New Social Media, Risk Communication, and Wildlife Health:

Implications for

Indigenous Communities of Saskatchewan and Alberta, Canada

by

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ABSTRACT

The study involved Indigenous communities of Saskatchewan and Alberta which are adversely impacted by industrial activities in their traditional territory. The overall goal of this study is: the assessment of social media in risk studies among Indigenous communities of western Canada. The methods used were: interviews, focus group discussion (FGD), and net-mapping. Results showed that the majority of youths communicated around risk using new social media (NSM) in event of risk outbreak, while Indigenous Elders, communicated face-to-face and via cell-phone. Results also showed that youths use Traditional Knowledge learnt from the Elders to understand Chronic wasting disease (CWD) risk, interpret, communicate and mobilize around mitigation. The study concluded that the use of NSM is becoming increasingly important for scoping information around wildlife decline and emergency in these Indigenous communities.

Keywords: Chronic wasting disease (CWD), Environmental justice, Infectious disease, New Social Media (NSM), Risk Communication, Wildlife.

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CHAPTER I: INTRODUCTION

The plight of Indigenous communities in Canada and the plethora of challenges they generally face in northern Canada are too numerous to describe in this thesis. The increase in levels of industrial presence leading to pollution, resource extraction, and the associated environmental decline cannot be overemphasized. These challenges place the Indigenous communities at a high risk. However, there is little effective communication between the Indigenous communities on the one hand and the government and industry on the other.

Owing to the tendencies for the marginalization of the conventional media, the existing risk communication in the western part of Canada, around the environmental crisis is ineffective and one-way in orientation. The need for effective knowledge exchange is required for risk mitigation, and as communities are increasingly plugged into the Internet, the new social media might potentially play an important role in addressing these gaps in risk communication. The importance of effective risk communication regarding industry-associated declines in the environment and any risk for affected communities is increasingly recognized by researchers from a wide array of disciplines over the last several decades. However, there are gaps in understanding regarding the potentials of Indigenous social networks for risk communication, risk mitigation and risk amelioration.

The use of New Social Media (NSM) as a tool for risk communication among Indigenous people is yet to be adequately explored. The benefits of Facebook in the advocacy regarding risk and communication of environmental hazards in Indigenous communities cannot be left untapped. In this study, I examined the Indigenous values that underlie concerns regarding the environment and wildlife in some Indigenous communities. I also examined the need for knowledge mobilization around these concerns, to the end of attaining environmental justice. Finally, I explored the role of Indigenous youths and their use of the NSM towards culture-conscious risk communication. As NSM continually and rapidly evolves, communication still remains constant in largely uncharted risk domains. NSM tools like Facebook, Twitter, and YouTube become increasingly valuable tools for advocacy in risk communication studies.

This thesis contributes to ongoing risk studies among Indigenous communities, by examining the potentials of New Social Media for addressing the communication needs and priorities within Indigenous communities. The science behind Indigenous culture and social networks was examined. This thesis revealed how youth potentials and knowledge mobilizing capacity have not been fully tapped. The effectiveness of NSM for creating awareness and passing out information from coast to coast was examined. As the custodian of Indigenous knowledge, these Indigenous peoples could make extensive use of NSM in conveying future risk information in case of an environmental crisis or disaster. The overall goal of this study is the assessment of social media in risk studies among indigenous communities of western Canada. The specific objectives of the research were to:

(i) document existing risk communication within Indigenous communities of western part of Canada;

(ii) characterize the role of youth, if any, in this risk communication;

(iii) document how and to what degree New Social Media (NSM) are used in these Indigenous communities; and

(iv) explore the potential of NSM for future community-centred risk communication in these and other Indigenous communities

CHAPTER II: LITERATURE REVIEW

2.1 Decline of wildlife and environmental health in Alberta and Saskatchewan.

In Canada, environmental responsibility for maintaining wildlife populations and environmental health are evolving as important social and governance priorities (Rudd *et al*. 2011). There is an increasing need to share lessons of effective risk communication in order to mitigate known exposures and to share insight regarding environmental remediation (Craft *et al*. 2006, Javorek *et al*. 2007). Impact of industrial development on the distribution and abundance of wildlife populations cannot be over-emphasized (Johnson and St-Laurent, 2011).

Resource extractive industry produces wastes and by-contaminants such as mercury, cadmium and other heavy metals that are ubiquitous in the environment. These in turn are known to have adverse effects on wildlife and on human health (Jarup *et al*. 2003, Blechinger *et al*. 2002). A measure of toxicity exists for food crops grown on cadmium-containing soil (Nasreddine and Parent-Maasin, 2002, Satarug *et al.* 2003) and the toxicity of cadmium and other heavy metals can persist with a half-life of 30 years in human kidneys without additional exposure (Teeyakasem *et.al* 2007). Increases in soil contamination and air and water pollution result from improper regulation of environmental emissions, as well as poor industrial and agricultural practices (Woolfson, 2006). As a result of activities of oil, gas, and forestry companies, land fragmentation via extended seismic lines, pipelines, industrial service roads have emerged as a problem in

many rural and remote landscapes, all of which adversely affect wildlife (Timoney, 2007, Swenson *et al*. 2012).

2.1.1 Environmental health and Indigenous communities

Most Indigenous communities still use wildlife extensively; however, their traditional territories are also rich in hydrocarbon resources, and this has been caused by the activities of oil and gas companies (Berkes *et al*. 2001). Social, political, economic, and environmental injustice and inequality are experienced by Indigenous communities across Canada (Brulle and Pellow, 2006). As a result of social, cultural, environmental and economic changes brought by colonization, Indigenous population health has undergone substantial changes and decline (Bjerregaard *et al.* 2004).

2.2. The role of oil and gas in the decline of wildlife and environmental health in Alberta

Environmental impact remains a major concern as Oil Sands development increases in northern Alberta (GA Report, 2009, Tenenbaum, 2009, Foote, 2012). Increased greenhouse gas (GHG) emissions and nitrogen oxides (Gosselin *et al*. 2010) and industrial environmental impact including the clearing of roads, cutting of seismic lines, fragmentation of wildlife habitat are commonplace (Braun and Hanus, 2005). There are also the associated effects of pipeline right-of-ways, well-pads, pipeline compressor emissions, gas plant pollution, oil batteries, road

run-offs, sedimented creeks and streams, oil and gas spills and leakages, health and safety related risk, sour gas effects, disposal of oil-field wastes, acidifying emissions, acidification of ecosystems, and the possible deposition of chemical compounds (Taylor *et al*. 2004, Tenenbaum, 2009). The overall ability of affected ecosystems to function effectively is reduced by modified nutrient cycling (Lal, 2005), which subjects the ecosystems to extreme acidity, and adversely affects the behavior and success of wildlife and the people who depend on them (Morrison *et al*. 2006).

2.3 The role of industry in wildlife and environmental health decline in Saskatchewan through agriculture and oil

Environmental impact assessments show that an increased number of oil wells are being drilled in Saskatchewan and Alberta (Nasen *et al*. 2011). The environment is also endangered by the combined effects of emissions of methane and carbon dioxide resulting from agricultural activities (AAFC Report, 2000). Emissions from agricultural practices contribute to global warming (Erisman *et al*. 2008). In turn, the conversion of natural into agricultural land, shifts land use to more intensive and persistent practices and contributes to habitat loss for wildlife (Georgoudis, 2005, Bulte and Horan, 2003). Once the habitat is altered, food shortage exacerbates competition for scarce resources, and wildlife species and populations decline (Morrison *et al*. 2006, AAFC report, 2000). Studies show linkages between the ecosystems, wildlife, people, zoonotic parasites, and disease (Polley, 2005). Inefficient nutrient management on agricultural lands creates

runoff of contaminants (Chapin *et al*. 2005). Environmental pollution also increases human mortality rate by contributing to pulmonary diseases, ischemic heart diseases, congestive heart failure, heart rhythm disorders, asthma, and diabetes (Lagorio *et al*. 2006, Bartell *et al*. 2013). There is also the recent onset of Chronic Wasting Disease (CWD) transmission through pastures contaminated by intensive wild-stocking of elk and deer, which obviously has adverse health implications for these cervids but also humans (Williams and Miller, 2002).

2.4 Chronic Wasting Disease defined

Ingestion of a misfolded version of a normal body protein called the prion protein can result in CWD (Leighton, 2011). CWD belongs to a group of prions diseases referred to as transmissible spongiform encephalopathies (Cullingham *et al*. 2011b). CWD is found in free-ranging wild cervids (i.e. elk, deer, moose), captive wild cervids, and commercial ranch cervids (Bollinger *et al*. 2004). It is known to be progressive, invariably fatal neurodegenerative, and is associated with significant disease outbreaks (Connie *et al*. 2007). Environmental contamination can influence the transmission of CWD through soil type and other factors affecting prion infectivity (Johnson *et al*. 2006, Schramm *et al*. 2006). CWD can also be transmitted directly from animal to animal and potentially through carcasses, blood, saliva, faeces, or urine from diseased animals (Haley *et al*. 2011, Paterson and Viney, 2000, Miller *et al*. 2004). Maximum dispersal distance of mule deer can exceed 100 km, suggesting that, infected deer can carry disease

across long distances and spark new foci of infection (Skelton, 2010, Almberg *et.al* 2011).

2.4.1 Chronic Wasting Disease in both Alberta and Saskatchewan

Across North America, cervid populations have suffered from this incurable chronic wasting disease that has no preventive vaccine (Silbernagel *et al*. 2011, Cullingham *et al*. 2011a). Several studies recorded over the last three decades show the emergence of an endemic form of CWD in North America (Omar, 2005). Captive elk on game farms were reported to have been infected with CWD in Wisconsin in 1960 and 1981 (Kahn *et al*. 2004). CWD was first discovered on game farms in Saskatchewan in 1996 and 1998; by 2000 it was also discovered in free-ranging mule deer in Saskatchewan through surveillance programs on wild cervids (Bollinger *et al*. 2004). As in Saskatchewan, CWD was detected in eastern Alberta in 2005 (Habib *et al*. 2011). In both Saskatchewan and Alberta, CWD raised concerns among hunters, and attracted much media coverage regarding cervid and the cervid farming industry (Arnot *et al.* 2009, McLachlan, 2010).

2.4.2 Chronic Wasting Disease and its importance for Indigenous communities

As CWD affects cervid populations across North America, it also poses threats to the socio-economics, culture, and health of Indigenous people who use cervid for food, medicine and ceremonial purposes (Vaske *et al*. 2006). Use of wildlife for subsistence by Indigenous communities has been adversely affected by the

presence of contaminants in food-chain (Thomas and Gates, 1999, Apeti *et al*. 2013). The ability of many Indigenous families to secure appropriate diet has also been significantly affected, as these traditional food sources have become threatened or are seen as unsafe (Power, 2008). CWD is already adversely affecting the availability of cervid populations in some locations. Wild-meat derived from CWD-bearing animals is also potentially threatening human health (Thomas *et al*. 2005). Decreases in the availability and safety of traditional foods, especially wild meat (Duhaime *et al*. 2002, Duhaime *et al*. 2004), thus poses major threats to Indigenous health and livelihood (King *et al*. 2009).

2.5 Implications of wildlife decline for Indigenous livelihoods

Consequences of the decline in wildlife and environmental health as it affects Indigenous people include the extinction of plant and animal species, scarcity of traditional lands; decreases in biodiversity; alteration of migratory patterns of wildlife, decreases in cultural knowledge transfer from Elders to youths; decreases in paid employment for harvesters; loss of taste for traditional foods; substitution of native-foods with processed and market-bought foods, and lack of funds for hunting and fishing related expenses (Duhaime *et al*. 2004, Boult, 2004). Some studies also show poor performance and impaired intelligence levels for children living adjacent to intensive resource extraction and industry, such as metallurgical factories (Sovcikova and Solova, 2000). There is correlation between increased rate of disease, and decrease intake of country foods due to

fear of and concern for contaminants (Kinloch *et al*. 1992, Duhaime *et al*. 2004). As a result, it is uncertain whether remaining populations of wildlife are adequate as sources of food for Indigenous populations (Norgaard, 2005, Hormel and Norgaard, 2009).

2.5.1 Implications of wildlife decline for Indigenous health

The probability of disease spread can increase in social mammals through interactions within social groups, contributing to further susceptibility (Altizer *et al.* 2003). The correlation between CWD status, social structure, and increased host densities determine lateral transmission of this disease. Indigenous communities have continued to endure emotional stress (Bloomberg and Chen, 2005) and chemical stress from contaminated diets (Kinloch *et al.* 1992, Lambden *et al*. 2006). Wildlife, and human health are potentially at risk (Bourne, 2004), from industrial wastes and toxicants such as PCBs, dibenzofurans, dioxins, polyaromatic hydrocarbons, fluorides, cyanides, aluminum, arsenic, chromium, and styrene (Arquette *et al*. 2002). Due to intimate contact of Indigenous people with their environment, they are at increased risk of exposure to such contaminants (Craft *et al*. 2006). Indeed, Indigenous people are arguably forced to choose between culture and health because they do not have the choice of averting risk by eliminating food, income, religion, culture, and heritage (Harper and Harr, 2008).

2.5.2 Implications of wildlife decline for Indigenous communities' treaty rights

Most wildlife diseases can be traced to some of the major impact arising from colonization of Indigenous people (Alfred, 2009). Indigenous people in Canada have explicit and well defined treaty rights, among which are their exclusive right to harvest wildlife within their traditional territories (O'Neill, 2006). Given the current levels of contamination, a full exercise of treaty rights could ironically have devastating health effects on Indigenous communities (Harper and Harr, 2008, Carmen, 2012). At the other extreme, contamination levels can get high enough that the exercising of these treaty rights becomes impossible. On the basis of government-to-government, and nation-to-nation obligations, treaty rights qualified First Nations people to be consulted in all decisions pertaining to Indigenous people and their lands (Arquette *et al*. 2002). Some unfavorable governmental policies still allow industrial activities to occur around Indigenous communities and on their traditional territories (Alfred, 2009); as a result, transmission patterns of CWD, based on the migratory behavior of wildlife pose significant threat to Indigenous communities (Conner and Miller 2004).

2.6 Definition of Risk Analysis and Assessment of Chronic Wasting Disease involving risk analysis

Risk analysis refers to the systematic use and communication of information to identify hazards, threats and opportunities (Pieter, 2009). This process entails risk assessment, risk management, and risk communication as interrelated components

(Lorenzoni *et al*. 2005, Renn, 2003). Risk assessment is a scientific process consisting of hazard identification, hazard characterization, exposure assessment, and risk characterization (EFSA Report, 2012). Risk management represents the action measures designed to reduce the likelihood of an unwanted event or the magnitude of its consequences (MacDiarmid and Pharo, 2003). Finally, risk communication is a cultural process that operates in a place with the meaning of risk dependent upon how the people interact within that social context (Masuda and Garvin, 2006).

In contrast to these ostensibly objective approaches to risk, risk perception is the subjective assessment of the probability of a specified type of accident happening and how concerned we are with the consequences (Sjöberg *et al*. 2004). Evaluations of the probability and the consequences of a negative outcome are generally used to characterize risk (Renn and Klinke, 2002). It transcends individuals to include social and cultural constructs reflecting history, ideologies, values and symbols (Douglas, 2013). There are two approaches to risk perception and these are: (i) the standard approach and (ii) lay versus expert approach.

2.6.1 Risk perception (standard approach, lay versus expert)

Risk perception is concerned with identifying the most appropriate and effective ways of discussing risk with a broad variety of publics. As a result, using expert or scientific views as the standard against which the perception of others should be judged is unfair and incomplete, because risk perception always entails values

rather than mere scientific facts (Hornig-Priest, 2011). Risk situates interactions of individuals, groups, and institutions within their social experiences (Scherer and Cho, 2003). Its interpretation is affected by social norms, mores, values, institutions, and other influences on the choices of members of social groups (Kasperson and Kasperson, 2007).

There are sometimes substantial differences in risk perception with respect to environmental issues (Antova *et al*. 2008). The psychometric paradigm operates with undifferentiated concepts of risk, which resemble generalization of risk. It also essentializes risk perception based on a number of underlying principles, e.g. dread, controllability, and knowability. The psychometric paradigm is very different from cultural approaches to risk perception, which emphasizes the importance of a diversity of views that in turn reflect underlying differences in culture (Sjöberg, 2000b). A pioneering skeptical view in risk studies, risk perception was described as a construct of the mind (Slovic, 2002). Risk perception is thus determined by measurable parameters, whereby subjective factors precede objective ones (Toledo *et al.* 2011). The effective management of risk requires circumvention of complications in perception; thus, societal choice of suitable approaches to risk management must depend on societal values and priorities (Craft *et al*. 2006).

2.6.2 The subjective perception of risk

The subjective perceptions of regulators and some segments of society do not always align concerning magnitude of risk owing to the fact that many risks are not easily quantified (OECD Report, 2010). While experts focus on details in risk assessment, the public generally focuses on the bigger picture of risk perception (Norgaard, 2007). For example, the public may overestimate the risk associated with lower probability events like floods and underestimate higher probability events like car accidents (Majone, 2006).

2.6.3 Comparative views of risk perception

The correlation of two or more risks on the basis of assessment known as risk comparison helps in the appraisal of different options such as technical solutions, courses of actions in understanding risk, putting risk on a scale of priorities in accordance with decision-making over limited resources, in order to arrive at a cost-benefit viewpoint (Schutz *et al*. 2006). Misperceptions of risk occur because there is tendency to focus on mitigating regulatory risk over larger disaster-related risk (Harkins, 2012). The "White male effect" is a terminology used in describing how the perceptions of white males often differ from members of other cultural and racial groups in perceiving risk such that they explain away risk as more acceptable, and thereby impose environmental risk on others (Norgaard, 2007).

2.6.4 Risk perception according to controllability

Risk controllability entails examination of the factors, the causes of risk, and the prevention behaviors required to mitigate risk. Fatalistic beliefs held by people affect knowledge about risk factors and knowledge of recommendations for risk prevention (Ramírez *et al.* 2013). Owing to the fact that risk interpretation factors are interconnected, in order to understand risk, institutional trust, proximity to exposure, gender, and race must be considered (Norgaard, 2007). Controllability in risk regulation requires series of decisions regarding the delimitation of the problems, and the timing of any subsequent phases (Schutz *et al*. 2006). Risk communication programs supplemented by appropriate educational materials for stakeholders are integral parts of the effective implementation of risk evaluation and mitigation strategies (Frame *et al*. 2013).

2.6.5 Risk standardization

It is important to identify distorted risk perception in individual subjects through risk indices because identifying and correcting inaccurate perceptions of risk in the population can improve decision making (Meng *et al*. 2013). Therefore, risk standardization is very important because it is the process of establishing guidelines and holistic regulatory frameworks that cover the entire process of risk assessment, risk evaluation and risk management for risk mitigation (Schutz *et al*. 2006; Zhonghua, 2012). Actual risk must be identified and assessed in order to be regulated. Afterwards diverse analytical methodologies are used for assessment and management (McNeil *et al*. 2005). Effective communication is inevitable in

response to hazards at the individual and societal levels because risk regulatory concepts are always embedded in a particular cultural and legal context, a process which is often not straightforward (Steelman and McCaffrey, 2013).

2.6.6 Multidisciplinary Approach to Risk Analysis

Multidisciplinary approach to risk analysis typically requires a close examination of risk from more than one perspective through a combination of methods that involves the technical, the cultural, the social, and the individual (Kasperson and Kasperson, 2007). Over the years, risk assessment and management experts have defined multidisciplinary approach as the combination of the quantitative approach, the psychometric approach, the cultural approach (Boholm, 2008).

2.6.7 Quantitative approach to risk analysis

Quantitative approaches to risk analysis emphasize how an accurate assessment of risk must be drawn from a wide range of disciplines (Aven and Kristensen, 2005). This process of risk evaluation is exclusively based on scientific risk assessments; whereby the risk perceptions of particular groups or the public as a whole become relevant criteria of judgment during the prioritization of risk management measures (Schutz *et al*. 2006). A benefit of quantitative risk assessment is that the justification of government actions can shift to focus on the most important risk and reduce them at the lowest cost while identifying other lesser risks (Steelman and McCaffrey, 2013).

2.6.8 Cultural approaches to risk

Cultural approaches to risk are an important complement to psychometric approaches. Culture represents the larger context through which the risk perceptions of individuals or groups are characterized (Boholm, 2004). The propositions of cultural theory state that risk is culturally construed, such that what people fear and why they are afraid of that hazard is ultimately determined by broader societal values (Boholm, 1998, Boholm, 2008). Cultural dimensions generate utilitarian accounts of individuals as an intrinsic, detailed investigative dimension that is missing in most components (Yamin, 2005).

As a result, the study of risk perception is incomplete without exploring cultural bias because this investigative aspect that allows inquiry is a dimension that exists within all communities. Thus, risk analysis cannot be solely rational, cautious, or contain risk adverse behavior (Douglas, 1994). Risk communication methods that ignore historical and social context of risk will ultimately fail (Keune *et al.* 2008). Social aspects explain how risk are influenced by collective mores, norms, values, institutions, and other influences on choices commonly held by social group members rather than the subjective interpretations of individuals that are emphasized in the psychometric paradigm (Kasperson and Kasperson, 2007). In recent times, efforts to bridge risk perception research and social context have mainly required the clarification of the role of culture in risk communication (Pidgeon *et al*. 2003).

2.6.9 Democratization of risk analysis

The democratization of risk analysis is in contrast to the expert-defined approaches, and the knowledge-deficit views of risk communication (Keune *et al*. 2008). In establishing a policy based on science and technology, there has been a growing call for greater public involvement in line with democratic ideals (Rowe and Frewer, 2000). For a long time, the traditional, one-way method, where experts overload the public with top-down monologues was used but is now largely criticized as a closed, undemocratic approach to risk communication (Keune *et al*. 2008). Ideally, risk communication involves local groups at local scales where government, industry, and the public meet to deliberate on risk (Masuda and Garvin, 2006). A comprehensive model integrates technical, cultural, social, and individual responses (Kasperson *et al*. 1988). Participating citizens can ideally examine, resist, and transform their roles, identities and interests in policy formation (Felt and Fochler, 2010). If appropriately executed, the inclusion of the public as partners through participatory processes adds legitimacy to final outcomes, achieves trust, provides support for policy decision-making processes, and increases mutual understanding (Lorenzoni *et al.* 2005, Ludwine *et al*. 2010). However, it never happens this way in reality because emphasis is usually placed on quantitative analysis of accident probability and consequences in the traditional approaches to risk analysis; hence, no effectiveness has emanated from such analysis which disregards the risk perception of the public (Meng *et al*. 2013).

2.7 Risk Communication- vulnerable groups

The current expert-focused approach to risk assessment generally excludes Indigenous people or other marginalized groups in society, because of its hierarchical nature (Arquette *et al*. 2002). Exclusion of these and other groups from participating in risk management processes renders the risk mitigation circle incomplete (Lundgren and Mcmakin, 2004, Bertozzi and Lee, 2003). Conventional media tends to function as a gatekeeper during this communication, by exercising authority over decisions regarding what becomes news and who has access to the airwaves and front pages (Vaughan and Tinker, 2009, Barnett, 2003). Due to legal requirements and the uniqueness of their needs, cultural impact as well as social and ecological factors must be considered in decision-making that involves Indigenous people (Arquette *et al*. 2002, Berkes *et al*. 2001). Without such deliberate involvement of the community in every aspect of risk analysis, from creation to implementation, risk communication cannot be successful (Ogan *et al*. 2009).

2.8 The role of local and Indigenous knowledge in Risk Analysis

Indigenous groups offer alternative knowledge and perspectives to environmental studies and management strategies (Mauro and Preston, 2000). Indigenous knowledge (IK) represents rich insights into environmental problems. It consists of the conjoint practices of Indigenous people shaping their habitat through adaptive knowledge, and management of biodiversity (Turnbull, 2009). Traditional knowledge is a holistic knowledge-practice-belief complex that is

adaptive by nature, gathered incrementally through observation and by trial-and-error, tested and then transmitted to future generations orally or by shared practical experiences across many generations (Berkes *et al*. 2000). Traditional Ecological Knowledge (TEK) is a cumulative body of knowledge, practice and belief that evolves by adaptive processes, handed down through generations by cultural transmission about the relationship of living beings with one another and their environments (Berkes *et al*. 2001). Consequently, TEK has enabled the perpetuity of Indigenous traditions like hunting methods, traditional foods, and the like (Berkes *et al*. 2000). Through achievement of valuable propositions, conceptualization and actions regarding the environment, Indigenous people have justified the resourcefulness, reliability, and rationale of IK (Mauro and Preston, 2000). Cross cultural approaches to environmental management bridge science and IK, and thus encourage dialogue between scientists, Indigenous communities, and other outside stakeholders (Brook and McLachlan, 2008).

2.9 Risk Communication - past, present, and future

Risk communication is an interactive process of exchange of information and opinions among individuals, groups, and institutions, which involves messages about the nature of risk, concerns about risk, opinions, reactions to risk messages, and legal and institutional arrangements for risk management (Schütz *et al.* 2006). Risk communication is the sharing of the probability and uncertainty regarding the effect of a particular hazard (Calman, 2002). Risk can be characterized by the identification of threats, recognition of vulnerabilities within a system, the

identification of consequences, and the effectiveness of protection measures (Adger, 2006, Kasperson and Kasperson, 2013). While some theorists (e.g. Kuran and Sustein, 1999, Sustein, 2005) question public involvement in risk analysis on the basis of preserving risk policies from cultural influence, others (e.g. Schrader-Frechette, 1991) consider the public to be relevant when achieving effectiveness in risk studies (French and Bayley, 2011, Basta, 2011). Inclusion of the public in risk processes bring risk into the social science domain, rather than being contained to the technical domain of the past (Boholma and Corvellec, 2011). A proper integration of the technical mode with the social mode underlies effective decision-making (Slovic *et al*. 2004). Expansion of any understanding of risk must include assessment processes, where risk analysis addresses decision-relevant questions, adopts reasonable assumptions, includes concerned stakeholders, avoids preventable delays and costs, all of which can jeopardize understanding and acceptability of any final decisions (Greenberg *et al.* 2012).

2.9.1 Risk Communication- as defined by scientific experts and governments

Risk is still largely defined by scientific experts and governments (Sustein, 2005).

Despite recent public engagement in the risk domain, broadening participation has not often led to a more democratic policy outcome, but rather a closed process that causes distrust in regulatory decisions (Faulkner and Ball, 2007). According to Sustein (2005), non-expert perceptions of risk are distorted, and must be prevented from influencing science-based risk policy-making (Sustein, 2005).

After deliberation concerning risk, stakeholders are actually likely to move towards more extreme positions than before due to a tendency for group polarization (Sunstein, 2002).

2.9.2 Risk Communication - social amplification of risk

The media has strong effects on public perceptions of risk (Sjöberg, 2003, Lewis and Tyshenko, 2009). The conventional media is further aggravated by the Internet-based public expert. The Internet provides the public with efficient means for interactive communication as well as an open space for active information-sharing and public participation (Chung, 2011). Interests are triggered through Internet, allowing for the dissemination of information to a wider and more diverse audience in a manner that is unavailable to the conventional media (Cline and Haynes, 2001, Fensel *et al*. 2011). As a result, the disconnection between public views on risk consequences and remedies on the one hand and the expert's opinions on the other hand can grow (Leschine, 2002).

2.9.3 How the field of risk has evolved from the objective to the societal

There has been a wide diversity, and sometimes incompatibility of terminologies and conceptual frameworks used by various researchers regarding risk (Young *et al*. 2006, Gallopin, 2006). Examination of the vulnerability of social systems or biophysical systems to harm, as induced by natural and socioeconomic variables, has drawn numerous propositions (Brooks *et al*. 2005). Understanding the levels of effects and responses of any affected systems or their component parts

transcend the analysis of perturbations and stressors (Kasperson *et al*. 2003). Consequences can arise from not considering risk within a broader spectrum (Turner *et al*. 2003). Important parameters were disregarded in previous quantitative risk studies as some methods developed for estimating and mapping hazards were inadequate when viewing risk in this broader context (Dai *et al*. 2002, Zezere *et al*. 2004, Remondo *et al*. 2005). Ideally, risk models should at once consider risk zoning, hazard, exposure, and vulnerability (Bonachea *et.al.* 2009). Risk and vulnerability analysis are used to find and address weaknesses in the process of managing risk (LaRocca *et al*. 2013). Vulnerability represents the characteristics of a population or system exposure to a hazard/stressor (Ezell, 2007, Sarewitz *et al*. 2003). Risk models should also consider the impact of hazards as functions of exposure to a given event (Dikmen *et al*. 2007); the sensitivity of the exposed entity (Vineis and Kriebel, 2006); how exposed systems amplify or attenuate impact of the hazard (Kasperson *et al*. 2003); how distinctions among exposed subsystems and components can cause significant variation in consequences (Maxim *et al*. 2006); and the role of political economy, social structures and institutions in shaping a difference in exposure and consequences (Turner *et al*. 2003).

2.9.4 Definition of Web 2.0 and its role in New Social Media and Risk Communications

Through the Internet, a new revolution in the field of communication has emerged as Web 2.0, with numerous applications including MySpace, Twitter, and Facebook (Takahashi *et al*. 2009, Eisenman *et al*. 2007). These tools facilitate online communication, networking, and/or collaboration, and are broadly referred to as new social media (Russo *et al*. 2008). Through the use of mobile-friendly Web 2.0 tools, the face-to-face model of communication has been transformed into an independent social constructivist model that allows communication, information sharing, data dissemination and exchange at much faster rates (Cochrane *et al*. 2009a).

2.9.5 Web 2.0 and Risk Communication- role of the conventional expert

The risk communications researcher can take on the role of the "technology steward" (Cochrane, 2009b). This technology steward can facilitate interactions that ameliorate one-way, top-down communication where information is channeled from experts to general audience (Keune *et al*. 2008). As a result, asynchronous and vulnerable communities can better participate in democratic interaction and planning through modern technology within an interactive, networked environment (Evans-Cowley and Hollander, 2010). Thus, health-related social networks are being developed by experts to facilitate information sharing and communication (Takahashi *et al*. 2009). These health-related social

networks are online communities driven by social networking sites such as facebook, tweeter, and the like. Based on how these social networks influence their users' perceptions of social support, health as well as self-efficacy, they are deployed for health purposes (Oh *et al.* 2013).

2.9.6 Role of expert changing in Web 2.0

The use of mobile, user friendly Web 2.0 tools has enabled collaboration, communication, capturing and sharing of critical and reflective learning events through the creation of online social environments such as blogs, social networks, location aware (Geotagged) image and video sharing, instant messaging, and micro-blogging among others (Cochrane *et al.* 2009). A number of institutions have used social media applications including blogs, podcasts and content shares to facilitate a participatory cultural experience (Russo *et al.* 2008). Health care providers are rapidly developing effective practical text message campaigns for health behavioral improvement, which is often referred to as mHealth practice (Cole-Lewis and Kershaw, 2010). This has especially important implications for under-served and geographically remote communities.

2.9.7 *New Social Media defined*

A new aspect of Internet-based technology that is evolving as a tool for communication is widely known as the new social media (NSM) (Bimber *et.al*

2005). Mobile phones, email, Internet/websites, instant messaging, chat rooms, blogs, online forums, social networking sites, video sharing sites, online communities such as Windows Live-Space, YouTube, Facebook and MySpace all constitute online technologies which are growing rapidly and expanding as a means of social interaction (Lucht, 2010, Kingsley and Tancock, 2014). Beyond searching for information, voice communication, increased daily social networking, photography, filmmaking, text-messaging, sending and receiving public health emergency messages are all achieved through NSM (Wasserman, 2011, Govani and Pashley, 2005).

2.9.8 New Social Media and health

The most widely available and frequently used mobile health data service is mHealth (Stewart and Quick, 2009, Cole-Lewis and Kershaw, 2010). Text messaging, video messaging, voice calling, and Internet connectivity are all ways through which mobile phone technologies are used for mHealth (Fjeldsoe *et al*. 2009). This approach to health promotion maximizes mobile communications platforms in addressing access to care, monitoring and treating diseases, and also provides ready and continuous medical education and training (Kosaraju *et al*. 2010, Curioso and Kurth, 2007, Cole-Lewis and Kershaw, 2010). Voice, text, resident application, mobile web, or other modalities represent interventions through which health behavior interventions are delivered (Riley *et al.* 2011). E-health facilitates access to diagnostic tests, monitoring of chronic conditions, medication adherence, appointment keeping, medical test result delivery, health

information communication, remote diagnosis, data collection, emergency tracking, and access to health records (Lim *et al*. 2008, Riley *et al.* 2011). As one of the most frequently visited Web 2.0 applications, representing over 100 million visits each day; YouTube carries timely health-related videos relevant to decision-making surrounding health (Ache *et al*. 2008).

2.9.9 New Social Media and health of marginalized groups

Individuals, groups, communities, or places can be classified as marginalized based on risk perceptions, living conditions, language, health disparities, health literacy, differences in treatment, accessibility to treatment, and lack of assurance in government responses to hazards (Vaughan and Tinker, 2009, Phillips and Morrow, 2007). Marginalized groups often get their information and news from online sources when they have access to the Internet at all (Lee-Wright, 2008). For example, in Australia, information communication technologies (ICT) have contributed remarkably to the promotion of mental health among young people at risk of cultural marginalization as well as in sexual health communication with young people. (Blanchard *et al.* 2008, Evers *et.al*. 2013). The use of Internet tools, mobile phones and other communication technologies is pronounced among many individuals living with HIV in Peru, as a result of the possibility of using these communication tools for delivery of HIV treatments and prevention of transmission (Curioso and Kurth, 2007). Level of affinity to NSM reveals that a greater number of Internet users are youths (Pujazon-Zazik and Park, 2010,

Kingsley and Tancock, 2014). Back-channeled messages, comments, Twitter streams, online forums (Karpf, 2010) are only some of the ways of revolutionizing the nature of Internet for information sharing, project collaboration, problem solving, organizing around causes without any corresponding message restriction by government and other authorities (Tapscott, 2009).

2.10 Web 2.0 and Risk Communication- New Social Media and disaster management

Effective and seamless cooperation and coordination can be achieved during crisis situations if the right procedures and protocols are in place for disaster plans (Eisenman *et al*. 2007, McGuire, 2009). During emergencies, where the effective flow of information and management becomes critical, Web 2.0 becomes relevant (McGuire *et al*. 2009). Social networking was a significant determinant of evacuation success during the Hurricane Katrina disaster, where integrated and prompt media messages were communicated by friends, family, neighbors, and church members around evacuation (Eisenman *et al*. 2007). Although the hearing-impaired were left out of numerous warning systems, they were still informed through side-kicker pagers, email, websites, and text messages (Phillips and Morrow, 2007).

2.11 Web 2.0 and Risk Communication- New Social Media and implications for risk communication

Since communication processes have been transformed from unidirectional models into multidirectional communication models (MCM) (Hanson *et al*. 2011), multi-faceted delivery methods have bridged risk communication gaps to target-audiences (Bridle *et al*. 2013). Internet-based health related information is improving consumer health knowledge more than the quantity and quality of printed materials (Ache *et al*. 2008). Endless promising possibilities through communication technologies and broadband networks are now being achieved (O'Donnell *et al.* 2008, Un and Price, 2007).

2.12. Reviews of some methods of research in Indigenous Communities

Selected methods commonly used in conducting research in Indigenous communities are summarized below: (i) community based research and (ii) participatory action research.

2.12.1 Community based research defined

Community-based participatory research (CBPR) is a promising collaborative research approach that combines systematic inquiry, participation, and action to address community-scale problems (Minkler, 2005). Community-based research (CBR) has been recognized as one of the best strategies for bridging the gaps between theory and practice as well as between scientists and vulnerable communities (Savan *et al.* 2009). Throughout the research process, beginning

from project design phase to the end, community participation is essential (Stewart and Draper, 2009). Through CBR, gaps between science and community members are bridged, as university researchers collaborate in implementing the jointly developed research processes and outcomes (Valente, 2010).

2.12.2 Participatory action research defined

Participatory action research (PAR) is a collaborative, democratic research and learning tool with processes that are built around communication, negotiation, observation, reflection, and critical analysis of data by stakeholders and scientists (Ballard and Belsky, 2010). Historically, PAR has been proven to be a highly suitable tool for conducting studies among vulnerable groups (Ballard and Belsky, 2010). It provides a framework for recapturing the potential of inquiry, which expands the notion of researcher to include stakeholders who collaborate and engage throughout the work (Brydon-Miller and Maguire, 2009).

2.13 Past: research conducted in Indigenous communities for outsider benefits

There has been theft of Indigenous beliefs, knowledge through invasive and disrespectful ‘experimentation’ that has left Indigenous communities grossly exploited (Humphery, 2001). Numerous cases of academic research have neglected to provide feedback around research findings to Indigenous communities (Castellano, 2004). This creates a legacy of distrust which justifies the reluctance of Indigenous communities to participate in research much less to

have these data distributed or put on public display (Mertens, 2009). Due to prejudice, wrong assumptions, attitudes, and a long history of misrepresentation of Indigenous communities, there has been a persuasive call to decolonize research (Law, 2004).

2.14 Research: dirty work for Indigenous communities

Indigenous people have been justifiably skeptical and reluctant to become the subjects of academic research in Canada, due to its historical association with colonialism (Castleden and Garvin, 2008). Negative memories associated with research make it one of the dirtiest words among Indigenous communities around the world (Smith, 2005). The colonizing role of research reflects the manipulation of research results, misrepresentation of Indigenous communities, and use of education, religion, public health and medical discourses to eliminate Indigenous culture and to "deauthourize" traditional ways of knowing (Minkler and Wallerstein, 2011). This is the reason why Indigenous communities perceive some research as dirty works.

2.15 Environmental research as it affects Indigenous communities

The prejudicial portrayal of Indigenous societies and culture has contributed to the transformation of Indigenous health research (Humphery, 2001). Culturally, inappropriate research represents a threat to Indigenous culture as it fragments, displaces, and even assimilates Indigenous communities (Schlosberg and

Carruthers, 2010). The direct impact of environmental contamination on human health are difficult to document, especially among Indigenous populations who depend on fish and wildlife as subsistence food source in remote areas (Wheatley and Wheatley, 2000). An important development has been the emergence of cross-cultural research that links community priorities and knowledge with western science as it relates to environmental and environmental health research (Brook and McLachlan, 2008).

CHAPTER III: METHODOLOGY

3.1 Study area

Three Indigenous communities participated in this study. Two of these communities are Saskatchewan-based and are located on the south-eastern edge of the province and surrounded by intensive agriculture. Of these, Cote First Nation, no. 366, was created through Treaty No. 4 in 1874. It covers an area of 8,088 ha and represents 3,316 registered members, of which 840 live in Anishinaabe community. The official language is Saulteaux. In turn, Keeseekoose First Nation, no. 367, is located between Cote and Kees First Nations. It was established in the 1800s, when inhabitants of the Swan River First Nation in Manitoba relocated because of recurrent flooding. It covers an area of 6,923 ha, and has a total population of 2,204 of which 724 live in the community. A member of Treaty 4, the community's official language is also Salteaux. In turn, the third community is located in Alberta: the Alexis Nakota Sioux Nation is closer in proximity to the city of Edmonton, Hinton, Whitecourt in the province of Alberta. Alexis Nakota Sioux Nation No. 437 is a member of Treaty 6, with their traditional language being Stoney language. It covers about 6175.2 hectares of land. The population of Alexis was 1779 people in 2012. These were registered Band members including 508 males and 459 females in all (Indian Northern Affairs, 2012).

3.2 Background of Methodology Used

Research was conducted with the larger community, but in particular focused on the youths of Saskatchewan and Alberta. Although Indigenous people have been justifiably skeptical and reluctant to participate in academic research in Canada due to historical experiences with colonialism, the total sample size used for the study was still reasonably high (n= 126), due to a long history of collaboration between Dr Stephane McLachlan and the Alexis community over the years on many projects such as the '*In Land and Life' project, and 'In Fire we Trust'* project, and the like. The reluctance to participate in scientific research because of negative experiences with researchers in the past (Castleden and Garvin, 2008), was ameliorated due to the relationship with Mrs Helen Cote of the Saskatchewan-based communities. In order to fully realize the objectives of the study, the methodology was divided into two phases: (i) phase one (interviews), and (ii) phase two (Focus Group Discussion (FGD) and net-mapping). In addition, feedback meeting was conducted with the partnering Indigenous communities on February 8, 2014 to present the outcome of the study to the research participants. Participants' clarifications based on the feedback meeting were incorporated into the discussions and conclusion.

3.3 Phase One of the study

Within phase one of the study, 79 interviews were conducted within the study area and they are detailed below:

•Twenty (20) interviews were conducted in Alexis (this was at the Alberta camp-out),

•Thirty two (32) interviews were done in Keeseekoose (this was at the Saskatchewan camp-out),

•Twenty seven (27) interviews were done in Cote (this was at the Saskatchewan camp-out),

During the first phase, I attended a culture camp-out from June 20 to 30, 2011 in Alberta (Alexis Nakota Sioux Nation) and Saskatchewan (Cote First Nation and Keeseekoose First Nation) from July 19 to 29, 2011. I conducted interviews with 20 community members in Alexis. They included Elders, youth, hunters, and women who process dry meat, fish, and pick medicinal plants, berries, and other edible plants. These interviews focused on the concerns of Indigenous people of Alexis around the presence of oil and gas industry in their environment, the pollution of waste dumping, chemical spray, oil spills affecting their water bodies, fishing activities, hunting of wildlife, CWD, and other environmental injustice to their community. The questions used in conducting the phase one interviews are detailed in Appendix I.

In addition, during the first phase in Saskatchewan, I conducted interviews with community members of Keeseekoose from July 19 to 29, 2011. I interviewed 32 participants in Keeseekoose community. During this first phase in Saskatchewan, the Cote community interviews took place from July 30 to August 10, 2011 at a culture camp. I interviewed 27 participants in Cote community. Owing to the fact

that the two communities were geographically close, the interviews I conducted with the community members of Keeseekoose and Cote communities were the same. The questions focused on mainly indigenous concerns. This includes the presence of mechanized agricultural farmers in the Indigenous communities with their agricultural activities involving pesticides spray against the health of humans and wildlife. In addition, the interviews also covered the Indigenous people's concerns on the threats to their Treaty rights, oil spills, waste dumping, and so on (Table 4.3, Table 4.4 and Table 4.5).

3.4 Individual Interviews

The method used in phase one of the study was interviews. The groundwork was executed by conducting basic individual interviews regarding community concerns, attitudes towards risk, cultural concerns, and wildlife health concerns in both Saskatchewan and Alberta. The total sample size for the first phase was 79, consisting of 59 participants in Saskatchewan, and 20 participants in Alberta. Interviews were audio recorded and transcribed in their entirety. Conversation analysis (Williams *et al.* 2013) was used to carry out fine-grained analysis of the empirical data as an important approach to qualitative content analysis (Palonen and Hakkarainen, 2000).

In order to identify emergent themes, comments were first partitioned into ideas. Segmentation of data for content analysis aids reliability of partitioning which can be assessed by coding into segments and notes were organized into ideas based on

emerging themes. The relationship between the number of participants and their ideas and the themes identified in the process of coding was then derived as numerical values (Palonen and Hakkarainen, 2000). Ideas rather than notes were used as the unit of analysis, in order to equalize the weight of short and long commentaries in the interviews. Participants presented their ideas in many different comments and narratives; some presented many ideas within a single comment such as presentation of a series of risk issues, concerns and explanations.

3.5 Phase Two of the study: Focus Group Discussion and Net-mapping

Within phase two of the study, four FGDs and a net-mapping were conducted and these are detailed below:

- Two (2) FGDs were conducted in Keeseekoose (these were homogeneous FGDs conducted with high school students and youths)
- Two (2) FGDs were conducted in Cote (this was the Net-mapping)

The phase two focused on mapping social networks, forms of communication, devices used in communication, and the potentials of the new social media in risk communication in the Saskatchewan-based Indigenous communities. In the phase two of the study, I conducted a total of four FGDs in all and the total sample size was 47. Both homogenous and heterogeneous components were adopted in conducting the FGDs. These were conducted as four focus group interviews. The four FGDs comprised two homogenous and two heterogeneous FGDs. The first

homogenous FGDs were conducted on January 23, 2012 with 20 participants and the second homogenous was conducted with seven participants on September 13, 2011. Similarly, the first heterogeneous FGD was conducted on January 23, 2012 with ten (10) participants and the second was conducted similarly with ten (10) participants on January 23, 2012. The methods used in the phase two of the study were Focus Group Discussion (FGD) and Net-mapping (McLafferty, 2004). The latter is equivalent to two simultaneous heterogeneous focus group discussions held in one session and analyzed with a Social Network Analysis (SNA) software called UCINET. The net-map was situated within the FGD setting in order to allow participants express themselves freely in a non-threatening atmosphere.

In this study, the following were considered: age, gender, participant level of engagement and interaction with Indigenous culture. A number of open-ended questions were asked that elucidated insight and understanding of risk perceptions around humans and wildlife health (Appendix II). I also explored the use of new social media in risk communications around wildlife and environmental health in these First Nations communities. According to Creswell (2006), the main components of FGD are interaction among participants, and the active role of the researcher in facilitating group discussion. In focus group discussions, McLafferty (2004) stated that heterogeneous groups should be used in exploratory research as they generate rich information; however, using homogeneous groups facilitates rapport and focus.

3.6 The two homogenous Focus Group Discussions

Two homogenous FGDs were conducted in phase two with a total sample size of 27 participants: high school students (n=20) and youths (n=7). The first of the two homogenous FGD was conducted on September 3, 2011 in Keeseekoose First Nations high school with 20 students ranging in age from 17-23 years old, while the second homogenous FGD was equally conducted on September 3, 2011. These students and youths were chosen based on my observations of their predominant use of mobile technology and new social media. Bradley Kakakaway, a Keeseekoose community member was my liaison with the community of Keeseekoose during this period. In order to understand the roles that Indigenous youths play within their communities around wildlife and human health concerns, I conducted the second homogenous focus group discussion (FGD) with a different set of youths within a culture camp setting in Keeseekoose on September 13, 2011. About seven participants were in attendance (N=7). This FGD was done in a culture camp setting with youths who have graduated from high school varying in ages 18-25 years old.

This second homogenous FGD was youth-focused due to the cultural reasons surrounding respect, youth expressions around Elders as well as rapport among youths generally. It was important for me to deliberately capture these youth voices regarding risk communication around wildlife health concerns. In addition, in order to understand and develop the themes around the roles that youths play in risk communication, the method of Mishna *et al*. (2012) was adopted. These authors used a conceptual understanding of the research problem, by using

inductive techniques that were consistent with constant comparison methods in order to examine deeper subjective meanings and the experiences of the research participants (Mishna *et al*. 2012). In so doing, these data were coded and many emergent themes were identified.

3.7 The two heterogeneous Focus Group Discussions (net-mapping)

During the second phase, a net-mapping was conducted as two heterogeneous focus group discussions in Cote community on January 23, 2012. The total sample size was 20 participants. These two heterogeneous FGDs were different from the first two homogenous FGDs conducted with students and youths. The reason was because the former was conducted with a diversity of participants including Elders, intermediate-aged adults and youths in Cote community, while the latter was conducted basically with students and youths in Keeseekoose community. I simultaneously moderated both the heterogeneous FGDs as a net-map.

The participants of the net-mapping meeting comprised community members such as traditional Elders who used mobile phones, youths who used smart phones in accessing their Facebook accounts and intermediate-aged adults who used both cell phones and also had Facebook accounts. This net-mapping meeting comprised mostly adults (N= 4), Elders (N= 12) and youths (N=4) with different age groups: youth (18 to 24 years of age), adults (25 to 40 years of age) and Elders (55 to 80 years of age).

The overall goal of the meeting was to explore the use of new social media (Facebook, Twitter, texting, etc.) in risk communication in Indigenous communities. My approach was to interrupt with probing comments, to use transitional questions, to summarize without interfering abruptly while covering important topics and questions (See Appendix II). This encouraged all participants to share their views during interaction in a supportive and non-threatening atmosphere (Creswell, 2006, McLafferty, 2004). Heterogeneous focus group discussions can be conducted with different groups of participants that range from Elders, intermediate-aged adults, and youth (Patton, 2002). Social Network Analysis has been used in many studies (e.g. Fulcher *et al*. 2013, Nooy *et al*. 2005, Huisman and Snijders, 2003, Huisman and Van Duijn, 2005) to elucidate relationships among people and to show how and with whom they communicate. Commonly encountered SNA software tools include UCINET, Pajek, and so on (Fulcher *et al*. 2013). In addition, many of these researchers have used focus group discussions to examine the social and communication networks. Net-map is an interactive model that allowed participants to interact with one another easily in a tension-free environment and in a culturally appropriate manner (Schiffer, 2011). As a result, Net-map was the tool that I used to facilitate these SNA exercises, in that it has been designed to allow participants in focus group settings to engage with one another in their discussions around communication and social networks. The use of Net-map enhances participants' definitions and evaluations of major links around their modes of communication and the emerging network systems (Borgatti *et al*. 2002, Schifer, 2011).

In addition, the process of net-mapping required that each participant represent themselves on the net-map sheet, with an identification point, differentiated with an object, or a coloured marker. After such identity has been well established, communication links were drawn from one participant to another on the net-map charts. In this case, the communication links were drawn with the use of markers/tempo (Figure 1). For the purpose of clarity, these connecting links were differentiated according to dissimilar colours. In this case, the specific colours denotations used were as follows:

i). All the orange colours/ markers/links were represented by the communication that was done through telephone calls.

ii). All the blue colours/markers/links were represented by the communication that was done in person, or as face-to-face interactions.

iii). All the green colours/ markers/links were represented by the communication that was done via texting (SMS/text messaging).

iv). All the yellow colours/markers/links were represented by the communication that was done through Facebook.

In addition, participants' positions on the net-map sheets were clarified to avoid possible confusion that may result from several clusters of links and markers. This differentiation of identical points was achieved through the use of post-it note/stickers. The post-it note/stickers were used in their various shades of colour, to represent participants according to age, specific tool used in communication, and subject of conversations. Furthermore, each colour-shade, link, marker, as

well as the post-it note/sticker stood out on the net-map sheets, consequently allowing the social network mapping to be executed. In this scenario, each post-it note/sticker denotes each participant as follows:

i). All the pink coloured post-it note/stickers represented the Elders on the net-map charts.

ii). All the orange coloured post-it note/stickers represented the Intermediate-aged group of participants.

iii). All the green coloured post-it note/stickers represented the youths/students in the group.

Therefore, each colour meant someone was specifically communicating with another. In addition, the colours depict the kinds of relationship that exists among the participants in the social and communication network. The net-mapping was conducted in a participatory and open ended way such that participants were able to point out who they talk to within their networks most especially their discussion groups. They identified who and who they have been communicating with over the years regarding wildlife and environmental risk. Furthermore, participants were able to express themselves freely in the net-mapping meeting. An audio recording device was used to capture their viewpoints around risk and the use of NSM to communicate in the event of risk outbreak.

The process of documenting risk resulted in a detailed transcription of all these data. Spread-sheets were made based on occurrence of certain repeated words. These words were useful in identifying emerging themes from the data. Those

themes that resonated with risk and communication around risk issues were documented separately. Participants were asked questions about the types of communication media that they used within their communities. Their responses were coded as yes (Y) or no (N). Media types that were coded included: (i) face-to-face talk (TK), (ii) telephone calls (PH), (iii) SMS/text messages (TXT), (iv) Facebook (FB) and (v) Twitter (TW). A qualitative software for theme identification known as Net-Map was used in order to map these communication networks (Borgatti *et al*. 2002, Schifer, 2011).

The reason for the net-map was to generate the social and communication networks that exist in Indigenous communities studied. I was interested in mapping the patterns of communication and the devices used in communication because I wanted to know who talks to whom around risk. What are their possible responses to risk messages? What is the relevance of participants' social networks in the event of risk outbreak? I was interested in knowing who these participants would contact within their social networks in cases of emergency. Also, how will such a relationship influence risk management? In addition, I wanted to know the principal actors in risk control and mitigation in Indigenous communities. For example, if a participant found a dug-out, oil spill or experiences pesticides spray in their environment; who will they contact first? And who will their contact in turn, reach out to?

Furthermore, I was interested in how Indigenous communities use the new social media, what are the tools or devices used in communication around risk outbreak in these communities and how effective are these tools or devices in risk

communication and preparedness? I wanted to know how participants use these tools to communicate regarding risks relating to environmental, human and wildlife health? I wanted to know the frequency of use of the new social media as a communication tool. For example, how many times/week did a participant use a certain communication tool? Perhaps, once or twice/month, or less, and the like. Also, how regularly do participants use their phones and for what purpose? Do they always talk in person or on the phone regularly, or they use Short Message Service (SMS)/text? Do they use the Internet (computer), Internet (phone), Facebook and Twitter in order to communicate? In addition, I wanted to understand what barriers or limitations exist to participants' use of the new social media. What are the things that get lost through communication via new social media compared to other forms of communication? How useful might the new social media be in communicating risks associated with human health and wildlife health? Through these questions, I wanted to understand and generate solutions to communication crisis in these Indigenous communities.

Furthermore, during the net-mapping meeting, I watched and listened to all the discussion, and audio-recorded everything the participants said. Some of the major themes of the questionnaire used as a tool for generating answers were highlighted as: the specific communication tools or devices participants use, the specific recipients of the message communicated, the relationship with the recipient, the proximity within each participant's social network, the reason for contacting recipients, the message or subject matter of communication, the frequency of use of new social media, and the possible response to risk outbreak.

3.8 Data interpretation

3.8.1 Data interpretation- phase one of the study

3.8.2 Interviews

In this study, the data analysis was done sequentially. The data generated from all audio recorded interviews were transcribed and the themes that resonated in the data were categorized and summarized into Tables 4.1 to Table 4.12. I made spreadsheets and evaluated the transcriptions according to emergent themes (McCormick *et al*. 2006). I listened to the audio transcriptions repeatedly before and after transcriptions. I developed memos from my field observations, journals, and notes.

In addition, in order to make a sense of the data, I used coding to define, differentiate and categorize the data according to groups of emerging themes. In qualitative research, the process of analysis entails data coding which is a categorizing strategy of looking for the similarities and differences and generally sorting the data for meaning (Maxwell, 2012). Having grouped the data, I compared them. I started at the beginning of the notes and engaged in comparing and contrasting the antecedents and consequences. Therefore, I was able to achieve meaningful conclusions through concept formation.

Furthermore, during the phase one of the study, a culture camp-out was held in the Alberta based-Indigenous community (Alexis community). Participants who attended the culture camp-out included community members, Indigenous Elders, government representatives, Industrial experts, and scientists. The intent of this

culture camp-out was to bring all stakeholders together in a round table discussion concerning risks confronting the Indigenous communities. As a result, there were discussions around sources of risk, protocols to consent acquisitions, risk control and management. Furthermore, some of the themes that resonated from the phase one interviews were coded and categorized.

3.9 *Data interpretation –phase two of the study*

During the phase two of the study, data generated were derived through Focus Group Discussion (FGD) and Net-mapping**.**

3.9.1 Focus group discussions

The outcomes of the two homogenous FGDs were grouped and combined together basically because of the similarities in the demography of the participants (youths and students). In addition, in order to elucidate additional information that may not have been accessible if each homogenous focus group with the youths and students was analyzed separately, I combined the outcome of the two homogenous FGDs. Conversational analysis suggests that participants' words contain underlying meaning (McCormick *et al.* 2006). All audio recorded discussions were transcribed. The data was coded to derive common ideas and themes that resonate through the data.

According to Maxwell (2012), coding entails application of pre-established set of categories to the data according to explicit, unambiguous rules in accordance with

the primary goal of generating frequency counts of the items in each category. The purpose is not merely to count things, but to "fracture" and reorganize the data into categories that facilitate comparison between things in similar category, which enhances development of theoretical concepts. The themes that emerged were categorized and structured for meaning.

Furthermore, in the process of documenting the existing risk communication, the roles of youths in risk communication among Indigenous communities became obvious. These roles emerged from the two homogenous FGDs conducted during the phase two of the study. The culture camp-out was instrumental to the peer-mentoring and cordial relationships that were important among youths. This is indescribable because there was amelioration of rivalry, understanding of risk, appreciation of values, and identification of the roles.

Further, in an inductive attempt to capture insights, I read the data all over again, re-examined them for specific important segments and information. For example, in order to estimate frequencies, I counted the number of mentions of related words and relevant themes such as ceremony, casino, cultural event, workshop, drive, work, singing, land, gatherings, town, highway, tradition, dance, drum, crisis, and the like. In addition, in order to do justice to the data, I focused on identifying segments and units, based on my prior understanding and idea of what might be important and more relevant to this study. Also, I re-examined the themes in order to have a holistic perspective of the roles that the youth play in risk communication within their communities. In addition, I critically reviewed the data for possible inherent uniqueness of the two homogenous groups. As a

result, I was able to see those slight differences that might be necessary for drawing conclusions. As a result, the hidden subtle differences became germane in interpreting the implied meanings of the data. In addition, by comparing and contrasting the data, I was able to re-examine and draw my conclusions.

Moreover, I compared the emergent themes for connections between the crisis, the concerns, and the source of the risk as well as the roles of youth in the communication crisis. I examined the data for linkages in terms of relationships in order to understand and interpret the reactions of youths to risk and what this might imply. I recognized the connections between what I observed in the field, and what participants said in specific situations, with specific actions or reactions. I understood in retrospect, the events and the activities that happened in the course of the field work.

As a result, I made a theme versus data matrix for description of substantive categories. This enabled clarity of description of participants' concepts and beliefs. I designed the columns and rows on Excel spreadsheets. The columns contained the names of participants and their specific communities. The rows contain participants' name abbreviations, the themes, related ideas, and so on. After filling out the cells, there were some empty cells which implied that some participants did not exemplify or address a certain theme or idea. As a result, I was able to visually see the result of the analysis and modify my conclusion accordingly. In order to physically "weed out" the irrelevancies and separate the data bearing roles and responsibilities from other data with themes such as communication tools, networks, and risk, and so on, I re-examined and compared

the categories basically for the purpose of sorting the descriptive data. As a result, I derived section headings with which I presented my discussions, results and conclusions. Owing to the fact that these section headings were in line with the data I already categorized, they made sense and did not inherently imply a different abstractive theory.

CHAPTER IV: FINDINGS

The findings of this study were presented to the partnering Indigenous communities through a feedback meeting. Research participants examined the results, clarified the outcomes with questions. The outcomes were considered acceptable.

Table 4.1: Indigenous communities and understanding of risk, signals of hazards and indicators of a healthy environment

Indigenous Community	Specific source of Hazards	Risk communication channels	Agencies contacted previously	Specific impacts on environment	The most vulnerable
Keeseekoose	Pesticides, waste dumping, equipment noise disturbance	Face-to-face, visitation, phone, Facebook, Tweeter, poster	Government, Agricultural agents, farmers, environmental Agencies	Air & water quality, deforestation	Wildlife, Children, youths, middle-aged adults, seniors,
Cote	Pesticides, waste dumping, equipment noise disturbance,	Face-to-face, visitation, phone, Facebook, Tweeter, poster	Government, Agricultural agents, farmers, environmental Agencies	Air & water quality, deforestation	Wildlife, Children, youths, middle-aged adults, seniors,
Alexis	Oil spills, chemical spray, Industrial equipment noise disturbance, Waste dumping	Face-to-face, visitation, phone, Facebook, Tweeter, poster	Government, Agricultural agents, farmers, environmental Agencies	Decline in Moose, deer populations, ducks migration,	Wildlife, Children, youths, middle-aged adults, seniors,

In Table 4.1 above, I attempted to capture the Indigenous communities' understanding of risk, signals of hazards and the indicators of a healthy environment. It is clearly evident from the Table above that the specific source of hazards in Keeseekoose and Cote First Nations communities are: pesticides, waste dumping, and equipment noise disturbance. In Alexis First Nations community, the specific sources of hazards are: oil spills, chemical spray, Industrial equipment noise disturbance, and waste dumping. From the Table above, the risk communication channels in these Indigenous communities were: Face-to-face conversation, visitation, phone, Facebook, Twitter, and poster. In addition, the Table showed that in the past, the agencies that the three Indigenous communities have contacted concerning the hazards encountered in their environment were the Government agencies, agricultural agencies, environmental agencies, and the agricultural farmers. Table 4.1 above evidently captured the specific impacts of the hazards on the environment. The Table also showed the impacts as follows: deforestation, poor air and water quality. As a result, the most vulnerable organisms in these Indigenous communities are the wildlife, children, the youths, the intermediate-aged, the adults, and the seniors.

Table 4.2: Traditional diets, food sources and their uses

	---First Nations sources of traditional foods and their significance---					
Availability based on Community	Wildlife Types	Traditional Uses	Food diet Supply	Plants	Benefits	Environmental benefits
Cote, Alexis, Keeseekoose	Bears	Sacred animal	Source of protein. Yet it is rarely consumed	Dry spruce	Medicinal, food plant	Windbreaks
Cote, Alexis, Keeseekoose	Ducks/ Geese	ceremonies, traditional feasts, food, tie and dyes gifts, drums, leathers, feathers, hides	High level of Protein	Sweet grass	Healthy lifestyle from quality food source	Aesthetics, tourism & arts
Cote, Alexis, Keeseekoose	Fishes	ceremonies, traditional feasts, food, gifts, drums, leathers, feathers, hides, tie and dyes	High level of Protein	Cedar	Healthy lifestyle from quality food source	Aesthetics, tourism & arts
Cote, Alexis, Keeseekoose	Rabbits/ Muskrats/ Squirrels	ceremonies, traditional feasts, food, gifts, drums, leathers, feathers, hides, tie and dyes	High level of Protein	Rat roots	Healthy lifestyle from quality food source	Aesthetics, tourism & arts
Cote, Alexis, Keeseekoose	Bees	ceremonies, traditional feasts, food, gifts, drums, leathers, feathers, hides, tie and dyes	High level of Protein	-	Honey, Medicinal effects, healing properties, healthy lifestyle	Aesthetics, tourism & arts

In Table 4.2 above, I attempted to capture the First Nations sources of traditional foods and their significance. The type of wildlife available in each Indigenous

community was highlighted. All the three Indigenous communities experience the presence of bears, ducks/geese, fishes, rabbits, muskrats, squirrels, and bees. In addition, Table 4.2 above evidently showed that wildlife are used for the following traditional purposes: ceremonies, traditional feasts, food, making of tie and dyes, given as gifts, used in making drums, leather, feathers, and the hides are used as clothing materials. Table 4.2 above also showed that high levels of protein are derived from the wild meat because they serve as a very rich source of food supply. It was evidently captured in Table 4.2 above that honey derived from Bees have healing properties, and it has medicinal effects which help the metabolism of the body. Furthermore, the environmental benefits of plants in Indigenous communities serve as windbreaks, aesthetics, tourism and arts. Overall, these traditional diets bring healthy lifestyle to the Indigenous people.

Table 4.3: Types and impact of risk in Alexis Community

Type of risk Identified & sources	**Impacts on Wildlife**	**Impacts on humans**	**Impact On environment**	**Other socio-political & economic Concerns**
Chemical spills from Oil & gas industries	water pollution	Poor air Quality	Deforestation	Language loss
Dugouts by Oil & gas industries	Air pollution	Poor water Quality	Scarcity in wildlife	Loss of Treaty rights
-	Cysts on wild meat	Food insecurity	Ecosystem destabilization	Psychological impact
-	Disease	Medicinal herbs and plant Species extinction	Waste dumping On community	Anti-Indigenous Government policies
-	Wildlife killings count for trophies	Access to traditional foods	Chemical waste seepage & leaks into water tables	Hunting rights & hunting license
-	Palsy	Sickness	Increased toxicity Levels	Industrial actions despite lack of consent from Consultation
-	Diminishing population of wildlife	Safety in wild-meat consumptio n	Noise disturbance from big loud equipment & machines	Poor housing system
-	Wildlife Poaching	Food Poisoning	Dumping of chemical wastes	Wildlife poaching
-	Safety of Wildlife	hunting out of season by Non-Native Hunters	Accumulated levels of chemical toxicity	Competition with Non-First Nations hunters for games
-	Frightening & scare away of wildlife	Inconsistent traditional practices & ceremonial breach	Industrial Actions despite lack of consent from Consultation	farming of wild animals
-	Misuse & wastage of wildlife	Inadequate Healing therapy	Polluted water bodies, e.g. creeks, slews, etc.	Degree of Travel distance to access Game
-	Dumping of Carcasses	Unemploy ment	-	wild animals as sports
-	Selling of Antlers	-	-	Exporting & selling of wild animals
-	-	-	-	Police ignoring phone calls from the community
-	-	-	-	Accidental killings from speeding through community

In Table 4.3 above, I attempted to capture the types of risk, their sources and effects on Alexis First Nations community. It can be evidently seen from the Table above that the specific source of risk in Alexis First Nations community is the presence of oil and gas industries. The type of risks and concerns identified by participants from Alexis First Nations community are chemical spills and dugouts. In addition, the impact of these risks on wildlife are noticeable in the form of cysts on wild meat, presence of diseases like palsy, and the decline of wildlife population. Table 4.3 above evidently captured water pollution and air pollution as environmental impact on humans and wildlife.

As a result of the continuous killing of wildlife for leisure and trophies, the population of wildlife continues to decrease. There is reduction in the level of safety of wildlife, due to poaching, and frightening of wildlife by noise from the operations of industrial equipment. The misuse and wastage of wildlife, through dumping of carcasses, selling of antlers also pose a threat to the environment. Other effects of risks in Alexis First Nations community are socio-political and economic. These include concerns over Indigenous language loss, loss of Treaty rights, psychological impact, anti-Indigenous Government policies, loss of hunting rights and enforcement of hunting licenses. There is an unfair competition with Non-First Nations hunters for games on Indigenous lands, there is poor housing system, the farming of wild animals, the degree of travel distance hunters have to embark upon before they can have access to wildlife, exportation of wild animals, industrial actions despite lack of consent after consultation.

Table 4.4: Types and impact of risks on Cote community

Type of risk Identified & sources	Impacts on Wildlife	Impact on humans	Impact On environment	Other socio-political & economic Concerns
Pesticides Spray by Agric Industries	Habitat loss	Diseases	Deforestation	Language loss
Dugouts by Industries	Diminishing population of wildlife	Lack of access to traditional foods	Ecosystem destabilization	Poor housing system
Genetically modified organisms (GMO seeds) by Agric Industries	Decline of wildlife natural habitat	Traditional food insecurity	Scarcity in wildlife	Loss of Treaty rights
-	Disease, Cyst on wild meat	Medicinal herbs and plant Species extinction	Waste dumping on community	Psychological impact
-	Wildlife killings count for trophies	Sickness	Chemical waste seepage & leaks into water-tables	Hunting rights & hunting license
-	Palsy	Safety in wild-meat consumption	Increased Toxicity levels	Industrial actions despite lack of consent from Consultation
-	Wildlife depopulation	Food poisoning	Noise disturbance from big loud equipment & machines	Anti-Indigenous Government policies
-	Safety of wildlife	Inconsistent traditional practices & ceremonial breach	Accumulated levels of chemical toxicity	Exporting & selling of wild animals
-	Frightening & scare away of wildlife	Inadequate healing therapy	Industrial actions despite lack of consent from Consultation	farming of wild animals
-	Misuse & wastage of wildlife	unemployment	-	Competition with non-First Nations hunters for games
-	Dumping of carcasses	hunting out of season by non-Native hunters	-	Degree of Travel distance to access Wildlife
-	Diseases	Wildlife poaching and wild animals as sports	-	Accidental killings from speeding through community
-	-	-	-	Police ignoring phone calls from the Community

Table 4.5: Types and impact of risks in Keeseekoose community

Type of risk Identified & sources	**Impact on wildlife**	**Impact on humans**	**Impact On environment**	**Other socio-political & economic Concerns**
Pesticides Spray by Agricultural Industries	Habitat loss	Food insecurity	Deforestation	Language loss
Dugouts Industries	Cyst on wild meat	Medicinal herbs and plant Species extinction	Scarcity in Wildlife	Loss of Treaty rights
Genetically modified organisms (GMO seeds) by Agric Industries	Decline of wildlife natural habitat	Lack of access to traditional foods	Ecosystem destabilization	Psychological impact
-	Diseases	Sickness	Waste dumping on community	Hunting rights & hunting license
-	Palsy	Disease	Increased Toxicity levels	Industrial actions despite lack of consent from Consultation
-	Wildlife depopulation	Safety in wild-meat consumption	Noise disturbance from big loud equipments & machines	Haphazard hunting
-	Safety of wildlife	Food poisoning	Accumulated levels of chemical toxicity	Anti-Indigenous Government policies
-	Frightening & scare away of wildlife	Inconsistent traditional practices & ceremonial breach	Industrial actions despite lack of consent from consultation	Poor housing system
-	Misuse & wastage of wildlife	Inadequate healing therapy	-	wild animals as sports
-	Dumping of carcasses	unemployment	-	Wildlife poaching
-	wildlife killings count for trophies	hunting out of season by Non-Native hunters	-	Competition with Non-First Nations hunters for games.
-	Tumors on wildlife skins	-	-	farming of wild animals
-	Rottenness in fresh fishes	-	-	Degree of Travel distance to access game
-	-	-	-	Exporting & selling of wild animals
-	-	-	-	Police ignoring phone calls from community
-	-	-	-	Accidental killings from speeding through community

In both Tables 4.4 and 4.5 above, I captured the types, sources and impact of risks in Cote and Keeseekoose First Nations communities as similar. The Tables evidently showed that pesticides spray and dugouts are the major risks identified. The specific source of the risk has been identified as the presence of agricultural industries. The effects of the risk on wildlife are habitat loss, presence of cysts and tumors on the skin of wildlife, and diseases like palsy. Other concerns highlighted in the Tables as observed by the participants from the Indigenous communities of Cote and Keeseekoose are Wildlife poaching, lack of safety of wildlife, tendencies of frightening wildlife due to the noise from operations of agricultural equipment, dumping of the carcasses of wildlife, and indiscriminate killings for trophies and leisure purpose. The impact of risks on humans is food insecurity due to discovery of rottenness in the freshly harvested fishes rendering them unsafe for consumption.

In addition, in these Tables, I captured other effects on humans as: scarcity of plants for medicinal herbal purposes, extinction of important plant species, lack of access to traditional foods, sicknesses, diseases, fear of food poisoning from consumption of unhealthy wild meat, inconsistent traditional practices and ceremonial breach due to inadequate wildlife, lack of materials for healing therapy, unemployment for Native hunters due to indiscriminate hunting during out of season by Non-Native hunters.

Table 4.6: Gender of participants in individual interviews

First Nations community	Male	Female	Total
Cote	22	5	27
Keeseekoose	12	19	31
Alexis	16	4	20
Total	50	28	78

The demographic characteristics of the respondents in the three First Nations communities are presented in Table 4.6 above. The Table above attempted to capture phase one of the study with the demographics of the participants interviewed according to their gender and their specific communities. The participants comprised mostly of males than females, except in Keeseekoose. The difference was due in part to accessibility and quicker rapport easily established among the male gender as compared to the reserved nature of the women and the conservative culture of interactions existing in these communities, especially with outsiders.

Results showed that in Cote and Alexis, majority of the respondents were males, suggesting that more men participated in this study in these communities. The men participated more in hunting exercise. Therefore, they are sensitive to risk associated with wildlife. This is due in part to cultural influences on hunting exercise. This activity tends to preclude women. However, in Keeseekoose more females participated in this study owing to the fact that my community liaison (Mrs Helen Cote), being a female naturally influenced higher percentage of women toward the study than men. In addition, the higher number of females in

Keeseekoose suggests that they were more accessible during the course of the study than males.

Table 4.7: Internet Access in Alexis, Cote and Keeseekoose

				Access to Internet		No Internet Access	
Indigenous Community	Male	Female	Total Participants	Men	Women	Men	Women
Cote	22	5	27	16	2	6	3
Keeseekoose	13	19	32	4	10	9	9
Alexis	16	4	20	11	1	5	3
Total	51	28	79	31	13	20	15

In Table 4.7 above, I attempted to capture the degree of access to Internet according to the gender of participants in the three Indigenous communities studied. There were more people who had access to the Internet in the three communities than those who did not have access to the Internet. As a result, the degree of digital divide is minimal in these three Indigenous communities. In addition, Table 4.7 above showed that the degree of digital divide among the First Nations communities in this study was based on the affordability of the communication device which participants use in accessing the Internet. Furthermore, relationships between participants influence accessibility to the internet, especially in situations where participants access the Internet from their neighbors' houses, from school or from their workplaces.

Table 4.8: Reasons for accessing the New Social Media

	Online Socialization		Acculturation & cultural purposes		Hunting & Wildlife Picture	
Indigenous Community	Male	Female	Male	Female	Male	Female
Alexis	5	7	2	3	2	0
Cote	8	10	3	1	2	0
Keeseekoose	5	8	2	4	2	0
Total	18	25	7	8	6	0

The reason why NSM is used in all the three Indigenous communities is presented in Table 4.8 above. The basic reasons highlighted according to the order of importance were: online socialization, acculturation and cultural purposes, as well as posting of hunting and wildlife pictures. Based on the number of counts of participants according to their gender, the female gender did not post pictures of wildlife on the NSM. This is because culturally, most women do not participate in the hunting exercise as men. This supports the fact that hunting is basically a man's vocation (i.e. number of males communicating around hunting and wildlife via NSM = 6, and female = 0). In addition, comparison of the users of NSM as the medium of socialization from the Table above showed that there were higher numbers of females compared to the males. (i.e. no. of males =18, no. of female =25).

Table 4.9: Reasons for using cell phone

Indigenous community	Family & friends		On community issues with band office & Govt. officials		Preparedness in the event of risk outbreak	
	Male	Female	Male	Female	Male	Female
Alexis	16	4	2	3	16	4
Keeseekoose	12	19	3	4	12	19
Cote	22	5	2	3	22	5
Total	50	28	7	10	50	28

In Table 4.9 above, I showed the reason why participants use cell phones in communication within the Indigenous communities studied. The major reasons highlighted were for communicating with family and friends, discussions on community issues with Band office, government officials, as well as preparedness in the event of risk outbreak. The readiness to deploy cell phone in the event of risk outbreak helps in cases of pesticides spray, chemical spills, disease outbreak such as CWD, and other forms of risk outbreak.

Table 4.10: Facebook users in Indigenous communities

	Internet	Accessibility		Total
Indigenous Community	Have access to Internet	No Access to Facebook account	Access to Facebook account	Total number of participants Interviewed
Alexis	12	1	11	20
Cote	18	2	16	27
Keeseekoose	13	3	10	32
Total	43	6	37	79

In Table 4.10 above, I showed accessibility to Facebook according to users and non-users among the participants interviewed in the Indigenous communities studied. More participants have Facebook accounts and they access it in these three Indigenous communities studied. From Table 4.10 above, Cote First Nations community have more Facebook users (i.e. 16 Facebook users) than Alexis (11 Facebook users) and Keeseekoose (10 Facebook users).

Table 4.11: How Facebook is used in Indigenous communities

Indigenous communities	What participants do on Facebook	Frequencies on Facebook website
Alexis	Talk to family and friends, Information sharing	Daily-to-weekly appearance on Facebook
Cote	Information sharing, notification around upcoming events, promote cultural events like *pow-wows, round-dance*	Daily-to-weekly appearance on Facebook
Keeseekoose	Information sharing, notification around upcoming events, promote cultural events like *pow-wows, round-dance*	Daily-to-weekly appearance on Facebook

In Table 4.11 above, I attempted to capture how Facebook is used and the rate of use by participants in the Indigenous communities studied. In Table 4.11 above, I showed how the three Indigenous communities have information sharing as a common exercise. Cote and Keeseekoose First Nations communities go on Facebook to share information, notify one another around upcoming events, promote cultural events like *pow-wows, round-dance*. While in the Alexis First Nations community, besides information sharing, participants also talk to their family members and their friends through Facebook.

Table 4.12: Characterizing the roles of youths around risk communication

Serial number	Roles	Attributes
1.	Knowledge transmitters/ (Knowledge Broadcasters)	These are youths who communicate on and advocate for social justice and environmental issues online in order to draw attention to what is happening in their communities (Boscha, 2014).
2.	Knowledge mobilizers/ (Knowledge workers).	These are culture preservers. Some are Elders-in-training. They may erect lodges, teepees, etc for use in cultural ceremonies. These youths engage in transferring knowledge learned from Elders regarding the traditions to peers (Bowie, 2013, Tsethlikai and Rogoff, 2013).
3.	Knowledge interpreters	These are mediators between outside stakeholders and the communities. They act as cultural liaisons who understand the Indigenous language as well as scientific jargons (Miklavcic and LeBlanc, 2014).
4.	Traditional celebrators	Celebrators actively participate in cultural ceremonies. They pass on their cultural heritage to others within their communities (Coward, 2012)
5.	Traditional providers	These are the hunters, gatherers, medicine pickers, craftsmen, etc. The community looks to them for provisions, help and the supplies for ceremonies (Severance, 2014).

In Table 4.12 above, I showed the roles of Indigenous youth in their communities. The outcomes of the FGD were coded and the emergent themes relating to roles and responsibilities were categorized as follows: knowledge transmitters

(knowledge broadcasters), knowledge mobilizers (knowledge workers), knowledge interpreters, traditional celebrators, and traditional providers.

4.1 Net-mapping

The results of the two heterogeneous FGDs conducted as a Net-Mapping were combined in order to elucidate additional information that may not have been accessible if each was analyzed separately. Combining the two heterogeneous focus group discussions gave a holistic and panoramic view of what the communication patterns looked like in the communities. This framed the foundation for my reflections, results and conclusion. I started the interpretation of the net-mapping data by making transcriptions of all the audio recordings from the two heterogeneous focus group discussions conducted. I identified the emergent themes which addressed the importance of communication. I generated Excel spreadsheets from the transcriptions and the net-map sheets. The participants' media of communication were identified and abbreviated as follows: (i) talking /face to face conversation, (TK) (ii) telephone calls (PH), (iii) text messages/SMS (TXT/SMS), (iv) Facebook (FB) and (v) Twitter (TW). In addition, the communication between participants were recognized and grouped accordingly. The messages communicated were grouped according to the specific recipients as: Q1, Q2, Q3, Q4, and so on. In this case, Q1 was communication/message exchanged with family members, Q2 communication/message exchanged with friends, Q3 communication/message exchanged with community members, Q4 communication/message exchanged

with Indigenous Elders, Q5 communication/message exchanged with government agencies and Q6 communication/message exchanged with Industry. Furthermore, the Net-map sheets were transferred into Excel spreadsheets. The cells of the spreadsheets were filled with data from the questionnaires specifically designed for this net-mapping meeting (Appendix I). Having filled out the spreadsheets according to rows and columns, I reorganized and sorted the data for further analysis. Furthermore, having grouped the communication according to the recipients, I further regrouped them according to the tools or device participants used in delivering the message. In this case, *FB.fm* means communication done via Facebook with family members. *TW.fm* means communication done via Tweeter with family members. *TK.fri* means communication done via face to face or talk in person. *Ph.fri* means communication done through text message with friends, and the like. The names of communication tools/device were abbreviated and loaded into the columns. All participants' names were arranged in the rows of the Excel spreadsheets. Furthermore, I used the UCINET software to run the analysis of the data generated from the net-mapping meeting in Cote community. The UCINET software has been designed to suit social network analysis (Borgatti *et al*. 2002). Having developed the Excel spreadsheets, I transferred the data on the Excel spreadsheets onto UCINET. This was done by importing the spreadsheets containing the data into the UCINET software. Once transfer was completed, the data which was initially on the Excel spreadsheets was now successfully imported onto the UCINET software. The UCINET immediately auto-generated the spreadsheets with features or icons for query.

Then, I queried the UCINET for the result of the analysis. The charts that were generated by UCINET showed the communication patterns among participants (UCINET charts in Figures 3 and 4). These charts revealed who would talk to whom in an event of risk outbreak in the communities. Furthermore, who the participants communicate with was also recognized from the chart generated by the UCINET software. The relationships of the social networks with respect to the media of communication as well as the links that connected the participants were seen in the chart that emerged from the UCINET software. Furthermore, the charts and the spreadsheets developed from the net-mapping meeting gave insight into the data. In addition, the frequencies of use of the communication tools were evident from the net-map sheets derived from the net-mapping meeting. As a result, the analysis gave clarity enough to make sense of the data. In addition, the emergent themes from the coded and categorized data gave insight into the data. In addition, themes relating to communication gave information on the purpose, the persons and the place of communication.

The relationship between participants and the effectiveness of the device used as tool of communication was recognized in the themes. Furthermore, I identified the social network influencers based on the insights drawn from the net-map sheets derived from the net-mapping meeting. The measure of the levels of influence of all participants within their social network was recognized as well as the principal actors inside and outside the community. In this case the higher the influence tower of participants the greater the influence of that particular individual in the network (Figure 1).

Figure 1: Group 1 & 2 Net-Mapping session conducted in Keeseekoose on January 23, 2012 showing participants in each group.

Data derived from the net-maps showed that participants use NSM tools, especially Facebook and text messaging in communicating within their social network. Links were drawn on the net-map based on who participants communicate with. These links were identified with arrows pointing towards each participant's influence towers (the net-map charts in Figure 1). In the net-map, the chains/links were the directions of communication based on who spoke to whom?

The frequencies of communication were coded based on the degrees of interaction. This degree of interaction showed one of the common evolving themes that was identified and coded during the analysis phase. Since the focus of the net-map was to generate social networks of the community members, and identify the potential of these social networks in the event of risk outbreak, the purpose of NSM in communication was achieved. Each net-map chart revealed

who made up each participant social network. Simulation of the net-map charts from both groups revealed that the communication patterns are similar among the participants in both groups. The reason for this net-mapping is to know who talks to whom in the community. In an event of risk outbreak, who will be the first point of call? Who will a participant talk to?

The use of NSM tools in advocating for environmental justice and social justice was identified and the potential of NSM in risk communication can be seen from the UCINET charts generated. In addition, communication chains/links with respect to relationships of participants showed common evolving themes and these are: (i) in person conversation (ii) visitation and (iii) telephone conversation (Figures 3 and 4). These themes were coded during the analysis phase. In addition, data were categorized according to the networks that connected participants. The most important networks participants have in common were identified, coded and categorized as science-oriented links, culture-oriented links, industry-oriented links, government/political-oriented links, and the like.

Basic principal actors were identified as Elders, youth, environmentalists, industry representatives, and government representatives. The focus of the Net-map was to generate social networks of the community members but to do so in a participatory and discussion-based setting. The intention was to understand the nature of response of community members in the case of risk outbreaks. My interest was to know who each participant would talk to and why in the case of an emergency (i.e. a risk outbreak such as pesticides spray or oil spills) in their community. I also wanted to better understand what communication devices or

tools would be used by community members during such an outbreak or epidemic.

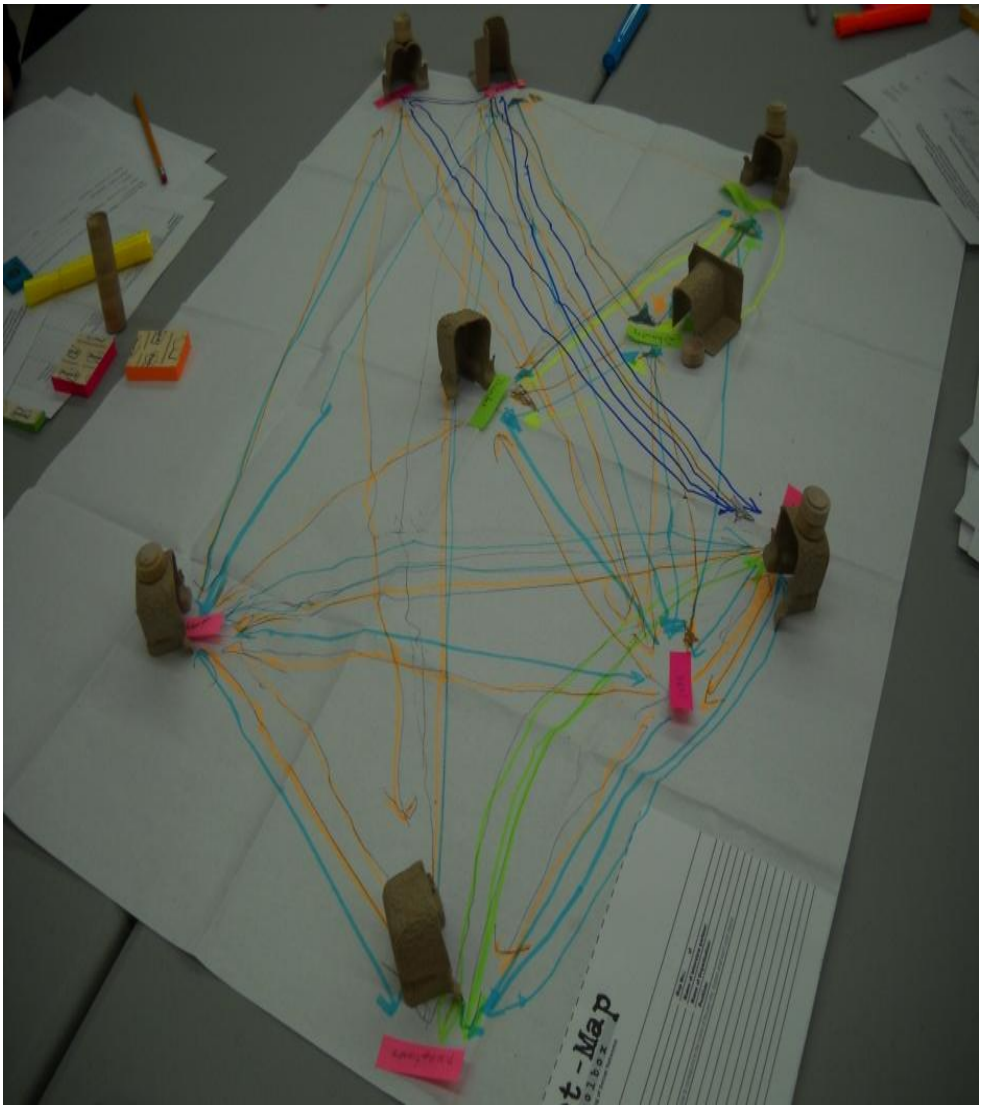

Figure 2: Figure showing Netmap sheet generated from the net-mapping meeting

The Figure above showed the net-map sheet during the net-mapping meeting. The coloured lines represented the lines of communication among participants. The

brown wooden objects represented each participant in the network. Their level of influence was reflected in the height of each participant's identification objects.

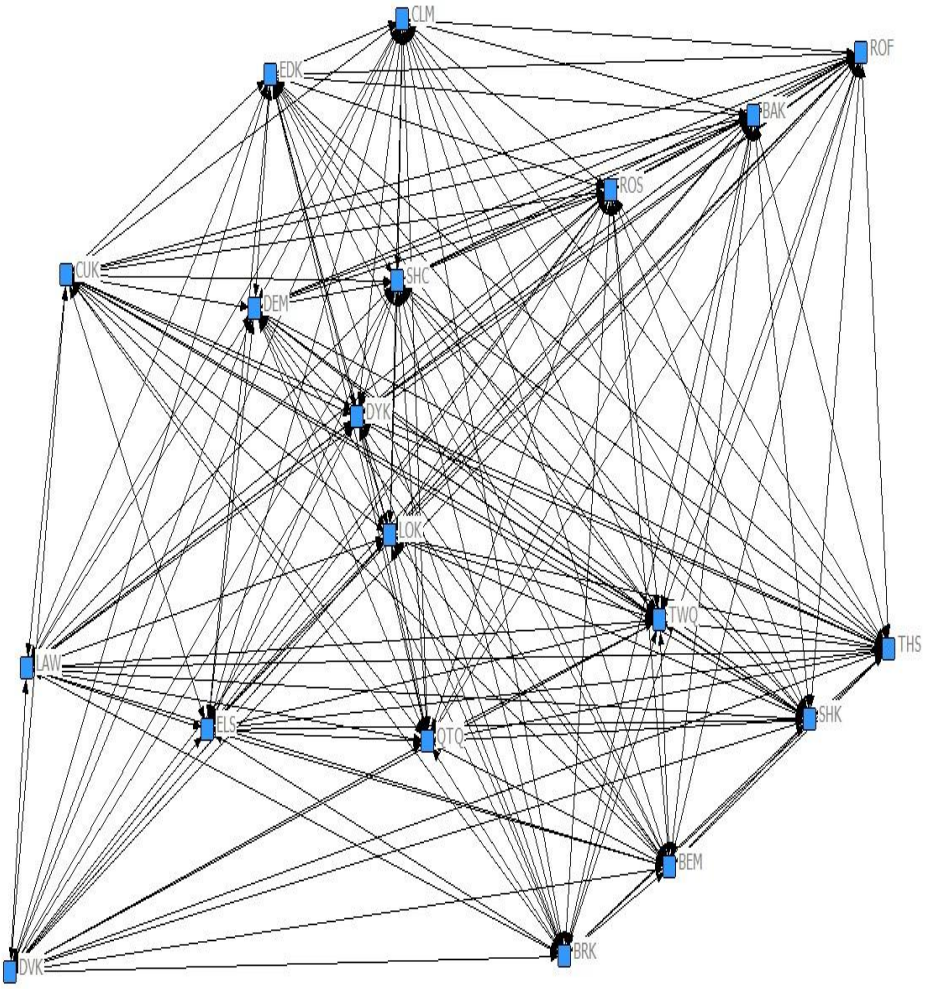

Figure 3: Net-Mapping of social and communication network patterns of participants

The Figure above showed the social and communication network of participants based on UCINET software. The name abbreviations used in the figure above, for example ROF represented Robert Flores, EDK represented Edna Kakakaway, and the like. These names and their abbreviations have been listed and defined in the Appendix IV section. In Figure three above, the participants in the net-mapping

meeting were shown as nodes. The nodes were represented by name abbreviations. Each of the abbreviations denotes participants' names and positions in the network. The nodes represent each participant and each participant was connected by links. The links symbolized communication patterns through face to face communication, telephone, text messages and the use of NSM. The figure attempted to capture the lines of communication because these communication links are vital in the event of risk outbreak such as chemical spray, oil spills in Indigenous communities. Participants specifically identified major people within their social networks as their point of contact.

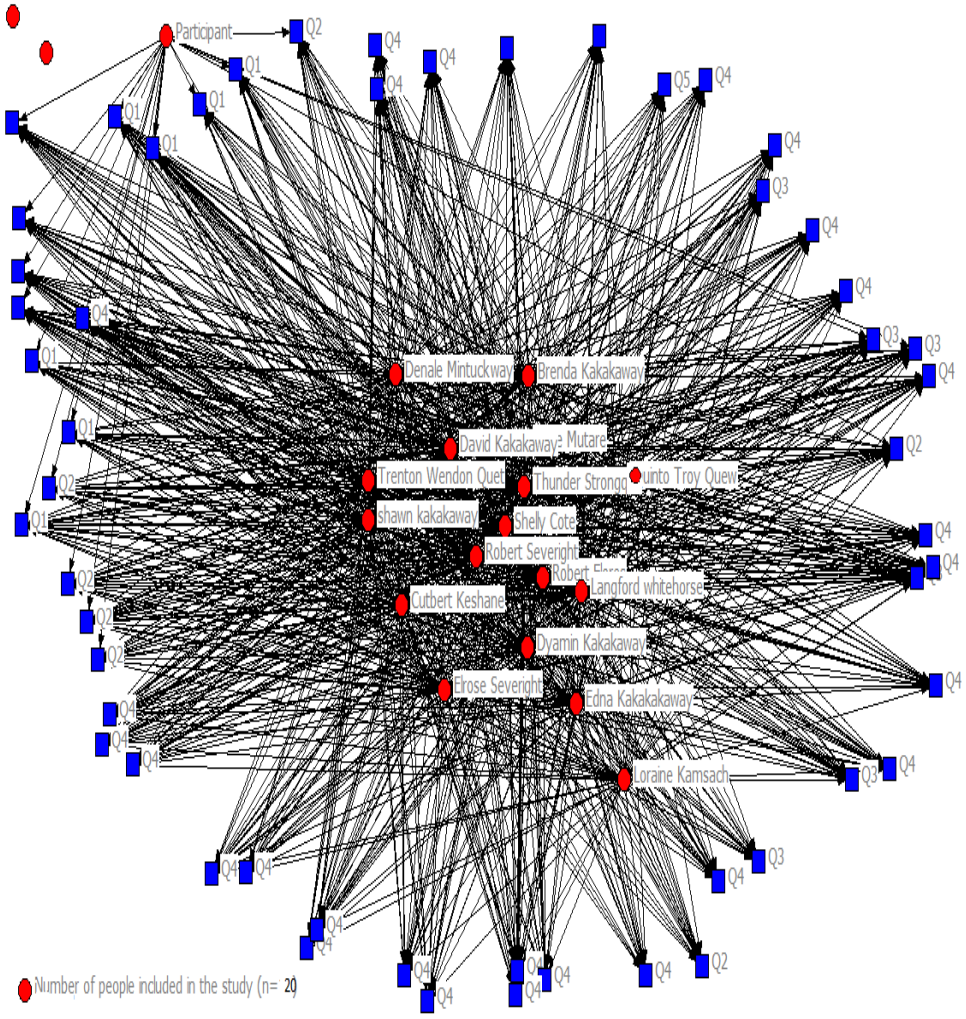

Figure 4: The UCINET generated links of social and communication network, as well as what participants talk about in their networks.

In the Figure above, communication according to recipients of messages as well as the tools or devices used were represented by the blue nodes. The red nodes represented the participants of the net-mapping meeting. The links represented by the black lines that ran in different directions denote the connections that exist between the participants and their social network (Martınez-Lopez *et al*. 2009, McKelvey and Menczer, 2013).

Furthermore, results showed that semi-structured interviews with participants gave ample opportunity for free communication around risk regarding their communities and the regions in which they live. Relevant problems/issues raised in the three Indigenous communities studied were documented and the result showed that major risk included oil spills; pesticides sprayed, and waste dumping. The emerging themes from the study were:

- relationship between Government and the First Nations communities,
- Treaty rights, sources of noise disturbance, presence of industries,
- poaching,
- tourism,
- travel passes before leaving community,
- unemployment,
- human healing therapy,
- cultural ceremonies,
- give-away at ceremonies,
- competition with Non-Indigenous hunters for wild games,
- reasons for hunting,
- hunting license,
- hunting for sports
- travel distance to hunting,
- specific types of wildlife available in each region,
- sources of traditional foods,
- reasons for wildlife depopulation,

- misuse of wildlife,
- wildlife as gifts,
- wildlife farming,
- capitalism and exporting of wildlife,
- abandonment and wastage of wild games,
- inappropriate preference for antlers,
- safety of wild meat consumption,
- the negative effects of these concerns on wildlife and humans,
- fear of Chronic wasting diseases, and so on.

These emerging themes were effects of post-colonialism, and these pose threats to the Indigenous culture and livelihood. On the one hand, the problem of oil spill was specifically identified by the research participants as the concern in the Alberta-based Indigenous community. On the other hand, the problem of pesticide spray was identified as the major concern in the Saskatchewan-based Indigenous communities. Risk communication channels were mainly achieved using text messages (SMS) and Facebook (FB).

Result showed that some of the existing social ties and communication networks among Indigenous communities were: science-oriented links, culture-oriented links, industry-oriented links, government-oriented links, leadership-oriented links, political-oriented links, and such like. Furthermore, based on these communication links principal actors were identified as Indigenous Elders, youth, environmentalists, industry representatives, oil and gas workers, mechanized agricultural farmers and government agencies (i.e. wildlife conservation agencies

(WCA). The outcome of the study showed that some of the problems known to have faced Indigenous communities for decades in Canada are environmental injustice, racism, and marginalization. These concerns occurred in a historical context of colonialism, which included the creation of reservations in the late 1800s and the tribulations associated with the residential school system. These effects continue till today. According to Robert Severeight, from Cote community:

"....there was a lot of abuse that went on in the [residential] boarding schools. And back in those days, the entire boarding school experience really did lot of abuse to the First Nations people. A lot of those kids who were in boarding schools were never at home to be with their own parents, in order to learn how to be a parent. And now they are having kids of their own and it's hard for them trying to be a parent because lot of them didn't learn how to be parents from home."

The aftermath of colonialism can be traced from one decade to another in how Indigenous communities have endured abuse from the desecration of their sacred lands, pollution of air and water quality, waste dumping in Indigenous communities, and many other forms of pollution. These aforementioned problems have impacted the ecology around Indigenous communities. This has led to the disruption in the wildlife's habitat. According to Robert Flores, an elder from Cote community:

"...there is so much disruption in the wildlife cycle; not only in the Northern areas, but also in the local areas of the reservation of the Cote and Keeseekoose First Nations communities. One of the main reasons why I believe there is such a disruption in the wildlife health and wellbeing is because of the agricultural farming that is done around the communities..."

The environmental disturbance caused by industry has impacted the food chain; thus creating scarcity in the supply of food, which has further led to dispersal and straying of wildlife into human territories within Indigenous communities. According to Pauline Buffalo Bullodge, an Indigenous woman who resides in Saskatchewan:

"...as a matter of fact, I was just thinking, there were some instances where the animals have been seen going into homes and places where animals should not be going. This is because the industries have pushed them out; and they are now going into places where they are not normally seen. That is why we are seeing different things happening with animals. I mean you never hear of the Cougars, too many coming out this way. But we are starting to notice these things…"

One of the major impacts of industrial operations has been reported in fish as a food source. It has been observed and reported that the negative reflection on the quality of fishes may have resulted from the change in the climatic conditions of the region which is further evident in the air and water quality. According to Vile Mustus, a woman from Alexis community:

"...well, I know about the water problems for sure. And you know other people, other sources; even the fishermen talk about the fish in the water; when they get the fish out of the water; like you know it's rotten. I have seen that. We used to go fishing here all the time before...and I won't go fishing. I love fish but I won't eat the fish out of here. So, I have seen it...I have seen how, I would try cleaning the fish; and it's next to rotten. You know what I mean? Yeah very, very soft. Even though it's fresh out of the water, yet very soft. And I don't think it matters what time of the year. When the water is warm, well the fish is not really that great I guess. But they said when it is nice and cold, there is supposed to be a better outcome but it's not the case. It is not the case. Even suckers that go, you know in creeks when they are spawning, we used to fish a lot of that. We can't do that anymore".

Besides the effects of industrial operations on air and water quality, the fish has been affected as well. Participants reported how they were bothered about this ruthless environmental degradation which is becoming life threatening to their Indigenous relatives and neighbors across western Canada. Since wildlife has been affected, Indigenous food source has also been equally affected. According to Pauline Buffalo Bull-lodge, an Indigenous woman from Saskatchewan:

"My biggest concern is what all of the pollutants are doing. The pollutants to the lands are killing a lot of the animals. For example, years ago in our country my uncle tells me that the caribou were flourishing. It was amazing, they had so many, and that was their staple; and now because of the climate changes, and I believe, the Fort McMurray's oil sands. I am pretty sure, I mean, they never had that problem, and so their staple is gone, and we don't have caribou out there anymore... So there has been a drastic change in the herd. And they are further north; there is no plenty left of it, and they have been diseased. They tell me that they can't eat because of the problems with the meat. Also, they don't eat deer. The deer hasn't been good up north in that area…"

Indigenous communities in western Canada can relate to the conditions of their relatives in northern Canada because their situations are similar. In addition, many participants said that they had observed changes in the health of wildlife occurring in their traditional territories. Wildlife health has depreciated to the extent that Indigenous hunters sometimes doubt if this wildlife is edible and useful for traditional purposes. According to Rainey Latender, an Elder from Alexis community:

"…the wildlife are getting cysts and stuff like that, like spots on them. Sometimes I don't want to take them when I hunt, but I take them anyways. It didn't bother us yet but it will likely in some time to come. Pretty soon, there's going to be no moose on the corner because they are all going to die off. All the moose don't know what to take, and they picked up

medicine too. That was what we did when we dug up those medicines that moose eat, to know more of what they used to heal themselves of the palsy and things like that. The moose we have been getting few, so far, but lately I have been shooting moose that has been getting palsy on their backs…"

While some Indigenous hunters have concerns regarding the state of health of wildlife, their Indigenous women who process and cook the wild meats for their families also have misgivings. Daisy Potts, an Elder from Alexis recognized these changes in wildlife and the environment. However, she found that communication with scientists associated in a related wildlife health study had assuaged many of the concerns that she had regarding wildlife:

"...I was really concerned with the wildlife because we have seen all kinds of cysts, things that are wrong with it, like things we didn't see normal on the meat. I'm wondering if our wildlife is sick or something. But ever since this study happened with the wildlife and they have been telling us something about the wildlife and the communities. I am less worried about it. Though they have not seen anything wrong with it yet. So far they never found anything on it. But it still bothers me, because lots of these companies still go out to do a lot of work on our traditional lands. And if they have chemical spills that you never know and I am still worried about what is going to happen to our traditional foods and the wildlife...Because that is my food. That is my way of life. I am used to the traditional diet..."

The threats to traditional diets as a result of industrial activities around Indigenous communities cannot be overemphasized. The adverse impact of industrial operations in Indigenous communities has made many rare species become extinct. Participants said that many of their traditional medicines and herbs which they were taught by their ancestors have become extinct from industrial chemical spray. As a result, the challenge to human health has increased from a reduction in the availability of biodiversity, especially plant species in Indigenous communities. Ben Potts, a youth from Alexis community says:

"…because when you spray, it possibly sprays on the medicines too, because the medicines sometimes, they lay along the roads, and they are spraying the trees, there is a certain tree out there that grows along the road and they spray that stuff on it. And the chemical is meant to kill whichever pest is based in the tree. And they spray some of that chemical on the tree and you know it makes it no good. It makes it no good…"

As a result of pesticides spray, important plants have been lost in Indigenous communities. Other participants also reported that their major source of traditional healing and therapy is threatened. The current conservation techniques seem questionable because it allows mismanagement of resources. As a result, traditional ceremonies and health management are at risk in most Indigenous communities. According to Pauline Buffalo Bull-lodge, an Indigenous woman from Saskatchewan:

"…Just recently, [my husband] He tans hide...the first time we were ever introduced to this problem, was with caged animals... I mean they have caged elk...you know because they can use the elk horns, and it is medicine. So they have made this cage marker on the elk. Well, elks are not to be caged because they are wild animals. So, now they say that we wanted the hide, but they said we have to cut the head off and send the animal away, because they have to test for some disease. I mean it was shocking to me because I thought that's crazy because they shouldn't be in a protected environment; and here we have these problems...I just found out that appalling that we can't; …men can't use the animals the way they wanted to tan, because they use the brain to tan. And if it is diseased, we can't have our traditional garments or make the drums, or whatever… because they are interested in the elk horn and they are selling it, and this elk horn has some properties of healing."

The current environmental problems in Indigenous communities call for prompt intervention. The need for urgent intervention in controlling and mitigating the risks has made the Indigenous people report many of these environmental problems to the government. Participants explained that the chemical sprayed by

the mechanized agricultural farmers impacts the health of their entire community members. Since this chemical spray is poisonous to humans and the environment, it should be reported immediately whenever it is sprayed in defiance to human health. Reporting environmental pollution can contribute to environmental justice. According to Shaw Kakakaway from Keeseekoose community:

"...I don't believe that they should be spraying the fields, due to the illnesses, I believe the respiratory, the children, the Elders, I believe that, and our throats, our foods are being contaminated. And I blame that on the sprays. And when it's an issue I believe they should call RCMP, or go to higher authorities...Because I remember when I was growing up, we didn't have that. I remember that much and then, now as I am getting older. I have children, and it's more of an issue because it's my concern. And we should just go natural with our earth instead of spraying..."

Even though Indigenous people were not heeded, they must intensify their complaints. Participants said that they were tactically turned down many times, and after waiting in hope without getting response or intervention, their hope soon became dashed out of disappointments, not just in government agencies but in Aboriginal leaders as well. According to Elder Robert Flores from Cote community:

"...I have been trying to talk to people for years about that (chemical spill/dug-out). I tried to go to the government building in Fort Carpel where there were supposed to be people who know about environmental damage, or the environment land resources , or land management, but I had a hard time really talking to the right person because they said the right people were not really available right now, or we don't have a department like that. And then, I have gone to the Federation of Saskatchewan Indian Nations (FSIN) and talked to some of their leaders about that. But they said that is a very good question, well we will have to get back to you but I never get anybody getting back to me. But I guess the

only other resource that will really put it out there if you are talking about result in putting it out there is the media..."

The relevance of the media in addressing the negligence of the government and industry concerning the plights of Indigenous people cannot be overemphasized. Even though most of the people who lodged complaints were turned back, and never allowed access to the officials in charge of decision making, there may be need for repetition of previous phone calls and visitations to appropriate quarters until a change is realized.

4.2 The roles of government in the ongoing communication crisis

With no consideration given to Indigenous views concerning authorization of the Industrial operations in Indigenous communities, there have been concerns that their opinions were not respected in conservation and environmental management. Yet the conservation agencies put in place by the Canadian government has not effectively resolved all the environmental problems. The present management practices do not effectively confront the mismanagement of land and natural resources. For example, the fragmentation associated with expansion of farming and elimination of natural habitat in central Saskatchewan, impacts the populations of deer, moose and bear. According to Allen Kakakaway, a youth from Keeseekoose community:

"...lots of poachers and stuffs that are hunting animals, like using them for their hides and stuffs, and selling them and stuffs...hunters that seem like poachers to be hunting animals like deer, moose, all that stuff. And then, nothing is really being done about it. Like they are not carefully watched in wildlife, and there is need to have more rangers out there to be

watching wildlife. And then, maybe making it easier for wildlife to be more in health than usual...but right now what I am seeing by watching is that currently with bears trooping out of their habitat...currently coming out more out of the wilderness than really staying where they usually are...they are currently...yeah they are coming out more... and you can just see more of that; like the wildlife is not doing so well; currently with bears...yeah they are coming out of camps more and going into cabins more and more…yeah, the wildlife is changing more and more quickly than ever before."

There is need for monitoring of the environment. The mismanagement of natural resources poses major threats to Indigenous people's source of livelihood. Yet, there may be hints of corruption in the protocols and processes involved in accessing Indigenous lands. According to Vile Mustus from Alexis community:

"…pertaining to the wildlife, I think it has a lot to do with the environmental problems that we have been having with respect to gas and oil, digging, and you know excavations, and stuff like that; so that is my biggest concern, because I think a lot of the problems that exist right now are probably derived from that ... it's because of it...even the water table is severely disturbed in this area; and when they were doing dynamiting on this line; they brought papers to me to sign and I refused, but they still went ahead and did it anyway. And it was direction probably from the leadership here. Now how are you going to fix that up when you are living in the reservation? So that is my biggest problem. And I think probably because of that, animals are suffering; the same way we are.... And I think anything living is in jeopardy because of the oil spill...you know that sort of thing. And I did make a complaint regarding the water to several government offices here in Alberta; and a lot of them said that they have no access to federal lands. Right? And so they said if I own the land, then they could act on it; but because I don't own no land…"

Lack of consent acquisition on the part of the industry as well as negligence on the part of the government is disturbing to the Indigenous communities of western Canada. With no feedbacks or intervention from previous reports made to the government offices, there is the tendency to give up over reporting another

complaint. As a result, the situations have grown more devastating and disappointing. According to Robert Severeight, from Cote First Nations, many community members were hesitant about communicating with representatives of government agencies:

"… I think a lot of people are scared to talk to the government. There are a lot people that think there is no hope. And their complaint is going to fall on deaf ears. They have given up. Lots of people think we have no hope because the concerns are falling on deaf ears. Why should I even bother? They are not going to do anything about the Indians in these communities because we are treated as statistics…"

With the indifference of the government and the continuous maltreatment from their uninvited industrial hosts, Indigenous communities are trapped between two hard rocks. Their communities have been taken over by pollution, yet their hope in the Canadian government is failing because the existing risk communication has been mostly characterized by top-down communication patterns. The decision making process is biased because it does not allow the Indigenous voice to be heard as the primary and most affected stakeholders.

4.3 Knowledge mobilization - a proactive role to the communication crisis

Owing to the neglect by Canadian government and the breakdown in communication, there was the necessity for a solution to the problems confronting Indigenous communities. As a result, Indigenous communities began collaborating with one another and proactive measures were taken towards the protection of Indigenous rights and livelihood. As many communities began connecting and talking about the problems, across the nations and beyond, they

started creating awareness around the risk and the need for protection of natural resources. They resulted to the most reliable, tested and trusted traditional ecological knowledge (TEK) as a means to achieving environmental protection and cultural preservation. According to Wanda Wapash from Keeseekoose community:

"I learn about cultural knowledge by attending the ceremonies, and participating in the feast or I attend round dances, I learn by listening to the Elders, and I take my children there so that they can also learn; and sometimes I am a translator; I can understand the language when the Elders are speaking and I can teach that to the children as well. So that is how I learn my culture. It is by attending and sharing knowledge with the people I am with."

Other participants reiterated that they deliberately learn traditional ecological knowledge and they strongly uphold the traditions which have been passed down from their ancestors. Participants also expressed that they position themselves to acquire knowledge and understanding from the Elders because they want to understand how to maximize life. Although much has been made of the loss of Traditional Knowledge, many youth indicated their interest in learning more about their traditions and native language. According to Ben Potts, a youth from Alexis community:

"...One thing about myself is that I like to share my knowledge. All the things I know, and there are times, I sit down and learn and just listen. And then you know, if you sit down there and listen, you know one day, you are going to be doing that same thing in their own shoes. And someone else is going to be observing and learning. And that was one thing that I was. That made me. I am....typical. One thing that made me typical with other boys was that I am the only one that sits there and want to listen. And I was the only one that wanted to do these things that are being taught. And I really push forward and ambitiously so I could learn whatever it is that they teach, because one day, it's going to be really great. It's going to be useful. It's going to be like you

know, I was sitting there.... I was sitting there at a feast one day. And one of the Elders asked me to pray and they taught us how to pray in Stoney in school and Stoney class…"

The need for knowledge mobilization from generation to generation cannot be overemphasized. Participants observed that although the traditional ecological knowledge has remained relevant, in understanding of risk, risk perception and risk mitigation, it is very important to deliberately preserve it because of the tendencies to lose it. According to Shawn Kakakaway from Keeseekoose community, there has been observation that traditional ecological knowledge might be at threat of being lost, and there must be purposeful creation of more avenues to transfer and preserve it because:

"Our culture is being lost a lot in our schools due to lack of professional people coming in. I work at the school and we don't have as many people coming to explain due to problem with the new curricula. Whereas before they used to always have Elders come in. People come in and tell us about culture. Very common in schools, but we seem to be losing that. But hopefully we can gain it back. I told you I lost my first language; which is Soto…. I absolutely can't speak it, which is a great loss. None of my children can speak it; but hopefully we are gaining it back in due time."

The need for preservation of culture has led to deliberate communication with the younger generations. Indigenous people have observed that their ancestral ways of life deployed within knowledge mobilization forum have proven effective in risk perception and management. As a result, they have intensified efforts in telling the new generations of youths about how things used to be during their own youthful days. According to Elder Langford Whitehorse from Cote community, it is germane to deliberately teach knowledge mobilization to the next generation so as to create awareness around these problems:

"…we help our youths to be more aware of what is going on around us. Like, when we talk about pesticides and the way things are. Like this community used to look so nice years and years ago. But today, we barely have any trees. Nothing grows now. Even our fruits, where do we get our fruits from? Nobody used to ever spray trees here a long time ago. And I used to go up in the "Darttah" forests. And go and get whole moose, deer, elks, rabbits, whatever, ducks. Now today it's so polluted. We can't even drink that water. We used to drink from the slews. Now we can't. We don't have that. But anyways, I could go on all night..."

There is need for continuous creation of awareness around environmental justice. Participants said that they have acquired understanding during many of the community gatherings designed for knowledge mobilization. Participants said that avenues such as culture camp-outs, ceremonies, band meetings, workshops, and such like have enabled Traditional knowledge, create awareness and sensitize them to risk management. In these traditional events and settings, the roles and responsibilities of individuals within their community are shaped and sharpened. According to Ben Potts, a youth from Alexis community:

"…once you turned into a young man. You got to learn your roles. Instantly you start your family. And you know you learn from your father how to hunt and all these things... the women too as soon as they turn into a young woman, they are no longer allowed to play with the opposite sex till they get married. They, learn from their moms. After that they learn around… you know they scrape hides with them. You know, they braid, screw grass. You know how to get water. You know they just learn their duties…."

The roles and responsibilities played within their respective communities enable the Indigenous people develop rich and specialized knowledge about their environment. According to Ben Potts, a youth from Alexis community:

"..You know you have your hunters; you have your women to cut the meat. You know you have your people that make the fire. You know you have your Elders. Your eldest relatives tell you, all of these. What you are using these for? Like

how to use it. Like the medicines, they show me, like each clan in this community, they have to get certain medicines, and there are only certain people that can get those certain medicines and bring them, but they could share it though, they could share it. But there are only a certain people that would go out there. My families are meant for…like they would go out and get all these medicines. You know everyone is allowed to get it but that is what they specialize in. They specialize in pudah, rat roots, cedar, you know this. There are lots of stuff there. It takes a lot of stuff to concoct a medicine, and you know, the people and that is the thing about all the stuff that is going on today…"

The increasing need for sustenance of the momentum around preservation of culture and traditions has led to deliberate management of social and communication networks. Indigenous Elders have proactively mentored the youths in knowledge transmission in order to prepare the next generation for unforeseen situations. Through these processes, there has been understanding, interpretation and translation of Indigenous ecological knowledge to the end of risk management. As a result, there has been re-emergence of Traditional Knowledge. According to Elder Harvey Whitehawk from Cote community:

"I guess at one point in our history here …we, for some reasons, we don't have contact with hunters, and fishers and gatherers, because we lost our way, we lost our connection to the earth. But now we are gaining momentum, gathering that back, gathering our knowledge back. And now, I can safely say that there is a lot of trappers and hunters out there that we can interact with. You know there are a lot available to us now than before. So I got no problems with that. But before there was a problem".

Within the confines of Indigenous culture, mentored youths who have been trained and equipped with life tools, also train their peers. Therefore, the effects of some of the problems were minimized through knowledge exchange because those who have taken time to understudy the Elders' way of life become the knowledge transmitters. As a result, they were able to pass on the message from

one Indigenous group to another. According to Ben Potts a youth from Alexis community:

"Yes once in a while, when I say I went on hunting...I tell everybody my experience. And that is one thing I like to do, I like to share my experience with everybody. And I will share my whole story with them and, the experience would sound funny. And sometimes, it's nothing funny. Sometimes it is not. Sometimes it is something…you know there is just a bunch of people I share with, you know, even random people, you know, Eeh! …I shot a moose; I tell them all about it. You know they would be like, you know ask me questions. Like where? And who were you with? And how did it go? And I'll share all that. My cousin and I were in the car and I was driving and I saw a Moose and rolled down the window and shot at it. Kill it and if you miss. Go, run in the bush. And chase after it...."

Furthermore, participants also reiterated that their inherited traditional values were passed onto them from one generation to another. Nevertheless, many of the teachings have become a body of knowledge that was deliberately transmitted within the same generation just as they were passed down from one generation to another. According to Ron Severeight from Cote community:

"I was taught from younger age not to waste anything. You don't just shoot at animals except with a reason."

The Indigenous youths in turn have translated and transmitted the Traditional Ecological Knowledge (TEK) acquired from their Elders into action. As a result, those who have no opportunity of direct contact with the traditional leaders can be

equally mentored from a distance. This does not occur in isolation from the Elders but it supplements this TEK. Participants said that they learn about culture and traditions from the Internet as well as by listening to the Elders. According to Jade Whitehawk, a female student from Cote community:

"I learn cultural knowledge by..., I can learn it by going on the computer, or from my Cooco [My grandmother] Barbra, and that is it about it."

While majority of youths claimed to have learnt about their traditions and culture from the Elders, some other participants claimed that they learnt Indigenous culture as well as global issues through the Internet. The use of new social media has enabled the understanding of culture and tradition. The type of communication devices used in accessing the new social media for relevant information is equally important. According to Allen Kakakaway, a youth from Keeseekoose community:

"...the Internet is for videos, for watching videos like that. But I never get a chance to get the news, and Apps...sometimes its music videos, maybe it's about let say stuffs on wars going on in the world today.....a cell phone is better than a laptop. I can get it anywhere I am. I am used to my cell phone; I can get access too on laptop... but it's not like a mobile phone…"

As a result of the multiple media and opportunities of learning about culture, the traditional ecological knowledge has been transmitted to the end of risk control and management to many people from far and near.

4.4 The potentials of new social media in Knowledge transfer

The potentials of NSM in risk communication during risk outbreaks cannot be overemphasized. In many parts of the world, social media has been effectively

deployed in risk management. Many participants of this study claimed that they would channel new social media tools around risk communication in the event of risk outbreak due to the effect it has on more people compared to other medium of communication. According to Teri Shingoose, a female student from Keeseekoose community:

"There is no oil in our community, but if there was oil spill; I will probably use Facebook mobile. I will contact the band office…they (Band office) will probably contact the news media right away to let everybody know about the pesticides that have been sprayed in our community and that's it."

Since more people would get to hear about the outbreak within the shortest period of time, participants who claimed that they speak with their community members about everything including risk issues said that they would use NSM tools maximally if the need arose. According to Wandar Walters, a youth from Keeseekoose:

"...I would think we can do a page, I would agree with my brother Jarves here, and bring it up as a communicating issue and talk about it through Facebook, or use Facebook link with community members directly, or through our community meeting so that everybody is aware of these pesticides..."

As a result, the social ties existing among the people and their communication networks are relevant in knowledge transfer and risk communication in Indigenous communities. Effective risk communication within Indigenous communities can continue to be achieved through maximization of NSM.

4.5 The role of youth in risk communication

More than ever before, the engagement of youth in the ongoing risk communication in Indigenous communities has drawn more attention to the problems. They have brought social traffic through deployment of modern communication tools such as Facebook, text messaging, and the like. As a result, as the youths continued communicating with one another as well as outside communities around the risk in their communities, more people are becoming aware of the problem of marginalization of Indigenous people in western Canada. As more people become interested in the problems, many of the Indigenous concerns were spread online and offline. By drawing attention to many of the problems in their communities through new social media such as Facebook, Indigenous youths have created massive online traffic which cannot be curbed. The outcomes of such social network traffic have led to tremendous online and offline discussions which cannot be ignored. Many of these deliberate social interactions were achieved through the creation of Facebook pages, online personal profiles, online discussion forums, community groups, chat rooms, blogs, websites, and the like. For example, participants said that they have personal Facebook account and have created online profiles for social interactions and communications around many of their concerns. According to Jarvis Wapash from Keeseekoose community:

"...We can communicate with them on Facebook, by creating a page, you create a page for the incident and everybody can come and talk about it on Facebook..."

As a result of these deliberate social structures, chains of reactions and mobilizations have occurred both online and offline. Some communities have risen in support of Indigenous rights such as *Idle No More* and so on. As the risk broadcasting exercise increased, the online and offline traffic advanced. These critical masses have led to attraction of overwhelming support from far and wide for Indigenous cause. As more people from outside communities and regions continue to understand the Indigenous plights, especially the problems of environmental injustice to vulnerable groups, the cause gained more global attention. According to Ben Potts, a youth from Alexis community, Facebook is relevant in raising awareness around environmental problems:

"...Yes! I have Facebook but I don't have Twitter…I use the Internet for downloading stuffs...Facebook will be a good way, because am…It is obviously working because everyone in the world is using Facebook, you know they have always had to have a Facebook page. You know they are saying look at our Facebook page. We are on Facebook. We are on Facebook everywhere now. So, the wildlife issue is good on Facebook too. There are lots of interesting people on Facebook and there are lots of people who are willing to share and learn what this is all about..."

Therefore, the public and the global communities which hitherto have been kept from knowing about the Indigenous concerns have joined in the struggle. In this study, most of the participants reported that they have Facebook account and they use it in contacting family, friends, other community members, band office, chiefs and Elders. Others said that in the event of risk incidence, they will hang up posters, call the police, and the wildlife agencies in their area. Most of the participants said that the new social media is relevant in risk communication because of the multitude of users accessing it daily.

4.6 The potentials of Indigenous social networks in risk communication

The social network within the Indigenous community helps in preparedness before a risk outbreak and during the risk outbreak. As Indigenous people communicate within their communities, the already existing informal social networks become a medium of delivering risk message. As a result, if there was to be any risk outbreak, it would be easy to get the news around. If there was to be a pesticide spray going on in the community, participants claimed that they would notify their neighbors. According to an Elder from Cote, Elrose Sevreight who communicates with people who live in her community:

"...When I talk to them; they would all phone each other... And if there was a crisis in the community, I will probably phone some of the elderly people. That way because everybody has a phone; so when I talk to them, they all phone each other…and if there is a crisis in the community; I don't send text message because I don't have cell phone…I talk to Bert at the Casino. We socialize a lot. And if there was a crisis that would happen like a pesticide spraying, I will call to talk to these people saying that they are spraying again; don't let your kids out. Like my daughter, she jogs, I told her, whenever they are spraying the pesticides, don't jog because she is going to breathe in that pesticide. If you are going to jog, don't jog down the road."

Most participants claimed that they interact with their community members and effectively communicate around Indigenous culture and concerns in their communities. As a result they would readily spread information around any risk observed in their environment. According to Allen Kakakaway, a youth from Keeseekoose:

"…I think we should be on a close watch with chemicals that is being spilled especially maybe around communities, or maybe out there where no one can see them; like deep in the forest. Yeah, it's very disturbing..."

The need for environmental monitoring for risk management cannot be overemphasized. Besides the youth's initiatives in risk communication through the use of new social media, other social networks were formed by some technology savvy Elders who have equally learnt to use the social media tools. Many of these Indigenous Elders also contributed to the momentum of the social structures around risk communication. By taking initiatives to learn how to use the modern technologies, they have equally maximized it for the purpose of risk communication. According to Daisy Potts, an Elder from Alexis community:

"…I mostly text message people. I find text message is better than talking. It's like sometimes, when you are talking you are not acting privately, and somebody can hear you, but with text message, when you are texting, nobody knows what you are doing. Nobody knows what you are saying. And it's fun. Text messaging is fun. I text everybody, even our leadership; if you phone them, they are not going to answer their phones. But if you text them, they are going to text you back."

Besides the use of new social media and cell phones in communication, direct contact through face-to-face communication has strengthened social ties in Indigenous communities of western Canada. Hitherto, participants' interactions which have been more around harvesters, fishermen, hunters, trappers, fishermen and so on; have been maximized for distribution of risk management information.

According to Jarvis Wapash from Keeseekoose, most of his communication revolves around his Indigenous networks:

"...Some of them are hunters, and most of them are gatherers, harvesters, going around picking plants, and sweet-grass and berries…"

According to Elder Robert Flores from Cote community, communication with other community members strengthens the ties within the Indigenous social network. This is germane for the promotion of health and enhancement of the sense of belonging within the communities:

"...I like to communicate in person. It's better for me. It's a better way of socializing in person. Talking to people in person. Because you get high feeling. You get to know them better. It's about acknowledging individuals that live in your community; and validating their existence; because it is important for all of us from the oldest to the youngest child to be validated. I have always been taught from my Grandpa that it's always nice to shake hands and acknowledge somebody, say hello and how are you. And Trenton I know his father very well, and I don't really know Trenton, but I am really happy to get to know him today.…But communicating is very important; whatever way you communicate, whether you talk on the phone. And nowadays we have all these new technologies... And it's important to keep that communication open."

Communication within social networks brings opportunity for problem solving. According to Elder Bert Mercas, a culture conscious band member from Keeseekoose community:

"…you know this communication with people is important to me; because I know how they think and how they solve problems and I try to do that in my own life. How they solve problems and communicate with each other..."

As the social ties among participants give opportunity for risk communication, the need to include the outside networks in deliberations to the end of risk management becomes more necessary. Although participants said that they have

attempted such negotiation meetings in the past, communication with the industrial representatives has proven abortive. There is need for deliberate communication with the industrial representatives in order to enlighten them concerning the hazards they are creating in the Indigenous communities. According to Elder Harvey Whitehawk from Cote community:

"...I think the best way to communicate or get in contact with people when there is an oil spill or pesticides in these territories is to make, say a company aware of the dangers that they are causing the community by their chemicals and whatever they are doing. But it's an upward battle because for those companies or the industries there, it is big money for them. So it's hard to find a way to clear up the use of pesticides in our communities. They either don't want to listen, or fail to communicate with us. Or they don't want to give up the silver lining. You know? So they just go ahead and use them..."

The communication gap between Indigenous communities and the industrial stakeholders cannot be left to chance. There is need for observance of protocols and receipt of consent from the Indigenous host. Industrial companies need to be aware of the implications of their extractive operations on Indigenous communities before embarking on any industrial operations. Therefore, meeting with them for dialogue becomes inevitable. And there must be an understanding on the part of the industry that consultation is not equivalent to consent.

4.7 The limitation to risk communication in Indigenous communities

Although, the technology savvy youths use new social media in communicating about risk in their Indigenous communities, there are limitations to maximizing these modern tools. As a result, there is a digital-divide existing in the Indigenous

communities studied. Not every home in the communities has a computer. In some homes, the dwellers either own a computer with no Internet access. In such instances, there were connectivity problems. Dial-ups modem were the medium of connecting to the Internet in the communities. As a result, the connectivity speeds are usually very slow when compared with the use of high speed connectivity. Inaccessibility to technology can be quite limiting and frustrating. According to Allen Kakakaway, a youth from Keeseekoose community:

"No I do not have a cell phone now but I am going to have a cell phone, I just recently went on top with texting a bit and then the Internet.... I lost my cell phone and I haven't had opportunity to buy a new phone yet. I haven't had the time...yeah money issues, work issues, yeah. But currently, I am just going to wait for school...but then I was pretty mad when I lost my cell phone. And then, I had to go running round trying to find it. It's very hard, it's pretty expensive. Very expensive technology...yeah; technology is very expensive..."

Participants remarked that the degree of the digital divide in their community was due in part to high unemployment rate, high cost of acquiring and maintaining modern technologies, as well as the increasing cost of keeping abreast with modern day technological inventions. Therefore, there is a direct relationship between economic cost of communication device and digital divide in Indigenous communities of western Canada.

CHAPTER V: DISCUSSION

5.1. Ongoing debates around environmental injustice in indigenous communities

There have been contributions to the debates around environmental injustice in Indigenous communities as a result of industrial presence. While the Indigenous communities continued experiencing oppression from industrial stakeholders, the need to increase profits and maintain the bottom-line has been the major concerns of the industry. As cost implications of sustainable practice challenge reason and the need for adoption of sustainable practice, the industrial process of extraction remains critical. As best industrial practice seems ideal in current industrial models, environmental responsibility remains paramount and a more challenging priority. Therefore, the urgent need for the resolution of the plethora of problems which Indigenous people face from industry and the government of Canada cannot be left to chance (Folke *et al.* 2005).

One of the areas of concern in the ongoing debates on environmental injustice is vulnerability. Vulnerability has been defined in numerous ways and this can be either physical or biophysical (Kelly and Adger, 2000, Eakin and Luers, 2006, Manyena, 2006). The complexity of the term, vulnerability and the contexts in which it has been applied cannot be overemphasized. Thus, vulnerability is a power-laden concept and its application could hold very real consequences for the populations labeled as such (Haalboom and Natcher, 2012). People are deemed more or less vulnerable according to their proximity to a hazardous location or activity. Furthermore, a school of thought defines vulnerability according to

human sensitivity to hazard determined by pre-existing social, economic, and political conditions (Kelly and Adger, 2000, Reid and Vogel, 2006). The biophysical aspect of vulnerability focuses on the nature of the physical hazard to which humans are exposed. The extent to which people are sensitized to a physical hazard, including social, political, and economic conditions that make exposure unsafe or threatening is an important consideration. Specific examples include social networks, institutions, poverty, food security, levels of inequality, and power dynamics (Kelly and Adger, 2000, Ford and Smit, 2004).

Assessment of Indigenous communities of western Canada revealed that small municipalities are more remote and lack experiences such as economic diversification, enhanced technology, infrastructure, and accessible healthcare services needed for increased adaptive capacities.

However, studies have cautioned on the wrong use of "vulnerability" in describing Indigenous people because this label creates powerful perceptions of the people and their regions (Haalboom and Natcher, 2012). Historically, labels such as vulnerability generates and internalizes adverse experiences linked to social, psychological and colonial rule. The ability of people to cope in an emergency or a disaster is shaped by prior experience and cultural narrative. This cultural narrative creates a set of expectations which sensitizes people to deal with their problems by creating a frame through which they understand and make sense of their experiences (Furedi, 2007).

Historically, economically and politically marginalized people have been considered most vulnerable because of their disempowerment and deficiencies in adaptive capacity (Turner, 2010, Ford *et al.* 2006, Chapin *et al.* 2009).

Besides vulnerability, other major Indigenous concerns were highlighted in this study as the industrial pollution due to industrial presence in Indigenous communities, chemical poisoning through pesticides spray from mechanized agricultural farmers, oil and gas spills on Indigenous lands. These aforementioned problems and other critical challenges face Indigenous people across western Canada daily. As a result, they have become threats to the Indigenous livelihood and Treaty rights. Although, many of these concerns were reported individually and collectively in the past, little or no attention was paid to them. As a result, deliberate risk communication becomes more indispensable to the end of mitigation and control.

In risk dialogues, one of the critical aspects of environmental justice which remains challenging to realize is consensus around risk management, as this subset of stakeholder participation that allows those affected by risk to be a part of decision making in consensus building has not been well represented (Lundgren and McMakin, 2013). As a result, Indigenous people are more concerned about their Treaty rights because it is no longer respected. They recalled that the Treaty was not signed with the Federal Government of Canada but with the British Crown as an international agreement. The Treaty was signed in 1874 by their ancestors as an international agreement that secured all the lands within the Indigenous communities as Indian lands. However, that Treaty which states that

all the land included in the Treaty 4 boundaries belongs to the Indigenous people have been taken over by agricultural farmers who now post such signs with inscriptions:*"this is a private land, trespassers will be prosecuted".* The question remains: whose land is that? Somewhere on Cote First Nations community, it was reported that there was a particular incident where an old road which had been constructed for over 100 years was blocked off by a certain modern farmer. Yet there was no mention of this incident by the people who should be in charge of land issues. This is one of several cases of environmental injustice experienced by Indigenous people.

As the scope of environmental justice extends to discussions around inequities (Schlosberg, 2013), the question that continues to resonate is, who speaks on behalf of the indigenous people? In alignment with several other literatures, this study showed that countless injustice may be attributed to the Canadian government and industrial maltreatment of Indigenous people. Among cases of injustice are acceptability of Traditional Ecological Knowledge, payment for environmental services, ocean acidification, and waste reduction through industrial symbiosis, the concept of sustainable development and the long-term impact of natural disasters on vulnerable groups (Middleton, 2013).

Review of studies showed that very recently, there has been a spatial expansion of environmental justice into discussions on environment and nature wherein conditions for social justice has become more evident. As a result, there have been discussions on broader issues, of the global nature of environmental injustice and the relationship between animate and inanimate world (Kirkham, 2013,

Schlosberg, 2013). Beyond the initial discussions around racism, documentation of inequity has expanded into thorough analysis of the underlying reasons for injustice; to examining the details behind environmental ills and risks; some of which are the reasons why minority communities, and/or vulnerable groups were devalued in the first place (Schlosberg, 2013). In the case of Indigenous communities, their poor conditions of living further challenge the claim of the Canadian government regarding whether fundamental human rights are attainable in Canada or not. Industrial practice which renders Indigenous communities inhabitable are forms of environmental injustice which undermine the justice system of Canada. As a result, the need for risk communication around these problems remains germane for the furtherance of the society.

5.2 Roles of Indigenous people in risk communication

Furthermore, as risk communication entails the communication of health, safety and/or environmental risk (Lundgren and McMakin, 2013); it is incomplete without discussion around environmental injustice, social injustice, and food injustice most especially among vulnerable populations. Owing to the peculiarity of risk and the importance of communication in risk studies, some of the roles that Indigenous youths play are gradually evolving at the speed of light. This is very necessary because the environment is a complex system; and it is constantly evolving. Some level of resilience can be found even in the human entities based on the plights of Indigenous communities and the level of abuse they suffer continually in the western part of Canada. Thus, there has been a historical case

evidence of the use of laws, legal institutions and techniques as instruments of social change to manage complex systems towards achieving social goals (Craig, 2013).

Owing to the peculiarity of the environment, the roles that individuals and groups play in it cannot be haphazardly left to chance. Therefore, with extension in social ties, there are corresponding increases in the rate of communication, as well as the links associated with communication. Consequently, there is redefinition of roles, connections, communication as well as the media of interaction. Many Indigenous social networks have been redefined, especially due to the role that youths play in risk communication within their respective communities.

As a result, the "new" roles, some of which are influenced and facilitated by the importance of technology and media in these communities may range from local cultural responsibilities to international activism, from community liaisons to community advocate, and the like. Therefore, as the roles change the key players are equally refined and continue to be redefined in identity. In some situations, many of these roles are fused together as one or they are much interconnected. As a result, the social and communication networks of Indigenous communities have the potentials of influencing change behavior through their influential principal actors.

According to a study conducted on social network by Singh and Diamond (2012), influencers can be classified into expert influencers, referent influencers and positional influencers. Expert influencers are considered authorities in specific

domains or they are people whom others depend upon for information or advice. Referent influencers are people like colleagues in a workplace or friends within a social group who may not be tightly connected with an individual. Positional influencers are individuals in the inner circle of a person, who often have to live with the decisions and choices made by that person. These are family members (Singh and Diamond, 2012).

This study agrees with the outcome of the study by Singh and Diamond (2012). In this situation, the traditional Elders are influential principal actors. Therefore, the Indigenous Elders can be classified as expert influencers because they are cultural elites. Indigenous Elders emerged as the hub of the social networks because they serve as the repository of Indigenous culture, Traditional Ecological Knowledge, and life experiences. As a result, in the event of risk interpretation and communication, the Elders are indispensable influencers in the Indigenous community networks. Since information spreads to more people through highly influential community members, it will be easier to get information around through the Elders.

In addition, the social networks of the Elders become more resourceful in the event of risk outbreak because they would cut across all the necessary quarters. As a result, in the event of risk outbreak, maximizing the social and communication networks of the Elders will geometrically connect the people within their social ties in the community almost in the same way that the new social media connects online users. Therefore, this study agrees with the study conducted by Fulcher *et al*. (2013). These authors in their study conducted in

Singapore observed that each network node has an associated contact list. Furthermore, they stated that the frequency and track between two nodes can be used for defining the degree of familiarity between two nodes. They also noted that the contact list can then be sorted according to familiarity degree. Therefore, the importance of social networks and ties cannot be overemphasized.

Furthermore, social learning is an interactive approach to decision making and problem solving. It is an essential component of sustainable natural resource management for promotion of desirable behavioral change (Muro and Jeffrey, 2008). Social learning is increasingly becoming an essential component of sustainable resource management for behavioral change (Miller *et al.* 2013). Since this fact remains true, how do we measure the change that results from social learning? How do we quantify the success? If people are less inclined to conventional learning processes, then what do we do? How and where do we teach them to change? This brings us back to the beginning of risk communication because the answer is the new social media.

The need for effective perception, accurate quantification, communication, mitigation and control of risk require public engagement through the new social media because the erstwhile popular conventional media has been systematically top-down in approach (Trimble and Berkes, 2013). This can be facilitated through discursive and inclusionary processes that will lead to a shift in the understanding of resource management. Furthermore, such inclusion and discursive process can be situated within a more democratic setting such as social media networks to the end of achieving the good of all and sundry.

The benefits of creating avenue for engaging public, vulnerable, and marginalized groups, especially the Indigenous people in risk control cannot be overemphasized. The benefits of public inclusion include enhanced stakeholder analysis in establishing institutional setting, local champions, social networks and power relations for societal advancement (Raymond and Cleary, 2013). In addition, this will create opportunities for social learning, knowledge co-production, knowledge mobilization for risk management. This can be achieved through deliberate interfacing of the lay people and the expert in the process of knowledge conceptualization through accessible and user friendly media like Web 2.0 tools.

According to a survey conducted on the use of social media in North America, approximately three quarters of adults (77% in the US) and (72% in Canada) were reported as using the new social media. Mishna *et al*. (2012) stated that 98% of Canadian youths access the internet and other means of Information communication technology daily. Therefore, there is need for the maximization of this communication tool in redirecting massive social network traffic. However, the challenge is that as the public participation in risk communication increases, there would be need for transcending social learning processes into action.

Learning that transcends participation processes is critical for public engagement's translation into legacies of enhanced environmentally responsible citizenry. In this case, the risk communication must lead into behavioral change on the part of industrial stakeholders and the government. The industrial production and extractive behavior must conform to sustainable forms. The

government needs to enforce on the industry, the need for due diligence in the process of consent acquisitions from their host (Indigenous stakeholders). Thus, the modern social media becomes germane in the process of engaging the public, raising awareness around risk and monitoring the outcomes.

CHAPTER VI: CONCLUSION AND IMPLICATIONS OF THE STUDY

This study looked at First Nations communities of Cote, Keeseekoose, and Alexis, located in Saskatchewan and Alberta provinces of Canada. The study was conducted with a total of 126 participants between 2010 and 2012, using Interviews, FGD, and SNA tools. According to the result derived from this study, risk communication patterns in Indigenous communities of Alberta and Saskatchewan can be said to have been from the use of mouth to mouth, face-to-face, in person contacts as well as the use of new social media applications. A critical concern that arose from this investigation was Indigenous language loss. This creates a limitation to knowledge mobilization around traditions and culture in Indigenous communities. In understanding and mitigating risk in Indigenous communities, a holistic measure of control must be considered. This requires understanding of Indigenous language and the Traditional Ecological Knowledge. Other concerns that arose from this investigation were inability to access traditional foods which is a form of nutrition insecurity (Desmarais and Wittman, 2014), and the disrespect of the mother-earth. This inaccessibility to traditional diets indirectly leads to nutrition insecurity in Indigenous communities. The implication of extreme nutrition insecurity can be devastating for any race or people groups.

6.1. Hazards confronting Indigenous communities in western Canada

Among several concerns identified in this study, the presence of industrial activities around Indigenous communities was paramount. Others are non-consent industrial habits that range from pesticides spray by agricultural producers to the impact of oil and gas engagements on First Nations communities. These effects on wildlife health as well as humans call for effective measures to risk communication and mitigation. Without effective monitoring in resource governance, environmental injustice, especially wildlife depopulation rate may continue unaddressed. Some other concerns of Indigenous people identified in this study were: fear of CWD, deforestation, desecration of traditional territories, decrease in wildlife population, illicit hunting around traditional lands, and violations of hunting territories. Besides the aforementioned problems, unhealthy environment is the reason for wildlife depletion. Indigenous people believe that many problems around hunting arise from violations of the protocols to hunting. Despite the impact of oil and gas in the decline of wildlife in the western region of Canada, the outcome of this study agrees with other studies that most wildlife are safe and healthy for consumption.

In addition, the result of the study elucidates the fact that although Indigenous communities have overcome some of these problems through resilience, mobilizations, innovative initiatives, and so on, there remain many other problems. Some of these are the threats to Indigenous Treaty rights, land use, resource governance, protocols surrounding resource extractions, general mismanagement of natural resources, and the like. The reasons why these

problems were not overcome were complications in the dialogues, representations, communication processes, biased attributes of conventional media, marginalization, colonialism, and misunderstanding of Indigenous rights, culture and values (Kingsley et.al 2009).

6.2. Impacts of mechanized farming in Indigenous communities

This study evaluated risk communication around CWD in Indigenous communities of Alberta and Saskatchewan. It was observed that during the period of data collection, no CWD event occurred. Although, the findings from this study showed that there was no incidence of CWD in these Indigenous communities, the Indigenous people were of the opinion that it was CWD that caused the decline of the wildlife which they experienced in their environment. However, the research outcome underlined the fact that risk can be traced to the Agricultural operations in the environment. The effects of pesticides spray, agricultural wastes and pollution of water and air quality in the environment were the causes of the environmental decline experienced. Furthermore, this study highlights the concerns of Indigenous people on how native diets have been adversely affected by unnatural means of growing foods in their environment. The modern mechanized system of farming has become a major threat to the Indigenous food system because GMO seeds used around the First Nations communities pose threats to biodiversity, the native food system and healthy sustenance of Indigenous people. The Indigenous people believe that the rich soil fertility characteristics of their land tend to draw Agricultural farmers who

indiscriminately use the genetically modified organism (GMO seeds) on Indigenous lands. Therefore, Indigenous Elders wanted some measure of consultation with the farmers. This consultation will make inquiries into the specific pesticides that farmers use on their farms. In addition, the knowledge of the laws binding the farmers from spraying chemicals around residential facilities needs to be known. This is because farmers do not notify the Indigenous communities whenever they are about spraying pesticides on farms. Thus, Indigenous communities are concerned about whether there are any Bye-laws regarding restrictions on the kinds of chemicals farmers are allowed to spray on farms. The assumption is that it is very possible that the cause of extinction of wildlife can be traced to the farming operations, especially the pesticides spray.

6.3. Digital divide and its implications in Indigenous communities

The results of this study showed that owing to the inadequate economic opportunities in most Indigenous communities, some of the community members were unable to afford the cost of subscribing to the Internet. As a result, some participants who have no access to the Internet at home experience digital divide. The problem of digital divide is ameliorated through other means of accessing the Internet such as use of mobile phones, visits to neighbors and friends who have Internet connectivity.

The implications of the limited digital access are that many Indigenous people would be unable to report their concerns and convey their grievances to the global

community. Having cut back the avenue through which many can report, exchange, and communicate their problems to the world, it is difficult for Indigenous people to expose the maltreatment they are facing. Nevertheless, participants who do not have Internet access are able to access the Internet from the social networks of their friends, family members and neighbors. They may maximize such Internet connectivity for advocacy around the Indigenous concerns. In that instance, the effectiveness of the social media tools is indescribable for reporting and getting response from global communities.

6.4. Benefits of social ties among Indigenous communities of western Canada

The use of new social media in events of risk outbreak evaluated in this study showed that Indigenous communities of Cote and Keeseekoose would readily deploy new social media in communicating in the event of a risk outbreak in their community. Evaluation of the social ties of participants in this study showed that the importance of social network is relevant in risk management. A cursory look at social network structure reveals that they may not be of primary interest by themselves, but the social processes which underpin the outcome of resource governance are enhanced or inhibited by these different network structures. As a result, paying attention to them becomes more necessary. Until now, most empirical studies addressing social networks in natural resource governance have treated them as being either present or absent, and rarely having structural characteristics (Westphala and Zajac, 2013). They have been explicitly measured and formally analyzed, most especially amongst Indigenous communities. The

implications of such gaps in the examination of both social network structure and the communication networks among vulnerable population are tantamount to haphazard approach to protocols of risk management. Therefore, during this study, the camp-outs held highlighted the importance of Indigenous social ties. The campout held in Keeseekoose community in Saskatchewan was entirely different from the campout held in Alexis community in Alberta. The reason is Saskatchewan's camp-out focused more on the roles of new social media in risk communication during an emergency or risk outbreak. This involved identifying social structures surrounding risk communication in the community. The principal actors in the social and communication networks were identified as Indigenous Elders and youths. On the other hand, the camp-out held in Alexis community in Alberta highlighted the risks confronting Indigenous communities.

6.5. Benefits of unconventional media in risk studies among Indigenous communities of western Canada

In order to achieve effectiveness in risk control, natural resource management and governance, the media must be accessible and deliberately unconventional. The implication is that data which is equivalent to asset can be accessed, collected, analyzed, interpreted and critiqued from far and wide through social and communication networks. Therefore, in my view, there is need for further evaluation and research in the area of social media in risk studies. It should be deployed as a tool for data gathering, science communication, and public enlightenment (Boscha, 2014). Other possibilities in using new social media are benefits that come from partnerships and collaborations; through open, fair and

democratic process to public engagement and social learning (Muro and Jeffrey, 2008). The assessment of risk and social media as risk communication tool within social networks helps to understand the process of communication and problems around risk.

The implications of investigating continuous use of NSM among marginalized communities are: the unveiling of opportunities of analyzing relationships within social structures to the end of resource governance. In addition, the use of NSM enhances suitable platforms for stakeholders in the establishment of institutional setting, local champions, social networks and power relations for their common good (Olorunnisola and Martin, 2013). In addition, NSM removes some stress in the groundbreaking exercise, thereby ameliorating the inadequacies that some researchers encounter in certain aspects of their study. Some of these are inability to cover certain regions, time constraints, cost implications, and many other limitations. Furthermore, NSM gives access to contributions and feedbacks in risk studies from far and near.

Furthermore, risk evaluation and research into the arena of social media as risk communication tools require that the scientific implication for using social media be given serious considerations. If most research will be relevant in the nearest future, there would be need for public engagement through social learning to the end of achieving environmentally responsible citizens. In the process of engaging the public, the social media becomes indispensable. This will bring simultaneous opportunity for both social interactions and social learning. Given the fact that public participation is germane, and social learning is increasingly becoming an

essential component of sustainable resource management for behavioral change, how do we measure the desired change? If people were less inclined to conventional learning processes, then what shall we do? How do we teach them to change? What forum and which media? The answers are imbedded in the use of social media (Lucht, 2010).

6.6. The roles of Indigenous youths of western Canada in risk management

Owing to the fact that Indigenous youths are versatile, they are able to flexibly switch roles in their communities. The roles that youths play around risk communication and management were identified in this study as: Knowledge Transmitters (Knowledge Broadcasters) who communicate and advocate for social justice and environmental issues online in order to draw attention to what is happening in their communities (Boscha, 2014). Knowledge Mobilizers (Knowledge Workers) who are the culture preservers and some of them are Elders-in-training. They may erect lodges, teepees and the like for use during cultural ceremonies. These youths engage in transferring knowledge learned from Elders regarding the traditions to peers (Bowie, 2013, Tsethlikai and Rogoff, 2013). Knowledge Interpreters are the mediators between outside stakeholders and their communities, and they act as cultural liaisons who understand the Indigenous language as well as scientific jargons (Miklavcic and LeBlanc, 2014). Traditional Celebrators are those who actively participate in cultural ceremonies, and they pass on their cultural heritage to others within their communities (Coward, 2012). Traditional Providers are the hunters, gatherers, medicine

pickers, craftsmen, fishers and the like. The community looks to them for provisions, help and the supplies for ceremonies (Severance, 2014).

The reasons why these roles are relevant for risk communication with the Indigenous communities are in the flexibility in the attributes of the people who play the roles and the value of team spirit these role players bring into their communities. For example, an individual who advocates and mobilizes online and offline, may equally step out into the bush as a hunter who feeds family and friends within the community and at the same time, supply wild meat from their hunting at the next community feast. In addition, the same individual may also understand how to pick medicines, recognize plants relevant for therapy and health treatments and so on. In that instance, it is difficult to limit such an individual to hunting or brand him or her as a medicine picker, or camp cook and so on. There are times when an individual may even go online to advocate for cultural sustainability and also mobilize support for Indigenous cause. Deploying social media in risk communication and mobilization in that instance does not mean the person could only be referred to as a broadcaster, or a transmitter. Roles may change interchangeably as the need arises. The most important thing is that the individual who transformed in that process has a goal in mind and that specific goal is the most important thing.

The role is the means to an end of reaching an objective. Thus, the flexibility in the roles depends on the urgency of the situation as well as the personality of the individual. In addition, Community mobilizers also mentor their peers in conservation and preservation of cultural heritage and values that have been

passed down from one generation to another. In addition, some who labor as providers in sustaining their communities through the supply of wild meat and forest produce also collaborate with other groups in cultural celebration, either as singers or dancers. Thus, providers fuse into celebrators, as well as advocators and so on. The interplay of roles is in accordance with the need to keep the community going. As a result, the hunters, the gatherers, the fishermen and fisherwomen are all collaborators in community development and promotion of culture and traditions. For example, those who bring scientists into their communities work as liaisons and interpreters of language and are equally important as those who hunt and gather medicines from the forest. They all work as a team and each is relevant as the other. At the same time, without the youths, the continuity of the traditions passed down by the Elders to the intermediate age of adults would be terminated. Therefore, maximizing social network can be achieved through proximity to the Elders who can effectively mentor those in the social network to be environmentally responsible.

In addition to synergizing the younger generation with the older, there is need for understanding the uniqueness of Elder and youth relationship. The pattern of relations differs depending on network or type of relations considered. These differences in ties are structural characteristics of networks, which affect social processes such as knowledge transfer, information sharing, consensus building and power relations. The content of the relational ties between actors is different based on networks. A network for transfer of ecological knowledge differs from a network of fishing gear assessments. Furthermore, the synergizing of youths with

the Elders in acquisition of knowledge, in growing of social and communication networks, in understanding of risk perception and management, is incomplete without engaging the public.

The process of engaging the public through the use of new social media for knowledge mobilization transforms the indices of the relationships from mere Elders to youth affairs; into social structure learning around risk (Olorunnisola and Martin, 2013). This indifference in the attitude of the government concerning indigenous plights has been heightened by the control and marginalization of the conventional media. As a result, the new social media has been deployed as an alternative media of communication around risk because it is free, readily accessible and democratic.

6.7. Protocols to the use of social media in risk studies among Indigenous communities of western Canada

Communication regarding risk may be said to be continuous in Indigenous community both on formal and informal basis. Informal online posting of photographs of events are common, such as pictures from wildlife, hunting, community programs, socio-cultural events, community events like workshops and so on. Most community members share photographs from friends' profile pages with their extended social networks. Other formal ways in which social media is used in Indigenous communities is for sending out notifications around traditional and social events such as *pow-wows, round dances,* and the like. Besides, casual social networking and online communication, many Indigenous

youths use social media for deliberate risk communication. This category of youths is known to be adept at using social media for mobilization and advocacy, mostly because it allows their autonomy and assertiveness.

In communicating around risk issues, especially risk of chronic wasting diseases, pesticides sprays and oil spills in Indigenous communities, this category of youths would maximize social media for notifying and sensitizing other community members. In addition, the use of social media has proven effective in connecting with family and friends, for scheduling appointments, contacting their neighbors for pick up in instances of transportation requests, as well as for invitation around casual visits. Many communications are done through SMS text messaging because of the resourcefulness of the smart phones in recording videos and songs of community events. Many of these recordings are subsequently uploaded onto the social media platforms such as Facebook and YouTube.

However, owing to lack of privacy in the nature of social media, there are protocols surrounding some forms of conversation and communication. Mostly the contents of online social interactions involving culturally sacred matters are expected to be discretionary. As a result, nothing intrinsically culturally sacred is expected to be posted or discussed on the social media platforms. Although some youths with divergent views prefer uploading pictures of wildlife hunted, thus showing off their exploits regarding wildlife hunt, the number of times their local hunting rifles hit accurately on the target is worth celebrating. Their different perspective is in preference for self expression and individuality. Their exercise of autonomy regarding online posts and discussions may be indicators to something

deeper. Posting of pictures of exploits from hunting on Facebook and Twitter may indicate how they would prefer to exempt themselves from herd mentality in following the status quo unquestionably. Their disagreement in preference of usage of social media for everything whatsoever, including posting of pictures and videos of wildlife exploits online, may be attributes of modern social media activists. This may be an indication of exceptionality and attributes of uncommon change agents.

On the other hand, others who deferred on discretionary grounds may be a group of youths with inner strengths of character. Yet they prefer to exercise their individuality in a different way. Such personalities may not promote self expression through social media but are effective and resourceful in other areas and matters of values and ethics for risk management. The medley of such diversity can be very interesting in analyzing risk communication, examining risk management and drawing inferences. As a result, in evaluating the influence of youths according to roles played in their communities, being social media savvy and showcasing exploits online may not be the accurate measurement of effectiveness and creativity. For example, some Indigenous youth are positioned with the Elders as Elders in training and they hardly appear online yet their resourcefulness in their respective communities cannot be overemphasized.

Many of these non-users of social network technologies would readily erect teepees, set up community camps, and are skilful in hunting, fishing, and many other activities that are different from online activities. As a result, the measure of influence may not be accurately judged according to how media savvy an

individual is but according to the resourcefulness and the roles an individual plays in their community. Furthermore, the youths who were not technology savvy and the adults who were not adept at using social media gave their major reasons for not accessing the Internet as follows: weariness of publicity, privacy reasons, problems that come with online posts, comments and status updates, online gossip, especially on Facebook, misunderstanding of information or technological concepts, lack of basic computer-literacy, lack of access to the Internet, non-availability of computer, general disinterests in the use of modern technologies, preference for face to face communication, economic cost of using cell phones in accessing the Internet, high cost of phone bills, and Internet subscriptions, and the like.

6.8. Importance of advocacy in Indigenous communities

The solution to Indigenous concerns involve continuous advocacy where dialogues have failed because there are undeniable evidences of the paradox of plenty in many provinces and regions of Canada. The situations in Northern Canada and several other Indigenous communities such as the western region of Canada are critically beyond description. Many Indigenous citizens of Canada are living in terrible conditions daily. In a bid to overcome the abuse confronting them, Indigenous people have decided to speak out against the social and environmental injustice taking place in their surroundings owing to the presence of agricultural industries and oil and gas industries. Although, some measure of progress comes from speaking out on the problems facing Indigenous

communities, there are other challenges surrounding risk communication. For example, the tendencies of the conventional media to censor what gets aired and what does not get broadcast (Olorunnisola and Martin, 2013). Since, problems of censored information and misrepresentation tend to come through conventional media; many Indigenous views have been mostly unaired. Therefore, the need for alternative means of risk communication calls for the deployment of NSM. Since NSM is becoming increasingly promising, it serves as a resourceful tool of advocacy in the hands of Indigenous youths for risk control. In this study, participants stated that in the event of risk outbreak, they would use NSM tools (i.e. Facebook). From the study, it could be clearly seen that majority of the youths communicated around risk with one another using New social media tools such as Facebook and Text messaging/SMS. The youths are more Internet savvy and at the cutting edge of modern day technology. Thus, Indigenous youths have made themselves heard through advocacy by using the NSM tools. Some socio-economic and cultural advancement has been achieved through advocacy done via the Internet. This is because the Internet takes the issue to a global perspective. As a result, Indigenous youths have been using the social media in order to make their voice heard regarding their Treaty rights as they continue to take advocacy global.

6.9. Importance of consent acquisition with Indigenous communities

Furthermore, the industrial approach to the formulation of industrial objectives will require intentional dialogue with the Indigenous stakeholders. Considerations of such dialogues require clarifying the when, the how and where such dialogues would take place in the course of the consultation. Therefore, the method, the process, the media must be considered and re-considered! If the evaluations of the aforementioned were effectively done, we could tell by the consideration given to both the online and offline communities. As a result, the right variables must be considered and re-considered. That is, it matters when, how and where these dialogues take place in the course of interaction between Indigenous communities and the industry. It matters what method, what process or what media was used?

Where NSM is deployed as a tool of science communication, data gathering, public engagement and enlightenment, approach to dialogue and consent acquisitions from Indigenous communities require the formulation of models that respect Indigenous culture and traditions. Therefore, research, especially those conducted with marginalized, vulnerable and at-risk communities must ensure that the voice of the oppressed is heard. As a result, the unconventional media becomes more necessary because this is the platform where the message, the masses, the methods, and the media are open, free, and democratic (Olorunnisola and Martin, 2013).

Therefore, the increasing interest in the new social media technologies as well as the increasing need for public participation in research will continue to birth inevitable networks. As the social structures are birthed, there will be opportunity for social learning through public participation in research. The opportunity for

public engagement will transcend social learning and social interaction processes into knowledge mobilizations, translations and transmissions in order to create legacies of enhanced environmentally responsible citizenry. As a result, social media becomes the medium/media of our interaction within which fairness to the silenced voice would continue to be heard and fair representations achieved. Thus, the medium is the message.

6.10. Implications of ignoring environmental injustice

This study gave foresight into the likely implications of ignoring the warning signals regarding hazards among vulnerable populations. The economic implications of ignoring the outcry over environmental injustice for the industrial stakeholders might be boycott of products, negative business branding and image, poor public relations, national and international defamation, and such like. The negative image may lead to customers' avoidance of dealing with oil and gas companies as well as the large-scale agricultural companies that are causing pollution by spraying chemicals that are poisonous to the environment.

The cultural implications may be viewed as a plot to eradicate Indigenous culture through threats to their cultural traditions and heritage. The financial cost of fixing the problems for the industry might mean the tendencies to reverse their activities, introduce sustainable best practices in their extraction business which may overshoot the present production costs and thus minimize profits. The implications of not fixing the problems are the tendencies for the continuous

unrest in the state, extremity of chains of riot outbreaks, loss of lives, especially of industrial workers. In the past, outbreak of chaos had been reported in some parts of the world where resource mining takes place. Many of these regions probably ignored the warning signals before the outbreak of the pandemonium. The political implications are gradual loss of interest in the electoral process by the electorate. Until behavioral change occurs in government as well as among industrial stakeholders, the problems may remain for many years to come. Consequently, evaluation of the risk, understanding of the communication crisis, and analysis of the social and communication network may enhance the amelioration of these hazards.

6.11. Personal Reflections

A certain amount of disclosure is expected in qualitative research especially in working with Indigenous culture. This is an indication that we are equally normal and healthy psychologically. It also indicates that we genuinely trust the other person (s) and we respect and appreciate them enough to open up to them. Bringing personal attributes into a qualitative research process may sound utopian, but realistically not all of oneself is relevant in every sense of it. Sometimes, in the course of research process, not everything about one is useful and relevant to the situation encountered where one goes. Distinguishing what is necessary from what is not can sometimes be a struggle. Yet, understanding this reality and the differences may be a key to a rare gem of wisdom.

It has been said that in the journey of knowledge, one of the most important things is speaking up when you are confused. Yet it can be difficult to open up to strangers because of the risks that come with that. Somehow, telling my stories was not easy for me. The reason was not fear but for the reason that I did not see my story as anything interesting compared with other people's experiences. Although, every person's story is unique in themselves and I appreciate mine, but I do not want to be the centre of attention to the detriment of my research work. This was the main reason why for several months in my research with the Indigenous people, I was unable to share my story, until it became very necessary to do so. Although I am a people person with unique skills of connecting with new people and strangers everywhere I go, yet I was full of self-doubts and apprehensions when I came into a new culture because of the culture shock effects that most people can identify with.

Our stories are the fertile soils with which the seed of trust interact. Until the soil (story) is dug up, the seed of relationship remains dormant. All my life, I have always loved to travel because it offers the opportunities for learning something new, seeing somewhere different and connecting with people I would not have been able to meet. One of the things I loved most about the research I conducted with the Indigenous communities was the opportunity to travel. I took my mind, myself and my story into the midst of the Indigenous communities of western Canada and I came away with their stories, realities, perspectives, and with as many lessons as possible.

I grew up in a middle class family and the challenges of growing up from a lowly background have been a struggle from childhood. However, this also became the source of my momentum for working hard. I was drawn to anything and anyone that would challenge and push me forward towards success and achievements. I became very tenacious about success because I wanted to help myself, my family, and my society. I just wanted my life to count. I wanted to make a difference in my lifetime. As I grew up, I became very restless and hungry for meaning. I wanted to know what life entails, and suck the best out of it and make impact. I did not want to depart from this life with a question mark on my heart.

While growing up, I had the opportunity to mingle with a diversity of people and ethnicity. I grew up learning about interactions with the Elders, the strangers and the neighbors. Besides proverbs, stories, folktales, sign language, body language, and so on, I was taught how to survive with little or no resources. We ate whatever was available. There was no chance to choose or reject anything. We accepted everything given to us in good fate with goodwill and grateful heart. In Indigenous culture, I saw this similarity because the Indigenous people also share together. They avoid wastage of resources. They ate whatever they were able to get from hunting and fishing.

Everybody would share whatever is available. However, in contrast, this was not the same experience I saw in the western culture because of the level of abundance, there is the tendency to be wasteful and one even expects everything

to come on a platter of gold. This was a major culture shock to me! I did not understand how I could fully relate with someone who often comes around with an air of pride, sense of entitlements and threats over some forms of rights they inherited because they were privileged to be born in some parts of the world. I did not understand why someone would lay claim to something like rights and go as far as abusing those rights which they did not labor for. Rather they have acquired these rights because they were born within the boundary of a specific geographical location on planet earth.

As a student Activist while living and studying in Nigeria, I disliked injustice in every sense. As a result of my thirst for justice, I went into advocacy for fellow students, defending their academic and social rights. While I was in Lagos state Polytechnic in Nigeria, West Africa, (where I studied General Agriculture), I deployed my speaking and writing abilities in advocacy and students' protests in the defense of my fellow students. Although, my academic program was General Agriculture, my passion was activism. I exhausted most of my time on missions such as student union, politics, social groups, as well as journalism. After a while, I advanced into the position of the Deputy Editor in Chief of the Press Club on campus. At the same time, I was the local chapter president of A Non-governmental organization known as All Nigeria United Nations Students and Youths Association (ANUNSA). I ensured that no injustice went unreported, unexposed under my watch. Many marginalized students became part of my circle of friends because we took up the issues together as a team.

During my Bachelors degree program in the university in Nigeria, I shot low budget films as sponsoring independent productions was a big struggle then and now. Yet attempting a worthy project always expands one's capacity as an individual. Another area of my capacity building was through reading. I studied the works and biographies of people like Socrates, Plato, Aristotle, Leo Tolstoy, Ghandi, Martin Luther King Jnr, Malcom X, Muhammad Ali, Nelson Mandela, Abraham Lincoln, Winston Churchill, and such like. During the era of political transition, I joined a minority political party in rallies because of their value. I did not mind if they would lose or win. It mattered to me that I belonged to the circle of those who shared the same values and ideals with me. I was all out for a social reform in my own way. In my little capacity, I tried to make my life count in the social and political reformation exercise. We campaigned throughout Lagos city. We went to the polls to lose gallantly because we would not bribe our way into winning like the ruling party. Our political party lost at the polls partly due to corruption in the political systems of Nigeria. Nevertheless, that did not deter me from holding on to my belief system in democracy. I believe in a federal system that stands for the freedom of the state, where the poor and the oppressed are catered for.

I graduated from the university to serve the nation in the National Youth service Corps (NYSC) program. This was a compulsory one year period in paramilitary program where every graduate serves the country in one capacity or the other.

During this period, I was into the drama squad, radio broadcasting, and facilitations of peer education training on HIV/Aids. After the NYSC service year, when I could not find a job because of age limit factor imposed on many Nigerian graduates, I went into teaching. I started my own business of consulting, operating as extension officer and recruiter for farmers. I wrote and published my first book during this time. I ensured that that season was fully maximized. I immigrated to Canada and I continued my advocacy online through blogging and writing for Newspapers in Nigeria on social change. Being a member of a minority group in Canada, it has taken a long difficult road to understand the culture of Canada. I came from a communal society and lifestyle into an individualistic society. It was hard for me at first. However, I learnt to adjust.

I detest injustice in any form. The qualitative research I conducted in my Masters program gave me an opportunity to address injustice in some way. I appreciate the saying: “injustice to one is an injustice to all.” I cannot forget these lines from the excerpt of Martin Luther King Jnr's letter from Birmingham Jail, which was written on 16 April 1963. In the letter he said and I quote:

"...I am in Birmingham because injustice is here. Just as the prophets of the eighth century B.C. left their villages and carried their "thus saith the Lord" far beyond the boundaries of their home towns, and just as the Apostle Paul left his village of Tarsus and carried the gospel of Jesus Christ to the far corners of the Greco Roman world, so am I compelled to carry the gospel of freedom beyond my own home town. Like Paul, I must constantly respond to the Macedonian call for

aid. Moreover, I am cognizant of the interrelatedness of all communities and states. I cannot sit idly by in Atlanta and not be concerned about what happens in Birmingham. Injustice anywhere is a threat to justice everywhere. We are caught in an inescapable network of mutuality, tied in a single garment of destiny. Whatever affects one directly, affects all indirectly. Never again can we afford to live with the narrow, provincial "outside agitator" idea. Anyone who lives inside the United States can never be considered an outsider anywhere within its bounds..."

The words of Martin Luther King Jnr aligned with the thoughts of John Donne who said in his poem that:

> *"No man is an island,*
> *Entire of itself.*
> *Each is a piece of the continent,*
> *A part of the main.*
> *If a clod be washed away by the sea,*
> *Europe is the less.*
> *As well as if a promontory were.*
> *As well as if a manner of thine own*
> *Or of thine friend's were.*
> *Each man's death diminishes me,*
> *For I am involved in mankind.*
> *Therefore, send not to know*
> *For whom the bell tolls,*
> *It tolls for thee."*

I strongly believe in the words of these great minds and they have really shaped my thinking. However, going into any new place, you must understand the culture before you can fully help the people therein. This in part is the reason why qualitative research was my preference for my Masters program. Although, my academic background in Nigeria was quantitative research; however, I wanted to have balanced perspectives of other methods of conducting research. Thus, I enlisted for a qualitative research with the Indigenous communities of western Canada. I was able to achieve these objectives through an ongoing research work

funded by PRIONET and Social Sciences and Humanities Research Council (SSHRC) research.

Living and working with the Indigenous communities brought a major turning point in my academic life because the similarity of many Indigenous cultural codes of conducts to the African race made it easy to understand and appreciate. Although, it was a very exciting experience for me, as I was able to feel at home with the Indigenous people of Canada; however, there were some conflicting beliefs around some aspects of the Indigenous culture that gave me a serious culture shock! Thankfully, I understood basic ways of behaving among the Indigenous people from my African upbringing and training. In the end, it was a worthwhile experience.

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APPENDICES

Appendix I: Interview questions phase one

1. What are the concerns (if any) you have about the environment, wildlife health in your community?

2. What is the relationship of your community with the government like?

3. Have you ever contacted the government around your concerns about wildlife health and environmental health issues? What was the response like?

4. If you see a chemical spill somewhere in the environment, say you found a chemical spill out in the bush, who do you talk to about this?

5. Do you have a cell phone, (if so, how do you use it and what purpose do you use this technology for?) who do you text with your cell phone?

6. Do you have a Facebook or Twitter account? Who are your network of friends on Facebook and Twitter; and what do you communicate about, online through the new social media?

Appendix II: Questions of Focus Group Discussion 1 -phase 2

The first homogenous FGD questions are:

(i) How will you (as participants) use the Facebook to communicate in any event of a pesticide spray or an oil spill in the community?

(ii) And if there was an outbreak, who will you contact?

(iii) Who will your contact person be in a risk situation like an outbreak?

Questions of Focus Group Discussion 2 - phase 2

The second homogenous FGD questions are:

(i). Who do you talk to on Facebook that is within the community?

(ii). Who are these people? Are they Hunters?, Fishermen, Harvesters?, Officials?, Elders? Can you classify them?

(iii). Is there any reason why you do not interact more with Harvesters (Fishermen/Fisherwomen) in Saskatchewan?

(iv). How can you use Facebook to communicate when there is pesticide spray in the community?

(v). If you use Facebook to communicate on pesticide spray, who will those people in your Facebook network talk to? Who will your Facebook friends communicate with?

(vi). Who are the people you will text/SMS in case of any emergency around wildlife? Say wildfire outbreaks or oil spill in hunting areas within the community?

(vii). Who will the recipients of your text message communicate with, regarding your emergency Text/SMS? Who will they forward your text/SMS to?

Appendix III: ***Net-mapping Questionnaire***

The questionnaire used for Net-Mapping are posted below:

OVERALL GOAL OF THIS RISK MAPPING MEETING:

The goal of this workshop is for us all to explore the use of new social media (Facebook, Twitter, texting etc.) in your community, what it is used for now, and how it might be used to communicate risks related to the environmental and human health

Individual tables

Please fill in the following background info tables before we begin the group interview

1) How *many times in the last week* do you use (check off a square in each row in the table)

	Less 1X/ month	*1X/ mth*	*2-3X/ mth*	*1X/ week*	*2-5X/ week*	*5-10X/ day*	*>10X/ day*	*NEVER*
Talk in person								
Phone (regular)								
Phone (texting)								
Internet (computer)								
Internet (phone)								
Facebook								
Twitter								

2) Who and how many in each do you talk to with each of these media –say last week (check off a square in each column. For example: 5 family members last week.

	Family/ friends	*Community member*	*Elders*	*Community leaders*	*government*	*industry*	*researcher*	*Not Approp.*
Talk in person								
Phone (regular)								
Phone (texting)								
Internet/ Computer								
Internet (phone)								
Facebook								
Twitter								

3) Why do you participate in each of these activities. Rank from 1-5 (1 most important, 5 least important. Use each number (1-5) only once in each column.

	In-person (1least-5most)	*Phone call (1least-5most)*	*Texting (1least-5most)*	*Facebook (1least-5most)*
Fun to do				
Making plans				
News (outside community)				
News (within community)				
Stay in touch with folks				

Focus group questions of Net-mapping meeting

4) In what ways does new social media (Facebook, texting, Twitter) work well when communicating with folks you know, say in comparison to talking to them in person or by phone?

5) What *barriers or limitations* exist to your using new social media - for you and for other community members?

Is *anything lost* thru new social media compared to other forms of communication?

6) How useful might new social media be used to communicate risks associated with human health and wildlife health (why or why not)

Introduction to Risks scenario mapping

We are going to create a *risk scenario*. This is a role playing activity where we pretend that something *quite frightening* is happening. And then ask you to identify who you would contact as a result. As indicated above, this might be family members, friends Elders or community leaders, or outsiders (e.g. government, industry, researchers, or others). As a group, we will *identify and map out* who these people are, and then ask you some questions about each of these people. We will do this for each of the following media: texting, Facebook, in-person, and telephone

Risk mapping scenario

They have discovered that this wasting away disease that kills deer and elk can be transferred to humans. And that it will kill humans as well. Who do you contact to tell them of this news? Indicate by name, in case other people would also contact that same person. Also for each, identify their role in your community and outside (Elder, student, counselor, politician)

Brainstorm after the fact (looking at the four diagrams)

7) How are these four communication networks *different* from one another?

8) How is each of these networks strong or effective?

9) What if any gaps exist in these network…i.e. who or what is left out

<u>Individual tables</u>

We will look at two of the four network maps in greater detail. For each person in the network you have identified through talking-in-person and through texting, please rank from one to five according to the following criteria

i) **Relationship to you** (child, sister/brother, parent, auntie/uncle, friend, work mate, professional)
ii) **Closeness to you**: 1 (not close) to 5 (very close)
iii) **Influence on you personally** 1 (slight influence) to 5 (very influential)

iv) **Influence within your community**: 1 (slight influence) to 5 (very influential)
v) **Influence on the outside word**: 1 (slight influence) to 5 (very influential)
vi) **Direction of influence** (from you to them, from them to you, both ways, neither way (no line)

For the talking in-person network. Please indicate for each person in your own social network (i.e. ones linked to your own name)

Person	**Relationship (family, friend, community**	**Closeness (1least – 5 most)**	**Influence on you (1least - 5most)**	**Influence-community (1least - 5most)**	**Influence-outside (1 least - 5most)**	**Direction (you: them, them: you, both, none)**

For the texting network. Please indicate for each person in your own social network (i.e. ones linked to your own name)

PERSONAL (name)	*Relationship (family, friend, community,*	*Closeness (1least – 5 most)*	*Influence on you (1least - 5most)*	*Influence - community (1least-5most)*	*Influence-outside (1 least - 5most)*	*Direction (you: them, them: you, both, none)*

Appendix IV: ***Names and abbreviations of participants in the Net-Mapping***

Serial number	**Participants' names**	**Name abbreviations**
1	Trenton Wendon Quet	TWQ
2	Quinto Troy Quew	QTQ
3	Cutbert Keshane	CUK
4	Robert Flores	ROF
5	Langford Whitehorse	LAW
6	Thunder Strongquill	THS
7	Edna Kakakakaway	EDK
8	Shawn Kakakaway	SHK
9	Claire Mutare	CLM
10	Dyamin Kakakaway	DYK
11	Shelly Cote	SHC
12	Elrose Severight	ELS
13	Bert Mecas	BEM
14	Brenda Kakakaway	BRK
15	David Kakakaway	DVK
16	Bradley Kakakaway	BAK
17	Denale Mintuck	DEM
18	Robert Severight	ROS
19	Loraine Kamsach	LOK
20	Geraldine Mecas	GM

Appendix V: Ethics

Fort Garry Campus Research Ethics Boards

CTC Building, 208 - 194 Dafoe Road

Winnipeg, MB R3T 2N2

Protocol # _____(Assigned by HES Admin.)

FORT GARRY CAMPUS RESEARCH ETHICS BOARD

PROTOCOL SUBMISSION FORM

Psychology/Sociology REB □ Education/Nursing REB □ Joint-Faculty REB √

Check the appropriate REB for the Faculty or Department of the Principal Researcher. This form, attached research protocol, and all supporting documents, must be submitted **in quadruplicate** (original plus 3 copies), to the Office of Research Services, Human Ethics Coordinator, CTC Building, 208 - 194 Dafoe Road, 474-7122.

Principal Researcher(s): _____Dr. Stéphane McLachlan_____

Status of Principal Researcher(s) (please check): Faculty √ Post-Doc □
Student: Graduate □ Undergraduate □ WRHA Affiliate □ Other □

Project Title: _In Land and Life: Implications of Chronic Wasting Disease and Other Wildlife Diseases for Aboriginal Communities and Other Stakeholders_

Start date: 04/01/2009____ Planned period of research (if less than one year): ___

Type of research (please check):

Faculty Research **Administrative Research Student Research**

Self-funded □ Sponsored √ Central □ Thesis □ Class Project □

(Agency) _PrioNet Canada_ Unit-based □ Course Number:_____

Signature(s) of Principal Researcher(s):_____

Name of Thesis Advisor: __Dr. Stéphane McLachlan__ **Signature**_____

(Required if thesis research)

Name of Course Instructor: **Signature**_____(Required if class project)

Persons signing assure responsibility that all procedures performed under the protocol will be conducted by individuals responsibly entitled to do so, and that any deviation from the protocol will be submitted to the REB for its approval prior to implementation. Signature of the thesis advisor/course instructor indicates that student researchers have been instructed on the principles of ethics policy, on the importance of adherence to the ethical conduct of the research according to the submitted protocol (and of the necessity to report any deviations from the protocol to their advisor/instructor).

Ethics Protocol Submission Form

(Basic Questions about the Project)

The questions on this form are of a general nature, designed to collect pertinent information about potential problems of an ethical nature that could arise with the proposed research project. In addition to answering the questions below, the researcher is expected to append pages (and any other necessary documents) to a submission detailing the required information about the research protocol (see page 4).

1. Will the subjects in your study be

   UNAWARE that they are subjects? ____ Yes __√ No

2. Will information about the subjects be obtained from sources other than the

   subjects themselves? ____ Yes __√ No

3. Are you and/or members of your research team in a position of power vis-a-vis the subjects? If yes, clarify the position of power and how it will be
   ____ Yes __√ No addressed.

4. Is any inducement or coercion used to obtain the subject's participation?
   __√ Yes ____ No

5. Do subjects identify themselves by name directly, or by other means that allows you or anyone else to identify data with specific subjects? If yes, indicate how confidentiality will be maintained. What precautions are to be undertaken in storing data and in its eventual destruction/disposition.__√ Yes ____ No

6. If subjects are identifiable by name, do you intend to recruit them for future

   studies? If yes, indicate why this is necessary and how you plan to recruit these subjects for future studies.____ Yes__√ No

7. Could dissemination of findings compromise confidentiality? __√ Yes ____ No

8. Does the study involve physical or emotional stress, or the subject's expectation thereof, such as might result from conditions in the study design? __ Yes__√ No

9. Is there any threat to the personal safety of subjects? ____ Yes__√ No

10. Does the study involve subjects who are not legally or practically able to give their valid consent to participate (e.g., children, or persons with mental health problems and/or cognitive impairment)? If yes, indicate how informed consent will be obtained from subjects and those authorized to speak for subjects. ____ Yes__√ No

11. Is deception involved (i.e., will subjects be intentionally misled about the purpose of the study, their own performance, or other features of the study)?
_____Yes__√ No

12. Is there a possibility that abuse of children or persons in care might be discovered in the course of the study? If yes, current laws require that certain offenses against children and persons in care be reported to legal authorities. Indicate the provisions that have been made for complying with the law.___ Yes__√ No

13. Does the study include the use of personal health information? The Manitoba Personal Health Information Act (PHIA) outlines responsibilities of researchers to ensure safeguards that will protect personal health information. If yes, indicate provisions that will be made to comply with this Act (see document for guidance http:/www.gov.mb.ca/health/phia/index.html). ____ Yes__√ No

Provide additional details pertaining to any of the questions above for which you responded "yes." Attach additional pages, if necessary. Re. (4). A $50 honorarium will be provided to participants in individual and group interviews to help defray the costs associated with participating and to affirm the value of their knowledge.

Re. (5) and (7). The participants will identify themselves by name in the research during individual and group interviews, and they will normally be identified if their responses (e.g. quotes) are explicitly used in the research. The outcomes of this research will be widely distributed in academic publications and in the popular media, and made available on the internet. Participants will not likely be anonymous and so confidentiality will not normally be maintained. This is desirable because this research is facilitated by recognizing the "experience-based" experts by name and also celebrates the importance of Aboriginal knowledge and participation. With the permission of participants, many of the interviews will likely be audio or video-taped, which generally undermines anonymity and confidentiality. Acknowledging participants by name is becoming commonplace in research with Aboriginal communities. It should be emphasized, however, that anonymity and confidentiality will be maintained should the participants so desire. In group interviews, those not wishing to be video recorded will sit off-camera. This research is iterative in nature. Participants will be able to vet the outcomes of the research before it is submitted for publication and may insist on anonymity at any point during this process, or indeed may withdraw from the research at any time.

In my judgment this project involves: √ minimal risk □ more than minimal risk (Policy #1406 defines "minimal risk" as follows: ". . . that the risks of harm anticipated in the proposed research are not greater nor more likely, considering probability and magnitude, than those ordinarily encountered in life, including those encountered during the performance of routine physical or psychological examinations or tests.")

____/____/____ _____

dd mm yr **Signature of Principal Researcher**

Ethics Protocol Submission Form

(Required Information about the Research Protocol)

Each application for ethics approval should include the following information and be **presented in the following order**, using these headings:

1. **Summary of Project:** Attach a detailed but concise (one typed page) outline of the **purpose** and **methodology** of the study describing **precisely** the procedures in which subjects will be asked to participate.

Background

Chronic wasting disease (CWD) has been identified in deer, elk, and moose across western US and Canada (Baeten *et al*. 2007, Happ *et al.* 2007, Vaske *et al.* 2006). Along with bovine spongiform encephalopathy in cattle and scrapie in sheep it comprises a class of zoonotic diseases known as transmissible spongiform encephalopathy (TSE). These TSEs have severe health and societal implications (McLachlan and Yestrau, accepted), especially for those who consume potentially infected animals (Bollinger *et al*. 2004). Already a source of fear for hunters (Seidl *et al.* 2003), CWD poses a critical risk for Aboriginal peoples as they have consumed wild ungulates for millennia (Vaske *et al*. 2006).

Longstanding disparities in health status between Aboriginal peoples and Canada's larger population are widely recognized and have been identified as a "national disgrace" (Health Canada, 2003). This disparity is reflected in their heightened exposure and vulnerability to wildlife-borne diseases and environmental contaminants as a whole. Wild meats continue to be a central part of diets and are key to the well-being of most remote Aboriginal communities (Gyorkos *et al*. 2002, Kuhnlein and Chan, 2000). Many are concerned with increases of disease and contamination of wildlife across their territories (Van Oostdam *et al.* 2005) as well as health crises, particularly diabetes, that occur when traditional foods are replaced by processed ones.

This vulnerability is compounded by the general lack of effective risk communication regarding wildlife health with Aboriginal communities (Arquette *et al*. 2002). Ad hoc communication surrounding wildlife health is commonplace when it occurs at all, resulting in distrust of government and other experts in Aboriginal communities. Such concerns are exacerbated by poorly informed media coverage (Arquette *et al.* 2002). These systemic shortcomings cause widespread stress, act to endanger personal health, and undermine age-old livelihoods, and cultural and spiritual traditions. This distrust will inevitably compromise future attempts to understand and communicate risks and responses associated with CWD and other wildlife zoonotics. Yet few disease-related studies adequately consult with these vulnerable communities, much less

incorporate their rich knowledge systems and active input in the understanding, management, and communication of these risks (Brook and McLachlan 2005, 2006, 2008).

Purpose

The goal of this study is to explore the implications of CWD and other wildlife zoonotics for Aboriginal communities and other stakeholders and to communicate these concerns in culturally appropriate ways with affected communities, government, and other stakeholders. More specifically, this study will:

- Evaluate risks associated with CWD and other zoonotics and their implications for Aboriginal communities and other stakeholders (e.g. hunters, tourism, ranchers) in Alberta and Saskatchewan
- Develop community-based and culturally appropriate models of risk communication that will better understand, manage and communicate these risks in the future
- Initiate a form of national policy forum as a vehicle of exchanging knowledge associated with this study

This study would be the first of its kind in North America and would help address the severe gap that occurs between Aboriginal communities and experts regarding zoonotics and both human and environmental health.

2. **Research Instruments:** Attach copies of **all** materials (e.g., questionnaires, tests, interview schedules, etc.) to be given to subjects and/or third parties.

A preliminary research instrument that will facilitate our contacting Aboriginal and other stakeholders affected by CWD and other zoonotics is attached. This information will in turn allow us to develop a more refined and community-focused set of semi-directed questions that we will submit at a later date as an amendment.

3. **Study Participants:** Describe the number of participants, and how they will be recruited for this study. Are there any special characteristics of the subjects that make them especially vulnerable or require extra measures?

We have been invited by leaders in Alexis Nakota Sioux Nation to initiate a multi-scale study on wildlife diseases (see attached letter). We have a decade-long research and education based relationship with this community. Over the course of this research, we will broaden the scope of the research to include all eight communities represented by the Yellowhead Tribal Council in Alberta. A wide variety of stakeholders will be interviewed including Aboriginal leaders, government and university experts, wildlife and agricultural agencies, agricultural stakeholder groups, and hunter organizations. In addition, elders and community leaders in Alexis and other communities represented by the Yellowhead Tribal Council will be interviewed in the future. Interviews will be either audio/video-taped or recorded in writing depending on the preferences of the research participants. A community advisory committee will be established

that gives guidance to the research. Moreover, an Elder will be hired as a cultural liaison, and she will also provide direction for the research. It is anticipated that, 75-100 people will participate in the research

4. **Informed Consent:**

Focus group and interview participation will be completely voluntary and accompanied by a signed official University of Manitoba consent form (see attached consent forms).

5. **Deception:**

There will be no intentional deception used in conducting the proposed research.

6. **Feedback/Debriefing:**

Once the data from the individual and group interviews have been transcribed, analyzed, and summarized, the participants will be given the opportunity to review and verify their responses. This feedback enables the respondent to identify any information they wish to have excluded from the results or if they wish to have their interview withdrawn from the research altogether. The responses will be returned in hard copy format and/or orally, depending on the wishes of the participant.

7. Risks and Benefits:

There are no anticipated risks for participants in the proposed research.

8. **Anonymity and Confidentiality:**

These data are *unlikely* to be anonymous, unless anonymity is requested by any participant. Any named participants would be allowed to examine the final research products before they were released to a larger audience, and insist on anonymity at any time during this process. Information that is deemed confidential by the participant will not be published. Written, audio-taped, and video-taped responses will be stored in a locked cabinet, accessible only by the primary researchers in this project. These raw data will normally be destroyed once the project is completed (five years hence). An additional copy of all data will be provided to the community, over which they will maintain control.

9. **Compensation:**

Compensation will be provided in the form of a $50 honorarium for participation in the focus group and/or individual interviews. It will be stressed that the compensation will be provided regardless of their complete participation, ensuring that they do not feel pressured into participating beyond their level of comfort. This payment will help offset the cost for participating in the focus groups and/or interviews.

Ethics Protocol Submission Form

Review your submission according to this:

Checklist

Principal Researcher: _____Dr. Stéphane McLachlan_____

T	Item from the Ethics Protocol Submission Form
	All information requested on the first page completed in legible format (typed or printed).
	Signatures of the principal researcher (and faculty advisor, or course instructor if student research).
	Answers to all 13 questions on pages 2-3 of Ethics Protocol Submission form.
	Detailed information requested on page 4 of the Ethics Protocol Submission Form in the numbered order and with the headings indicated.
	Ethics Protocol Submission Form in quadruplicate (Original plus 3 copies).
	Research instruments: 4 copies of all instruments and other supplementary material to be given to subjects.
	Copy of this checklist.

Protocol #____ J2008:164_____*Request for Renewal/Amendment*

Knowledge mobilization has long been a priority for our PrioNet-funded *In Land and Life* project. Our project has examined the implications of environmental decline for wildlife, environmental, and human health, and recently identified that moose kidneys and livers have elevated levels of the heavy metal cadmium. Research on environmental contaminants has a long-standing history of poor communication with vulnerable Indigenous communities, most of which continue use wildlife as an important food source and for ceremonial purposes. Indeed, because of poor communication many of these research outcomes undermine traditions and create concern and even fear regarding these country foods. Over the last two years we have been using campouts and newsletters as a key way to communicate our research outcomes with the partner communities in Alberta and Saskatchewan as well as other stakeholders including researchers, government, and industry. Although they have yet to be adequately evaluated, both forms of outreach seem to resonate strongly with community members. Our intent here is to formally evaluate the newsletters and campouts as culturally appropriate forms of knowledge mobilization. We are also interested in the potential that new social media has for further facilitating knowledge mobilization between project scientists and community members in both Alberta and Saskatchewan. Younger community members use mobile phones for texting and Facebook and Twitter to communicate with one another. These media also have great potential to facilitate more effective knowledge mobilization with young adults and youth, who have thus far been largely left out of our research communication. Our intent is to interview youth (i.e. 18-25 years) and young adults (i.e. 26-35 years), However, should younger youth (i.e. 15-17 years) want to participate, we would accommodate this interest – with the permission of their parents or guardians. We have thus included both assent and consent forms regarding the latter group.

1. Question Amendment

The following questions are a revision of the previously approved questions for the Aboriginal community members based on community input.

Evaluation of Newsletters as a form of culturally appropriate Knowledge Mobilization (semi-directed interviews conducted with community members (10) as well as researchers (5) and government staff (5) who have received these newsletters)

have you heard of or read the newsletters associated with the *In Land and Life* project? how would you describe them and their intent to an acquaintance who had not heard of them before?

- what, if anything, do you like about the newsletters?
- what, if anything, would you want to change about the newsletters?
- a primary purpose of these newsletters has been to facilitate communication regarding the progress and outcomes of our In *Land and Life* research project. How effective do you feel these newsletters have been as a way of communicating this

research? what if anything would you do to make the newsletters more effective as a vehicle for research communication? what other ways might we better communicate these research outcomes of the In Land and Life project with community members?

Evaluation of Culture Camps as a form of culturally appropriate Knowledge Mobilization (semi-directed interviews conducted with community members (10) as well as researchers (5) who have participated in the research campouts and some community members (5) who have not participated) what is the role of culture campouts in your community and other Aboriginal communities you have interacted with historically? currently? the *In Land and Life* project has now funded two of these culture camps; what if anything have you heard about these research campouts? did you participate in either of these two campouts? if so, please describe your experience and those of others who participated. If no, please indicate why not and describe, if appropriate, what you have heard about them? what, if anything, do you like about your experiences in and the intent of these campouts? what, if anything, would you want to change about these research campouts? a primary purpose of these two campouts has been to facilitate communication of the progress and outcomes of our *In Land and Life* project. How effective have these campouts been as a way of communicating this research? Please speak more specifically about whether and to what degree the campouts facilitated communication between researchers and community members. what, if anything, would you do to make the research campouts more effective as a vehicle for research communication?

Evaluation of New Social Media as a form of culturally appropriate Knowledge Mobilization

Phase One: semi-directed interviews conducted with community Elders (6), young adults (6) and youth (6)

Phase Two: focus group interviews conducted with youth (two groups, with 6-9 participants in each)

Phase Three: one pilot study in Alexis Nakota Sioux Nation conducted with young adults (5) and youth (5) as well as scientists (5)

Phase One (Interviews with Elders, young adults, and youth to provide cultural context for KM)

a) <u>Questions for the elders</u>:

- What concerns do you have around the health of wildlife and the environment in and around your community? What if any concerns around human health in your community?
- Have these concerns affected your consumption of country foods? Why or why not?
    - What are the sources of these concerns? Your own observations
    - Observations of other community members (word of mouth); if so who?
    - The media; if so which media? Government; if so directly with you or through others in the community, especially youth? Other?
    - Have you ever contacted the government around the concerns you have on wildlife health and environmental health? How did they respond and why

did they respond this way? What relationship do you have with government officials about wildlife and the environment?

- If you had a concern about the health of wildlife or the environment, say you found a chemical spill out in the bush, who would you talk to?
- What impact would this have? We are interested in the role of youth in better communicating any community concerns, and the role that computers might play in helping communication. What is the current impact of computers, the internet, and cell phones in the community, especially as it relates to youth
    - good; how so? bad; how so?
- Our thinking is that youth might be a link between scientists and other community members around wildlife and environmental health. That they could collect photos and share them on the internet and using their cell phones with scientists. Scientists could send them back information, which they could then share with other community members.
    - What do you think about this idea
    - What do you think about youth playing this role and being a link between communities and scientists?
    - How would you respond to a youth who had been communicating about an environmental concern, say a chemical spill, in this way
    - Would this project change the way you feel about the internet?

b) *Additional questions for young adults (in addition to the questions listed above for Elders):*

- What access to the internet and cell phone exists within the community
    - What if any barriers exist around their use?
- Do you and/or others that you know within the community access Facebook or Twitter? What if any barriers exist around their use?
- How useful are those tools like Facebook in communicating risks around wildlife and human health?
- If you saw a chemical spill in the bush for example, could New Social Media tool like cell phones, Facebook or Twitter be useful in communicating any associated risks?
    - other community members?
    - community leadership?
    - allies (e.g. environmental groups)?
    - government?
    - industry?
    - conventional media (newspapers, television)?
    - new media (Internet)?
- Do you think this project would work; why or why not?
    - How would Elders and other community members view this project
    - Would your role as youth in this project be controversial; why or why not?

c) *Additional questions for youth (in addition to the questions listed above for Elders):*

- What access to the internet and cell phone exists within the community?
    - what if any barriers exist around their use?
- How prevalent is the use of Facebook or Twitter within the community?
    - Who uses these media and for what purpose?
    - What if any barriers exist around their use?

- How useful might tools like cell phones, Facebook, and Twitter be in communicating risks around wildlife and human health?
- If you saw a chemical spill in the bush for example, could New Social Media tool like cell phones, Facebook or Twitter be useful in communicating any associated risks?
    - with other community members? with leadership?
    - with allies (e.g. environmental groups)?
    - with government? with industry?
    - with conventional media (newspapers, television)?
    - with new media (Internet)?
- Do you think this project would work; why or why not?
    - How would Elders and other community members view this project
    - Would your role as youth in this project be controversial; why or why not?

Phase Two (two focus group interviews conducted with youth, most if not all of which will be 18-25 yoa)

- for each of the following social media (i.e. mobile texting, Facebook and Twitter), please indicate:
    - who you communicate with
    - how often
    - for what purpose
    - with what impact
- how and to what effect would your network be used to communicate concerns about wildlife and environmental health?
- If you were to design a project around an environmental crisis, say a large scale chemical spill in your traditional territories
    - how would you use this network to inform its members
    - how would you use this network to expand its impact across your community, including those that do not use social media
    - how, if at all, would you incorporate outside scientists into this network

Phase Three (one pilot study in Alexis Nakota Sioux Nation conducted with young adults)

- Create a pilot project around the use of new social media to communicate risks associated with declining wildlife and environmental health
- Please load past and current photographs depicting sick wildlife on Facebook and to text and tweet one another and participating scientists
- What worked with this project and what could be changed
- How effective might this model be for communicating risks to wildlife, environmental, and human health in the future?

2. Consent Forms Amendment

The following are the consent forms for the interviews around the evaluation of knowledge mobilization written to be comprehensible to community members and other participants. Those for Elders and young adults, and older youth are the same consent forms, where was those for minors would involve both assent and consent forms.

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Informed Consent Form (Individual Interview)

Research Project Title: In Land and Life: Evaluation of culturally appropriate forms of knowledge mobilization between scientists and community members

Researchers: Stéphane McLachlan, Andrew Miller, and Babawale Odunuga, Environmental Conservation Lab, Department of Environment & Geography, University of Manitoba

Sponsors: PrioNet Canada, SSHRC

This consent form will give you a basic idea of what our research is about. It will also show how you might become involved in this research project. We will leave a copy of this form with you. Please feel free to ask if you have any questions or if you would like to find out more about the research.

You are about to participate in a semi-directed interview. This will allow you to share your experiences and opinions regarding communication around wildlife, environmental, and human health. We will also ask you about the use of newsletters, culture camps, and/or Internet technology to bring attention to these issues. Your knowledge is very important in this research. It will help us all understand what changes you are seeing on the land, how you feel about the past and present communication around these changes and what may be the best way to address communication problems. It will also help us learn how to increase the usefulness of newsletters, culture camps, and Internet and cell phones in communication regarding our research.

You will receive $50 for participating in this interview. The interview will take 30-60 minutes to finish. During this time, we will ask you a number of open-ended questions to encourage discussion. Please feel free to say anything you want during these interviews. If you agree, we will record your interview as audio (sound only) or video (sound and image). If you do not agree to be recorded that is fine as well. We would then translate these recordings into a written form. A copy of the written form will be given to you so you may look over and change any of your responses. If you agree, the video of your interview may be used as part of a larger video. If your footage is used we will show you the larger video first. We will try and make any changes to that video that you want. If you agree, we will show the larger video to others. It might be shown to the community and other participants. Again, we will only record your interview if you agree. If you do not want people to know that this is you on the recordings, we can do this as well. This is often referred to as "confidentiality". The information you share with us will be stored in a locked cabinet at the university for five years. Only the researchers will be able to see the original information. Another copy of the information will be given to you. We will

destroy the university copy after five years. 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. You will be free to withdraw at any point in the research. Your information will be used to create a final report. The report will be given to you and to the community. This information may be used in research papers that are published in scientific journals. Some of the information will be put on the Internet website for our research project. You can find this website at <www.inlandandlife.ca>. We will also provide you with a copy of the newsletter about the research. If you are comfortable about being videotaped, these recordings will be shown to you. Other people that might see the video may include community members, members of other First Nations, university researchers, and government and industry representatives. Parts of the video may also be loaded onto our project website on the Internet. Again, we will show you copies of all reports, academic papers, and videos before we share them with a wider audience. This will allow you to give us feedback on this information. It will also allow you to correct any mistakes. You can drop out of this research project at any time. If you wish, we can then take your information out of the research project and give it back to you. We will now ask you to sign this form. Your signature shows that you understand how and why you are participating in the research. Your signature also shows that you agree to participate in the research. You are still able to withdraw at any point in this research. If you have any questions please feel free to ask at any time. This research has been approved by the Joint-Faculty Research Ethics Board at the University of Manitoba.

In conclusion, please indicate in the boxes below which of the following you agree to:

☐ Permission to **video-record** for research purposes or

☐ Permission to **audio-record** for research purposes., or

☐ **No** permission to either **audio or videotape-record** for research purposes And ☐ Permission to **release confidentiality** in any research outcomes that arise from these interviews or

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Researchers: Stéphane McLachlan, Andrew Miller, and Babawale Odunuga,

Environmental Conservation Lab, Department of Environment & Geography, University of Manitoba

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Researchers:	Stéphane McLachlan, Andrew Miller, and Babawale Odunuga, Environmental Conservation Lab, Department of Environment & Geography, University of Manitoba
Sponsors:	PrioNet Canada, SSHRC

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Informed Consent Form (Group Interview)

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Researchers: Stéphane McLachlan, Andrew Miller, and Babawale Odunuga, Environmental Conservation Lab, Department of Environment & Geography, University of Manitoba

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And

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Name_____

Address _____

Phone Number _____ Email Address _____

_____ _____

Participant's Signature Date

_____ _____

Researcher's Signature Date

Parental/Guardian Informed Consent Form (Group Interview)

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Name
_____

Address _____

Phone Number _____ Email Address _____

_____ _____

Parent's or Guardian's Signature Date

_____ _____

Researcher's Signature Date