein and Chan 2000; Van Oostdam et al. 2005; Donaldson et al. 2010). However, considerably less research has been done to investigate the safety of traditional foods in other parts of Canada, even in areas with high levels of industrial activity and pollution, such as the province of Alberta. Water quality is another key issue for Indigenous communities in Canada and many other places around the world (Reading et al. 2011). Many First Nations, Inuit, Métis and non-status Indigenous communities in Canada live with poor water quality, long-term water advisories and chronically unsafe drinking water on reserves (Wilson 2004; White et al. 2012), in addition to the industrial contamination of water bodies and surface water sources in their traditional territories (Mascarenhas 2007; Stelfox 2010).

6.2.2 One Health and EcoHealth

In conventional 'western' science, various disciplines including health sciences and professions have become highly specialized and segregated (Hueston et al. 2013). However, the emerging concept of 'One Health', defined as "the collaborative efforts of multiple disciplines working locally, nationally, and

globally, to attain optimal health for people, animals, and our environment” (OHITF 2008:9), reflects an increasing awareness among professionals in a wide diversity of fields that the health of all people, wildlife, and the environment are interdependent. Health research focusing on Indigenous Peoples in recent decades has also increasingly recognized the importance of healthy environments and ecosystems, as well as identity and culture, for the health of Indigenous Peoples and communities (e.g. Burgess et al. 2005; Parlee 2005; Panelli and Tipa 2007; Wernham 2007). Parallels between Indigenous conceptions of health and principles found in the One Health movement (especially the aspects that deal with environmental health) have been recognized in research on and discourses about Indigenous health (e.g. Nettleton et al. 2007; Stephens et al. 2007; Parkes 2010). EcoHealth is also related as another widely adopted approach that links human health to the environment. It represents a participatory, action-research framework that can be used to address concerns regarding human health by studying both the environmental and social determinants of health, from both ecological and socioeconomic perspectives (Charron 2012). The integration of different approaches and types of knowledge, including local knowledge, is a fundamental principle of EcoHealth (Lebel 2003; Charron 2012).

Several studies have highlighted similarities between Indigenous knowledge, worldviews and perspectives on health and EcoHealth approaches to understanding the complex relationships and interactions between social and ecological systems (e.g. Johnston et al. 2007; Nettleton et al. 2007; Parkes 2010; Green and Minchin 2014). Parkes (2010) suggests that these new integrative EcoHealth approaches actually represent a resurgence of long-standing Indigenous knowledge and understandings of health and wellbeing in social-ecological systems. She and others assert that the common ground between Indigenous and EcoHealth perspectives provides much opportunity for learning and exchange, and ultimately for more effective promotion and protection of both human and environmental health (Nettleton et al. 2007; Parkes 2010).

6.2.3 Indigenous Knowledge Systems and Traditional Knowledge in Research

Many Indigenous knowledge systems, including those of the *Isga* of west-central Alberta, are closely tied to environment and culture and have developed and evolved over thousands of years of close interaction with the natural world. Accumulated knowledge has been passed down orally across many generations and through experiential learning (Simpson 2000, 2011; Settee 2007; Potts-Sanderson 2010 Ballard 2012). *Isga* scholar Misty Potts-Sanderson describes *Isga* knowledge systems, or “*Isga* Ways of Knowing”, as comprehensive, including spiritual understandings as well as ecological knowledge and the know-how of traditional land use practices. In fact, all knowledge is conceptualized within, and does not exist apart from, the spiritual foundations that are a fundamental part of living and learning. *Isga* knowledge systems are also process-oriented, as experiences that give rise to teaching, learning, knowing and understanding are an integral part of everyday life (Potts-Sanderson 2010). Within many Indigenous knowledge systems, all information gathered and experienced is considered valid and nothing is discarded, regardless of whether the information came from visions, dreams, stories or the natural world (Deloria 1999). The existence of multiple realities or truths is also accommodated in many Indigenous philosophies. Thus, Anishinaabe scholar Shawn Wilson writes about Indigenous knowledge as relational, that knowledge is based on and exists within the context of relationships. The relationships between individuals, and with animals, plants, spirits, the earth, the cosmos, and even ideas, constitute and define knowledge and reality. As each individual’s web of relationships is unique, so is their experience of truth and reality (Wilson 2008).

Land-based Indigenous Peoples have a great deal of knowledge about the ecosystems in which they live and practice traditional land use and occupancy. Multiple generations of extensive experience on the land make for a rich understanding of ecological components and processes as well as long-term landscape change (Berkes 2012). Recognition by academic researchers of the value of the ecological knowledge of Indigenous and other rural, land-based peoples has led to an increasing use of Traditional

and Local Ecological Knowledge (TLEK) in environmental research. TLEK has contributed to an understanding of a variety of ecological phenomena, most notably, wildlife population dynamics (e.g. Ferguson and Messier 1997; Fall et al. 2013), wildlife distribution (Stronen et al. 2007) and climate change (e.g. Berkes 2012; Ignatowski and Rosales 2013). The use of TLEK has also been valuable for natural resource conservation and land use planning and management. Applications for which TLEK has been incorporated include at-risk species and wildlife conservation (e.g. McNay et al. 2008; Benoit et al. 2010; Gosler and Tidemann 2010), forest management (e.g. Treseder and Krogman 2008; Pei et al. 2009), fisheries management (e.g. De Freitas and Tagliani 2009; Murray et al. 2011), co-management of wildlife and protected areas (e.g. Hunn et al. 2003; Hill 2006) and community-based monitoring (e.g. Berkes et al. 2007; Parlee et al. 2014).

However, despite the increasing incorporation and acceptance of TLEK in environmental health research and management, many Indigenous communities are still not involved in much, if any, of the environmental research conducted within their traditional lands (Brook and McLachlan 2008). The credibility of TLEK is still questioned in some academic and public spheres, or is perceived to be incompatible with knowledge produced through a conventional scientific approach (Agrawal 1995, 2009; Berkes 2012). There is also considerable discussion around the issues of appropriate contextualization and use of TLEK. One criticism is that many studies incorporating TLEK have been conducted by and for outsiders using a top-down approach, with the involvement of local Indigenous community members restricted to the role of 'informants' in data collection (Nadasdy 2003). When research is designed, carried out, analyzed, presented and utilized by or in collaboration with Indigenous community members, TLEK is more likely to be interpreted, contextualized, and presented in accurate and culturally appropriate ways (Fraser et al. 2006; Shackeroff and Campbell 2007; Ferreira and Gendron 2011).

6.2.4 The *Isga* People and Changing Environmental Health

The *Isga* are a distinct cultural group of Indigenous People in what is now known as west-central Alberta, related linguistically to the 'Siouan' Peoples (Dakota, Lakota and Nakota) of the North American Great Plains (Parks and DeMallie 1992). They are also known as 'Stoney', 'Nakota/Nakoda', and 'Assiniboine'; however, '*Isga*' is the term by which they refer to themselves in their own language (Potts-Sanderson 2010). The *Isga* have a traditional land use area covering most of what is now known as west-central Alberta; from around what is now the city of Edmonton west into Jasper National Park, and from around Rocky Mountain House in the south to at least as far north as Lesser Slave Lake. Family groups tended to live in different parts of this large region, but also traveled within and among smaller regions according to seasonal harvesting as well as for social and cultural purposes. Following the signing of an adhesion to Treaty 6 in 1877, the *Isga* were assigned to what is now known as the ANSN Reserve (No. 133) on the north shore of *Wakâ Mne* (Lac Ste. Anne). Shortly thereafter, part of the band moved to *Wihne Mne* (Lake Wabamun), establishing the PFN Wabamun Reserve (No. 133A and B) on the eastern shore of the lake (Andersen 1970).

The *Isga* traditional territories are rich in natural resources that have been intensively exploited over the last half-century. Alberta is reliant on industrial resource extraction and processing activities, especially those associated with the petroleum industry. Between oil and gas wells and oil sands mining in northern Alberta, the province has become one of the world's largest oil and gas producing regions (Evans and Garvin 2009; Johnson and Coderre 2011). Nearly 500 000 oil and gas wells have been drilled in the province, with an associated 400 000 kilometres of pipelines (Lee et al. 2009b). The sour gas industry has been of particular concern in west-central Alberta, due to a record of serious sour gas well blowouts (ACPC 1978; Lewis 2010) and also sulfur emissions from sour gas processing plants (Addison et al. 1984; Prietzel et al. 2004). Forestry is another major industry in Alberta, and 64 000 – 82 000 hectares of forests have been harvested every year since the mid-1990s (CCFM 2012). Almost all logging in the

province is done by clearcutting (98.6% in 2007) and nearly all of this in primary forests (Lee et al. 2009b). Habitat loss and other impacts on wildlife populations in west-central Alberta due to clearcuts have been the focus of previous studies (Smith et al. 2000; Nielsen et al. 2004a; Nielsen et al. 2004b). Coal mining and electricity generation are more localized but also represent significant land uses. Alberta mines and consumes more coal than any other province in Canada (Jardine et al. 2007; Lee et al. 2009b), and 36.9 million tonnes of coal were produced in 2011 (Alberta Energy 2011). All of these resource extraction activities currently take place on the traditional territories of the ANSN and PFN.

Lake Wabamun has been particularly highly affected by industrial activity and contamination over the last 60 years. Extensive open-pit coal mining has occurred on both the north and south sides of the lake during the past several decades. Highvale, the largest coal mine in Canada (Lee et al. 2009b), extends along the entire southern shore of the lake for a distance of nearly 20 kilometres. In addition to the mines, there are three active coal-fired electricity generating stations in the area, and another that was decommissioned in 2010. The so-called Sundance plant on the southern shore of the lake is the largest in western Canada, and is also the largest mercury emitter of any Canadian power plant (Donahue et al. 2006; CEC 2011). The plant is located within three kilometres of the PFN Reserve (Plate 6.3).

Recent industrial accidents have also had serious impacts on water bodies in the *Isga* territories. Lake Wabamun suffered a catastrophic railway oil spill in 2005 (DeBruyn et al. 2007; Wernick et al. 2009), which continues to affect water quality and the ecology of the lake. Also, in October 2013, a massive coal slurry leak from the Obed Mountain Coal Mine near Hinton discharged 1 million cubic metres of waste water and sediments, containing mercury, arsenic and carcinogenic PAHs, into the Athabasca River (Schindler 2014; Wohlberg 2014).

Agriculture represents another major land use in Alberta. Beginning in the late 1800s, agricultural activity including livestock grazing and crop cultivation dramatically altered the prairie and parkland eco-

regions, and has since transformed more land in Alberta than any other land use (Van Tighem 1993; Bradley and Wallis 1996). As of 2005, nearly 38% (25 million ha) of Alberta's land base was being used for agriculture (Stelfox 2010). A substantial portion of the eastern part of the *Isga* traditional lands are located in the aspen parkland and mixed wood regions of central Alberta and have been transformed as part of this agriculture-dominated landscape.

Along with agriculture came non-Indigenous population expansion and settlement. The expansion of settled and urban areas has occurred continuously in central Alberta since the late 1800s, and in more recent decades following the booms of the resource extraction-based economy (Stamp 2014). Over the last half-century, the population of Alberta has nearly tripled (Statistics Canada 2011), resulting in a continual western encroachment into the *Isga* territories by urban, suburban, residential and recreational developments. Residential properties now cover a total of 225 000 ha in the province, in turn representing an average annual growth rate of ~3% (Stelfox 2010).

Despite the increasing intensity of industry and resource extraction, agriculture, and urbanization throughout their traditional territories, many *Isga* continue to practice traditional land use activities including hunting, fishing, trapping, harvesting of berries and medicinal plants, ceremonies and spiritual practices. However, the dominant land uses have affected the ecology of the landscape and the ability of the *Isga* to practice their traditional livelihoods (Potts-Sanderson 2010). Moose in particular are used extensively as a food source and for ceremony, and arguably represent a cultural keystone species for the *Isga* (Misty Potts-Sanderson 2010, pers. comm.). However, hunters have noticed poor health and changes in the moose in recent decades, and are concerned about the future of the moose populations in their traditional territories.

6.3 Purpose and Objectives

In response to *Isga* observations of declining health in moose and other wildlife, the In-Land-and-Life

wildlife health study was initiated as a collaboration between ANSN, PFN and academic researchers, primarily through the University of Manitoba. The study was multi-dimensional and cross-disciplinary and employed a variety of methods to investigate changing environmental health from both TLEK and conventional science perspectives. Although some community members have participated in other environmental research and land use consultations, In-Land-and-Life was the first environmental health study to be initiated by the *Isga* themselves. I was invited to facilitate the mapping component of In-Land-and-Life, i.e. to spatially document changes to wildlife and environmental health in the *Isga* territories with hunters and other traditional land use harvesters. Two previous studies, including one by an *Isga* researcher (Potts-Sanderson 2010), have examined environmental health within the *Isga* territories from a Traditional Knowledge (TK) perspective (also Arai 2007). To build upon the findings of these studies, we examined the issues of environmental and human health using a spatial approach, and by using maps and satellite imagery as well as oral interviews documented and analyzed TLEK to help understand any changes.

The larger purpose of the environmental health mapping study was to explore the relationships between landscape disturbance, environmental health, and human health within the *Isga* territories. Our more specific objectives were to:

- Characterize spatio-temporal variations in environmental health in the traditional territories of the *Isga*;
- Assess how environmental and human health are affected by changes in surrounding land use, including activities such as industrial resource extraction, development and other anthropogenic disturbance; and
- Describe the cumulative impacts of development and disturbance on environmental and human health and wellbeing within the *Isga* territories and communities.

6.4 Methodology

6.4.1 Methodological Approach

The In-Land-and-Life project as a whole and the environmental health mapping study in particular were designed collaboratively within the framework of Community-Based Participatory Research (CBPR) (Tremblay 2009). *Isga* community members were involved in many aspects of the research process, including the identified need for the project itself; initial identification of research questions and areas of investigation; wildlife sampling for contaminant analysis; hosting, setup and logistics of campouts to conduct research and share traditional skills; participation in interviews; and ongoing feedback during the analysis and reporting of results. Community Principal Investigator Misty Potts-Sanderson from ANSN was the primary liaison between the *Isga* communities and the other academic researchers and graduate students including myself. Misty and also In-Land-and-Life Cultural Advisor Daisy Potts provided me with invaluable guidance on *Isga* culture and protocols for conducting research activities in a respectful and effective way.

The expert ecological knowledge of *Isga* Elders and traditional land use harvesters was central to the environmental health mapping study. The TLEK of participants was analyzed together with conventional scientific data including satellite imagery, and in conjunction with two complementary wildlife and environmental contaminant studies. Our aim was to analyze and present the TLEK in a format highlighting the spatial nature of the information, by complementing it with scientific data and methods while allowing it to stand as valid expert knowledge in its own right.

In terms of data management, the In-Land-and-Life collaborators chose to follow the principles of OCAP (Ownership, Control, Access and Possession) as outlined by the National Aboriginal Health Organization (Schnarch 2004; FNC 2007). The OCAP framework emphasizes the right of Indigenous communities to make the decisions about what, why, how and by whom research is conducted and information is

collected in their communities, as well as how it will be used and shared. In the case of this environmental health mapping study, interview transcripts will be given to participants whose interviews were audio-recorded, and the spatial database will be retained by the ANSN and PFN Lands Departments and Misty Potts-Sanderson for future reference and use by the *Isga* communities.

6.4.2 Research Design and Methods

Data Collection

The environmental health mapping study was primarily carried out through interviews with *Isga* community members and also with several non-Indigenous hunters and residents that live within the *Isga* traditional territories. In total, from 2010-2013, interviews were conducted with twenty-eight *Isga* people, including Elders, hunters, and other traditional land use harvesters, and five non-Indigenous participants. Many of these interviews took place in the ANSN training centre or in the homes of participants, and the rest were held during one of several In-Land-and-Life campouts. I also kept a journal with observations and reflections on the interviews, campouts and other research and community activities in which I participated, and on the challenges and successes of my own cross-cultural learning experience.

The interviews were semi-directive, with a format that evolved over the course of the research as patterns of responses emerged and community priorities became apparent. For the environmental health mapping component, I asked participants about the health of the land and environment where they live, camp, hunt, and gather, and how this has changed over time. I asked about changes to the health of animals in general and also more specifically about the health of cervids, including moose, elk and deer. I also invited participants to document areas of environmental change and concern on plastic overlays of maps at one of three scales (a provincial base map from Alberta Sustainable Resource Development at 1: 1 000 000 and topographic maps from the Canada Centre for Mapping at 1: 250 000

and 1: 50 000) depending on the size of each participant's traditional use areas. Different coloured markers were used to depict different sites and areas, depending on the types of land use or environmental concerns. In the earlier stages of the research, some hunters documented locations of moose harvested for the wildlife sampling component of In-Land-and-Life, although this intent changed as my project became broader in scale. Overall, nineteen participants used the maps to document spatial information about environmental health. Participants were also asked to talk about responses to environmental change, that is whether and how their families and communities have been able to adapt their land use activities to the changes and if these changes have affected community health and wellbeing. Most of the interviews were conducted with individuals, although several included two or three participants at a time. Twenty of the interviews were audio-recorded. I also took notes during most of the interviews, especially those for which the participants had indicated consent for note-taking but did not wish to be audio-recorded.

Analysis

I transcribed the interviews that had been audio-recorded and then coded the interview text and my field note summaries according to emerging themes related to environmental and human health concerns as well as types of disturbance on the landscape. The transcript texts were coded using the qualitative data analysis software ATLAS.ti (version 7.1.7). To incorporate the map data, I created a spatial database using Google Earth (GE). The spatial data from the map overlays and oral interview data (i.e. significant places and areas mentioned or drawn on the map overlays) were digitized by drawing points and areas onto the satellite imagery provided in GE. I then embedded the GE database as a document directly within the ATLAS.ti project. Using the spatial analysis tools in ATLAS.ti, hyperlinks were created in the margins of the interview transcripts to link text passages directly to the geographic sites and areas in GE to which they refer. In the GE database, I also wrote and embedded short descriptions of areas and sites discussed during the research, their significance to the *Isga*, and some of the

environmental impacts that have affected these places.

In analyzing the interview data, I compared the overall emphasis participants placed on the various land uses and environmental impacts discussed. The frequency and extent to which various land uses and other themes were discussed guided the order in which topics are introduced in the findings of this chapter. For key topics, I counted the number of people that discussed similar observations or concerns. This method was particularly useful in highlighting specific observations for which a significant number of people shared similar information. Overarching themes that emerged from the interviews were environmental degradation and declines in the health of the *Isga* People. These themes will be examined in the following section, along with the dominant land uses associated with changes in environmental health.

6.5 Findings

Declines in environmental health were a serious concern for nearly all the participants. They spoke of general concerns with respect to the health of the land and animals, and also of the impacts of dominant land use activities on the ecology of the region. Major environmental health themes that emerged included the health of moose and other animals, water quantity and quality, and vegetation health. Although moose was the initial main focus of *In-Land-and-Life*, participants had concerns regarding the health and abundance of many other animal species, including elk, deer, fish, ducks and other water birds, grouse (prairie chickens), songbirds, birds of prey, rabbits, beavers and muskrats. Vegetation health concerns were described for forested and wetland areas, and specifically for berries, and medicinal and edible plants. Many participants spoke of disappearing berry patches and medicinal plant harvesting areas. Other topics discussed included changing air and soil quality, insect populations, and weather and wind patterns.

Many participants emphasized that all of these components were interrelated, and spoke about some of

the ways that various ecosystem elements were affected by and depend on one another. Various concerns about environmental health were linked together, the most frequent of these being water quality and the health of animals:

Well, pretty well everything's polluted now. Not like it used to be when, years back- like when you went out, out in the bush, everything was kind of clean, seemed fresh, everything was fresh. It's not like that anymore. When you go out in the bush, even the water... you could drink the water out of the creeks, seemed fresh. You can't do that. ... Seems like the animals, seems like they're different, too. They don't get as fat as they used to. I don't know why, maybe they roam around too much.

Stanley Alexis, ANSN

As the health of water and animals were the most commonly discussed issues, the following sections will explore in greater depth the observations made with respect to these two themes.

6.5.1 *Mini*¹¹ (Water)

Water (*Mini*) was one of the most prominent themes that emerged from the interviews and discussions.

Water quality was the foremost concern. Fifteen participants spoke about observed declines in water quality in lakes, wetlands, rivers, creeks, springs, wells and groundwater in their traditional territories.

Many also discussed the impacts of these declines on the health of plants and animals, as well as the impacts on their own use of traditional and residential water sources:

We have to take the water off store shelves now. At one time or another, we'd go to a creek or a spring and just go drink water from there. Now today we can't. Can you imagine water animals and the plants, what they're, how it's affecting them? All that pollution that's leaking into the water.

Bernice Bull, PFN

Isga women in particular tended to talk about changes to drinking water quality, and the increased need to buy bottled water for traveling and camping, and even for the home. A few Elders commented that even standing water bodies such as lakes and sloughs used to be drinkable, but that it had not been possible to drink from these water bodies for decades:

¹¹ '*Mini*' [mee-nee] is the *Isga* word for water.

I remember when we were kids, like this lake [Lac Ste. Anne], we were able to drink it. We didn't have any problem worrying about if we were going to get sick. The last time, I would say, that I drank this water was when I was about 13. So during that time it changed a lot.

Brenda Kootenay, ANSN

The other main water-related concern was the drying of water bodies and water sources. Ten participants talked about the drying of surface water sources including lakes, sloughs, creeks and springs. Most were Elders who spoke of this drying as a long term trend. Several noted that the shores of *Wakâ Mne* (Lac Ste. Anne) and other lakes had receded substantially over the last several decades. In fact, on the main ANSN Reserve at the far west side of the west basin of *Wakâ Mne* is a peninsula of land locally referred to as "The Island" as it used to actually be an island completely surrounded by lake water but is now connected by a 300-m stretch of dry land covered in terrestrial vegetation.

It's going into the ground. It's drying up. Like around here, all the creeks we have dried up. And little lakes, you know, like ponds and sloughs, that's all dry. See, Lac Ste. Anne and Lake Isle, they're kind of chain lakes and there are creeks running from one lake to the other, and there's another one here, we call it Devil's Lake, it's all got joining creeks. These creeks, the Sturgeon that runs out by Gunn here, that's all, in summertime, that's all dry. So water, we lost a lot of water.

Daniel Kootenay, ANSN

Many stressed the importance of water and wetlands for aquatic vegetation, including for a variety of medicinal and edible plants, as well as habitat for animals including moose, fish, ducks, beavers and muskrats. Many also attributed observed declines in wildlife habitat and populations, and also medicinal plants, to any underlying loss of surface water.

6.5.2 *Wadezha*¹² (Animals)

Wildlife health was of great concern for the vast majority of the participants. The deteriorating health of moose was identified as a key issue from the outset of the research, and we soon found that people had concerns about many other animal species, especially those that are harvested for food. Several people

¹² '*Wadezha*' [wah-deh-ʒa] is the *Isga* word for animals ('ʒ' is a soft 'j' sound).

talked about chronic wasting disease (CWD) and illness in deer. Many others were concerned about the health of fish, and several discussed observations of harvested fish, including growths, cysts and other abnormalities, and also changes in the texture of the flesh. A few people noted that fish in some lakes now had softer flesh and the scales came off much more easily. A few also discussed changes in the texture of the flesh of ducks and grouse, noting that the skin was now softer and the feathers came out much more easily than they did years ago. Several women Elders noted decreases in abundance and in some cases the disappearance of a variety of songbird and water bird species from their former habitat. Three Elders also spoke about a dramatic decrease in the abundance of rabbits in their traditional habitat, and two also highlighted the declining health of rabbits, including abnormalities in harvested animals.

The majority of participants attributed these observed declines in the health and abundance of wildlife species to industrial disturbance on the landscape, primarily through the contamination of water sources by resource extraction activities:

Boils, it's like- little boils. I have seen a few [moose] that they have that. Ever since the boom of the oil. 1942, 44, the boom was west of Drayton Valley. My trap line is there. Ever since then, my father said the moose are getting kind of sick. Before, they were okay. ... I was raised mostly towards this way, Drayton Valley. ... Before the oil was booming, the moose were in good health, healthy animals.

Fred Alexis, ANSN

Moose was generally the animal of greatest concern for the *Isga* traditional land use harvesters. Observations of harvested moose, documented in the related cervid-sampling project and the mapping interviews, included cysts in the lungs, liver, heart and muscles, lumps on the heart, bones and hide, discoloured and hard internal organs, a bubbly appearance to the liver and other tissues, swollen lungs, foul smells, patchy fur and strange behaviour, as if the animal was lethargic and not alert (Darrell Letendre 2013, pers. comm.). Hunters documented the locations of seventeen harvest sites for moose that were sick or had abnormalities (Plate 6.1). Some locations marked harvests from as far back as the

late 1970s, although all but three were from 2005 or later. These harvests tended to be in the eastern parts of the *Isga* territories, which could have at least partially reflected the relative accessibility of hunting areas closer to the reserves on the eastern side of their territories where most *Isga* now live. The larger red circle near the bottom of the image, encompassing the settlements of Cynthia and Lodgepole, was documented by Elder Francis Alexis and outlined an area within which many sick moose have been observed in recent years. In fact, the majority of *Isga* that had related observations of sick moose had either harvested or heard of them being harvested in and around this area, although only a few of these harvest locations were documented on the map:

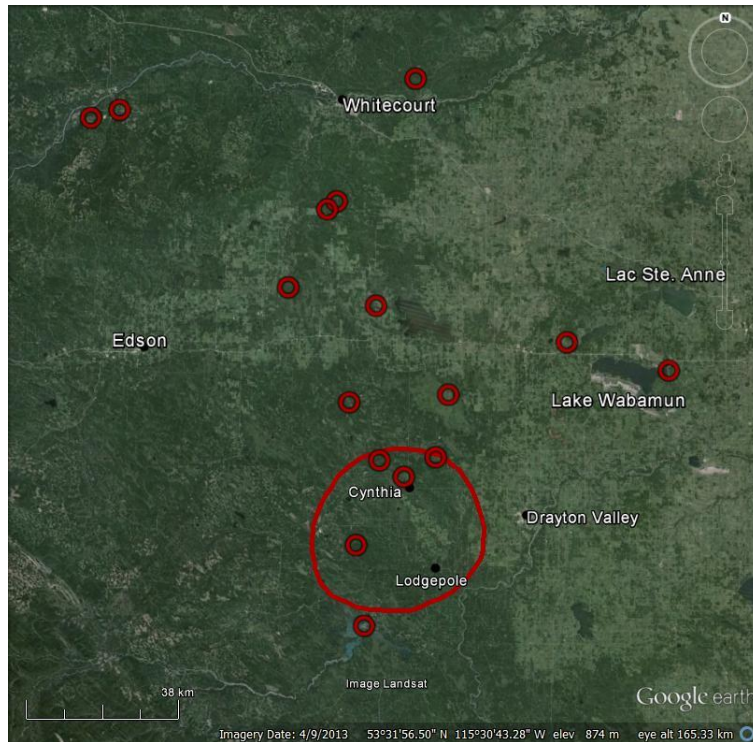


Plate 6.1 Harvest locations of sick and/or abnormal moose in the *Isga* territories¹³

Many hunters also commented that moose were generally skinnier now, as they had less body fat. A few also noted that the moose population was younger than in previous decades, based on observations of antler size and body size. One very common observation was that moose were less frequently found in

¹³ Image courtesy of Google Earth and Landsat.

their typical forested and wetland habitats and were more likely to be found in the settled and agricultural areas in the eastern parts of the *Isga* territories. This trend was associated with a loss of natural habitat and pressures from industrial activity. Additionally, the cervid sampling analysis results as well as a follow-up environmental contaminants investigation showed increased levels of cadmium in harvested moose, particularly in the liver. These cadmium levels were high enough to recommend that caution be taken when consuming moose liver (Miller and McLachlan 2012).

Several *Isga* participants went on to discuss how sick or reduced wildlife populations were having or would have an impact in their communities:

Our future kids, what are they going to see? In their generation to come. That's a big changeover. It kind of worries me because we as traditional people, we depend on wildlife, to survive... because that's more healthy for us.

Brenda Kootenay, ANSN

6.5.3 Health of the *Isga* People

Although the primary focus of the research was on wildlife and environmental health, many participants also talked about changing human health in their communities. All of the *Isga* who discussed human health felt that people in their communities were less healthy than in previous generations. Concerns about physical, mental and spiritual wellbeing were raised. The most frequently discussed concerns centred on changes in diet. Several commented that members of their families and communities, especially younger people, no longer ate as much wild meat. Despite observations of health decline in moose and other wildlife, many were of the opinion that wild meat was healthier than store-bought meat. However, most *Isga* had become at least somewhat disconnected from their traditional food sources:

Hardly anybody lives off the land now. Stores [laughs]. It's cheaper, easier. Easier. Instead of skinning a moose. Before, there were no diabetics, no heart disease. People didn't smoke, except for natural herbs.

Fred Alexis, ANSN

A few *Isga* talked about the prevalence of diabetes and other diet-related diseases in their own communities, and associated these diseases with a lack of traditional foods and generally poorer diets. Of particular concern were the diets of children. Elder Geraldine Bearhead, who works in the Alexis Head Start Program, commented on the poor diets of many preschool children in the program, and also about institutional barriers to providing them with culturally appropriate education and nutrition:

We teach culture and we try to teach the kids about the wildlife, our ways of life before, and how important it is for them to know- the game, the animals that they should eat. ... Health Canada, they want us to follow a food guide and we can't teach them traditional foods if we have to follow that food guide. They won't allow us to feed them these traditional foods in our work area. If they find out, they'd shut us down. So it's difficult to try and teach them this, but yet not feed them it.

Geraldine Bearhead, PFN

A few talked about the greater longevity of Elders in previous generations, and one attributed this longevity to traditional foods and medicines, as well as the constant physical activity of a traditional lifestyle. Another participant also spoke about spending time on the land, camping, and practicing traditional land use as contributing to health and wellbeing.

A few *Isga* participants spoke about addictions in their communities, to alcohol and to drugs including prescription drugs. One Elder directly attributed these addictions to colonialism, the long term impacts of residential schools, and also a decreased use of natural, traditional medicines in healing and the maintenance of good health.

Another prominent health-related concern was air quality. Several participants expressed concerns about compromised air quality due to industrial activity. Three mentioned acid rain, and two remarked about increased incidences of asthma:

The other concern that we have, I think everybody in Alberta is concerned with that one, is the acid rain. Pollution in the air. And for people that have asthma, or they develop asthma. ... Only in Alberta, not nationally. In Alberta, because of the oil refineries.

Daniel Kootenay, ANSN

The following section will explore in greater depth the impacts of industry and other dominant land uses on human health among the *Isga* and environmental health in their territories.

6.5.4 Land-use Impacts

Participants discussed a variety of anthropogenic impacts in their traditional lands, and frequently associated these impacts with the adverse environmental health effects they have observed and experienced. Five main land uses emerged for which participants had the greatest concerns: the oil and gas industry, the forestry industry, coal mining and electricity generation, agriculture, and urban and residential expansion. Oil and gas and forestry were the sectors of greatest concern (Table 6.1):

Table 6.1 Number of participants that discussed concerns about each major land-use type

Land Use	Oil and Gas	Forestry	Coal Mining and Electricity Generation ¹⁴	Agriculture	Urban Expansion and Waste Disposal
Participants	26	22	8	9	8

Oil and Gas

There’s a lot of oil and gas development out there. You just, you can’t even recognize the place [Cynthia/Lodgepole] anymore, the way it used to be. That’s probably why they [cervids] are all coming out sick, like, the way they are.

Daisy Potts, PFN/ANSN (1)¹⁵

The petroleum industry was the most frequently and extensively discussed land use in relation to environmental health and in particular, wildlife health. Twenty-six of the thirty-three participants discussed environmental concerns regarding the oil and gas industry. Twenty-one were concerned about contamination and pollution as a result of oil and gas extraction and transportation, including leaks, spills and emissions. Surface and groundwater loss and the drying of wetlands was identified as

¹⁴ Concerns about coal mining and electricity generation may be underrepresented as more interviews were conducted with members of ANSN than of PFN, which is located on Lake Wabamun where intensive coal mining and electricity generation operations are situated. Most participants from PFN were very concerned about these mining and related impacts. Also, the interviews were conducted before the Obed Mountain Mine coal slurry spill of October, 2013 (Schindler 2014).

¹⁵ All quotes in sections 6.5.2 and 6.5.3 are numbered sequentially and are depicted in Figure 6.1 (p. 127) according to the land use(s) and impact(s) described.

another major concern, and seven participants directly linked these losses to oil and gas extraction. These water losses were attributed to the volume of water used by the industry, and also to the effects of drilling and extraction on aquifers and groundwater flow.

Oil and gas activity occurs throughout the *Isga* territories, but it is more heavily concentrated in some regions. The region most frequently discussed in terms of the density of developments is an area west of the town of Drayton Valley, around the settlements of Cynthia and Lodgepole. This region is a highly important part of the *Isga* territories, as many families have ancestral roots there, many community members were raised there, and much traditional land use continued to this day. However, many hunters and other community members had observed sick moose there, more so than for any other area. The vast majority attributed any declines in the health of moose and other animals in this area specifically to the petroleum industry. Indeed, this landscape has been quite visibly affected by intensive oil and gas activity, as well as other land uses including forestry and agriculture (Plate 6.2):

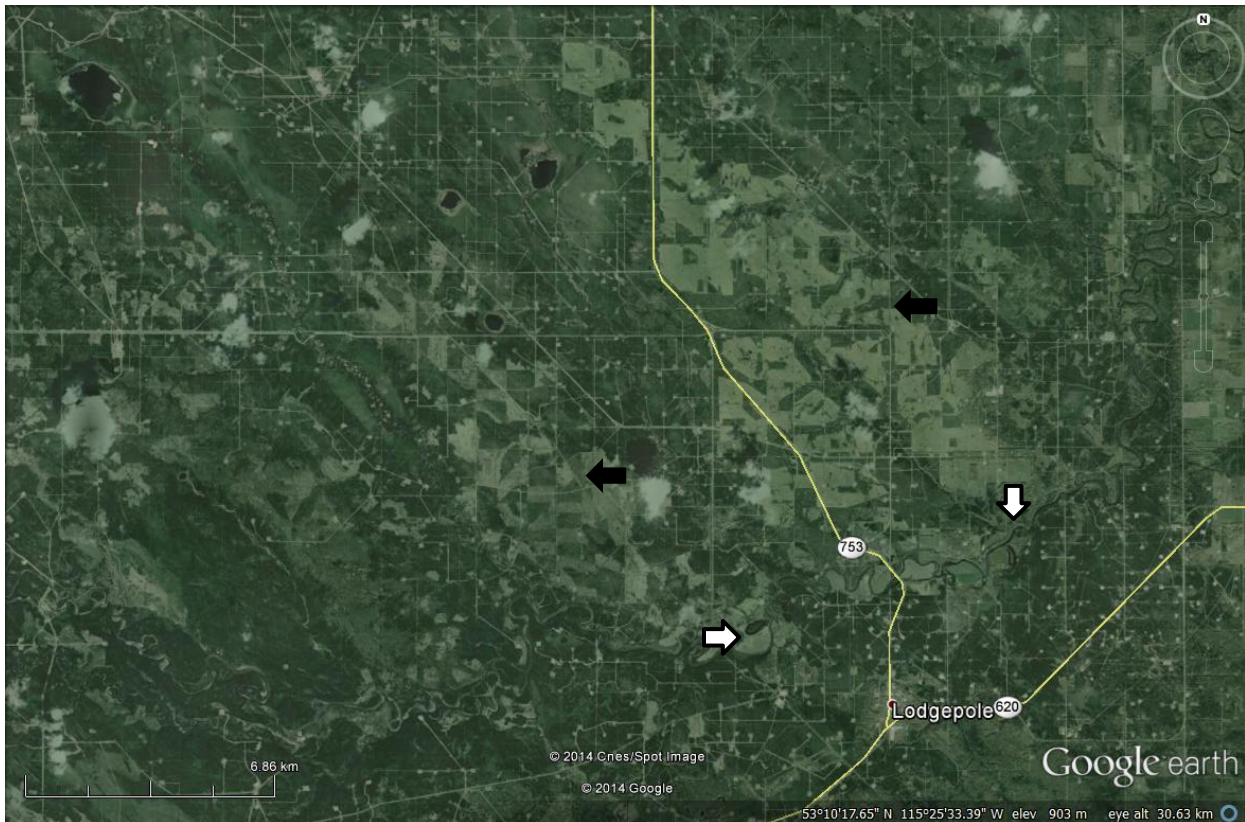


Plate 6.2 Lodgepole area with high density roads and oil and gas developments¹⁶

Many had a very specific concern regarding oil and gas extraction sites. Nine had observed moose, elk and deer licking petroleum residue from the ground where it had leaked from oil and gas wellheads, flare pits and other related infrastructure. Many attributed this behaviour to the high salt content of the oil residues. Two further linked this behaviour to the destruction of natural salt licks:

When they drill, I think when they find something, sometimes they bring sulphur out, and all kinds of chemicals, and toxins, and it comes through the ground. And sometimes the animals go lick- if the salt licks are destroyed, anything that tastes kind of salty, they'll go lick it.

Francis Alexis, ANSN (2)

Five participants specifically recommended that oil and gas companies install fences, or improve the fencing, around their infrastructure. Several people noted an absence of fencing; others identified a

¹⁶ Oil and gas developments are visible in this satellite image in the form of white lines ending in white 'dots' (white arrows). Clear cuts are also visible as lighter green sections (black arrows), some of which have been converted into grazing lease land (top right black arrow).

Image courtesy of Google Earth and Cnes/Spot Image.

need for higher fences that would more effectively exclude any cervids.

Another major concern was the occurrence of oil spills. A particularly devastating railway spill occurred in 2005 into Lake Wabamun, in which ~ 149 500 L of heavy fuel oil spilled into the north side of the lake from a derailed train (Wernick et al 2009). The primary reserve of the Paul First Nation (PFN) is located along the eastern and southeastern shoreline of the lake. Also, Wabamun Creek, the main outlet from the lake, runs through much of the reserve. Many *Isga*, particularly those who live on the PFN Reserve, discussed the impacts of this oil spill in detail. Thomas Rain, along with many other members of PFN, contributed to clean-up efforts, and described how a large proportion of the oil landed on the shores of the reserve due to westerly winds (Plate 6.3). Although many of the initial advisories for drinking water and wildlife consumption in and around the lake had been lifted (MPWGSC 2007), many PFN community members were still living with the impacts of this spill on well water and shorelines:

In Paul Band, there was a spill a couple of years ago, and now all the berry hills are no good, berry patches are no good. Water is not healthy, you know. We have to buy water. Our wells are useless. ... My water at home has got an oily film on top.

Geraldine Bearhead, PFN (3)

Impacts were also seen on traditional foods:

With all that oil spill in this lake here, it was even in the newspapers, to stop eating ducks and wildlife. So, everything came to a halt for us and we stopped eating everything and we started going further out, and even then too, like going further out and the hunters would find their moose damaged on the inside.

Bernice Bull, PFN (4)

Bernice commented on how the community had really depended on Wabamun Lake and the connecting creeks at the time of the spill, particularly for fish and ducks, as well as terrestrial animals and plants from the surrounding area.

Some participants also related concerns about sour gas wells. Several discussed the impacts of the Lodgepole Blowout of 1982, which is known as the worst sour gas blowout in Canadian history

(Lewis 2010). It resulted in a massive and uncontrolled release of hydrogen sulfide, sulfur dioxide, natural gas and other hydrocarbons for 68 days (Monenco 1983), with serious health impacts to surrounding residents and livestock (WIN 1983; Harris 1985; Lambert et al. 2006). Several harvesters also expressed concerns about the effects of sour gas well blowouts and emissions on wildlife.

Many *Isga* were greatly frustrated with the way the oil and gas industry related to their communities. Some spoke of being harassed by industry workers while hunting, and others expressed a profound dissatisfaction with current land use consultation policies. Yet, a few did note improvements with respect to consultation and compensation, as well as some environmental practices. Some also discussed the need to work together with government and industry to improve consultation practices, in order to minimize the negative impacts on their traditional lands and way of life:

That could do a lot of damage, those pipelines, these pipelines and everything. We don't realize that. That's why I say there's no sense trying to protect something that we can't protect. Because they're going to take it anyway, whatever is underneath there. So we're going to have to try to work with them...

Zachary Potts, ANSN (5)

Forestry

Forestry was the next most frequently discussed land use activity with respect to environmental impacts. Twenty-two participants expressed concerns about deforestation, including the majority of the *Isga* and also a few of the non-Indigenous participants. Seven specifically mentioned clearcutting as a practice with particularly detrimental effects. Many talked about the land now becoming 'too open' and a few spoke about not even being able to recognize their traditional harvesting areas once they had been deforested. Four also talked about the detrimental effects of deforestation caused by the oil and gas industry, through road building and site clearing.

Wildlife was identified as the greatest concern, and twelve participants identified the negative impacts

of deforestation on animals and their habitat. Concerns about moose were most frequent, and wetlands were most frequently identified as a habitat of concern. Several talked about the importance of wetlands for moose, for the aquatic vegetation they eat, and in the summer as protection from heat, ticks and insects. Several also commented that moose and other wildlife had to move from their traditional habitats into agricultural and other open human-use areas where they became more vulnerable to hunting and predation. A few also commented that some wildlife populations had benefitted from land clearing including white-tailed deer (*Odocoileus virginianus*) and wolves (*Canis lupus*) whereas others including moose (*Alces alces*), rabbits, grouse and many songbird species had declined. One noted that cervids often foraged in the regrowth of cutblocks, whereas another remarked that in the winter, foraging was better under the tree canopy, where the snow was not as deep as in open areas.

Another frequently discussed and related concern was impacts on watersheds. Several talked about the drying effect of deforestation, particularly on wetlands and understory vegetation. Two participants specifically discussed the connection between trees and water. They described how forests were an important part of the water cycle and watersheds, holding in and providing moisture and shade to the understory, berry patches and wetlands, including moose wallows.

Many also discussed the multiple impacts of forestry practices and the interrelatedness of various forest ecosystem components:

Well, those big lumber companies, they're clearcutting. And once they take the overhang off on the meadows, where there are moose wallows and springs, they dry up. It dries up, affects the medicines. ... So that's what they've been doing, they **are** affecting the watershed. ...They've been saying that it's going to grow back! Not in my lifetime it's not going to grow back.

Percy Potts, ANSN (6)

A few talked about the impacts of deforestation on berries, which were important resources for food:

Well, the berries are harder to find, because it's- the logging. Where there used to be huckleberries, not far from here, it used to be you could go there in no time and fill up a

five gallon pail. Now you go there, there's nothing, not even a tree growing, a plant.

Darrell Letendre, PFN (7)

Some also spoke about the impacts of this land use on medicinal plants:

Even the places where medicines used to grow, they just... they cut the trees down, you know, it doesn't look like the same place where we went.

Rosie Bull, PFN (8)

Several reported that there are still berries in some of their traditional picking areas, or in cleared areas where some species such as wild strawberries are able to grow. However, most questioned the quality of these berries, citing pesticide and fertilizer use for vegetation and insect control along roadways, around settlements, and in agricultural zones. One participant also had specific concerns about pesticide use in the forestry industry, applied during the regrowth of planted trees.

Several expressed frustration with industry-made claims that the forest would grow back. They were adamant that once a forest was clearcut, it became impossible to replace the traditional resources and various ecosystem components in all their diversity and complexity:

It's not select logging anymore, it's complete. ... And they figure planting it back is going to bring everything back, that's baloney, it's not going to happen. They've destroyed our way of life. And for us to see, this is how it is for our kids ... it's completely different habitat, there will be a different landscape altogether. They won't see the trees the way we saw them growing up- they'll see them in little rows.

Ronald Potts, ANSN (9)

Many *Isga* were involved in early timber harvesting operations throughout their traditional territories, and several Elders spoke about previous harvest methods, particularly selective cutting. They suggested that these methods were better ones, in terms of the sustainability of the timber supply, as well as impacts on the land, soil, vegetation and wildlife. Many recognized that forestry produces useful wood products but at the same time expressed profound dissatisfaction with current forestry practices, emphasizing the importance of intact forests for the health of living ecosystems and their traditional way

of life.

Coal Mining and Electricity Generation

Coal mining has been another major industrial land use for decades in the *Isga* territories. Elders spoke of coal mines in the foothills, particularly around Cadomin, in the time of their parents and grandparents. Coal operations have continued to expand since this time in the Cadomin-Hinton area as well as in the Wabamun Lake area. Some participants expressed concerns about the environmental impacts of open pit and strip mining. Indeed, Miller and McLachlan (2012) found high levels of arsenic in medicinal plants collected near a major coal mine in Cadomin. Several PFN members spoke about the impacts of the extensive coal mining and electricity generation around Wabamun Lake, as their main reserve is situated along its eastern shore (yellow, Plate 6.3):

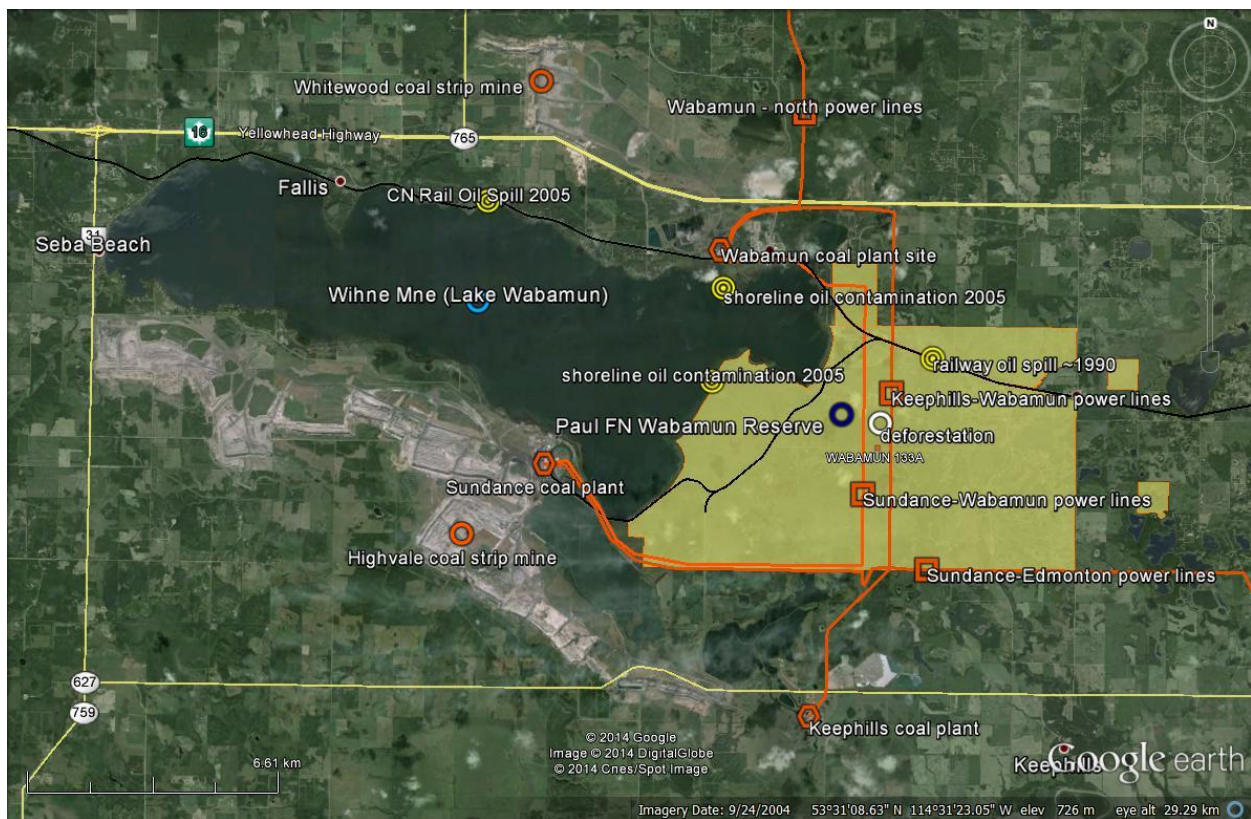


Plate 6.3 Lake Wabamun, the Paul First Nation Reserve and surrounding industrial impacts¹⁷

¹⁷ Image courtesy of Google Earth, DigitalGlobe and Cnes/Spot Image.

Several PFN members described changes to the lake since the first coal-fired power plant began operating in 1948. Three described how many of the fish from the lake now had a softer texture and explained that many people avoided eating the fish due to mercury contamination. There was also concern about the effects of elevated water temperatures due to plant wastewater. One participant talked about the ducks that live year-round on the open water around the plant sites but were not edible. The greatest irony, however, lies in the name of the lake itself. The *Isga* name 'Wihne Mne' means 'Mirror Lake', for the beautiful, clear surface of Wabamun Lake in the time before industrial activity began (Brenda Kootenay 2012, pers. comm.).

This lake here, at one time, they did fish... But with the [coal-fired] plants coming up, people stopped eating the fish because of mercury in the water. And the fish were coming with soft- like, they weren't edible. But people have, with oil spills here, with all the ducks and the fish, and the wildlife that were using the water, we had to stop using the whole area. ... This place used to be full of picnics, and people swimming here and stuff like that. Everything came to a halt. Plus people were getting hives and getting itchy and they don't even use the lake anymore.

Bernice Bull, PFN (10)

Two also talked about the threat of further encroachment by coal mining activity onto the PFN Reserve itself:

They want this, this east of the reserve. That's how come they closed that side down. ... They want the east side of the lake. They've got coal all around [Wabamun Lake].

Rosie Bull, PFN (11)

Agriculture

Agriculture represents another land use that has become increasingly widespread within the *Isga* territories over the last century. Nine participants related concerns about the environmental impacts of agriculture. The most commonly identified issue was the use of chemicals including fertilizers and

pesticides, in terms of impacts on watersheds and wildlife:

Anything caught in this area, you're going to have chances of 50/50 of going bad or going good with the moose. Some of the farmers, they spray chemicals on their crops, gets into their system. ...Going east it's just nothing but wet area. Slowly coming down. So it's catching this river, it's catching the lake... and then the farmlands as well.

Zachary Potts, ANSN (12)

Concerns over agricultural chemical use are increasingly relevant as wildlife were commonly observed migrating into agricultural areas, particularly in the eastern regions of the *Isga* territories. Several also discussed concerns about domestic livestock, including a distrust of the health of livestock, the quality of farmed meat compared to that of wildlife, and also the spread of diseases from domestic animals to wildlife.

The other main agricultural issue discussed was the destruction of wildlife habitat and native vegetation. Several participants discussed the impacts of clearing land for agriculture, expressing concerns similar to those about the forestry industry. Agricultural activity, particularly in the form of grazing leases, continued to expand into the once-forested areas of the western regions of the *Isga* territories:

A lot of them [salt licks] have been destroyed, and the habitat for the animals is also destroyed. Like this one here is a grazing lease. See, look at how much habitat and the natural things for the animals, their environment, their feeding grounds- it's destroyed. And the blueberry patches are gone with it, the saskatoon patches and some of the medicine places where they gather is also gone. And whatever's left, the roots, usually it grows back but not when you put cows there, they trample it and it doesn't grow anymore.

Francis Alexis, ANSN (13)

A few talked about the importance of native forage plants for wildlife health, and how this vegetation was becoming scarce in agricultural landscapes. One participant also mentioned overgrazing as a cause of reduced forage for wildlife.

Urban and Residential Expansion

As this study has focused largely on environmental health where the *Isga* can still practice traditional land use including hunting and harvesting, urban and settled areas were generally not a topic of focus. However, much of the Edmonton Capital Region, as well as many towns and smaller settlements are on land that was traditionally inhabited by the *Isga*:

All this is going to be affected, from the city coming this way. The further we get up into the hills, that's where we are going to be protected.

Zachary Potts, ANSN (14)

A booming population has resulted in the continual encroachment by urban, suburban, residential and recreational developments as they expand further into the *Isga* territories. This development brought with it all the pollution and wastes associated with residential settlement:

My partner wouldn't- would be very lucky to eat fish out of here [Lac Ste. Anne]. ... There are people living on the east side and where are their toilet outflows going? Where is it going? And we've noticed, she's noticed some ulcers on some of these fish and stuff like that and that's why she doesn't eat them.

Ronald Potts, ANSN (15)

A few participants made specific reference to the burgeoning human population in the region and the effects that these increases had on wildlife and human health. Some also talked about increased insecticide and other pesticide use around these human settlements, which has affected their use of traditional berry harvesting areas. A few others had observed increases in hunting pressure on wildlife during the fall hunting season, especially around the more densely populated rural areas.

Waste disposal, from both residential and industrial sources, was a related concern mentioned by several participants. One pointed out that the main landfill site for all of Lac Ste. Anne County bordered the main ANSN Reserve on its east side. Elder and hunter Daniel Kootenay was also very concerned about the impacts of the Alberta Special Waste Treatment Centre, a disposal facility for hazardous wastes from across Canada, which is located near the town of Swan Hills in the northeastern part of the

Isga territories. In 1996 there was an airborne leak of PCBs, dioxins and furans in this facility, followed by an explosion and a fire in 1997. This chemical leak and subsequent human and wildlife contaminant monitoring has resulted in long-term wild game and fish consumption advisories in the area (Alberta Health 2013). Daniel spoke of *Isga* hunters finding many sick animals following this leak, some more than 50 kilometres south of Swan Hills.

6.5.5 Cumulative Impacts on the Health of Land and People

A key theme that emerged during the course of the research was the cumulative impact of disturbances on the landscape, particularly by the primary resource industries:

They're out there for natural resources. Renewable and non-renewable. And that's the biggest problem. ... The incursion onto the land of grazing leases, the continuous exploitation of the land by oil and gas companies, the damage that they do to the land. Everything impacts what's out there.

Percy Potts, ANSN (16)

A number of participants raised concerns about the compounding effects of these industries operating in the same area or in close proximity to each other. Plate 6.4 depicts disturbances and sites of concern documented within the *Isga* territories:

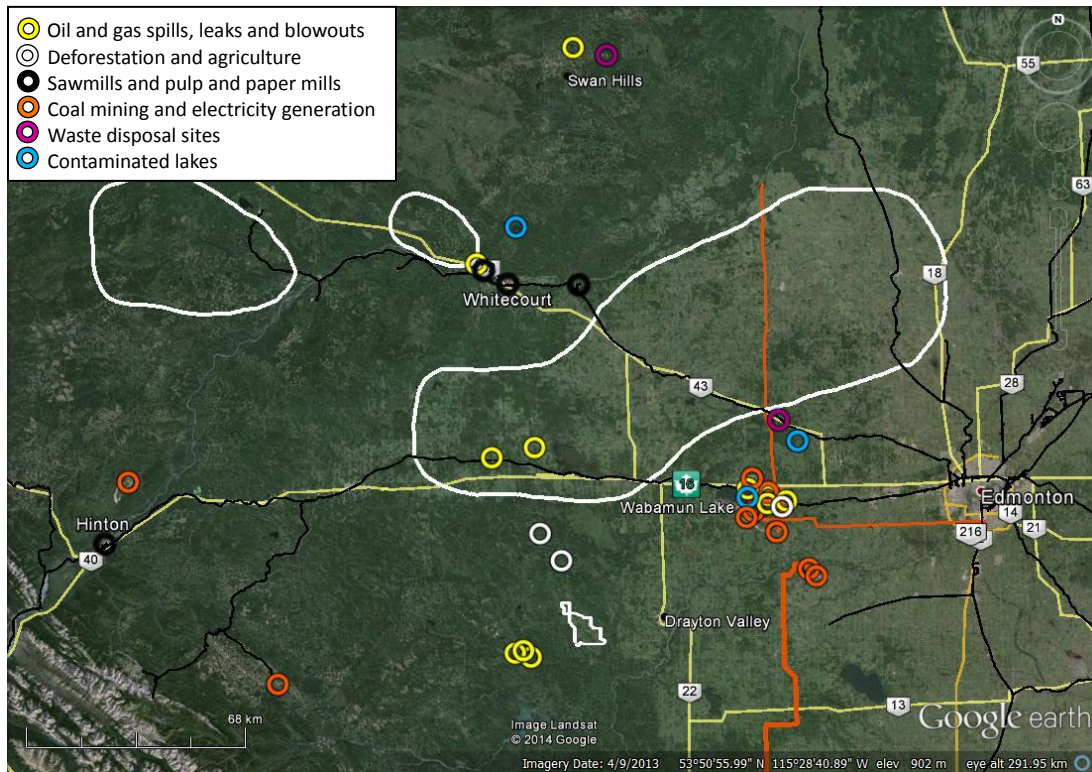


Plate 6.4 Industrial and other disturbances documented in the *Isga* territories¹⁸

Documenting cumulative impacts was a difficult task, because many, such as oil and gas and forestry, were widespread and overlapping. For oil and gas, we focused on incidents such as spills, leaks and sour gas well blowouts. A few participants outlined specific areas of intensive forestry and agricultural activity, although both of these land uses are extensive in many parts of the *Isga* territories. Another concern was the high density of roads, many of which had been built to facilitate resource extraction, particularly by oil and gas and forestry companies. Several discussed the impacts of these extensive land use changes on wildlife habitat, particularly for moose. Between an increasingly cleared landscape in the west and the expansion of urban settlement in the east, some remarked that moose were simply running out of room. Also of concern for some was pollution from sites of secondary resource production, including the coal-fired electric power plants around Wabamun Lake, and pulp and paper mills in Whitecourt and Hinton.

¹⁸ Image courtesy of Google Earth and Landsat.

Although difficult to document on a map, some widespread land uses were highly visible in satellite imagery, for example as depicted in the south-central region of the *Isga* territories in Plate 6.5:

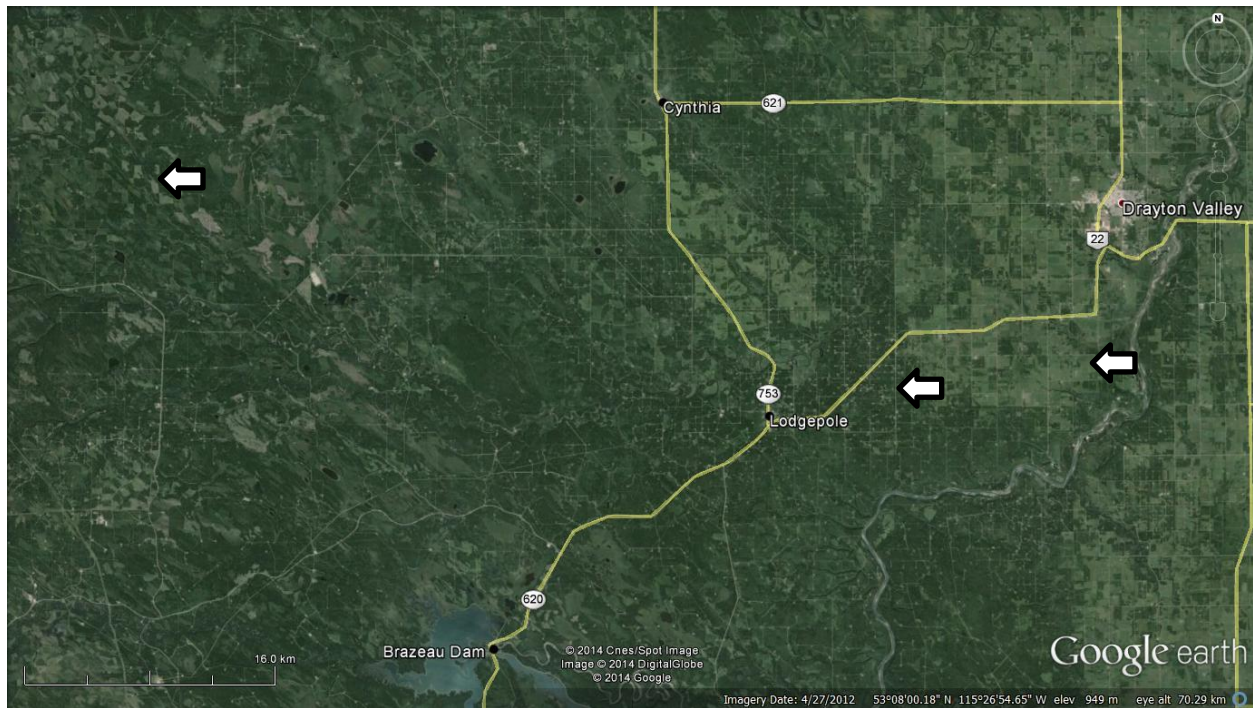


Plate 6.5 Forestry, oil and gas and agriculture in the south-central region of the *Isga* territories¹⁹

One Elder also discussed a progression of land uses over time:

Yes, logging, a lot of clear cutting, a lot of oil and gas activity, a lot of forestry activity, now agricultural activity and pretty soon residential activity. So that land is more like- well, they call it progress, but it's also impacting us and the animals. Where do we go to pick berries now? Where do we go to pick, gather, where do we go to hunt, because we're familiar with these hunting places and now we have to go somewhere else that maybe we're not familiar with in hunting.

Francis Alexis, ANSN (17)

Francis spoke in particular about the foothills and boreal forest regions in the western and northern parts of the *Isga* territories. He described a progression from forestry to agriculture, in which forests were initially clearcut and then sometimes turned into grazing leases rather than

¹⁹ Patches of clearcuts (left arrow), oil and gas sites and corridors (middle arrow), and agricultural regions (right arrow) are clearly discernible in satellite imagery of the region around Drayton Valley and the Brazeau Reservoir. Image courtesy of Google Earth, Cnes/Spot Image and DigitalGlobe.

replanted with trees. Agriculture, in turn, was generally accompanied by settlement and an increased and more permanent human presence on the landscape. He also discussed how the cumulative impacts of disturbance had affected the health of both the land and people:

The land- it's not healthy anymore. It's all scarred up and wounded. In time, it might heal itself, but... it's not going to be the same again. Because all of those places I knew as a little kid, the landscape is changing. And where we used to pick berries and gather medicines, when you go there, you'll find a refinery, or a farm, or a highway built right through it. And where there are sacred places, you'll find all kinds of development. ... The health of the land is also a reflection on the health of the people... if the land was healthy, we were healthy. But the land is not healthy, and we're not healthy.

Francis Alexis, ANSN (18)

Indeed, many *Isga* talked about the importance of a healthy environment for healthy human communities, in terms of clean water, healthy wildlife, and abundant and healthy berries and medicinal plants, and also in terms of cultural and spiritual connection with the land.

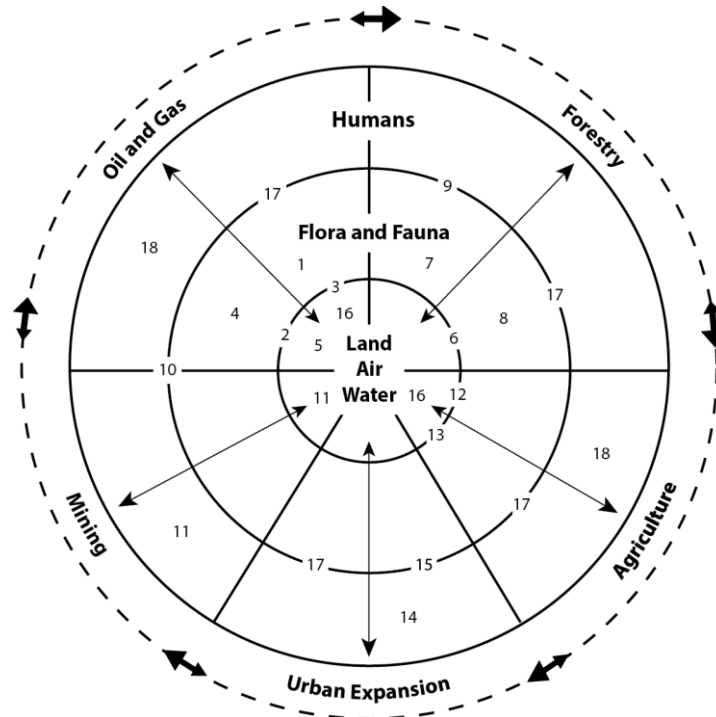


Figure 6.1 Progressions of cumulative impacts to environment and health on the *Isga* lands

Figure 6.1 depicts relationships between abiotic factors (land, air and water) and biotic factors (flora and fauna, and humans), and how the health of living ecosystem components is affected by the various dominant land uses. Numbered quotes from sections 6.6.2 and 6.6.3 are depicted according to the land uses discussed and environmental concerns raised. This figure also shows a general progression of land use, in which certain land use activities facilitate entry for others. New industry takes advantage of the deforested land, roads, and infrastructure in place from previous resource activity and settlement, leading to increasingly impacted landscapes.

6.6 Discussion

The *Isga* People are concerned about a myriad of environmental health issues in their traditional lands. Declining health and abundance of wildlife, berries and medicinal plants were key concerns as many rely on and prefer traditional food sources and medicines. Water quality and water loss were also key concerns. Participants emphasized the fundamental importance of water for the health of all plants, animals and people. Declines in the health and abundance of flora and fauna were associated with the drying of water bodies and loss of wetland habitat as well as deteriorating water quality. The vast majority of the participants strongly attributed these declines to disturbances on the landscape, particularly resource extraction activities. Oil and gas, forestry, and coal mining were reported as having the greatest impacts on water, air quality, wildlife, and vegetation.

These findings are supported by previous qualitative environmental research conducted with the *Isga* (Arai 2007; Potts-Sanderson 2010) as well as by numerous quantitative ecological and environmental health studies conducted in the region. Biodiversity and many wildlife populations are declining in Alberta due to anthropogenic landscape change (Smith et al. 2000; Timoney and Lee 2001; Lee et al. 2009b). Forest fragmentation and loss of old-growth due to industrial activity are key concerns in Alberta's boreal forests (Timoney and Lee 2001; Berland et al. 2008; Linke and McDermid 2012). Drought

and water loss in the region are also well-documented and have been cause for concern among researchers and in rural communities (Petroni et al. 2005; Schindler and Donahue 2006; Bonsal et al. 2011). Industry, particularly oil and gas, has been implicated in water concerns in the province because of the high volumes of water used as well as contamination from spills and effluents (Griffiths et al. 2006; DeBruyn et al. 2007; Griffiths 2007). Air, water and soil quality in western and central Alberta have also been affected by emissions from the coal-fired power plants around Lake Wabamun (Donahue et al. 2006; Mazur et al. 2009), from oil and gas wells (particularly through flaring and venting) (Burstyn et al. 2007; Johnson and Coderre 2011), oil refineries (Simpson et al. 2013), sour gas processing plants (Addison et al. 1984; Prietzel et al. 2004), sour gas well blowouts (Monenco 1983; WIN 1983; Lambert et al. 2006), and recently by the massive Obed Mountain Mine coal slurry spill into the Athabasca River (Schindler 2014).

Human health among the *Isga* was also a serious concern. Participants raised a variety of health issues as experienced in their communities, especially ones related to diet. The loss of traditional diets was seen as a central factor in much of the chronic illness experienced by the *Isga*. Additionally, some attributed a loss of connection to the land and land-based cultural practices to reduced health and quality of life in recent generations. These health concerns closely reflect the realities of many other Indigenous Peoples around the world, who often live with disproportionately high levels of environmental contamination, as well as the loss of natural ecosystems and resources that are essential to their traditional livelihoods (Adeola 2000; Nettleton et al. 2007; Agyeman et al. 2009).

These environmental and human health concerns are typical of those faced by Indigenous Peoples elsewhere in Alberta, Canada and internationally. Many Indigenous communities are increasingly affected by degraded water quality (e.g. San Sebastian 2001; Rodgers 2004), drought (e.g. Rigby et al. 2011) and water use conflicts (e.g. Weinberg 2010; Garrard 2012). The health and safety of country

foods is also uncertain in many places where there has been exposure to industrial pollution. Heavy metal contamination in wildlife has been of particular concern, as has been extensively documented in the Arctic (e.g. Kuhnlein and Chan 2000; Van Oostdam et al. 2005), downstream from the oil sands (McLachlan 2014) and also for some North American freshwater fish populations (Kinghorn et al. 2007; Harper and Harris 2008). Similar to the findings of our wildlife contaminants studies (Miller and McLachlan 2012), the bioaccumulation of cadmium in the liver and kidneys of cervids has also been found in the Northwest Territories (Kim et al. 1998) and in central Alberta (Miller and McLachlan 2012). Cadmium contamination is a concern as it is a highly toxic metal. High levels have been found in a variety of traditional food sources in the Canadian Arctic, especially moose (Chan et al. 1995; Kim et al. 1998) and also in people and animals in tropical and marine ecosystems exposed to industrial pollution and effluents (e.g. Talbot et al. 1976; Anticono et al. 2013).

Industrial activity is closely associated with many of these environmental health concerns. The oil and gas industry is responsible for serious environmental degradation and human health concerns in economically marginalized countries (e.g. San Sebastian 2001; Aaron 2005; Orta-Martinez and Finer 2010) as well as on Indigenous lands in wealthier countries including Canada. The struggles of the Athabasca Chipewyan and Mikisew Cree First Nations are another striking example of the health and livelihoods of Indigenous communities in Alberta being profoundly impacted by the petroleum industry, as much of their traditional lands have been consumed and heavily contaminated by the Athabasca oil sands operations (Timoney 2007; Passelac-Ross and Buss 2011; Huseman and Short 2012; McLachlan 2014). Mining is another industry that has greatly affected Indigenous Peoples worldwide, through pollution and the appropriation of land and resources (e.g. Weinberg 2010; Murombo 2013; O’Faircheallaigh 2013). Similar to the situation of the PFN, it is typical for Indigenous Peoples to be living in poverty and in close proximity to large mining operations from which they receive little economic benefit (O’Faircheallaigh 2013). The type of large-scale coal mining and power generation found around

Wabamun Lake has also had negative impacts on the health and wellbeing of Indigenous Peoples and local residents in Australia (Higginbotham et al. 2007; Connor et al. 2008). There is also widespread concern about the human health effects of mercury and other emissions from coal-fired power plants in this region (Donahue et al. 2006; Jardine et al. 2007; Mazur et al. 2009). Deforestation through forestry, agriculture and resource extraction activity is another major problem faced by many Indigenous Peoples in forested landscapes around the world (e.g. Walpole et al. 2012; Durigan et al. 2013). Since colonization began in Canada, Indigenous Peoples have typically had very little say in how their forested lands have been managed and in how timber has been harvested. In recent decades, some Indigenous communities have been able to take a more active role in the management of forest resources on their lands, through co-management and Aboriginal forestry (Natcher 2008; Wyatt 2008; Tindall and Trospen 2013). However, for the *Isga* communities, participation in forest management is still minimal, occurring largely through 'consultation' with government and industry.

A key theme that emerged from this study was the cumulative impact of disturbances and development on environmental and human health. Many participants were concerned that there are very few areas of intact habitat and uncontaminated resources left for wildlife, and that as a result the health and population size of many species is widely in decline. In many places, the landscape has been affected by multiple forms of intensive disturbance. Over the course of this research, patterns in the progression of disturbance and development over time became more apparent. In the early years of colonization, agriculture and associated settlement became dominant land uses in the parkland regions of west-central Alberta. Commercial forestry and mining also began during this time, although on a much smaller scale than that in current operations. Oil and gas extraction did not begin in the region until the mid-20th century, but has quickly become one of the most dominant land uses throughout the *Isga* territories. The forestry industry has also dramatically altered much of the forested landscape through the now-ubiquitous practice of clearcutting. Many of these land uses have followed a pattern of westward

expansion, beginning in the parkland areas of central Alberta. Oil and gas and forestry now have an extensive presence in the boreal forest and foothills, and agriculture is also being established in many of the more accessible deforested areas. Many cities, towns and recreational settlements in the *Isga* territories are also expanding their footprints. This urban development tends to expand into areas that have already been affected by agriculture and other dominant land uses, and represents the most complete land transformation and permanent removal of land from the areas available for Indigenous land use and occupancy.

The cumulative impacts of all of these land uses raises questions about the long term survival of the *Isga* and other Indigenous Peoples in the region. Over the past 150 years, Indigenous land use and occupancy has been increasingly restricted to progressively smaller areas as industrial and residential uses appropriate more and more of the remaining land and resources. This trend occurs throughout Canada; however, in much of Alberta these land use changes are generally progressing even faster than in other provinces and territories (Timoney and Lee 2001; Lee et al. 2009a). Perhaps unsurprisingly, the health and quality of life of Indigenous communities across Canada is generally unacceptably poor. Identity and culture are also often being lost, especially in the younger generations. As meaningful connections to and use of traditional lands and the practice of traditional livelihoods are made progressively more difficult by dominant land use, what are the prospects for the survival of the *Isga* and other Indigenous Peoples as distinct cultures with healthy and thriving communities?

Extreme enough in central Alberta, the cumulative impacts of economically-driven land use change also threaten the health and cultural survival of Indigenous Peoples in many other places across Canada and around the world (e.g. Nutall 1998; Munsterhjelm 2002; Connor et al. 2008; Schlosberg and Carruthers 2010). In Canada, many First Nations have had to deal with the compounding impacts of dominant land uses similar to those faced by the *Isga*, particularly in the boreal forest regions of northern Alberta and

British Columbia (e.g. Booth and Skelton 2011; Parlee et al. 2012). The cumulative impacts of land dispossession, agriculture and industry have affected the livelihoods, wellbeing and community cohesion of Indigenous Peoples across this country including communities along coastal British Columbia (Turner and Turner 2008), southwestern Ontario (Mascarenhas 2007), the Arctic (Nutall 1998; Chapin et al. 2004) and the Maritimes (Lawrence 2009). In Newfoundland, the plundering of Indigenous resources and the devastation of food supplies contributed to the complete demise of the Beothuk People. The Mi'kmaq of Newfoundland have also faced an almost complete dispossession of their land, resources and culture; problems aggravated by the refusal of the provincial and federal governments to recognize their Indigenous status. The extreme assimilation pressures faced by the Mi'kmaq of Newfoundland have taken a severe toll on community health and cultural cohesion (Lawrence 2009). Yet, they and many other Indigenous Peoples have survived this onslaught of dispossession and assimilation and are working to revitalize their cultures and to have their land rights recognized (Mascarenhas 2007; Anderson et al. 2008; Turner and Turner 2008; Lawrence 2009). The *Isga* also show an incredible resilience through their continued practice of traditional land use and livelihoods, and through the revitalization of language and cultural practices (see also Chapter 5).

In recent decades, there have been efforts made to address the issue of cumulative effects in environmental assessment at both the federal and provincial levels (Parkins 2011). In Alberta, previous attempts to consider cumulative effects, through integrated land management and initiatives such as the Northern East Slopes Strategy, have been largely ineffective (Fluet 2003; Brownsey and Rayner 2009). Now a new Alberta Land-use Framework (ALUF), a regional land planning regulatory framework with the stated goal of managing cumulative environmental effects in the province, and with the involvement of Indigenous Peoples, is currently being designed and implemented (Parkins 2011). However, there is already evidence that the first completed regional plan, the Lower Athabasca Regional Plan (LARP), has not been particularly comprehensive or integrated when dealing with cumulative effects, particularly

with respect to water use and watershed management (Passelac-Ross and Buss 2011; PIAD 2012). Notably, the LARP incorporated very little of the input given by Indigenous Peoples throughout the consultation process (Passelac-Ross and Buss 2011; Laidlaw and Passelac-Ross 2014). Conventional cumulative effects assessments also seldom consider social indicators of community wellbeing or the importance of approaches that are culturally responsive (Weber et al. 2012). However, there is a growing body of literature emphasizing the value and importance of identifying and incorporating indicators and thresholds of broader social-ecological systems into cumulative effects assessments and land use planning (e.g. Parlee 2005; Forbes et al. 2009; Parlee et al. 2012; Weber et al. 2012).

Many *Isga* in this study talked about a fundamental dependence on wildlife and the environment for survival. It was often difficult to separate responses neatly into categories of 'environmental health' and 'human health', or according to just one particular land use activity of concern. Participants often spoke of the land, plants, animals and the *Isga* as all being intrinsically connected, closely tied and interdependent. This holistic way of thinking is typical of Indigenous Peoples throughout the world (Nettleton et al. 2007; Parkes 2010). *Isga* understandings of environmental and human health also bear great similarity to the ideas embodied in the concepts of One Health and EcoHealth. Some talked about the intimate connections among people, animals and land through the teachings of their culture. They spoke of animals as brothers and sisters that must be shown respect, of everything having a spirit, and of the earth itself as a living being that sustains all life.

Many *Isga* also talked about human health, culture, language, social cohesion, colonization and self-determination, and some discussed the connections between all of these factors and the health of the land and ecosystems. Health researchers are also increasingly recognizing linkages between autonomy, colonization, political oppression, resource alienation and the health of Indigenous Peoples (Marmot 2003; Durie et al. 2009; King et al. 2009). These findings suggest that politics and health are closely

intertwined and that political realities and decisions have far-reaching implications for Indigenous health and wellbeing. This study supports these assertions as many participants emphasized the importance of political factors including Treaty rights and self-determination for the wellbeing of the *Isga* (see also Chapter 5).

Limitations

Our study somewhat resembles an EcoHealth approach; however, many challenges were encountered that limited the kinds of information and data we had aimed to incorporate. Digital data layers showing the locations of all industrial impacts throughout the *Isga* territories would have been very useful in the analysis of the spatial data. These kinds of land cover data do exist, but are difficult and expensive to acquire in Alberta. For a region as large as the *Isga* territories, many thousands of dollars would have been needed to purchase these datasets from the provincial government or private companies. Some First Nations are starting to be able to access industry data for their lands, but this data is often piecemeal, from specific companies, for specific lease or Forest Management Agreement (FMA) areas. In the end, because of bureaucratic barriers and prohibitive costs, we relied on free public data sources, including satellite imagery available through Google Earth and datasets available through federal databases. Many of the industrial impacts described by participants are discernible in satellite imagery. However, detailed and geocoded data showing the comprehensive spatial coverage of each industrial land use would have greatly enhanced the analysis of the impacts of each type of land use.

Another limitation arose during the wildlife health sampling study. Our veterinary pathologist partners from the University of Calgary unexpectedly withdrew from the project and moved out of the country, leaving us without the detailed data we had expected on the health of each animal that had been harvested and submitted for sampling. This left us with a much smaller dataset of moose health and harvest locations, which were acquired primarily through the interviews and which mostly focused on

unhealthy moose. We had very few documented locations for healthy moose harvested and could not do a quantitative, spatial comparison of the locations of healthy vs. unhealthy moose.

These limitations left us with much less of the conventional scientific data than we had initially hoped to include. However, what we did acquire was a wealth of qualitative data through the interviews with Elders, traditional land use harvesters, *Isga* community members, and non-Indigenous rural residents and harvesters. The knowledge and concerns among the participants were diverse in nature, and yet there was a great deal of consistency in many of the responses regarding the general state of wildlife health, and changes in wildlife populations, movement, and behaviour. This documented knowledge represents a valuable contribution to the overall understandings of the impacts of land uses on environmental health and the health of Indigenous Peoples in Alberta and beyond.

6.7 Conclusion

The *Isga* are facing a human health crisis while their traditional land base is simultaneously degraded. This reality is a common experience among many Indigenous Peoples in Canada and worldwide. Among Indigenous populations in Canada, chronic illness and disease related to changes in diet and lifestyle are rampant. Declining health, safety and quality of traditional food and water sources is a concern for many communities. Environmental health impacts on many Indigenous Peoples, including the *Isga*, are compounded by colonialism and political oppression, which has resulted and continues to result in a loss of autonomy and self-determination, alienation from traditional lands, and loss of culture, language and social cohesion (see also Chapter 5). Throughout this study, the theme of environmental justice featured prominently. The cumulative impacts of environmental disturbance and destruction and the continuous encroachment of the dominant society into the *Isga* traditional lands pose a serious threat to the long-term survival of the *Isga* as a culturally-distinct People with healthy and cohesive communities.

To date, there has been little consideration of the cumulative effects of development in Alberta. The new

Alberta Land-use Framework (ALUF) represents the most recent attempt to implement an integrated land and resource management system in the province. Many residents are observing and participating in this process with the hope that there will be progressive change in land use planning and management in Alberta, particularly with respect to cumulative effects management and a greater inclusion of Indigenous Peoples in land use planning. However, the outcomes of the regional planning process are not showing much promise, especially when it comes to meaningfully incorporating input from Indigenous communities. Environmental indicators are usually the only indicators considered in most cumulative effects assessments, including any that are being implemented in the ALUF (Government of Alberta 2008).

There is increasing recognition among ecologists and social scientists that ecological and social systems are closely tied, and that the most comprehensive understanding of each is attained by looking at the processes, changes and indicators within social-ecological systems as a whole (Berkes and Folke 1998; Gunderson and Holling 2002; Berkes et al. 2003; Norberg and Cumming 2008). The health of people and communities, particularly Indigenous communities, is highly dependent on a healthy environment. Likewise, the social and political functioning of a society determines how land and resources are used and how ecosystems are engaged and affected. Understanding the role of the environment in the health of Indigenous Peoples provides a fuller context for the health crisis they are facing around the globe. Systemic factors, including environmental degradation and also losses of autonomy and cultural cohesion, must be meaningfully addressed in seeking solutions to improve health conditions. Attempts to address these underlying influences must be informed by and meaningfully involve Indigenous Peoples themselves, in order to make changes that are culturally appropriate and thus, effective in the long-term.

The interconnectedness of environmental and human health has been increasingly recognized in recent

years by professionals in various health disciplines through the concepts of One Health (OHITF 2008) and EcoHealth (Charron 2012). The Indigenous knowledge and perspectives shared in this study very much describe a holistic way of thinking about health. And though there is great diversity among the Indigenous Peoples of the world, the *Isga* perspectives on health and wellbeing resonate strongly with those of many other Indigenous Peoples. Holistic health paradigms are clearly not new in the human experience, and the movements of One Health and EcoHealth still have much to learn from Indigenous perspectives on health and approaches to managing social-ecological systems (Parkes 2010). EcoHealth approaches could also be useful in future research with the *Isga*. Our study primarily looked at environmental health with a relatively minor focus on any implications for human health. However, a more comprehensive examination of the health and wellbeing of the *Isga*, looking at both environmental and social determinants, could provide greater insight into the full range and relative importance of various health determinants within the *Isga* communities.

What is already clear is that the loss and degradation of land and resources is negatively affecting the *Isga*. The majority of Albertans enjoy affluence and prosperity due to the exploitation of resources in many Indigenous lands across the province. However, most of Alberta's Indigenous Peoples have yet to share in this prosperity, and have had very little recourse to counter the expropriation and industrialization of their lands. The current, most commonly touted solution is the incorporation of Indigenous Peoples into the dominant society job market, most often into the very same resource extraction and related industries that are damaging their traditional lands and livelihoods. This new form of assimilation has yet, if ever, to improve the lives of Indigenous Peoples. In any case, the continued rapid and unsustainable exploitation of resources in Alberta will ultimately leave an undesirable legacy for future generations, Indigenous and non-Indigenous alike. Transitioning to sustainable energy sources and resource use in the generations to come will require cooperation and ingenuity on a grand scale, both locally and globally. The diversity of Indigenous knowledge, ways of thinking and approaches to

environmental management have the potential to make valuable contributions in this transition.

Working together in good faith is necessary to foster healthy communities, share resources equitably and to build our future as Nations and cultures living together.

6.8 Chapter References

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7 CHARTING A NEW COURSE

You know the world, sometimes, you feel the heartbeat. If you notice and stand still, and put your mind away from everything, thinking about your heart, you can feel it on the ground. The heartbeat. All the noise goes away finally, you'll put your feet on the ground and just relax and all of a sudden you'll feel the heartbeat. ... You know, Mother Earth, they said that Mother Earth doesn't seem to know anything- he knows everything. Got his own heart, deep down, down there. Someday he'll stop and we could too. That's something my grandfather told me a long time ago, that.

Angela Jones, ANSN²⁰

This research journey has been one of immense personal learning and growth for me. I truly had no idea what I was getting myself into. I knew that Indigenous Peoples around the world and in my own home province were marginalized and face racism and systemic oppression. I knew that First Nations communities are dealing with disproportionately high levels of poverty, poor health, depression and addictions among their people. But I did not really **know** what that meant in the day-to-day realities of parents, children, youth, grandparents who are taking care of young grandchildren and people who are trying to make a difference in their communities in the face of many obstacles from within and outside of their communities. I am amazed at the strength and perseverance of the many people I have had the privilege to come to know, particularly Elders who have survived things I cannot even imagine and are still carrying so much, and also young people who have taken on family responsibilities far beyond the norms that would be expected within mainstream society.

I found that I identified with the words of many *Isga* who talked about their connections to the land and the importance of intact ecosystems, even as someone with no ancestral or cultural connections to the land, as a white kid living on an acreage who just spent a lot of time romping around in the bush, observing nature and then later following up a passion for wild places with formal environmental science

²⁰ One thing I learned in the Stoney language course I attended is that the *Isga* language does not have gendered pronouns, that is, speakers do not differentiate between 'he' and 'she' the same way as in English. This helped me to understand why many *Isga*, particularly Elders, often seemed to use the words 'she' and 'he' interchangeably.

education. But I could see from a young age at least some of what was happening- I also grew up with oil and gas developments encroaching closer and closer to our home and water supply in the heart of the *Isga* traditional lands.

“Charting a New Course” was suggested to me as a title for an article I wrote about the mapping project early on in the research process. This title seemed apt in terms of our efforts to re-map the landscape from an *Isga* perspective. It also seemed a good fit with respect to our general research approach as an attempt to break from a history of one-sided agendas and unequal power dynamics between researchers and Indigenous communities, and to instead work collaboratively with the *Isga* to address issues and concerns that were a priority for them. Throughout my time working with the *Isga*, the idea of “charting a new course” took on personal meaning for me as well. I grew up less than a half hour’s drive north of the Alexis Reserve and passed close by it every time we drove to Edmonton. Yet, I had never once set foot on it. The closest I ever came to this in my youth was a trip with high school friends to Jasper in which we took a ‘wrong turn’ and found ourselves on ‘the rez’. We promptly turned back the way we came, not having any idea that there was a road through the reserve that would have taken us by another way to the turn we had been trying to find. As for the Paul First Nation, I did not even know of its existence. During the course of *In-Land-and-Life* and the mapping research, I traveled throughout west-central Alberta, accompanying *Isga* people in various kinds of traditional land use, moose sampling, assessments and monitoring of industrial leaks and spills, community campouts, ceremonies and even a traditional pow-wow in Jasper National Park. We took many back roads in areas I had only previously driven through on the highway, and where I would have easily become lost on my own. I also learned the *Isga* names and descriptions for many places I had only known by the English names of the largest nearby towns. I began to see the landscape in a whole new way and realized how little I knew about the land and the history of human relationship with it beyond the very recent period of European settlement.

This research project was an intense process, and took a lot longer than I expected to complete. Part of the reason for this was the time it took to deal with some personal health issues, but a large part of it was also due to the nature of doing participatory, community-based research. It takes a long time to do it well. This is true especially when there are significant cultural differences as well as colonial baggage and power dynamics to navigate within the research team and wider communities. It took a long time for me to build trust in this context. Spending enough time within partner communities in order to develop meaningful relationships and understand at a deeper level the challenges facing Indigenous communities is extremely important. Initially, I spent a lot of time with Misty's mother Daisy, especially in her kitchen at the Alexis school. Daisy's kitchen is a hub in the community, and it was here that I met many people and began to get a feel for daily life in Alexis. I helped Daisy prepare and serve lunch to the students, and sometimes we would also shop for groceries for the school or make bagged lunches for students to take on field trips. After lunch clean-up, Daisy would take me to meet people who were knowledgeable and experienced in traditional land use. I also attended round dances, pow-wows, community campouts, ceremonies and visited people in their homes. Only after spending a substantial amount of time getting to know people in the communities did I earn enough trust to make progress with the research, especially the interviews.

At the same time, this kind of involvement can be personally challenging. I found myself wanting to help out people I had become close to in whatever way I was asked to or could. I was also aware of my position of privilege as a white, formally educated person whose career could benefit through this research. I felt a great deal of responsibility, especially towards those community members that had been instrumental in establishing the project, some of whom are now also close friends. I was unaccustomed to knowing my limits in terms of giving support to people who were in crisis, or who were struggling over an increasingly longer term with things I had never experienced or had to deal with myself. Providing a substantial amount of ongoing support, while maintaining a healthy home life and

continuing to progress with the research proved impossible, and eventually I had to take a step back to regain personal balance and also to complete the research in time. These experiences again speak to the gravity of the crisis facing Indigenous Peoples in Canada. It is difficult to be adequately prepared for the challenges of working with Indigenous communities, and yet it is only through efforts to build bridges, reconcile relationships and nurture trust between Indigenous Peoples and settlers that there is any hope of meaningfully addressing some of these issues.

Another significant challenge I had was in navigating gender dynamics in the communities. I quickly found out that gender determined many of the expectations around conduct and respectful behaviour in the communities and especially in the context of certain events. As a woman, it was appropriate for me to spend time with and learn from other women in activities and tasks traditionally carried out by women and to likewise limit my efforts in making connections with men and participating in tasks and activities typically carried out by men. Through my 'western' feminist lens and a very incomplete understanding of *Isga* culture, these gender norms often seemed limiting and disempowering to me. However, I came to realize that spending time with women also gave me insight and a sense of connection and community with other women. Daisy and Misty both gave me a lot of guidance around gender norms and roles in *Isga* culture. Discussions with Misty about Indigenous feminism also challenged me to question my assumptions and opinions about gender politics that I had developed within the context of 'western' feminism. I began to understand that there is no universal, objective feminism, much in the same way that there is no universal, objective system of knowledge and inquiry.

So along with the physical experience of visiting places new to me and learning some of the rich history and importance of these places on the landscape, the relationships and bonds formed with *Isga* people have also had a tremendous influence on my understanding of *Isga* culture, relationships and connection to land. These experiences and relationships have profoundly re-shaped my own course in ways I had

never imagined, and will no doubt continue to influence and enrich my life's path.

Contributions, Limitations and Areas for Future Research

This study illustrates how the health and wellbeing of the *Isga* is affected by a range of underlying factors that fit within the related themes of environmental health, land justice and self-determination. These influences are not often considered in conventional health assessments, policies or strategies aimed at improving the health of Indigenous Peoples. Yet, there is much evidence to suggest that all of these factors are highly important for Indigenous health and wellbeing. This research supports the concept of One Health and identifies similarities between this new approach among health professionals and *Isga* conceptions of health that are also holistic in nature. This study also affirms the relevance of EcoHealth approaches in investigating and addressing the health of Indigenous Peoples, as the health of the *Isga* is greatly affected by both ecological and social factors. It may be useful to consider the *Isga* and their lands and ecosystems together as one social-ecological system that also includes other Indigenous communities as well as a large and increasing number of non-Indigenous people. Also, a practical contribution of this project at the community level is the land use-and-occupancy documentation. I hope the maps and spatial database will be useful to the *Isga* communities in terms of knowledge preservation and transmission and also in their struggle for land justice.

There were some significant limitations in this study as well. This research is my first foray into the social science realm. My previous education and research experiences have largely been in ecology and the natural sciences. This gave me a background in environmental and conservation issues, but little perspective on the human and social dimensions of environmental matters. My understanding of Indigenous issues and perspectives on environmental concerns was also limited, as the first Native Studies course I attended was during my graduate studies, and the first Indigenous environmental researcher I met was Misty Potts. Thus, I had a steep learning curve entering the program, in

familiarizing myself with issues faced by the *Isga* as well as in participatory research methodologies and qualitative and mixed methods techniques. This was also my first time conducting research interviews. As I gained experience and confidence interviewing community members, my skills developed and I noticed a big difference between the first interviews and those done more towards the end of the study. Undoubtedly, someone with a background in social sciences and Native Studies could have facilitated the research process more smoothly and perhaps a little more efficiently than I did.

Another limitation was the dominant use of the English language throughout the research process and also in this thesis. As language is a direct reflection of knowledge systems and worldviews, *Isga* knowledge and perspectives, especially those of the Elders, would ideally be articulated in the Stoney language. However, many younger *Isga* speak English as a dominant language, and for most interview participants English was the most appropriate language to use in the interviews. On the other hand, some Elders are more fluent in Stoney than English and in the case of a couple of Elders I realized it probably would have been best to work with a translator to allow them to articulate their knowledge and concerns within the context of their own language.

An additional challenge was adequately representing the knowledge and perspectives of the entire community. As in most communities, there is significant political division among families in both ANSN and PFN, and these divisions undoubtedly had an impact on who I had the most contact with, and who I was introduced to. I am aware that the knowledge and views of some families in these communities may be underrepresented in this study.

Future research could take a variety of directions to build on what was investigated through this study and the In-Land-and-Life project as a whole. One idea we discussed among the research partners was initiating a study specifically focusing on human health in the *Isga* communities. We talked mainly about investigating physical health indicators, and I would suggest expanding this scope to include a wide range

of socioeconomic and environmental determinants as well. Another possibility would be to establish a community-based wildlife health monitoring program. Such a program could use and build on the sampling skills acquired by *Isga* hunters during the In-Land-and-Life cervid sampling project. As industrial development pressures in the *Isga* territories continue to increase, and with the threat of wildlife diseases such as CWD entering local cervid populations, there is a need to continue to monitor the health of wildlife, particularly moose, deer and other species important as traditional food sources for the *Isga*. Another idea we had was to track the movement of cervids using tracking collars to investigate the range, movement, behaviour and contaminant exposure risk of these animals. Although In-Land-and-Life did not ultimately develop into a long-term research program, the project explored and brought to light a number of environmental health concerns, and these outcomes could be built upon by future research and monitoring endeavors.

Research represents just one avenue in working to bridge the chasm between Indigenous and settler communities. The *Isga* have survived and are certainly here to stay. A healthy co-existence will require a good deal of listening and understanding by all non-Indigenous people, as well as a commitment to justice.

Ish Nish to all the *Isga* who have made my life richer and opened my eyes in new ways to the beauty of the land we call home. I hope to continue to nurture for a lifetime the bonds and friendships we have created. *Hucimahad*.²¹

²¹ '*Hucimahad*' [hoo-chee-mah-hahd] is an *Isga* phrase meaning 'see you later', rather than 'good-bye'.



Figure 7.1 Making bannock at the In-Land-and-Life campout near Anselmo, Alberta.

Photo credit Anna Weier, July 2010.



Appendix - Interview Consent Form

Department of
Environment and Geography

Winnipeg, Manitoba
Canada R3T 2N2
Telephone (204) 474-9667
Fax (204) 474-7699
environment_geography@umanitoba.ca

Informed Consent Form (Individual Interview)

Research Project Title: In Land and Life: Implications of Chronic Wasting Disease and **Other Wildlife Diseases** for Aboriginal Communities and Other Stakeholders

Researchers: Dr. Stéphane McLachlan, Environmental Conservation Lab, Department of Environment & Geography, University of Manitoba

Sponsors: PrionNet Canada, Alberta Prion Research Institute, SSHRC

This consent form, a copy of which will be left with you for your records and reference, is only part of the process for informed consent. It should give you the basic idea of what the research is about and what your participation will involve. If you would like more detail about anything mentioned here, or information not included here, please feel free to ask. Please also take the time to read this carefully and to understand any accompanying information.

You are about to participate in a semi-directed interview in order to share information on your experiences, opinions and concerns regarding chronic wasting disease, **other wildlife diseases, and more generally the decline in health of moose and deer.** This 'local knowledge' is essential for better understanding the current status and potential risks associated with diseases on affected individuals, communities, and society as a whole.

You will receive \$50 for participating in this interview which will take approximately 60 minutes. During this time, a series of open-ended questions will be used to facilitate conversation with the researchers. Your participation in this dialogue is highly encouraged. Please feel free to speak your mind.

An audio /video recording device will be used during the interview. The information will be used to generate a transcript of the proceedings and, **if you desire to be video recorded, to create a video we will show in your community and in others. Should you wish not to be recorded, we will of course accommodate your concerns.**

All information that you provide will be kept strictly confidential and will be stored in a locked cabinet, accessible only by the researchers on this project, for the duration of the project (5 years). **Another copy will be provided to your community for your use and control. Our copy of the raw audio/video data will be destroyed after this period.**

In order to celebrate the importance of your voice and experiences, we will normally identify people by

name in any research outcomes that arise from these interviews. However, you will always be able to choose to remain anonymous, if you so wish. Indeed, you will be free to withdraw at any point in the research.

The outcomes of this research will include a final report and peer reviewed research papers. Also, outcomes will likely be posted on the university website. If you choose to be recorded by video, this footage may be incorporated into a video that is shown within your community, distributed to other Aboriginal communities, and made available on the internet. We will also show you a draft version of the video and will change the video to accommodate any concerns you might have. Once we have analyzed the data, we will also provide you with a research pamphlet that summarizes the outcomes of this research if you indicate your interest and contact information below. A copy of all reports and publications will be made available for you to review and to comment upon.

Your signature on this form indicates that you have understood the information regarding participation in the research project and agree to participate. In no way does this waive your legal rights nor release the researchers, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from the study at any time, and /or refrain from answering any questions you prefer to omit, without prejudice or consequence. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation.

If you have any questions about the research, please contact Dr. Stéphane McLachlan by phone (_____) or email (_____).

The Joint-Faculty Research Ethics Board at the University of Manitoba has approved this research. If you have any concerns or complaints about this project you may contact the above-name person or the Human Ethics Secretariat at 204.474.7122, or e-mail margaret_bowman@umanitoba.ca. A copy of this consent form has been given to you to keep for your records and reference.

In conclusion, please indicate in the check-off boxes below which of the following you consent to:

- Permission to videotape-record for research purposes, which will later be transcribed and/or analyzed
or
- Permission to audio-record for research purposes, which will later be transcribed and/or analyzed
or
- No permission to either audio or videotape-record for research purposes

And

- Permission to release identity in any research outcomes that arise from these interviews
or
- No permission to release identity in any research outcomes that arise from these interviews

Also please indicate if you are interested in the following:

- Yes, I would like to receive a summary (i.e. pamphlet) of the research outcomes in the future
or
- No, I would not like to receive a summary (i.e. pamphlet) of the research outcomes in the future

And

Yes, I would like to participate further in the research over the next year (e.g. follow-up, one-hour interviews)

or

No, I would not like to participate further in the research (e.g. follow-up interviews)

If you indicated that you would either like to receive a summary of research outcomes or participate further in the research, please provide your contact information below

Name _____

Address _____

Phone Number _____ Email Address _____

Participant's Signature Date

Researcher's Signature Date