

PROMOTING THE RELATIONSHIPS OF PLANTS AND HEALTH WITHIN  
WESTBANK FIRST NATION

by

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## **Abstract**

In this thesis I present a community-based participatory research project analyzing principles for the management of non-timber forest products within Westbank First Nation (WFN). This work situated WFN perspectives within current research on Aboriginal understandings of human and ecological health. The mixed method approach of this project utilized qualitative community knowledge and quantitative, field-based research. The results from the qualitative components detail community understandings of the connection between plants, health, and the environment. These connections were summarized in community principles for managing native flora and creating culturally-grounded ecological education. The quantitative research component analyzed the current distribution characteristics of *Shepherdia canadensis* (L.) Nutt., Elaeagnaceae within the Central Okanagan. Distribution characteristics and various plant community associations were analyzed using a plot-based field methodology. This information was compared to community input regarding the historical distribution of *Shepherdia canadensis* (Okanagan - sx<sup>w</sup>usəm) in the region. The current fragmented distribution of *Shepherdia canadensis* implies the potential for a broad historical access to this plant at low elevations. This broad distribution was in accordance to the accounts of some community members. This particular information provided an example of how traditional ecological knowledge (TEK) has the potential to improve questions within resource management practice. On a broader level, this data provided some context to discuss effectively co-managing for resources within changing ecosystems. As a whole, this thesis presents an example of how Aboriginal perspectives of health and ecology relate to their conceptions of managing resources and how these perspectives should be engaged to promote effective management practice.

## **Preface**

This work was a collaborative project between UBC Faculty of Land and Food Systems and Westbank First Nation (WFN) with the input and participation of the UBC Institute for Aboriginal Health. The project received Behavioural Research Ethics Board approval from the UBC Office of Research Services (ref. H07-01457). The thesis incorporates the usage of the Okanagan language, Nsyilxcen, where applicable. Okanagan words are written according to the International Phonetic Alphabet.

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### **List of Abbreviations and Acronyms**

**BCPHO** – British Columbia Public Health Officer

**BEC** – Biogeoclimatic Ecological Classification System

**CBPR** – Community Based Participatory Research

**CD** – Black Cottonwood – Red Osier Dogwood Ecosystem

**FNFC** – First Nations Forestry Council

**IAH** – UBC Institute for Aboriginal Health

**NTFP** – Non Timber Forest Products

**PHAC** – Public Health Agency of Canada

***S. canadensis*** – *Shepherdia canadensis* - Okanagan - sx<sup>w</sup>usəm - Soapberry

**Sylix** – Ensylixen language for the People of the Okanagan Nation

**TEK** - Traditional Ecological Knowledge

**WFN** – Westbank First Nation

### **Biogeoclimatic Zone Acronyms**

**BG** - Bunchgrass

**ESSF** - Engellman Spruce / Subalpine Fir

**IDF** - Interior Douglas Fir

**MS** - Montane Spruce

**PP** - Ponderosa Pine



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## **Dedication**

“If we save the plants, we save ourselves.” — *Tis Mal Crow*

This work is dedicated to Westbank First Nation and to Tis Mal Crow.

## **Chapter 1 : Introducing the Research Context and Presenting the Overall Methodology**

### **1.1 Introduction**

Plants are intimately connected to the health of all cultures, particularly through their uses as medicine and food. Plants are also used in spiritual practices, shelter, tool making, and many other cultural activities that can significantly affect the health of an individual and a whole community. It could be said that the ecological health of plant communities are inherently linked to the health of people.

Within North America, various settlers brought important plants with them to the region. Many of these plants were slowly integrated into cuisine, medicine, recreation and several utilitarian uses that influenced their ecological distribution (Weatherford, 1999). In general, native plants are affected by competition with invasive plant species, anthropogenic disturbances, new diseases, agricultural practices, and development of natural habitats for human use and, more recently, human contributions to climate change. Throughout North America, Indigenous people have a history of managing the land, engaging in practices to improve and maintain access to the flora and fauna which are important to them (Cajete, 1999; McDonald, 2005; Trusler, 2006).

Canadians enjoy a high standard of health in comparison to the rest of the world, and this is often directly correlated with high socio-economic status (SES) (Alder, 1999). Within this general positive depiction of Canadian health, Aboriginal Canadians are considered particularly vulnerable populations (Frolich, 2006). Despite extensive research on Canadian Aboriginal cultures and their health outcomes, many gaps remain in applying this knowledge within populations (Waldram, 2006). More recently, environmental degradation has been included as a determinant contributing to disparities in Canadian Aboriginal health (Waldram, 2006; King and Gracey, 2009; Kirmayer, 2009).

In this thesis I present a community-based research project with Westbank First Nation (WFN), a member band of the Okanagan Nation Alliance (Sylix nation) in the Central Okanagan Valley of British Columbia. This research illustrates Aboriginal peoples' connection to native flora and to the health of the land. WFN community members provided knowledge about how they define health, and how they envision

community actions for improving their health and the health of the land through actively managing non-timber forest products (NTFP). WFN community members also provided specific examples of flora impacted by a changing environment. Through the presentation of this research, I hope to show that effective co-management of natural resources with Aboriginal communities should recognize the connection Aboriginal people make with their personal health and the health of the land. In addition to this point, I hope to show how Aboriginal Traditional Ecological Knowledge (TEK) can provide essential information to making better management decisions within a local context.

## **1.2 Research Objectives and Questions**

This research project began by generally asking: *How do WFN community members connect changing access to native flora and health?* This question spawned two more specific questions explored in this thesis. They are: *What are some WFN definitions and conceptions about health?* And: *How has access to native flora changed in WFN?*

The first general question was presented as a potential research topic to WFN through several meetings with the WFN Chief and Council. On a personal level, I was interested in listening to what WFN community members thought about the rapid urbanization of the Central Okanagan, its effect on access to native flora, and subsequently the health of the community. Moreover, I wanted to conduct work that would directly address some of the ecological concerns of the community. During these meetings, consistent reference was made by Chief and Council for the need to train their youth to be strong in their cultural traditions, while simultaneously building all of the necessary technical skills to support the diverse work of the community. As a specific research objective, Chief and Council suggested a complete inventory be taken of the distribution of all native floras within Sylix traditional territory. Through continued dialogue this large objective was narrowed to more short-term goals; namely, providing a framework for conducting a larger study and providing some foundational data to support the need for this work. As the broader WFN community became involved in the project, the research questions in this thesis were expanded.

Through this initial dialogue with Chief and council, a more general research questions arose. *What are the reasons for supporting Aboriginal participation in*

*resource management planning?* In response to this question, this thesis posits that there are several potential benefits in Aboriginal participation in resource management practice. WFN's participation in creating resource management priorities for non-timber forest products (NTFP) provides two major examples of the benefits Aboriginal participation in resource management. They are:

1. Natural resource management practice is linked to Aboriginal conceptions of health. Therefore, Aboriginal participation in natural resource management practice provides an opportunity to support and promote community health.
2. Aboriginal traditional ecological knowledge can provide information that can impact the effectiveness of land management practice.

Highlighting these details two benefits of Aboriginal resource management is the overall goal of this thesis. The foundation for discussing these benefits will first be examined through a literature review, and further developed through the presentation of research data from the project. Addressing these points explores how WFN views conventional approaches to health promotion and land management, and how Aboriginal knowledge can be integrated into these practices to incorporate broader conceptions of health and new opportunities in managing the land.

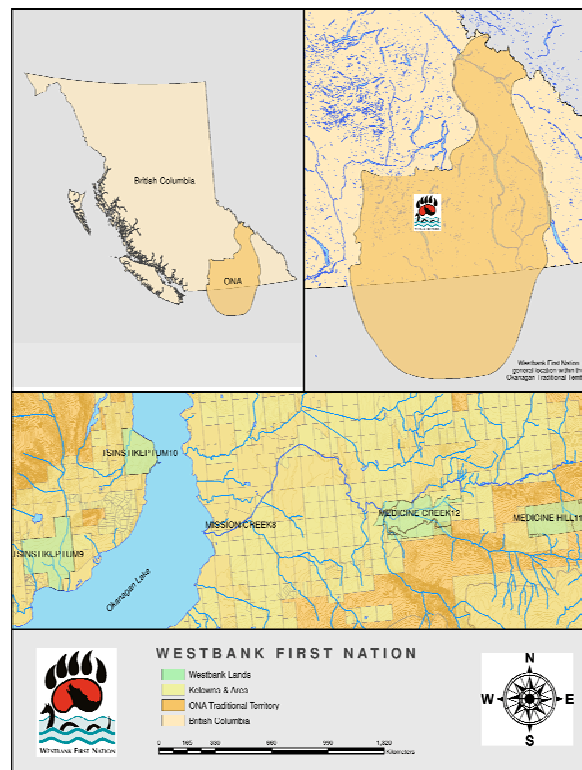
### **1.3 Thesis Description**

This thesis is arranged into three major sections: First, a general introduction, literature review, and overall research methodology is presented in Chapter 1. In Chapters 2 and 3 I present the qualitative and quantitative data gathered in the research project. Chapter 2 focuses on qualitative data gathered to address the connections between health and the environment, the role of plants in the health of the community, and how a changing environment has affected access to native flora and ultimately, their health. Chapter 3 is a field study of one plant species, *Shepherdia canadensis* (Soapberry; Okanagan - sx<sup>w</sup>usəm), which demonstrates how access to native flora has changed within WFN and how TEK can be directed toward influencing management of *Shepherdia*

*canadensis*. Chapter 4 then transforms the findings of Chapters 2 and 3 into recommendations for long-term management of native flora that integrates traditional Aboriginal perspectives and ultimately aims to support a WFN vision of health.

## 1.4 Background and Rationale

The Westbank First Nation is one of Eight First Nation bands (Seven in Canada, one in the United States) comprising the Sylix/Okanagan Nation (Okanagan Nation Alliance, 2010). There are approximately 650 WFN band members. WFN territory encompasses five reserves totaling 2,150 hectares all within the central Okanagan (WFN, 2010). Figure 1.1 shows the traditional territory of the Sylix people within British Columbia (BC) and the location of WFN reserves.



**Figure 1.1: Map of WFN and Sylix Traditional Territory**

This map highlights the WFN reserves within the Central Okanagan and the traditional territory of Sylix (ONA-Okanagan Nation Alliance). (WFN, 2010)

The Okanagan Valley is one of the fastest growing regions in BC, experiencing a 9.8% population growth from 2001 to 2006 (Statistics Canada, 2007). This rapid urbanization of the Okanagan Valley has prompted questions about the future of various natural resources within WFN territory. There are also predictions about the ecosystems

of the region changing equally rapidly due to climate change. (Hamann and Wong, 2006; Cohen and Neale, 2006) These predictions include the potential for general desertification of the region pushing the xeric conditions ecosystems of the lower elevations up to higher elevations within the valley. (ibid)

Through their own independent research, WFN has recognized these changes to their surroundings and the need to ensure access to native plants of traditional significance. These ideas were summarized in a WFN Food Security Forum in 2006. The report on this forum established a strong “interest in promoting traditional foods, and cultural activities related to harvesting, hunting and fishing” within the community (Lindley, 2006, p.8). This report also highlighted the unified view among WFN community members of the significant connections between the health of the land, human health and traditional foods and medicines (Lindley, 2006).

In response to the changing demographics of the Central Okanagan, and in an effort to secure self-determined management of the region, WFN entered into a self-government agreement with the Federal Government of Canada in 2005 (WFN, 2010). This agreement gave WFN the responsibility to act as the primary governing body within their reserve lands, and included the power to enact regulatory bylaws. This also gave WFN the opportunity to make decisions about economic and social development within their community. As a result of this agreement, WFN is the primary governing body responsible for development of their reserve lands.

In spite of these socio economic opportunities, WFN retains many of the health concerns shared by many Aboriginal Canadians. These issues include prevention and mitigation of diabetes, heart disease, mental health, geriatric care, the impacts of colonization on health, and training of Aboriginal health professionals (Waldram, 2006; Gracey and King, 2009). Although, the specific context of this project deals with issues around access to native flora and its relationship to WFN conceptions of health, the general rationale for this project is to simply support WFN’s vision of health and developing methods for generally promoting health within their community.

## **1.5 Literature Review**

The overall purpose of this review is to retrace the steps taken to choose the mixed-methodology of this research project. I used a CBPR framework, which stems from a philosophical perspective inclusive of community engagement in research in all phases of a project (Wallerstein, 2006). This research framework has been shown to provide opportunities enhancing community health while provide capacity building opportunities in scientific methodologies (ibid). My personal expectation upon entering into this research was that by focusing on the cultural connection between plants and health and encouraging participation in the research process, healthy perspectives existent in Sylix culture would be revealed. This process would then provide an opportunity to highlight effective community-based health strategies along with presenting specific information about effectively managing native flora.

This literature review highlights some of the general characteristics of effective Aboriginal research discussed in the context of: (1) determinants-based health promotion in an Aboriginal context, including culture and environment as complementary determinants of health; (2) the role of co-management as a tool for effective environmental stewardship in an Aboriginal resource management context and 3) the opportunities for capacity building using CBPR (Parkes and Panneli, 2001; Wallerstein, 2006; Walrdam, 2006; Gracey and King, 2009). The purpose of presenting these particular research areas is to highlight that the diverse disciplines related to NTFP research in an Aboriginal context point to similar specific methodological considerations. Namely, that community participation from inception is a necessary component of any Aboriginal research project, regardless of the nature of inquiry.

### **1.5.1 Analyzing Aboriginal Health Indicators: The Role of Culture and Physical Space as Key Determinants of Health**

Much of this research focuses on NTFP management and how WFN community knowledge and their perceptions of health and the environment impact their decisions about managing NTFP. Therefore, general studies concerning Aboriginal perceptions about what makes people and ecologies healthy should be acknowledged. Aboriginal health research has provided evidence that unique considerations are needed to fully



understand and address Aboriginal health issues (Gracey & King, 2009). These perspectives extend beyond conventional epidemiological and health promotion approaches to include broader characterizations such as culture, ecology and traditional practices (Waldram, 2006; Gracey & King, 2009).

The World Health Organization (WHO) defines health promotion as “the process of enabling people to increase control over the determinants of health and thereby improve their health” (WHO, 1998). This concept is often described as a “determinants-based” approach to health promotion (Kickbusch, 2002). If this WHO definition is applied to health promotion within an Aboriginal context, it follows that the most significant health determinants to Aboriginal populations should also be acknowledged in order to frame health promotion projects.

In Canada, Aboriginal populations have the worst health outcomes as compared to the rest of the population (Frolich, 2006; Waldram 2006; BCPHO, 2009). This prompted a particular study which asserted that “First Nation Status” was the greatest determinant of poor health status in Canada (Frolich, 2006). The literature around population health approaches presents some confusion about which determinants should be the greatest focus for Aboriginal communities, with various priorities being put forward that best target health issues. (Gracey and King, 2009; BCPHO, 2009; PHAC, 2010)

This section highlights some issues within determinant-based Aboriginal health promotion in Canada, with a particular focus on two of the “key determinants of health” as listed by the Public Health Agency of Canada. They are “culture” and “physical spaces” (PHAC, 2010). These two determinants were chosen due to their connection to the unique historical experiences of Aboriginal populations in order to highlight what could support a unique approach to Aboriginal health promotion. Although this study is not measuring the effectiveness of health promotion models on community health, the purpose of presenting Aboriginal health promotion in this section is to highlight the general framework for establishing the research questions for this project. From the perspective of this research, the management of NTFP within in an Aboriginal context is as much about their larger conceptions of health as it is about ecology or simply managing resources. This is due to the connections Aboriginal cultures make with the

land, its flora, and their community perceptions of health. (Burgess, 2007; Gracey and King, 2009) Through analyzing WFN perceptions on changing practice and access to native flora, we are given a specific lens to discuss the larger health determinants of culture and physical space. Moreover, by encouraging participation in the development of strategies around NTFP management we can begin to develop a sense of the potential impacts of the role of Aboriginal engagement in resource management can have on the health of a community.

The PHAC has identified culture as one of twelve key determinants of health. They explain, “Some persons or groups may face additional health risks due to a socio-economic environment, which is largely determined by dominant cultural values that contribute to the perpetuation of conditions such as marginalization, stigmatization, loss or devaluation of language and culture and lack of access to culturally appropriate health care and services” (PHAC, 2010). Under this rationale, various health disparities within Aboriginal populations can be described through the lens of culture as a key determinant of health. Much of this is due to the Aboriginal populations being targets of programs to purposefully impact their connection to their culture, citing examples such as the residential school programs and aspects of the Canadian Indian Act (Smith, 2005; Gracey and King, 2009). The recognition of Aboriginal health disparities as strongly linked to loss of culture infers that a major objective of any health promotion project should encompass the active promotion and revitalization of Aboriginal culture.

The priority of strengthening culture as a response to Aboriginal health disparities in BC seems to be overshadowed by the conventional approach of targeting SES as a general determinant of health. There is a long-standing general perspective within health promotion research that SES is the most predictable indicator of health (Alder, 1999). However, in recent years, this classic position has fallen into question in terms of its applicability to culturally distinct communities. Collins Airhihenbuwa introduces this argument by stating that “SES may reflect buying power and opportunity, but it does not always explain or predict behaviour” (2008, p. 9). His reasoning being that isolation of various communities by SES still reflects differing health behaviour according to the cultural reality of their environment. His eventual conclusion in terms of designing health

projects was that cultural promotion should take primacy over addressing SES without completely negating its significance (ibid).

Some researchers have suggested culture plays an extensive role within the health outcomes within the BC Aboriginal population. Hutchison used the results of the first BCPHO report on Aboriginal health to determine that the concept of social capital, termed as a “community’s ability to network through power structures”, served as an effective primary indicator of health status (Hutchinson, 2006, p.106). The mechanism Hutchinson described for increasing social capital was heavily linked to cultural continuity, defining this process as “the realization of a population’s culture within a social service” (Hutchinson, 2006, p.108). According to this line of reasoning, the practice of cultural revitalization within an Aboriginal context is a necessary component of addressing health status. The connection between social capital and culture is further supported by Mignone, who views cultural programming as a key element of building social capital in an Aboriginal context (2005). Rather than pitting culture against SES as the higher priority, both likely play a role in determining health status of Aboriginal populations within BC. (BCPHO, 2007) Therefore, a balanced and integrated approach to health would consider culture when creating opportunities to build capacity toward improving SES within communities.

A second major key determinant of health identified by PHAC is the “physical environment” in which an individual grows up and lives (PHAC, 2010). Simply put, this includes the air, soil, water and food surrounding a specific population (ibid). The PHAC rationale for this determinant focuses primarily on the impacts of local environmental factors such as exposure to second-hand smoke and lack of adequate housing (ibid). Broader regional environmental activities such as forestry, mining, and large-scale development are not discussed in direct relationship to health outcomes. The 2007 also includes some specific recommendations regarding larger scale regional activities in terms of the impact the physical environment plays on Aboriginal health. The report stated that the role of government should be to encourage:

Research and public discussion about environmental risks and the options for managing them, using both traditional and scientific knowledge; encouraging public reporting on the impact of human activities on fish stocks, forest areas,

mineral supplies, and other natural resources; and conducting surveillance of contaminants in food safety” (BCPHO, 2007, p.172).

Although the report failed to provide an in-depth discussion as to why these particular activities were singled out, it demonstrates a clear recognition that land-use decisions regarding resource development must have a significant impact on human health. It is also interesting to note that this report establishes the idea of Aboriginal TEK as vital component of mitigating environmental risks to human health. (BCPHO, 2007)

There are various general paradigms which call for the explicit connection of ecological and human health. Ecohealth as a concept is similar to earlier ecosystem approaches to human health (Waltner-Toews, 2004). General models of ecohealth have been recently put forward to strengthen the links between ecology and health within research (Wilcox, 2004). In a similar fashion to these models, researchers studying international Indigenous understandings of health have found that many Aboriginal groups refer to the land as part of their definition of health without making a distinction between human and ecological health (Johnston, 2007; Pesek, 2010). This position complicates the discussion about which determinants should be higher priority in designing health promotion projects in Canada (SES, culture, or physical environment). Since all Canadians can potentially be affected by fluctuations in SES, the effects of culture and physical environments were selected as unique determinants particularly affecting Aboriginal health. Both of these particular determinants are intimately embedded in the changing history of Aboriginal traditional practice in terms of the usage and management of native plants for food, medicine, ceremony and utilitarian purposes (Turner, 2001).

This research attempts to highlight these determinants in current WFN community perceptions of ecological and human health, and postulate influence of these health perceptions on decision making about managing NTFP. This was addressed by first assuming that WFN reflections on health would contain information which acknowledges the significant connection of WFN culture, the land, the local ecology, and a host of living flora and fauna as significant components of their health. This deliberate assumption recognized these trends as general aspects of definitions of Aboriginal perceptions of health as described by the literature (Gracey and King, 2009). Therefore,

the initial research questions sought to establish what WFN perceptions of health are. This choice provides a further opportunity to discuss the uniqueness of WFN's position as an urban Aboriginal entity, and how that context provides unique management opportunities in a rapidly changing ecosystem.

### **1.5.2 Aboriginal Resource Management**

Aboriginal participation in resource management is required by law in Canada as a result of the outcomes of a series of court rulings and laws (Usher, 2009). Many of these rulings cited issues of Aboriginal rights and title as justification for the need for governments to consult with affected Aboriginal groups on matters of natural resource development (ibid). To summarize the message behind these rulings, it could simply be said that Aboriginal participation in resource management is their right as first peoples of Canada. Despite the legal foundation for Aboriginal consultation, questions remain among resource management professionals and Aboriginal communities as to how this process should be supported from social, political, scientific, and economic perspectives (Nadasay, 2009).

Aboriginal participation in the environmental impact assessment (EIA) process has created many opportunities for continued interaction between resource management professionals, regulators and Aboriginal communities. However, this has not necessarily translated into a uniformly effective process for the integration of Aboriginal participation in resource management (Nadasay, 2009). Various complications have been cited by both Aboriginal and western researchers as to how TEK and the scientific method (as well as the consultative process) should be integrated to meet EIA requirements (Ross, 2006; Greskew, 2008; Galbraith, 2009). Such complications have unfortunately created a great deal of reluctance among resource management professionals and Aboriginal communities to engage in co-management (Nadasay, 2009). To address these complications, Aboriginal communities, researchers and management professionals have begun to develop a growing number of models to support and explore the effective integration of TEK into resource management (Turner et al. 2000; Moller, 2004). Within these models are a range of somewhat contrasting philosophies about the purpose of Aboriginal inclusion in resource management practice. There are those who

uphold the process because they “have to” include Aboriginal participation as a fulfillment of the law by obligation. In contrast, others put forth that resource management professionals should “want to” include Aboriginal perspectives because the process results in overall benefits to the project (Nadasay, 2009). Although many intermediate perspectives exist within the extremes of these two positions, they are provided here to illustrate the complexities in implementing a truly successful model of Aboriginal participation in resource management. It is a significant step forward, however, that such debate have moved beyond the question of *whether* to involve Aboriginal participation to *how* to achieve effective Aboriginal participation.

In response to the extended length of time required to settle land claims, various solutions have been put forth by the government to involve Aboriginal communities in co-management of natural resources as an interim process (Turner et al. 2000; Moller, 2004). Co-management is broadly defined as a process where government and local bodies are engaged in the management of resources from an equitable framework (Plummer, 2004). These efforts can rely on a fusion of scientific and policy-based contributions by governments and local TEK (Plummer, 2004).

There is a growing recognition that management of NFTP is becoming an area of increasing interest and concern for BC First Nations (FNFC, 2009). The First Nations Forestry Council of British Columbia (FNFC) recently released a policy document calling for models of NFTP management. Their assertions call for a process akin to co-management as articulated below:

A conceptual framework must be developed that adequately addresses the unique values and cultural relationships for each First Nation. This framework must incorporate First Nations’ self-determined definitions of non-timber forest resources that are understood and acknowledged in the management practices in the context of the First Nations meaning and relationship. Science based methodologies and standards, although useful to the extent these sciences are compatible with community values, goals, decision making and traditional ecological knowledge, have limited impact on informing policy and practice that incorporates multiple resource values with societal relationships and functions that enable communities to co-exist and depend upon forested lands. (FNFC, 2009)

When unpacking the philosophies presented by FNFC for managing NFTP in BC we see a consistent theme: across all Aboriginal communities is an underlying desire to meet at

the planning table with all stakeholders in a spirit of reciprocity and equity. Aboriginal people believe community perspectives, including TEK, matter and should carry equal footing with technical and policy-related data.

Although many frameworks exist for the integration of TEK into resource management planning, there remains a significant degree of difficulty in implementing these ideas (Nadasay, 2009). Some doubts may still remain in the perceptions that scientific researchers have on the nature of TEK. These perspectives often focus on TEK being historical knowledge which was suited for a time and for a very specific, geographical space not existent in the present time. In this project, I will try to highlight the broader positive aspects of TEK and how understanding these concepts can improve how we use this knowledge in a beneficial way. To achieve this, Aboriginal TEK can be thought of as general knowledge in one sense, highlighting the Aboriginal connection to the land in thought and practice (Turner, 2001). The benefit of this general characteristic was highlighted by Charles Menzies' description of Aboriginal mushroom pickers in the Northwest Coast of British Columbia (2009). This work describes Aboriginal mushroom pickers' ability to integrate TEK through their knowledge of animal behaviour and ecological indicators of seasonal change in order to improve harvesting methods (ibid). The implications from these findings demonstrate that TEK can be thought of as a fluid way of knowing informed by history that is adaptable to new challenges rather than a set of data stuck within a historical framework.

Traditional ecological knowledge regarding NTFP in Canada has been largely documented using conventional ethnobotanical methods. This generally consisted of making lists of plant species within a region and outlining their uses by Aboriginal people. Examples of early works regarding NTFP uses amongst the Sylix were conducted by historical anthropological figures like Franz Boas and James Teit (Teit and Boas, 1985). This approach has also been accompanied by other ethnobotanical works such as Nancy Turner's work on the traditional uses of plants by the Interior peoples (Turner, 1980). These early studies provided a wealth of traditional knowledge about how the plants were used within their historical context. Much of what is left out of these works are the larger regional perspectives of TEK in reference to whole functioning ecologies of the region, and the interactions between organisms within ecosystems.

These more general issues have come to the forefront in more recent studies (Turner et al. 2000; Moller, 2004). In summary, it could be said that more detailed studies about TEK in reference to ecological interactions is an emergent concept, with a sparse body of published knowledge in comparison to the conventional ethnobotanical studies of NTFP. The further development of this type of ecological knowledge could present some foundation for knowledge translation between science and TEK, and could provide working examples of co-management (Pesek, 2010).

### **1.5.3 Community-based Participatory Research as a Vehicle for Capacity-building**

Community-based participatory research (CBPR) involving Aboriginal communities in Canada have gained increasing popularity over the decade (Dickinson, 2001). Examples of CBPR methodology (also termed “community-based action research” or “participatory action research”) can be found across disciplines including health, linguistics, anthropology and sociology, resource management and field science (Minkler, 2000; Parkes & Panelli, 2001; Wallerstein, 2006). Applying CBPR toward resource management has been a more recent development (Parkes & Panelli, 2001). Emergence of CBPR as a method for Aboriginal research has coincided with the development of new ethical parameters for research as discussed later.

As mentioned previously, the emerging expectation in Aboriginal research is that, regardless of discipline, community participation should be a required component of all Aboriginal research. Community-based participatory research has been promoted by Aboriginal researchers because it enables flexibility in methods as the research progresses, which is an approach more conducive to Aboriginal ways of knowing (Dickson, 2001; NAHO, 2002). CBPR implies more than simply encouraging participation. It implies an element of capacity-building by through constant knowledge translation in the process of community direction (Parkes & Panelli, 2001).

In isolation, Aboriginal communities do not appear to be committed to the dominant models of scientific inquiry as they conventionally exist within universities. This is dramatically evident when an assessment is made of the priority Aboriginal students place on the natural sciences through enrolment their choices. As of 2001, university enrolment in science programs among Aboriginal students comprised 10.6%



of total Aboriginal undergraduates. This is in comparison to 30.0% enrolment in science programs among the general population (INAC, 2001). Aboriginal scholars suggest these statistics portray a distinct cultural response to the realities of science education (Cajete, 1994). Cajete identifies a complex relationship between culture and Western views of science that ultimately reflect dominant perspectives on health. Cajete issues a challenge for educators to provide culturally relevant opportunities for Aboriginal students to succeed in science education.

The adaptive characteristics of CPBR provide the dual function of creating capacity-building opportunities in science as well as promotion of culturally relevant research outcomes. Multiple national and international projects using a CPBR methodology have demonstrated the power of collaborative, culturally relevant models of engagement in scientific research (Dickson, 2001; Fletcher, 2003; Pesek, 2010). These projects used TEK as an interface to engage with scientific methodologies, rather than using TEK as a compliment to scientific methodologies. This project aims to recognize the effectiveness of CPBR as a model to achieve a similar goal; searching for effective examples of WFN TEK to ensure that community knowledge is the foundational aspect of capacity-building directives and research analysis in this project.

#### **1.5.4 Literature Review Conclusion**

Aboriginal research is part of the fabric of the history of academics in Canada. There has been a consistent movement across many disciplines to engage in a shared process of research, where everything from the research design to knowledge translation includes community input and participation. Although there are many proposed models and methodologies for achieving this reality, there seems to be a common philosophical thread throughout the literature that asserts that Aboriginal people believe their knowledge would be relevant and beneficial to conventional Western scientific research (Cajete, 1991; Deloria, 1995). We are now seeing a range of methodologies involving shared research processes that do not diminish the technical merit of the work. In fact, some projects have demonstrated better research outcomes when such perspectives are taken into consideration and combined with technical data (Rou  , 2002; Pesek, 2010). Moreover, a commitment to community participation in research projects has shown to

lead to healthy outcomes for participants and provide long-lasting capacity-building opportunities (Wallerstein, 2006). These positive results should be attractive to anyone with even a limited knowledge of Aboriginal history and the current realities of Aboriginal health status. The difficulty in engaging in a reciprocal model of research with Aboriginal communities rests on the limited number of simple examples as to how any professional in the health sciences, applied sciences, or even social science can adapt reciprocal Aboriginal participation into their research.

Based on this review of relevant literature, I aimed to frame the research methodology on the following principles:

1. That a research project on the connection between plants and health should recognize the role of culture and the environment as key determinants of health from Aboriginal perspectives;
2. That research on plants and health should actively integrate Aboriginal TEK in a respectful way;
3. That research should provide opportunities for capacity-building within the community.

The remainder of this chapter outlines how these concepts were integrated into a general method for researching the connection between plants and health within WFN.

## **1.6 Description of the Overall Research Method**

This section summarizes the overall research method for this project. The research method is a mix of both qualitative and quantitative methodologies that generally represents a model for collaborative research between researchers and Aboriginal communities. The hope was that this general model could benefit other researchers interested in Aboriginal community engagement to follow what encompasses best practices for research with Aboriginal people. This section will first present the ethical framework for this project and then discuss the overall research framework.

### **1.6.1 Presenting the Ethical Framework: Community Participation, Input, and Review**

Over the last few years, there has been a vigorous effort among Aboriginal researchers, communities and universities in Canada to create a unified framework for conducting research. Most of these efforts centered on creating a consistent ethical framework to ensure positive Aboriginal participation in academic research (Ball, 2008). The questions being asked in this research project reflect depictions of Aboriginal health as a matrix of conceptions of the individual, the community, and the local ecology (Waldram, 2006). The literature revealed that within many areas of Aboriginal research, the established expectations of Aboriginal communities should be taken into account. (Sharnarch, 2004; CIHR, 2009) Some of these community expectations are found in research frameworks such as the “4 R’s of Aboriginal Research – Respect, Relevance, Reciprocity, and Responsibility” and “Ownership, Control, Access and Possession (OCAP)” (Kirkness and Barnhardt, 1991; Sharnarch, 2004). These works highlight general principles such as respect and reciprocity within research practice. Beyond these general examples of Aboriginal community principles of research practice, the some good principles of practice can be gleaned from these works. Namely, that effective Aboriginal research is participatory, it provides opportunities for capacity-building, and it is effective in engaging Aboriginal knowledge respectfully. (Kirkness and Barnhardt, 1991; Sharnarch, 2004; CIHR 2009)

The integration of community review into the research is directly aligned with Section 10 of the new CIHR guidelines which reads: “The Aboriginal community should have the opportunity to review the research results before they are submitted for publication to ensure that confidential cultural information is not divulged to the public and that errors are corrected prior to wider dissemination” (CIHR, 2009). Providing the community with opportunities to review and edit research findings could be interpreted as a limitation on “academic freedom” from a conventional definition (Altbach, 2001). However, when taking into account the communal nature of Aboriginal communities and the history of exploitation of traditional knowledge facilitated by many universities in the past, we have reached a point where communities are calling for ownership over and respectful utilization of their traditional knowledge (Sharnarch, 2004; Flicker, 2007).

In light of the new CIHR guidelines, the challenges for universities are significant if they are to follow the guidelines to the letter. Since research agreements will now be a condition for the release of grant funds, many points of agreement have to be established at the outset of a project. Regardless of the overall objectives of any research project (scientific or social science), genuine and in-depth community engagement will have had to be established before the start of any project. The CIHR guidelines describe some of the expected components of these agreements:

The agreement should detail issues of data ownership, use and interpretation/analysis, rights to intellectual property (if appropriate), and expectations regarding process, content and authorship of publications, with identified mechanisms for dealing with conflicting interpretations or inappropriate use of the data. There should be prior agreement on the respective roles of the parties, desired outcomes, measures of validity, control over the use of data, funding and the dissemination of research findings. (CIHR, 2009, p.29)

Although many Canadian universities incorporate some of these parameters through the function of Behavioural Research Ethics Boards (BREB), the unique aspect of the CIHR guidelines is that community participation will soon be a requirement for ethical approval of any project involving Aboriginal people. These research agreements require an understanding of all aspects of the research project by Aboriginal communities involved to qualify them as signatories. Additionally, they provide a planned mechanism to ensure agreed conditions are met throughout the research process. In so doing, Researchers and communities will be corporately responsible to work together from research design to publication of the findings.

In accordance with the standards outlined by the CIHR guidelines, the entire first year of this project was dedicated to building a research agreement with WFN Chief and Council. By the end of the year, the framework for a research agreement was finalized titled “WFN Code of Research Ethics.” This document can be viewed in Appendix III. This document built on previous work conducted by the UBC Institute for Aboriginal Health (IAH) in partnerships with Heltsuik First Nation, Carrier-Sekani Family Services, and Boston Bar First Nation. These partnerships had created a template for developing community research agreements within BC. These agreements were meant to be living documents that could be elaborated on with each successive signing to suit individual the

individual community needs. Once a draft of the WFN Code of Research Ethics was developed, it was presented to Chief and Council. This created an opportunity for immediate dialogue about core concerns the community had if they entered into this project.

The primary concern expressed at this juncture was in handling sensitive cultural data. At the first meeting, the WFN Chief recounted a story about how the formulation of a brain medicine using TEK from his grandmother was used without permission. Other points of discussion was of past experiences with researchers interested in traditional Okanagan medicine which contributed to some degree of reluctance on the part of Okanagan nations to engage in university research at present. It was decided that any research conducted should not focus directly on TEK (i.e. the traditional uses of plant medicines), but on the ways in which this research could promote capacity-building and access to native flora. It was agreed that WFN had the right to review all aspects of the findings and have right of refusal on publishing any results that were considered culturally sensitive. At this point the document was left to be reviewed by the WFN legal team. After two rounds of exchanges from the research team and WFN, The WFN Code of Ethics was signed by WFN and returned to the research team to be processed and signed by UBC.

### **1.6.2 Presenting the Research Methodology**

I went into this project with an assumption that the rapid development of the Central Okanagan has created some strong opinions within the members of WFN with regard to the sustainability of native flora of the region. The specific research questions were not set before interaction with the community. To adhere to literature on Aboriginal research ethics promoting community participation at all stages, I chose to allow the research questions and processes to emerge through the cooperative process of engagement with the community. It became apparent that I needed to develop a framework and research model that was flexible enough to address an emergent research question and also build in engagement at all stages of this research. The model selected to address and analyze WFN community perspectives was a CBPR method similar to Stringer's ongoing reflective and adaptive process within action research (1999). The

general research methodology relied on community engagement to initiate the reflection, adjustment and evaluation of the research questions and direction of field research.

The CBPR methodology was implemented primarily through community meetings and workshops. The outcomes from each workshop informed the design of an action plan for activities in the field and successive workshops. The workshops also provide a venue for Aboriginal cultural practice to be included directly into research. This was facilitated through activities such as: the inclusion of Sylix language as a component of the workshops; and cultural presentations and interactive activities focused on identified health concerns and/or Okanagan flora combined with scientific presentations. The participants these workshops were also asked to participate in narrative-style interviews to gather insight into their perspectives shared during the workshops. The information was then collated into potential field research ideas, and other potential community projects. The office of WFN Office of Title and Rights department served as the ethical steering committee through their own discretion for this project. The constant utilization of this function as a secondary source of review outside of the participants ensured that the research ethic protocols were adhered to. A diagrammatic model describing the research process is presented below in Figure 1.2



**Figure 1.2: Research Model**

This Model describes the overall CBPR research method. Each workshop included a dialogue about plants and health presenting both scientific and traditional knowledge. The topics from these workshops were further discussed in narrative style interviews. The summary of each workshop and subsequent action plans for field work was presented to the ethical steering committee for review and recommendations. After review, field work was carried out and the summaries of data were presented at the successive workshops.

## 1.7 Conclusion

Upon review of the literature, the connections between Aboriginal participation in resource management and health merited further exploration. Although there are a variety of jobs within the public health field which require knowledge of natural resources, research around the practical management of the land is often relegated to fields outside of health. This project proposes that Aboriginal participation in resource management, through the specific area of non-timber forest product management, offers a variety of determinant-based connections to health promotion that may be well suited for Aboriginal communities. Some of those connections are:

1. Many local natural resources have a direct relationship to the Health of Aboriginal communities through their uses in Food, Medicine Ceremony and Utilitarian purposes
2. Indigenous communities throughout the world have identified their own health being linked to the health of the land
3. Community engagement in resource management provides opportunities for cultural revitalization
4. Community engagement in resource management planning provides opportunities for capacity-building

(Turner, 2001; Parkes and Pannelli, 2001; Gracey and King, 2009; Pesek 2010)

Taking the above into account, it became evident that questioning WFN community members about access to non-timber forest products could provide an excellent opportunity to address health issues and health promotion from an Aboriginal worldview. Subsequently, this would provide WFN with the opportunity to look at specific projects directed by their community members which address their overall perceptions of health.

The rest of this thesis will present the data to WFN conceptions of health and wellness, as well as how WFN participants view their changing access to Native flora and its effects on community health. Furthermore, I will present an example of how Aboriginal TEK can be positively incorporated into management practice to support the ability of TEK to support healthy environment. Finally, I will present WFN participants

recommendations to address these changes within the Central Okanagan. From WFN's conceptions of health and their specific priorities for managing native flora, community health promotion and integrated land management initiatives could be designed. These could benefit other Indigenous communities with similar concerns about their resources' sustainability, health promotion and effective engagement in co-management of natural resources.



## **Chapter 2: Westbank First Nation (WFN) Perspectives about Health, Access to Culturally Relevant Non-timber Forest Products (NTFPs), and Resource Management**

### **2.1 Introduction**

This chapter presents the methodologies for and results from the qualitative components of the research project. The qualitative data drawn from WFN community members was collated and provided an assessment of linkages between health, the environment, and access to culturally relevant NTFP among WFN community members. The purpose of this inquiry was to design general principles for the management of NTFP within the traditional territory of the Sylix people. The results presented in this chapter form the core of community perspectives around NTFP management and good research practices within community-based projects. The core ideas addressed within the qualitative data were: 1) WFN definitions and reflections on health; 2) education and capacity-building and their relationship to health and the environment; 3) specific management issues for NTFP; 4) and the relationship of cross-cultural engagement and self-determination to NTFP management.

The qualitative data was generated by using multiple techniques. These included unstructured interviews, workshops, and action-oriented activities such as field workshops and community projects. These various approaches provided multiple contexts to present community perspectives both in thought and action. The core of this community framework highlights WFN perspectives that focus on the importance of sustainability of native flora, and the connection between biodiversity and health.

### **2.2 Description of Qualitative Methodologies for Data Collection and Analysis**

The qualitative data was gathered through community workshops, narrative-style unstructured interviews, and documenting situational data from actions carried out with community members in the field. The following section provides a description of the methodological choices for the various qualitative projects and analysis of data.

### 2.2.1 Workshop Methodology

The design of the workshops followed a similar format to conventional focus groups, with a few distinctions. The term “workshop” was used in favor of “focus group” because the process was designed for information extraction and served as an active process for knowledge translation and capacity-building. The group inquiry provided by workshops enables the expression of a broader spectrum of ideas in a short amount of time (Marshall, 1999). In so doing, this process recognized that opinions are often developed through interaction, providing opportunities for solutions and action through dialogue (Ritchie & Lewis, 2003).

Each workshop consisted of open-ended discussions around specific themes associated with the general topics of the connection between plants and health. They began with a short introduction and an outline of the theme of each workshop. Each successive workshop included a review of the outcomes of previous workshops as a component of the introduction. At the conclusion of each workshop there was an opportunity to reflect on the discussion and time to envision potential research activities with which the community could engage. Various community elders were asked to take an active role in the workshops by providing insight to the discussion regarding traditional knowledge and language.

Four workshops were carried out with the following topics:

- 1) Introduction to the general topic of the project and a discussion of how access to plants of significance to the community has changed through time
- 2) Defining health and the potential actions community members might undertake in their community to support a long-term sustainability strategy for native flora.
- 3) Discussion of the initial results of the field work and further discussion on the distribution of specific species of native flora in reference to what the elders could remember.
- 4) Participants aid in data interpretation based on findings from the field work on *Shepherdia canadensis*, and a summary of all the qualitative analysis.

### **2.2.2 Method for Unstructured Narrative-Style Interviews**

The data from the workshops was supplemented with select interviews with workshop participants and other interested community members. This approach followed an unstructured, narrative style interview (Bowling, 2003). The objective of these interviews was to gain insight into personal reflections of the general concepts of the workshops. The unstructured interview format was chosen to promote a broad degree of freedom within the participant responses in order to reduce the elements of coercion and allow unintended areas of detail to emerge. (Marshall, 1999)

The interview format invited each participant to tell their story concerning particular topics raised in the workshops. Although the interview method did not use a specific script, it followed the same thematic pattern for each interview. This followed the end-point methodology described for unstructured, in-depth interviews described by Marshall (1999). The rationale behind this approach was to rely on the knowledge of the participant by framing leading questions around their answers and direct them toward topical areas of storytelling. Each interview began with questions about the participant's definition and reflections on health in relationship to personal and community experiences. Interviews continued by asking participants about their perceptions of health and the land. Additionally, questions about their personal experience with participants' ways of knowing' were discussed. The interviews ended with an invitation to share any concerns participants had regarding specific plants species and processes of managing native flora within their territory.

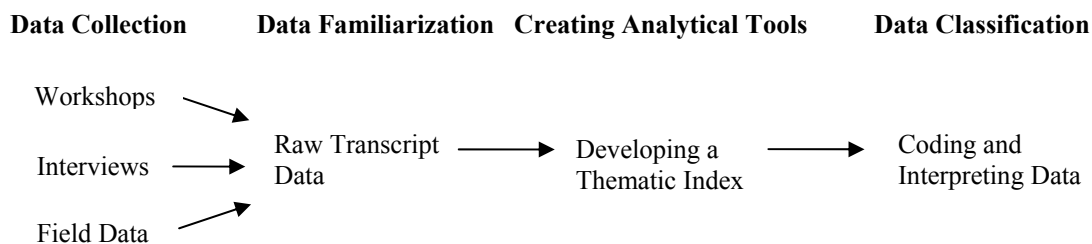
### **2.2.3 Method for Documenting Field Projects**

The workshops provided initial data to develop proposed field projects to address concerns around NTFP management. These actions included the creation of a community garden and greenhouse to cultivate native plants, transplanting projects within reserve lands, and youth field trips designed to emphasize the value of native flora. With appropriate permissions, these actions were documented through video recording and later transcribed. In one instance a community elder gave instruction in the field on the importance of two specific plant species. The elder then instructed the youth about cultural protocols required for transferring a number of these plants from a sensitive

habitat to a community garden space. This type of data was used as a third source of qualitative information to further illustrate some of the concepts discussed in the workshops. Utilizing varying modes of data collection and multiple opportunities for community participation promoted triangulation, thus strengthening the trustworthiness and validity of the results (Bryman, 2006).

#### 2.2.4 Method for the Evaluation of Qualitative Data

All workshops and interviews were audio-recorded and one of the four workshops was video recorded. In addition, one of the field projects was video-recorded. All of these recordings were then transcribed. The transcript data was interpreted according to a theme-based model of content analysis (Ritche & Lewis, 2003). In this process I was looking specifically for themes within the data as they related to health, ecology and the management of NTFP. The framework for the qualitative analysis followed basic methodologies supported by Ritche and Lewis (2003) and Rossman and Rallis (2003). Their primary concepts for content analysis can be summarized by the following steps: primary data collection, data familiarization, creation of analytic tools, coding, and data classification. An overview of the method of qualitative data analysis for this project can be seen in Figure 2.1.



**Figure 2.1 – Framework for Qualitative Data Evaluation –**

This framework for data evaluation was adapted from combining the steps described by Rossman and Ralis (2003) and Ritchie and Lewis (2003).

Once transcription was complete and reviewed multiple times, notes were taken line by line to map out descriptive themes. This process generated an extensive list of thematic concepts. The list was then collated into a thematic index and used to code the data. Once the transcribed data was coded according to the index, the coded sets were grouped together and analyzed to clarify their relationship to the larger concepts of health, ecology and resource management.

## **2.3 Qualitative Results**

### **2.3.1 Introduction to Qualitative Results**

Responses from community members were balanced between general concepts, which could be applied to any research or community project, and specific ideas relevant to the management of NTFP. The data provided specific and helpful concepts connecting health, ecology, education and land management principles inherent within the cultural understanding of community members.

Four main themes were identified with each theme revealing separate sub-themes. The themes were: Definitions and Reflections on Health; Education/Capacity-building; Specific Management Issues for Okanagan NTFP; and Cross-Cultural Engagement and Self-Determination in relation to NTFP management. The index of the various themes can be seen below in Figure 2.2. The goal of this coding index was to try to give as broad a representation of the community responses as possible. As the sample size was small, the details of each response were given equal credence as part of the representation of the community.

The thirteen participants represented a diverse cross section of the community. Ten individuals participated in the workshops, and a total of nine interviews were conducted. The participants ranged in age from 24 to 68 years old. Ten of the thirteen participants were female. There was a mix of how participants self-identified in terms of knowledge they had concerning plants. Three of the participants considered themselves to be knowledge-holders about Okanagan plants and ecology. One participant was educated and worked professionally within the area of botany and ecology. The rest of the participants had a general interest in plants and the need for conservation. Three of the participants were fluent speakers of Nsyilxcen – the Sylix language, one of whom considered Nsyilxcen to be their first language.

## Thematic Index

- I. Definitions and Reflections on Health**
  - A. Personal Health**
    1. Physical Issues
    2. Emotional Issues
    3. Spiritual Issues
    4. Pathways to Personal Health
  - B. Community Health**
    1. Culture and Community Health
    2. Pathways to Community Health
  - C. Ecological Health and the Connection to Human health**
    1. Connecting the Environment and Human Health
    2. Defining the Roles that NTFP play in the Health of the Community and the Environment
  
- II. Education / Capacity-building issues and their relation to Health and Environment**
  - A. Personal Accounts of Transformation**
    1. Cultural Awareness
    2. Environmental Awareness
  - B. Cultural Revitalization**
  - C. Skill Building**
  - D. General Reflections on Education**
  
- III. Specific Management issues for NTFP**
  - A. Ecological Conditions of Traditional Territory**
    1. Local Distribution of Plants
    2. Regional Distribution of Plants
  - B. Recognition of Changing Landscape**
    1. Impacts of Development
    2. Impacts of Climate Change Knowledge
  - C. Access to traditional Plants**
  - D. Priorities for Management**
    1. Potential Local Issues
    2. Regional Considerations
  
- IV. Cross-Cultural Engagement, Self-determination and NTFP management**
  - A. Need for Cross-cultural cooperation and Engagement**
    1. Historical challenges around First Nations Management
    2. Perceptions of the Benefits of Incorporating Traditional and Western Approaches to Management
  - B. Need for Action towards self determination**

**Figure 2.2 - Thematic Coding Index of Qualitative Data**

The quotes presented in this chapter are followed by a two letter abbreviation identifying the individual participant. This was used to maintain anonymity and to lessen the potential influence of cultural, age and gender bias in the participatory analysis of the qualitative data carried out by the community in the final workshop.

Each of the following sections presents the salient responses in reference to the thematic sections of the coding index. The sections conclude with a summary of how the themes relate to NTFP management and how they inform priorities for creating co-management protocols for NTFP.

### **2.3.2 Definitions and Reflections on Health**

There were two main reasons for exploring WFN conceptions of health. First, I wanted to gain a contextual understanding of WFN perspectives on health that reflected specific Sylix cultural beliefs and how those beliefs were manifested in an increasingly urbanized setting. The second reason was to understand how participants associated the role of the environment in relationship to health practice. Most of the comments in this section were in response to the opening question asked across interviews: “how do you define health or what makes a healthy person?” The responses reflected a range of personal, community, and ecological viewpoints. This next section describes the responses according to the themes and connects them with specific actions community members engage in to improve health.

#### *Personal Health*

Participants had a variety of responses that were coded under the theme of “personal health”. Responses included descriptions of physical characteristics of a healthy person as well as comments about how spiritual, mental and emotional factors contributed to personal health. This resonates with popular descriptions of Aboriginal health approaches as holistic - encompassing the physical, spiritual, mental and emotional (Stephens, 2005; Waldram, 2005). A concept reflected by a number of participants in reference to health was that of balance. One participant described it simply in the following: “A person that is healthy recognizes the balance of life; the physical, mental, emotional, and spiritual. It helps all things related to health.” **MS**

At the same time, the similarities within the general depictions of health do not reflect the diversity of responses about priorities for individuals becoming healthy. Several participants talked at length about the priorities of eating healthy foods and exercising as a means towards improved personal health. Other participants prioritized the need to be culturally connected through ceremony and traditional practice. Still, other participants discussed the need to have greater access to western health care services. The diversity of responses made it difficult to single out one area that specifically promoted good personal health among WFN community members. This diversity did solidify a more general reality about the nature of WFN as an Aboriginal community. The

responses supported generalizations within the literature that Aboriginal perceptions of personal health cannot be limited to a description of the physical characteristics of an individual, but rather that physical health is a component of a larger set of characteristics – all of which corporately describe health (Waldram, 2005).

### *Community Health*

There were varied responses from individual participants relating to their perceptions of community health. The general outcomes garnered from these questions were consistent with Stephen's comments, "Importantly, unlike many western models of health, indigenous peoples' notion of health is often not individual, but one that encompasses the health of the whole community" (2005, p.10). Participants placed a high priority on the social context in which health was currently experienced with the WFN community, and dominated most of the discussions pertaining to health definitions. Some participants believed it was impossible to have healthy individuals without healthy communities.

The whole social aspect of our community is lacking in health, there are certain areas where we are strong, but there are areas such as social, family that are not strong overall. And that comes back to having one part of you that is very strong. You need to healthy legs to run a marathon. GC

Like the insights about personal health, participants proposed a variety of actions and processes they felt would lead to a strong and healthy community. Some suggested that before any expectation of good health could be achieved, the highest priority would be to deal with socio-economic issues within the community. These responses fit closely with the conventional models of health promotion represented within the research literature. Other participants suggested that there be broad health training programs available for the community, including traditional practices that would connect community members back to the land.

I think increasing cultural activities are a big part of a healthy community; ultimately it is a huge part of who we are. I don't think it's the only way to strengthen our community. I mean education, more direct interaction with the youth, more direct involvement with the



community period more coming together of the community would start seeding this growth that needs to happen. **GC**

In addition to the priority of increasing cultural activities, there were discussions around more specific principles for developing priorities for health project. Some participants emphasized healthy diets and the relationship of a healthy diet to community health.

Food I think today is everything is too fast it's too commercialized. I think you should cook from scratch - don't open that can, and don't open that dehydrated package from somewhere. But more cook from basic food stuffs and make it as wholesome as you can. Our family did that and continues to do that. My grandchildren, no one loves fast food chains more than they do, but you have to limit how much you eat that stuff. **CU**

Much like the responses concerning personal health, participants had similar views in terms of envisioning characteristics of a healthy community. Embedded within these general characteristics was a philosophy that individual health and community health were not separate entities, but complementary components of a general definition of health. Often in this type of inquiry the desire may be to look for a formula that could be reduced to one project to make a community healthy. However, the diversity found within this work suggests that, at least within WFN, a more effective approach might be to engage the community in a number of projects that address a broad scope of topics such as access to and education about traditional foods, health eating in general, and socio-economic development.

### *Ecological Health*

The concept of ecological health has been applied to Indigenous communities in various contexts (Burgess, 2004; Johnston, 2007). This particular project addressed this concept through asking questions about community perceptions of the state of the local ecology. Participants were encouraged to reflect on how the landscape of the WFN reserve and traditional territory had changed. One participant included the land itself as a determinant of health, drawing an equivalent relevance between the environmental conditions of the land and the diseases manifesting themselves in the human population.

“You have to be healthy in all areas, part of physical health is the environment – what you eat what you ingest, it is all related.” **MS**

Other participants applied the general principles of their responses concerning human and community health to their responses about the state of the land.

Well it comes back to that definition of wholeness and balance. There's a worldview that the earth is a machine or a rock and that we are separate, but the way I see it is that we are a part of the earth and if the earth isn't healthy than we are not healthy. So having a relationship with these plants and the animals and the rivers and the rock is part of knowing yourself and having a relationship with yourself. **GC**

This response depicts personalization of the land consistent with other depictions of Aboriginal perspectives on ecology (Johnston, 2007). One can then surmise that a health project which accounted for a whole view of WFN health would need to work towards building or improving this relationship with the people and the land.

That's what our people need, I think that's why we're confused is because we're not connected to the land, if we were if we could keep going back. It's like me sitting here every morning I never get tired of it. Cause there's always something different, when the wind comes when the storm comes when there's a deer out there when a skunk is there, all of that is out there that's all part of it it's important. **SM**

From the above perspective it can be asserted that health projects would need to include the promotion of healthy ecosystems and the community knowledge about the principles of healthy ecosystems.

### *Summary*

The data around definitions of health within WFN suggests a gradient from the individual, to the community, to the surrounding ecologies and environment. A definition of health should therefore recognize all of these elements as noteworthy components of health. The complexity within this issue lies within how individuals prioritize health promotion. However, this complexity should not be a deterrent for engaging in diverse approaches to health promotion. It should simply reflect a similar diversity about health

promotion priorities reflected by the BC Provincial Health Officer and other health promotion professionals (PHO 2009).

The general consensus among WFN participants was that health does mirror the holistic Indigenous definitions noted in other global indigenous research projects (Johnston, 2007). In this context, participation in the management of NTFP could be considered health promotion practice in that there was participation in an issue intricately linked to the land. However, due to the diverse priorities expressed by the participants, the importance of building and implementing an NTFP management strategy might not meet the immediate health concerns of the whole community. The participants' broad definitions of health do reveal a need to reorient resource management practice (including NTFP) towards a health promotion activity from a WFN framework. Therefore, as a general principle for NTFP management, it could be said that all management practice on the land should recognize that the work is intimately linked to health of the WFN community, and is ultimately a health practice.

### **2.3.3 Education/Capacity-building and its Relationship to Health and Environment**

Many Indigenous researchers have proposed that no action within an Aboriginal context is without an educational component (Deloria, 1994; Cajete, 1999). This concept is readily coupled with many principles of CBPR implying that capacity-building be a necessary component of successful research (Wallerstein, 2006). Since capacity-building within an Aboriginal and CBPR context was so prevalent within the research literature, questions about the nature of effective capacity-building and education within an Aboriginal context were integrated into the qualitative components of the project. Early in the workshops and interviews, many of the participants articulated what specific capacity-building measures should be included within a successful project. There was a collective response that any work in managing the land for NTFP should include building capacity within the community. Moreover, there was consensus that NTFP management should also include best practices from both Western scientific and traditional Okanagan knowledge. Taking these general perspectives into account, questions concerning effective educational practices were readily integrated into the projects. Effective education practices in an Aboriginal context were articulated through asking participants

about personal accounts of their educational experiences and asking them to define their general views about educational priorities within the community. The next section will outline WFN perspectives on educational practices, and how these perspectives could be included within an NTFP management strategy.

### *General Reflections on Education and Capacity-building*

Many important concepts around priorities of project and capacity-building were drawn from the interviews. Two characteristics of effective Aboriginal education were repeatedly included in responses. 1) Educational experiences promoting land management should be place-based; 2) projects should include hands-on activities. The inference was that a place-based nature of projects might support memory of cultural teachings, making projects relevant to participants and adding value to learning.

The different markers in our territory that shows that we're Okanagan and proves that we're from here. So from our classroom we went and we visited these places and the spiritual energy and the goodness that comes from these places really had an effect on my life and really made me decide that I needed to know what these places are like and where these places were so I could take my children and my grandchildren to go visit those places and to show them this is where we went to collect ochre and this is where our fishing grounds were. This is where our hunting grounds were these are berry patches and this is what kind of berries you're supposed to look for. **SD**

“Hands-on” learning was described by one participant as the primary way in which Aboriginal people learn. This could be extended to a philosophy of any capacity-building within an Aboriginal context, in that regardless of the format for delivering knowledge it should always include hands-on activity.

I guess a lot of that would be hands-on experience, that was essentially the teaching I received was from hands-on experience. To go out there to do the picking when it was the right time, all of that takes place just following around with the seasons is what it comes down to. **MS**

These responses about education and capacity-building could be summarized as: effective educational practice within WFN is embedded within experiential learning and a place-based context.

### *Personal Accounts of Transformation*

Further questions about education and capacity-building focused on the issue of transformation and how an individual develops responsibility to the land. Responses were varied as to what might cause a personal transformation towards responsibility to the land. One compelling response focused on the role of traditional practices and expanded to whether or not new projects should focus on traditional teachings alone. Many participants highlighted their connection to traditional teachings as their means for feeling responsible to the land. The following is one example:

So I grew up with this belief system that everywhere I looked it was cool to be Indigenous, it was cool to have that responsibility, and it was cool to be a steward of the land. It was cool to fish and to say, “Here elder, you can have this fish.” And “here buddy you can have this fish head,” all of that was good there was a lot of pride it wasn't about shame or embarrassment. Or about you can't do this because it is a provincial park. We were doing it because the “land was the culture” and we can fish where we want to fish. That's what I grew up with so it was different than a lot of people, I don't think a lot of people got that reinforcement not just from my parents and not just from Westbank people from people of the nation...when you hear that over and over and everywhere you look it's there it becomes normal. **SM**

A consistent element included within the discussion of transformation was the necessity of motivated individuals to serve as mentors for young learners. This infers the importance of people over the actual programming.

### *Cultural Revitalization*

Participants had a clear sense that any effective health promotion project would need to be connected to the teachings and learning inherent within the traditional cultural knowledge of the Okanagan people. Expressed was the fact that engaging in skill-building alone was not enough for effective projects.

It doesn't mean anything for me to walk around and be able to identify a plant. I need to know why that plant is there. That's the importance and the lessons behind why we exist as Okanagans today, I can look in a book and recognize things it's not going to mean anything to me unless I can connect it back to my roots and my heritage. **SD**

This priority of traditional teachings was tempered with a view that there is complexity in defining what is traditional. None of the participants negated the value of traditional knowledge, but some pointed out that claiming that something is traditional should not be used as authoritative against other ways of knowing.

I can go back three hundred years and be pretty positive about what happened in this area because of what I have been taught growing up. I see people that give thanks for offering for fruit from a tree or a bush and I wonder where did that come from? Where along our line did that come from? I guess I am more inquisitive, and if you can tell me without a doubt that this is how it was, I can pretty well believe what you are saying. But when you're having a problem telling me where that actually started from and that's our custom. **CU**

This tension within the responses could be explained by the fragmented nature of traditional knowledge. If this is an effective explanation for the tension, the resulting priorities for educational projects might include traditional teachings in working towards capacity-building. However, a necessity would be to present the teaching in a way that is open to a range of perspectives.

All knowledge-keepers' knowledge is important. We can't get into a situation where we're bantering back and forth where your knowledge is better than my knowledge. Or my knowledge is right and yours is wrong because every family does things differently and every family whatever way they survived they survived. If they were wrong in what they were doing they wouldn't be there today the math is quite simple there so we need to respect each other's knowledge and accept each other's knowledge because our families are getting so diverse and spread out so we need to rely on each other as extended families and neighbor families rather than biological families. **SD**

These general views from participants summarized much of the discussion around education within a WFN context. There was a genuine desire among participants to get as much information as possible and from multiple sources. While all participants

recognized the value of traditional knowledge there was acknowledgement that in its current definition traditional knowledge is fragmented amongst the community as a whole.

### *Skill Building*

Responses around specific activities for skill building were varied. They included both technical and cultural approaches to education around NTFP management as well as some other foundational skills necessary to engage in this work. While many Indigenous researchers have expressed an aversion to Western scientific approaches and exploration within an Aboriginal cultural context (Deloria, 1994), it should be noted that within the responses from WFN community members there were no responses highlighting aversions to specific technical or scientific practices. Unique concepts for skill-building, both cultural and technical, were presented by some of the participants. However, they were not presented in opposition to one another.

Many of the cultural skill building activities prioritized by the participants called for a revival of the traditional practices that kept the Okanagan people on the land.

I would love to see that take place in terms of survival skills. Because the plants are having a tough time with the changing of the season the weather that is taking place top, so there is a lot of things that could take place working with for our children in that aspect. **MS**

The responses often included dialogue on modern society, and an understanding that the future reality of the community will undoubtedly be mixed between what is traditionally cultural and the emergent reality of a modern, urban society.

I'm not saying that is what our community needs to do, but I used to talk as a five year old about talking about going back to hunting and practicing our traditional ways, and that journey I have gone through in that time has brought me back to that, it's not that I want to do away with grocery stores or anything like that. But the health of our culture has not been great because of the things inflicted on our people in the past. **GC**

One specific example to improve skill building was to create an educational garden exhibiting a range of flora and proper approaches to taxonomy in order to erase any confusion around native species.

I think sometimes the right plant isn't being identified properly, and I'm not an expert but I think I can only rely on what my family taught me so I think sometimes there is confusion on what the right plant actually is and there may be confusion on that so I think I would actually bring that all to the forefront and people would actually be able to recognize the plant and the species. **CU**

As an action process, this garden was constructed at the Pine Acres Elders Care Home on reserve. Some community participants who were considered plant and medicine knowledge keepers discussed specific examples of skills that young people would need to manage the land.

The basics...plant recognition, knowing how to take measurements and statistical analysis. When I took forestry all you did was plots, plots, plots; you're basically measuring everything, size of trees' diameters, all of these things are applicable in other areas, because mainly it's stats and it's counting, so maybe it's not a tree your counting but it's a medicinal plant but it is the method so you got to get proper sample size, numbers, a cross section **OX**

In all it could be said that capacity-building in relation to specific skills need to recognize the current reality urban context of WFN. The result is an approach that recognizes the need for constant engagement of outside ways of knowing without diminishing access to the protection and advancement of traditional knowledge.

### *Summary*

What is clear from these responses is that capacity-building for the community at large should be a vital component of NTFP management. There was a collective sense that each individual was responsible to take ownership of the management of the land and therefore educational opportunities in this area should be provided for the community at large. These opportunities should include hands-on activities in the field that are grounded in both traditional teachings and modern technological approaches to management.



### 2.3.4 Specific Management Issues for NTFP

Participants spoke at length about challenges the community faced in terms of management of NTFP. They included changes in accessing specific plants due to changing population dynamics and the ecological impacts of climate change. The dialogue presented an array of options highlighting potential methods of improving access and the establishment of Aboriginal management controls within WFN territory. This section outlines community concerns about changing access to NTFP and explains some of the proposed initiatives to improve access.

#### *Establishing the state of access to NTFP*

Priorities for NTFP management issues arose through questions about how the access to native flora has changed. Participants were consistent in their views that access to traditional NTFP has changed over time. However, there were a variety of explanations for reasons for this, including the impacts of development and potential climate change.

If you look at us as indigenous people and you look at historically what we had access to throughout our whole nation today we don't have that access I couldn't go into all of those areas, there are provincial parks and federal parks and businesses and private lands there's all kinds of stuff that have replaced our berries. **SM**

Participants had varying opinions on whether or not initiatives to improve access to NTFP could function in conjunction with regional priorities for development. Some participants saw the greater impact of environmental issues such as climate change to be the greatest factor impacting management NTFP.

There are prophecies and things that say when our food is gone we will be gone to. But then we have our community doing a media release that we're going to have a 30 story high rise on the lake. So you can't have it both ways, you can't on one hand endorse a sustainability management for the environment and plants and on the other hand keep building to no end. You can't have it both ways, at some point you have to choose. **SD**

I think the main thing is the environmental issue; the environmental changes are more serious. I mean development, it's going to happen.

And in a lot of cases the band from a political perspective making sure with referrals and that type of stuff they are involved in some way shape or form to benefit the community as a whole. There's other impacts developmental impacts on crown land they can be there to fight those things hopefully. But I think the changes in climate are going to be felt a lot more and more significantly to our community.

**OX**

These responses represented the perspectives on what the limitations will be for successful management of NTFP. There was a general consensus that the long term sustainability of key flora is an important consideration. However, there were divergent views on what were the most significant obstacles - continued development of the Okanagan, the changing environment of the region, or both.

*Proposed Policy Initiatives to Support Aboriginal Title in the Management of NTFP*

There were suggestions to deal with development of the land through a type of Indigenous assessment of development proposals akin to government-led environmental impact assessment processes already in place. It was suggested that these WFN assessments be modeled to present a broader scope of the impact of development and to include the effects of such impacts on cultural practices within a WFN context.

No that is a good question, because with my experience with South Mount Boucherie, their environmental assessment passed. But their environmental assessment was based on endangered plants to their perspective not endangered species and plants that are valuable to Okanagan people. That was not on the list and I couldn't believe it, this was a culturally valuable plant, and medicine and food that was not on the list, so it just falls through the cracks and these are some of the things that we're using in our own development process. **DE**

These comments underscore the hidden impacts of development upon Aboriginal communities and are inherently linked to perceptions of their connection to the land and the relationship that connection has to their overall well being. Designing and creating assessments that include such hidden impacts would help to develop Aboriginal indicators towards healthy land development.

### *Summary*

There was sense among participants that there are obstacles standing in the way of sustainable management of NTFP and the land as a whole. Major factors cited by community members were rapid development of the region and the potential impacts of climate change. Although there was a diversity of opinion about which of the factors had a greater influence, the general consensus was that WFN should recognize both development and climate change as motivational factors to act on NTFP management initiatives. As an ideal outcome, it was suggested that WFN enact measures to incorporate models of sustainable management that counter the effects of rapid development as well as the potential impacts of climate change which reach to all areas of caring for the land.

### **2.3.5 Relationship of Cross-Cultural Engagement and Self-determination to NTFP Management**

Since so much of the discussion from the workshops and interviews focused on how WFN interacts with outside communities, questions were included regarding the value of cross-cultural engagement and what are the necessary principles for engaging in positive cross-cultural efforts.

#### *The Need for Cross Cultural Cooperation*

There is an acknowledgement within the WFN community of historical struggles with cross-cultural interaction. However, there was also a consistent affirmation that this place in time provided a unique opportunity for the positive infusion of Aboriginal perspectives into a multitude of issues. Furthermore, it was established that discussions around land management and the more detailed area of NTFP management is uniquely suited as a way to engage in cross-cultural dialogue.

I think that is important to do the cross-cultural because we know we can't do that alone. If we think that we can and we've limited ourselves to those small little reserves than we're not doing what we're supposed to be doing. Traditionally we were responsible we were proud of that stewardship we had all over our nation our hunting areas our fishing areas our fishing camps - the gathering, the socialization; and when

we're not doing that we're not doing that socialization, we're missing out on so much by not harvesting and not doing those things. **SM**

This quote reflects the perspective that within WFN, managing the land is a responsibility that has not disappeared. This responsibility is continuous and by necessity involves a reciprocal process between Aboriginal and non-Aboriginal partners to move forward in a healthy way for the benefit of the community and the ecosystem in general.

### *The Need for Action toward Self-Determination*

Data drawn from the community also revealed an urgency to assert an Aboriginal right in managing all aspects of WFN's cultural and political obligations. These highlight the cultural and political idealism of the community, both as an urban reserve and as an autonomous self-governing nation. Much of the discussion around NTFP management therefore included discussion of learning and action around NTFP as an opportunity to support self-determination for WFN.

They got together and they would reinforce "the land is the culture"  
They got together, they gathered together, they fished together, they did roadblocks together, we did feasts together and all of that reinforced the land was the culture. So I grew up hearing this over and over again and seeing it, seeing my elders do it, seeing our political leaders do it and they did it because they believed it and they felt it and they knew it, and they weren't doing it because it was part of the BC treaty process, they weren't saying it because Canada was telling them to say it. They were doing it because their mothers and fathers and grandfathers and ancestors said it, and that's what the language told them, that was what the culture told them. **SM**

These final statements about the purpose of action towards self-determination highlight some of the unique nuances of the WFN community. WFN has made significant strides towards autonomy through their self-government agreement as well as other initiatives. All of these actions seem to stem from the perspective that within the rights that Aboriginal people hold as first peoples, there is an equal responsibility to act on those rights.

### *Summary*

Discussions about plants and health brought up interesting perspectives within the community about opportunities for the establishment of their rights as Aboriginal Canadians. Included were suggestions for asserting those rights within the region of the Central Okanagan. In the same breath it should be recognized that community members also saw the process of working to manage NTFP as an opportunity for cross-cultural collaboration. This seems to represent a common paradigm for the urban First Nation community, caught between working cooperatively with non-Aboriginal partners without inhibiting their opportunities as First peoples. WFN appears to represent sides of this paradigm simultaneously. Therefore, in recognizing this dichotomy the solution from the community perspective was that both self-determination and cross-cultural engagement should be addressed together. This is not unlike the FNFC asserting co-management processes for NTFP and that “First Nations retain rights, title and interests to one hundred percent of non-timber resource values within our respective Traditional Territories” (FNFC, 2009, p.9).

## **2.4 Discussion**

### **2.4.1 General Discussion of Results**

aʔliʔ k<sup>w</sup>u swi-wi numtaʔx  
aʔliʔ k<sup>w</sup>u suknaqinxatʔiʔ  
axaʔ iʔ tmx<sup>w</sup>ulaʔx<sup>w</sup>

Translation: We are beautiful  
Because we are Okanagan  
Because our land is beautiful

### **Figure 2.3 - The Okanagan Song- syilx/ nqilx<sup>w</sup>cn nkwancin**

Written for the Okanagan people by Delphine Derrickson, Jeanette Armstrong and Herman

Above is the Sylix welcome song. It begins with the verse that is quoted above and then includes a second verse oriented in the second person, beginning with the line “you are beautiful”. This song is taught to all students attending Sensisysusten Elementary School on the WFN reserve and is a vital component at all gatherings. This is included here as an example that highlights the crux of the qualitative components of this research

– the connection of WFN people to the land. The value of beauty as presented by this song is inextricably linked to the people. This illuminates the land as a part of human and cultural identity.

Another complementary example is a quote from a participant who stated succinctly, “the land is the culture”. When asked for a further explanation of this quote, I was told this was a saying attributed to a hereditary Chief of the Okanagan during a politically active period in the 1970s. These two examples coupled with other qualitative data enlighten the concept of how the health of the Sylix people is implicitly related to the land and how the management of NTFP fits into WFN conceptions of health.

Identity, culture, health and traditional practices of management are all related to the land. The vignette presented is that the land itself is a component of culture, and moreover, a member of the community. Without access to the land, or with rapid change to the physical characteristics of a place, the Sylix culture is forced to adapt and change. Moreover there are clues to this connection in Nsilyixcen. Physical places are often named in reference to legend or cultural practice. Plants themselves are often named according to their functionality, either in their cultural uses or their ecological function. With this in mind the plants as represented in the ecosystem are a representation of Sylix culture. Their loss represents more than access to food and medicine. The diminished access to native flora represents identity through the function of their language and practice.

#### **2.4.2 Community-based Summary of Qualitative Results**

The information presented in this chapter reveals both the justification for prioritizing NTFP management within WFN and a need to provide Aboriginal perspectives when developing co-management strategies of all resources including NTFP. Aboriginal conceptions of health, including ecological health, could be thought as a justification for action towards the management of the land. This justification is based on the recognition that native flora are physical manifestations of culture and identity. Their loss could ultimately mean the loss of language through a lack of a descriptive reference of terms, cultural practice, and the overall health of the ecosystems themselves. There are a number of detailed suggestions about the management of NTFP drawn from the

responses of the WFN community members that support the development of core philosophies for the management of NTFP.

All the data included in this chapter were presented to the participants in the final workshop. This included the thematic coding index, participants' quotes, and a series of summary statements collating the convergence of responses. These summary statements were intended to represent the core components of what participants were saying about NTFP management. They are as follows:

1. NTFP management should work to protect and improve the healthy state of the land - as the land is a manifestation of WFN culture and ultimately Aboriginal health.
2. The Okanagan territory is rapidly changing through a variety of factors, and there is concern about the effects of this rapid change on the health of the land.
3. Through education, there needs to be a comprehensive plan to raise awareness of NTFP within the community. This would include spaces dedicated to educating the community and the broader community on the importance of stewardship of the land.
4. NTFP management needs to provide capacity-building opportunities for WFN community members; training them in trans-disciplinary approaches to land management, both through traditional knowledge and western scientific approaches to land management.
5. There needs to be more options in engagement with development that highlights concerns to the impacts on WFN health and culture.
6. NTFP management needs to include the recognition of WFN rights as a sovereign nation, while simultaneously allowing them to engage respectfully with other cultures.

These statements provided a great deal of opportunity for discussion in the final workshop. They were reviewed, edited and eventually accepted as accurate representations of the community perspective. Quotes representing these final community summaries in reference to the coding index are provided below in Table 2.3.

Area of Coding Index	Representational Quote(s)	Community Principle of Management
<b>I. Definitions and Reflections on Health</b>	<p>Well it comes back to that definition of wholeness and balance. There's a worldview that the earth is a machine or a rock and that we are separate, but the way I see it is that we are a part of the earth and if the earth isn't healthy than we are not healthy. So having a relationship with these plants and the animals and the rivers and the rock is part of knowing yourself and having a relationship with yourself.</p> <p>But there are prophecies and things that say when are food is gone we will be gone to. But then we have our community doing a media release that we're going to have a 30 story high rise on the lake. So you can't have it both ways, you can't on one hand endorse a sustainability management for the environment and plants and on the other hand keep building to no end. You can't have it both ways, at some point you have to choose.</p>	<p>1. NTFP management needs work to protect and improve the healthy state of the land, as the land is a manifestation of WFN culture and ultimately Aboriginal health.</p> <p>2. The Okanagan territory is rapidly changing through a variety of factors, and there is concern about the effects of this rapid change on the health of the land.</p>
<b>II. Education / Capacity-building Issues and their Relation to Health and Environment</b>	<p>The basics... plant recognition, knowing how to take measurements and statistical analysis, when I took forestry all you did was plots, plots, plots; you're basically measuring everything, size of trees' diameters, all of these things are applicable in other areas, because mainly it's stats and it's counting, so maybe it's not a tree your counting but it's a medicinal plant but it is the method so you got to get proper sample size, numbers, a cross section.</p> <p>All knowledge-keepers knowledge is important we can't get into a situation where we are bantering back and forth where your knowledge is better than my knowledge, or my knowledge is right and yours is wrong because every family does things differently and every family whatever way they survived they survived. If they were wrong in what they were doing they wouldn't be there today the math is quite simple there so we need to respect each other's knowledge and accept each other's knowledge because our families are getting so diverse and spread out so we need to rely on each other as extended families and neighbour families rather than biological families.</p>	<p>3. Through education, there needs to be a comprehensive plan to raise awareness of NTFP within the community. This would include spaces dedicated to educating our community and the broader community on the importance of stewardship of the land.</p> <p>4. NTFP management needs to provide capacity-building opportunities for WFN community members; training them in trans-disciplinary approaches to land management, both through traditional knowledge and western scientific approaches to land management.</p>



Area of Coding Index	Representational Quote(s)	Community Principle of Management
<b>III. Specific Management Issues for NTFP</b>	<p>With my experience with South Mount Bouchrie, their environmental assessment passed. But their environmental assessment was based on endangered plants to their perspective not endangered species and plants that are valuable to Okanagan people. That was not on the list and I couldn't believe it, this was a culturally valuable plant, and medicine and food that was not on the list, so it just falls through the cracks and these are some of the things that we're using in our own development process</p> <p>Absolutely, especially here in Westbank there is so much development going on. There are so many areas where certain things grow because of the land or the soil or whatever combination that makes it grow and it doesn't grow anywhere else. Because of the development that's going on now they are just getting wiped out. I know that off reserve in developments that have to have x percentage of acreage that's supposed to be left for greenspace. One of the things that I truly believe strongly because our reserve is so small and everything is being developed, I know families that are developing their land post to post. They never even save a house lot for them or their grandchildren, or for anybody it's absolutely gone.</p>	<p>5. There needs to be more options in engagement with development which highlights concerns to the impacts on WFN health and culture.</p>
<b>IV. Cross-Cultural Engagement, Self-determination and NTFP Management</b>	<p>Developing policy and legislation and saying as first nation communities we want a government to government relationship. And how can you have that as first nation communities unless you are developing along the same trajectory, yes our history is oral but in this day and age, you can use it in the court of law but how do you tell someone hey you can't do that because it's passed on to me for generations that you can't ride your motorbike here.”</p>	<p>6. NTFP management needs to include the recognition of WFN rights as a sovereign nation, while simultaneously allowing them to engage respectfully with other cultures.</p>

**Table 2.1 – Summary of Qualitative Results**

## 2.5 Conclusion

The qualitative component of this project provided relevant examples of priorities for any community-based research project. WFN community members had a clear sense of what they wanted to get out of any research project taking place within their community. They are committed to the promotion of a robust vision of health promotion in their community which extends beyond the absence of disease to include developing healthy communities and ecosystems. The data also provided specific suggestions and concepts for management of NTFP and the connections of health, ecology and land management inherent within the cultural understandings of community members. The various discussions around the role of NTFP within the health of WFN community members provided a core framework to build a management strategy for NTFP informed directly by the priorities of the community. The objective in engaging Aboriginal communities should highlight the core community perspectives on how their ecologies have changed and the resulting priorities that each community would like to see put into action. Although each community will differ within their priorities, and many will reflect unique relationships to the land, there will be many points of convergence as respective communities engage in this work.

WFN is situated to act concerning the management of NTFP based on their current political standing and infrastructure. As mentioned earlier, they have a self government agreement, which empowers them to enact bylaws pertaining to the management of natural resources within their reserve lands. They own and operate a WFN community forest. WFN is located in an area of rapid urbanization and potentially drastic ecological change in the future through climate change. (Hannaman and Wong, 2006) A review of the core principles around the qualitative processes within this unique case-study approach to research may provide a model for other more rural BC First Nation communities regarding urbanization and climate change.

Indigenous people throughout the world have rich interactions with NTFP. There have been a number of pressures within our modern day context that will undoubtedly impact the nature of that relationship. When reflecting on Aboriginal community perspectives in relationship to plants, it becomes apparent that plants are more than products existing within the ecosystem. The flora is a partner with individuals and

communities in preserving health, systems of education, the sustainability of land, and ultimately, cultural identity. Through creating systems that empower the voice of the community, effective strategies for management can emerge that can address the scope of those voices. This concept makes engagement with the land and the resources therein more than an economic commodity, but rather one that is collectively recognized as integral to who we are as individuals and communities. Discussion with community members from WFN touched on many issues including WFN definitions of health, perceptions of education, and a treasure of information on how plants themselves are vital components of culture. Management from WFN perspectives could be more accurately interpreted as an act of cultural preservation, and not just an action to improve the physical conditions of a place.

## **Chapter 3: Analyzing WFN Traditional Knowledge about the Distribution and Succession of *Shepherdia canadensis* (sx<sup>w</sup>usəm - Soapberry, Russet Buffaloberry) in the Central Okanagan**

### **3.1 Introduction**

The general principles presented in Chapter 2 provided perspective on the process of engaging in NFTP management. In addition to this effort, I hoped to explore the applicability of Aboriginal TEK to effective NFTP management. *Shepherdia canadensis* (sx<sup>w</sup>usəm – Okanagan; Soopolallie – Chinook; Soapberry; Russert Buffaloberry) was selected as a plant of focus to highlight challenges of changing community access to NFTP and the ways in which TEK may be applied to natural resource management.

This chapter addresses various accounts about the distribution of *S. canadensis*, comparing historical accounts given by WFN community elders with the current distribution characteristics presented by the research literature and a condensed field study of various *S. canadensis* plots. The research data established from this comparison served to provide baseline information to plan for long term management initiatives for *S. canadensis* in the region. The outcomes extrapolated from this field research support the notion that the distribution of *S. canadensis* has likely changed in the Central Okanagan in accordance to the accounts given by the WFN elders. Furthermore, the usefulness of WFN TEK in this particular instance highlights the importance of Aboriginal TEK in management and restoration planning.

### **3.2 Developing a Research Framework on the Distribution and Succession of *Shepherdia canadensis* in the Central Okanagan using WFN Community Perspectives**

There was a great deal of information presented by the community about effective NFTP management. These discussions included some types of ecologies that are high priority for management projects and specific plant species where community access has changed over time. Many participants identified the lower elevation spaces as priorities for management project. The simple explanation for this could be that these areas are where people live and are most familiar, and where the majority of the development of the region has been witnessed. There was a sense that high elevation sites typified the

pristine and healthy ecosystems associated with the past. One participant described, “With many of the medicines in this area there are a fair amount of areas where they are thriving. The losses that are taking place are the ones that are lower down in the valley part” **MN**. This sentiment was also established with the consistent reference in the qualitative components of this project about concerns of the rapidly disappearing natural spaces in light of rapid development within and around the reserve lands.

Multiple participants presented *S. canadensis* as a specific species that typifies losses at lower elevations:

I think about home and again the  $sx^wusəm$  [*S. canadensis*]. I think about Crystal Mountain. In talking to our Elders that whole area right from highway 97 to Crystal Mountain was a huge resource area for  $sx^wusəm$ . But now if you go through there you couldn't find one  $sx^wusəm$ , but you'll find schools and houses. So if we don't have access to those types of things, or if we don't have a way to go and get them, or if they aren't readily available through walking, or traveling distances it has a horrible effect on who we are. **SM**

As far as picking the fruits from this area as a child I would say we had chokecherries, saskatoons and the foaming berries [ $sx^wusəm$  - *S. canadensis*].

**All down this low?**

Yeah, and we enjoyed them **CU**

These quotes present an interesting look into history of the distribution of *S. canadensis* in the Central Okanagan. The elders suggest that *S. canadensis* used to occur within elevation ranges and ecosystems that are no longer seen as typical habitats for *S. canadensis*. This information challenges current scientific assessments of *S. canadensis* habitats within the Central Okanagan. These studies place its typical distribution within higher elevations (typically 1150-2150m; as per Lloyd, 1991; 2005) than these statements of the community members (350m+).

This TEK provided by the WFN community members provides a unique opportunity to retrace the biological layout of a space and consider the changes that have brought us to the present. In order to make the case about the strength of applicability of Aboriginal TEK to NFTP management, I proposed research questions directly targeted at assessing these WFN accounts of the historical distribution of *S. canadensis*. I wanted to

first ask whether their traditional accounts of distribution *S. canadensis* were possible. In order to achieve this I first asked whether there are lower elevation stands or occurrences of *S. canadensis* in the Central Okanagan at present? Once responses to this question were addressed, I went on to ask what the characteristics of these low elevation occurrences were in association to their surrounding plant communities? The purpose of this question was to assess whether the plant community composition of lower elevation stands were similar to the higher elevation stands, thereby dictating whether we were dealing with unique occurrences of plant communities. This information could then begin to provide a framework for various plant community profiles in association with *S. Canadensis* within various ecological conditions at varying elevations.

### **3.3 Review of Relevant Literature**

Research on *S. canadensis* has been conducted in areas such as biology, chemistry, ecology, traditional Aboriginal uses, and its responses to human disturbances. This section provides a review of relevant literature on *S. canadensis* to emphasize the importance of this plant both in its ecological function and its significance to the Aboriginal cultures in Canada for uses in food and medicine. The aim of this review is to show the potential negative impacts of diminishing access to the plant species on local ecosystems, and the Aboriginal people who utilize this plant.

#### **3.3.1 Biogeoclimatic Classification of the Central Okanagan**

The Biogeoclimatic Ecosystem Classification (BEC) was developed in conjunction with researchers and management professionals to provide a framework for ecosystem-based management decisions (Pojar, 1987). The BEC relies on the principles of incorporating both biotic and environmental factors for the application of resources uses (Meidienger, 1990). The Southern Interior contains 52 biogeoclimatic zones according to the BC Ministry of Forests and Range (Lloyd, 2005). This study focused on the Central Okanagan, an area stretching from the Pennask Summit to the west and Black Mountain to the east, south to Peachland and north to Lake Country. This particular contains seven BEC zones with multiple variants (BC Ministry of Forests and Range, 2008). Site series measures within the BEC system of classification are used to describe

“detailed ecosystem units” within the Ecoregion System of Classification of British Columbia (Demarchi, 1996). For the purpose of this study BEC site series names will be used as a broad description of ecosystem units of the Central Okanagan.

The biogeoclimatic zones associated with this area include Bunch Grass (BG), Ponderosa Pine (PP), Interior Douglas Fir (IDF), Interior Cedar Hemlock (ICH), Engelman Spruce/Sub-Alpine Fir (ESSF), Montane Spruce (MS), and Interior Mountain-heather alpine (IMA). Additional studies have further delineated these larger ecological classifications into more specific ecosystem types which have been described in various works including Iverson (2003, 2004), Lloyd (2005) and Lea (2008). These detailed ecosystem types or site series will be referred to later in the chapter to assess the plant community relationships associated with *S. canadensis* within the Central Okanagan.

### **3.3.2 Biology**

The biology of *S. canadensis* has typically been studied within the context of larger research projects on North American native plants. “The shrubs typically range from 0.9 – 3.9m in height and the fruits are ovoid achenes that ripen orange to bright red” (Walkup, 1999). *S. canadensis* is typically described as a deciduous woody shrub in many plant guides (Marles 2000, Parish, 1996). Its sexual reproductive biology is usually described as dioecious although some works cite the occasional existence of monoecious occurrences (Cooper, 1931; Stephens, 1973). There is substantial variation in the description of the root systems of *S. canadensis*, with some works describing a rhizomatic network with “shallow fibrous components” and other works describing a single taproot (Parish 1996, p.173; Walkup, 1999). *S. canadensis* has been classified as an actinorhizal plant through its ability to form symbiotic relationships with various microorganisms through its root system (Visser, 1991). It is able to fix atmospheric nitrogen and promote mycorizhal symbiosis (ibid.).

### **3.3.3 Ecology**

Various works have described the ecological characteristics of *S. canadensis*. Much of this work has emerged from management initiatives around forestry, mining,

and monitoring of large migrant mammals such as deer and caribou. *S. canadensis* occurs in a range of ecosystems in association with various plant species (Walkrup, 1999; USDA, 2009). It is listed as a native plant species in every Canadian province and 22 states in the United States stretching south to Arizona and New Mexico. *S. canadensis* is so widespread that it is difficult to place a certain ecosystem in direct association with this species. For example, *S. canadensis* occurs in 16 of the 34 ecosystems characterized by the United States Forest Service (Garrison, 1977; Walkrup, 1999). Within BC, occurrences of *S. canadensis* have been recorded within 13 of the 14 BEC zones (Klinkenberg, 2008; Lloyd, 1990).

This broad distribution implies an exceptional adaptability for this plant. Generally, multiple descriptions converge on *S. canadensis*' affinity for moderately dry conditions with coarse, well-drained soils (Parish, 1996). Beyond these relatively simple generalizations, the cited ecological conditions vary around such parameters as shade conditions and elevation. Walkrup, citing an unpublished paper by Noble (1985), notes the tendencies of *S. Canadensis* to form "dense thickets" along valley bottoms within the US Rocky Mountains (Walkrup, 1999). Within BC, the general BEC zone most strongly correlated with *S. canadensis* is the Interior Douglas Fir (IDF) zone (Klinkenberg, 2008). Within the interior *S. canadensis* is cited as a significant understory shrub in 3 BEC zones: the IDF, the Montane Spruce (MS), the Engellman Spruce / Sub-Alpine Fir (ESSF).

*S. canadensis* has been shown to have a variety of ecosystem functions noted by researchers. Various degrees of significance have been placed on this plant as food for grizzlies, moose, caribou, and deer; and many small mammals and various birds (Knight, 1999; Walkrup, 1999). *S. canadensis* has also been suggested as a particularly beneficial organism for promoting diversity within local ecotypes, making it a target for use in site reclamation (Winterhalder, 1990). This has been attributed to its usefulness as a nitrogen fixer and an early succession shrub in post-fire environments (Birk, 1980; Pashke, 1997). *S. canadensis* has been utilized in targeted reclamation at mining sites, and naturally reclaimed two coal mine sites in Alberta (Russell, 1985). These points detail some of the potential value of this species to both animals and the natural environment.



### 3.3.4 Documented Traditional Knowledge of Medicinal Uses and Ecological Characteristics

The diverse accounts of traditional knowledge and uses of *S. canadensis* among Aboriginal populations match its broad distribution. Traditional uses for this plant have been cited in multiple ethnobotanical works from Canada (Turner, 1981; Marles 2000). Traditional uses for this plant are diverse and utilize all of the physical components of the plant. The stems and roots of the plant were used in a tea by the Algonquin's of eastern Canada for various remedies including stomach ailments, labour pain, and skin ailments (Black, 1980). Similar uses extend further west to the Woodland Cree of south-eastern Saskatchewan, the northern Cree of Alberta and the Dene of northern Alberta at Slave Lake (Leighton, 1985; Siegfried, 1994; Lamont, 1977). As mentioned earlier, the Carrier of northern BC used *S. canadensis* as an anti-cancer medicine which was administered internally through a decoction of the bark of the roots (Turner, 1981).

Western Aboriginal groups have similar uses for the berries, the best one being whipping the berries into a foaming beverage known as "Indian ice cream" (Turner, 1981). This was thought to cleanse the intestine by mimicking the behaviour of pre-hibernating bears in late summer. There were some unique uses of *S. canadensis* attributed to the Okanagan people including cleansing rituals for hunters in their preparation for a hunt, and ritual uses for an individual to change their luck through cleansing (Turner, 1980).

Despite extensive Aboriginal narratives on the medicinal uses of *S. canadensis*, there is very little information on Aboriginal perspectives of its ecological characteristics. Turner's work provides some insight into the typical or ideal habitats for *S. canadensis*. Okanagan elders spoke of a place south of Kettle Falls that was literally called a "place of Soapberries" in the traditional language (Turner, 1980). Unfortunately this place, historically located around Rickey Rapids, is now submerged under Franklin Roosevelt Lake as a result of the Grand Coulee dam. We can surmise from this information that Okanagan Elders perceived one "ideal" or extensively productive habitat for *S. canadensis* to exist within a riparian area with some variation of a Ponderosa Pine or Interior Douglas Fir Biogeoclimatic Zone judging from the surrounding elevation ranges.

### **3.3.5 Summary of Published Literature on *Shepherdia Canadensis***

After analyzing the published literature about *S. canadensis* it could be said that a loss of its distribution could be detrimental to both human, ecological, and cultural health. *S. canadensis* has significant potential in reclamation projects and in promoting ecosystem diversity (Winterhalder, 1990). It is a food plant for humans, large and small mammals and birds (Walkrup, 1999). *S. canadensis* has potential as an anti-cancer medicine (Ritch-Krc, 1996). *S. canadensis* has an extensive connection to Aboriginal cultures in North America - used as food, medicine and in ceremony (Turner, 1981; Marles, 2000). Despite the fact that there is nothing to signify a threat to its distribution from conventional assessments, its complete loss would impact health culture and the environment.

## **3.4 Methods**

### **3.4.1 Introduction**

The purpose of this component of research was to examine the role of plant community composition within low elevation *S. canadensis* stands and compare that to more common *S. canadensis* community characteristics within the Central Okanagan. This was carried out in four phases:

- 1. Gathering of WFN TEK about *S. canadensis* distribution**
- 2. General observation of *S. canadensis* habitats**
- 3. Quadrat sampling of *S. canadensis* communities from low to high elevations**
- 4. Analysis of sampled *S. canadensis* communities using cluster analysis method**

A map highlighting the sampling area and quadrat locations for the research can be found below in Figure 3.1. The methodological foundation for each of these steps is described in the following sections.



### **3.4.2 Method for Addressing WFN TEK About *S. canadensis***

Using historical site data in plant succession research from the traditional perspective of the botanist is described in works like Luken (1990) and Bazzaz (1996). Their perspectives assert that such data should be used as a complementary side piece of evidence to an effective plant succession study. This more conventional approach is contrasted by MacDougall (2004), who proposes that local historical knowledge should be sought out as a primary and necessary aspect of plant succession research and management planning in order to frame research questions. Support for the utilization of traditional ecological knowledge (TEK) in conjunction with scientific approaches about local ecosystems have been supported various researchers. (Turner, 2000; Raue', 2002; Sherry, 2002; Moller, 2004). TEK in the context of this research was treated as anything which participants shared in regards to ecology. Although only some of the participants self identified as traditional knowledge holders, this general approach to TEK was taken to account for the possibility that all of the participants could have had access to TEK through their experiences without asserting their expertise. The TEK presented in this chapter was primarily gathered in the interviews and workshops described in Chapter 2. In addition to this information, various informal review sessions were conducted with one elder who was a traditional knowledge holder and an active gatherer of traditional foods and medicines.

### **3.4.3 Methods for General Field Observation *S. canadensis* Habitats**

The first phase of the field research was designed to get a general picture of the distribution characteristics of *S. canadensis* in the Central Okanagan. The framework for site selection was multifaceted. I was given information by one community elder about the current characteristics and locations of dense stands of *S. canadensis*. This elder simply explained, "If you drive up any forest road about 1000 meters in the area, you will start seeing the sx<sup>w</sup>usəm." **SM** The elder went on to suggest some areas west of the WFN reserve at high elevations to find dense stands of *S. Canadensis*. This information was compared to Lloyd's "A Guide to Site Interpretation of the Kamloops Forest District" (1991), the BC Ministry of Forests and Range Biogeoclimatic Ecological Classification (BEC) system, and general assessment in the BC ecosystem and species explorer (B.C.

Conservation Data Centre, 2010). The BEC database was analyzed to identify ecological site series where *S. canadensis* exists as a major understory plant. For the purpose of this study, these dense stands were defined as at least level 3 (frequencies of occurrence of at least 40% and abundance measures of at least 7%) from Lloyd (2005). These specific site series were then identified on the BEC maps for the region. The BEC data summarized by Lloyd highlighted a total of 6 site series within or near the Okanagan Valley where *S. canadensis* was recognized as a prominent shrub (2005). These site series are listed below in Table 3.1. Once the locations of these site series were assessed within the BEC maps, walkthroughs were carried out within these BEC zones to identify locations of these site series and to note characteristics of typical plant communities in association with *S.canadensis*.

<b>BEC Zone</b>	<b>Site Series Name</b>	<b>Abbreviation</b>	<b>Elevation</b>
<b>Interior Douglas Fir (IDF)</b>	Cascade Cool Interior Douglas Fir Variant 2 – site series 3	IDFdk2-03	1150- 1400M
	Cascade Cool Interior Douglas Fir Variant 2 – site series 4	IDFdk2-04	
<b>Montane Spruce (MS)</b>	Okanagan Highlands Dry Montane Spruce Variant – site series 04	MSdm1-04	1275-1700M
<b>Engellman Spruce / Sub Alpine Fir (ESSF)</b>	Okanagan Highlands Dry Cold Engellman Spruce Subalpine Fir Dry Cold Variant – Site Series 2	ESSFdc1-02	1600 – 2250M
	The South Thompson Uplands Dry Cold Engellman Spruce Subalpine Fir Dry Cold Variant - Site Series 2	ESSFdc2-02	1475 – 1900M
	The Okanagan Range Very Cold Engellman Spruce Subalpine Fir Very Cold Variant – Site Series 84	ESSFxc1 -84	1700 – 2150M

**Table 3.1 – BEC Site Series Containing Dense Stands of *S. canadensis***

This table highlights BEC Site Series with *S. canadensis* as a dense shrub in the forest understory

Simultaneous to identifying the general characteristics within the BEC framework, low elevation *S. canadensis* habitats near the valley bottom were identified. WFN community members suggested specific places near the valley bottom where they had remembered seeing *S. canadensis*. One of the places noted was within the Mission Creek Greenway which runs on the east side of Okanagan Lake. Once this site was initially

visited, the density of *S. canadensis* seemed greater than high elevation stands found in typical habitats. The elevation range of this particular stand was 347-360 meters. At this point this stand seemed like an anomaly due to its high density, its occurrence within a riparian area, and because there are relatively few low elevation forested areas. For these reasons, this stand was chosen for comparison to typical stands to assess whether this low elevation stand was a unique ecosystem. Walkthroughs were carried out within all of the major low elevation riparian areas of the central Okanagan to establish more comparative test plots. During this phase of the research, samples of *S. canadensis* and other plants existing in proximity to *S. canadensis* were gathered through cuttings or seed and taken back to the community garden at the WFN Health and Wellness Centre to be grown in the native plant repository garden. Seedlings were started over two springs and summers of this project and plants can now be seen growing in the garden space.

#### **3.4.4 Method for Quadrat Sampling of *S. canadensis* Habitats**

In the second phase of field work more specific information on the plant community associations of *S. canadensis* were gathered. Within the sampling areas of phase 1, 29 sample plots of 25 feet squared (7.62 m<sup>2</sup>) were taken within phase 2. Most quadrats (24) contained at least one *S. canadensis* specimen. A total of five of these low elevation quadrats without *S. canadensis* were sampled in order to assess similarities in flora to the low elevation riparian communities. A description of the sampling areas with listing of some relevant ecological characteristics is found in listed below in Table 3.2.

This sampling method was directed to plant community compositions associated with *S. canadensis*. Therefore the majority of quadrats were specifically selected to contain *S. canadensis*. In any area with larger, dense stands of *S. canadensis*, I walked around the limits of the distribution of the plant, then walked back on a line sampling a quadrat every 200m on either side of the line. This was done to maintain randomness in regards to the density of *S. Canadensis* versus complementary species within each quadrat, thereby limiting sampling bias towards relative density measures (Ezlinga, 1999; Gurevitch, 2006).

Sample Area Name	Elevation Range	BEC Zone	General Notes
Hardy Creek (HC)	340 – 360 M	<b>BG/PP</b>	3 quadrats; Riparian; No <i>S. Canadensis</i> Present., E aspect
Bear Creek (BC)	360 – 390 M	<b>BG/PP</b>	2 quadrats; Riparian; No <i>S. Canadensis</i> ; NE aspect
Mission Creek Greenway (MCG)	340 – 390 M	<b>PP/IDF</b>	7 quadrats; Riparian habitat; Varying densities of <i>S. Canadensis</i> stands; W aspect
Okanagan Mountain Park (OMP)	440 – 460M	<b>IDF</b>	2 quadrats; Riparian Habitat; Isolated occurrences of <i>S. Canadensis</i> ; NW aspect
Lower Glen Canyon (LGC)	420 – 580 M	<b>IDF</b>	4 quadrats; Riparian habitat; Isolated occurrences of <i>S. Canadensis</i> ; NE aspect
Upper Glen Canyon (UGC)	1010 – 1040 M	<b>IDF</b>	3 quadrats; Riparian; Isolated occurrences of <i>S. Canadensis</i> NE aspect
Cedar Mountain (CM)	1060 -1080 M	<b>IDF</b>	2 quadrats; Isolated occurrences of <i>S. Canadensis</i> ; NW aspect
Silver Lake (SL)	1260-1275 M	<b>IDF</b>	3 quadrats; Upper shelf of a riparian habitat; Dense stand of <i>S. Canadensis</i> ; SW aspect
Jackpine Lake (JL)	1310 – 1320 M	<b>MS</b>	2 quadrats; Isolated occurrences of <i>S. Canadensis</i> ; NW aspect

**Table 3.2 – Description of Sample Areas – This table lists the various sample areas, BEC zones and some general characteristics of the areas.**

Sampling within each quadrat involved gathering total counts of all plants not including mosses, grasses and lichens to highlight general plant community structure. This choice was made with the specific purpose of attempting to develop quick plant indicators (i.e. trees and shrubs) that would be present throughout longer growing periods, thereby mitigating some of the phenological variation of these quadrats. Simultaneously, detailed notes of morphological characteristics of *S. canadensis* plants were made within each quadrat including occurrences of monoecious specimens, and notes on unique structural characteristics.

The intent was to simply gather data in a pilot context to develop more specific questions about the succession of *S. canadensis* in the Central Okanagan. Since the BEC framework had done a great deal of sampling to define plant community characteristics at higher elevations, I concentrated more of the sampling on the lower elevation populations within the riparian areas. Samples were taken from two of the higher

elevation areas targeted in the first phase of this project - five plots in all. Two of these plots were somewhat dense populations of *S. canadensis* (> 10 plants/plot) and two of the plots were less dense (<5 plants/plot). These characteristics from the higher elevation samples were used as a quick reference of similarity for density of *S. canadensis* within the plots.

### 3.4.5 Methods of Data Analysis

A general framework for community similarity was used for data analysis. This analysis measured the overall similarity of quadrats based on plant composition. This would in turn give a quick measure of the uniqueness of the plant composition of the low elevation quadrats in comparison to the higher elevation typical habitats. Total community counts were gathered into a spreadsheet seen in Appendix III, Table 1. A logarithmic data transformation was carried out to minimize the effect of isolated occurrences of large plant counts such as Fireweed (*Epilobium augustifolium*) which occurred in three quadrats (CM 1,2 and OMP2) at a count of 85, 89, and 73 plants. This was done according to procedures recommendations for data transformation laid out by Wolda (1981) and Krebs (1999). The logarithmic transformation followed the equation:

$$n = \log (n+1)$$

n= number of species

Data from each quadrat was then compared to other quadrats using the Renkonen or “percentage similarity” index. This measure was chosen due to the minimal effect small sample size and high species diversity has on its effectiveness (Krebs, 1999). The Renkonen index follows the equation:

$$P = \sum \text{minimum} (p1i, p2i)$$

P = percentage similarity between samples 1 and 2  
p1i = Percentage of species i in community sample 1  
p2i = Percentage of species i in community sample 2  
(Krebs 1999, pg 304)



The resulting analysis determined percentage similarity measurements for each quadrat relative to the other. A cluster analysis was then performed on these percentage similarity measurements to form groupings based on the similarity of the plots. A type of average linkage clustering called Unweighted Pair Group Using Arithmetic Averages (UPGMA) as referenced in Krebs (1999) was then used. This clustering method was chosen to minimize complications with single linkage and complete linkage clustering methods when applied to larger, diverse data sets (Krebs, 1999). Data sets were analyzed and calculated through Microsoft Excel.

The equation for this analysis is defined by:

$$S_j(k) = 1/T_j T_k (S_{jk})$$

$S_j(k)$  = Similarity between Clusters  $j$  and  $k$

$T_j$  = Number of samples in cluster  $j$  ( $\geq 1$ )

$T_k$  = Number of samples in cluster  $k$  ( $\geq 2$ )

This grouping method was used to create the clustering tree diagram presented in the results section. This method allowed for a quick visual reference of how each sample area was similar based solely on the composition of plants in each quadrat. These similarity characteristics were further analyzed in order to discover a subset of plants that characterize communities associated with *S. canadensis* within each larger cluster.

### **3.5 Results**

#### **3.5.1 Results of General Field Analysis**

The first phase of field work consisted of gathering large amounts of data on the descriptive characteristics of plant communities growing with *S. canadensis*. This then provided the opportunity to refine the research questions about *S. canadensis*. The refined questions centered on whether the lower elevation habitats within the range of 250–500m were simply low elevation occurrences of sites series typically described by the BEC framework or whether they were unique habitat types. These questions were

prompted by comparisons of basic observations of the low elevation community compositions within the riparian areas and community compositions of the higher elevation stands. Several low elevation quadrats on the east side of Okanagan Lake within the Mission Park Greenway had dense populations of *S. canadensis* greater than the density of high elevation stands. However, they seemed to display a unique plant community composition compared to the high elevation plots. Other low elevation occurrences of *S. canadensis* were discovered within the riparian areas on the west side of Okanagan Lake. There seemed to be greater similarities within the plant communities at these locations and the low elevation stands around Mission Creek, despite differences in the density of the *S. canadensis* stands in each of these areas.

Notes were taken in reference to the most frequent plants growing in proximity to *S. canadensis* as a preliminary component of the quadrat analysis. Beginning with most occurrences in conjunction with sampled quadrats containing *S. canadensis*, the species were: *Pseudotsuga menziesii* - Douglas Fir (81%), Douglas Maple - *Acer glabrum* (67%), Oregon Grape - *Mahonia aquifolium* (48%), Black Cottonwood - *Populus trichocarpa* (48%), and Saskatoon Berry - *Amelanchier alnifolia* (43%). It should be noted that these numbers are skewed towards riparian species since the selection of sites included more riparian habitats than forest habitats.

### **3.5.2 Results of Unweighted Pair Group Using Arithmetic Averages (UPGMA) Analysis**

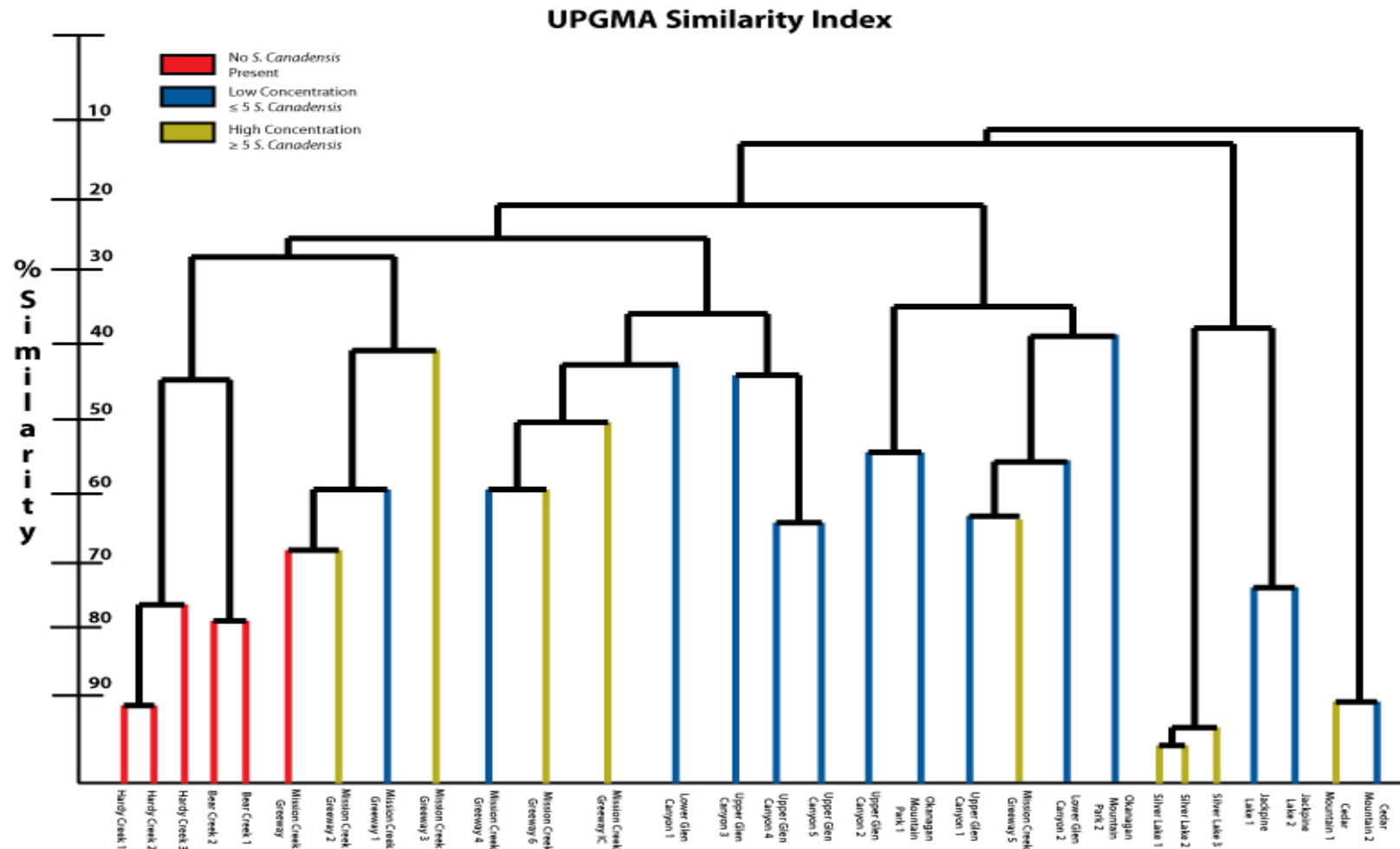
The results of UPGMA analysis show some interesting trends within the sampled *S. canadensis* communities in the central Okanagan. Most notably the linked clusters are grouped generally by elevation. More simply put, there are not instances of high similarity measures between quadrats of highly variant elevations. These results are illustrated in a clustering tree diagram in Figure 3.3. The linkage data is arranged into three major clusters. The left hand cluster is the sampled low elevation riparian areas without the presence of *S. canadensis*. These plots consisted of two separate low-elevation riparian sample areas, Hardy Creek (3 plots) and Bear Creek (2 plots). These plots show strong linkages within their respective sampling areas (>75%) as well significant linkages from each of their respective clusters to one another (46%). These

particular quadrats typify Black Cottonwood riparian ecosystems described by Lloyd for this region (2005).

The middle clusters of Figure 3.3 represent the majority of the low elevation occurrences of *S. canadensis*. These quadrats were sampled from three riparian areas. The first was Mission Creek on the east side of Okanagan Lake. This was a traditional harvest site of Kokanee and the largest riparian area on the east side of the lake. A total of eight quadrats were sampled in this area. The second major sampling area was within Glen Canyon along Powers Creek on the west side of Okanagan Lake. This site had seven measured quadrats. The third sampling area was a low elevation site along a creek in Okanagan Mountain Park. Within these middle clusters of quadrats it should be noted that there were various occurrences of dense stands of *S. canadensis*. Four of the sampled low elevation quadrats contained more than five *S. canadensis* bushes within the quadrat. One of these quadrats, Middle Creek Interpretive Centre, peaked at 27 *S. canadensis* bushes, three times the average density of the higher elevation Silver Lake plots.

The far right hand section of the table consists of clusters from higher elevation plots at three sample areas, Silver Lake (3 plots), Jackpine Lake (2 plots), and Cedar Mountain (2 plots). Similar to the lower elevation plots in the left hand section of the diagram, these plots are heavily linked internally (>75%). However, unlike the plots on the left hand cluster each sample area is not as heavily linked to each other. The Silver Lake plots represent a dense stand as described earlier in this chapter. Working from Lloyd (2005), these particular plots represent the Cascade Cool Interior Douglas Fir Variant 2 site series 4 (IDFdk2-04) titled the “Pinegrass” site series. This was deduced by analyzing the elevation, and comparing commonality between the vegetation tables found in Lloyd and the plant lists for these three plots (“IDFdk2-03”, 2005, p.5).

In summary, the quadrats sampled reveal the following characteristics in terms of similarity. The cluster of low elevation plots without *S. canadensis* (Bear Creek and Hardy Creek) were most closely linked to a group of plots with *S. canadensis* in the southern portion of the sample area of the Mission Creek Greenway (Mission Creek Greenway 1,2,3). All of these quadrats shared the species Black Cottonwood as the dominant tree species with Douglas Fir as next most prominent tree species.



**Figure 3.2 - Cluster Tree Diagram Highlighting UPGMA Analysis**

This clustering tree diagram highlights the UPGMA analysis. Y axis is the Percentage (Renkonen) index of similarity, x axis area the quadrats. Each horizontal line represents the Similarity measure between two plots or two clusters of plots. The height of the horizontal lines are the measurement of similarity. The color coding describes the prescence and density of *S. Canadensis* within the plots.

This low elevation cluster without *S. Canadensis* links to a cluster of low elevation plots with *S. Canadensis* comprised of seven quadrats (Mission Creek Interpretive Centre, Mission Creek Greenway 4,6; Lower Glen Canyon 1; Upper Glen Canyon 3,4,5). The major common plants in these quadrats were *S. canadensis*, Douglas Fir, Douglas Maple and Oregon Grape.

This large cluster is linked to another cluster of low elevation plots comprised of six quadrats (Mission Creek Greenway 5, Upper Glen Canyon 1,2; Okanagan Park 1,2). The major plants linking this cluster were Douglas Fir, Ponderosa Pine – *Pinus ponderosa* and False Solomon’s Seal - *Maianthemum racemosum*. This cluster links to the higher elevation plots at this point. It first links with a cluster of the sampling at Silver Lake and Jackpine Lake. It should be noted that these two sampling areas are not heavily linked to each other, only containing the common species Prince’s Pine. The characteristics of the Silver Lake site are indicative of IDFdk2 -04 as mentioned above, containing a Douglas Fir and Lodgepole Pine - *Pinus contorta* canopy with *S. canadensis* with Sitka Alder - *Alnus viridis subsp. sinuate*, and Saskatoon berry all in the understory. The major plant components linking the two Jackpine Lake sights are Douglas Fir, Engelman Spruce - *Picea engelmannii*, Western Red Cedar - *Thuja plicata*, Boxwood - *Paxistima myrsinites* and Prince’s Pine - *Chimaphila umbellata*. Finally, all of the plants cluster with the two plots at Cedar Mountain with the least similarity. Interestingly, this particular site was within the fire zone on east side of Okanagan Lake and had a number of unique plant species apart from the rest of the study including early successional plants such as Fireweed - *Epilobium angustifolium*. Along with *S. canadensis*, Douglas Maple any large connection to the other sampled areas.

### **3.6 Discussion**

#### **3.6.1 Connections to Research Questions and Other Literature**

The research questions posed a complex picture about the historical distribution of *S. canadensis* within the central Okanagan. The elders’ accounts about access to *S. canadensis* posed a simple question about whether or not those distribution accounts were probable or even possible. The fact that we can still witness low elevation occurrences on both sides of Okanagan Lake within many of the major riparian areas

show their accounts are in the realm of possibility. What can be definitively said about the distribution of *S. canadensis* at present is that it is fragmented from high elevations to the valley bottom. The clustering of plots seems to indicate *S. Canadensis* being distributed along a gradient of changing plant communities from low to high elevations.

The overall characteristics of *S. canadensis* distribution documented in this study shows three distinct ways that this plant is distributed. They are: dense typical stands at higher elevations (approximately 1200 meters and above), isolated occurrences within mid to low-elevation riparian areas (350 meters -1100 meters), and one very dense stand of *S. canadensis* within a floodplain riparian area within the Mission Creek Greenway at the valley bottom (approximately 350 meters). Although mainly speculative, these findings present one potential explanatory model for the historical distribution accounts provided by the elders. This model would assert that at one time there were multiple dense low elevation stands of *S. canadensis* associated with the Black Cottonwood riparian ecosystems of the Central Okanagan, and the decrease of these Black Cottonwood ecosystems influenced the current distribution characteristics we witness today.

The data in isolation implies that the low elevation stands of *S. canadensis* exist a unique ecosystem type currently undefined within British Columbia which was at one time a component of larger variants of Black Cottonwood (BC) ecotypes. The plots at the Mission Creek Greenway share closer similarity in plant community composition to the other lower elevation riparian areas, all of which consistently matched plant communities of the Black Cottonwood – Red Osier Dogwood ecotypes (found in BEC units: PPdh2/04, IDFxh1/00 BGxh2/07) (BC CDC, 2010).

There are two works assessing ecosystem types of the Central Okanagan which are relevant to this study on *S. canadensis*. They are the Sensitive Ecosystems Inventory conducted by Kristi Iverson (2003, 2004) and a historical analysis of ecosystems of the central Okanagan conducted by Ted Lea (2009). Iverson provides references to riparian ecosystems similar to the quadrats analyzed within this project, and her study area includes the Mission Park Greenway. Within Iverson's findings, there is no mention of *S. canadensis* as a significant plant within any of the ecosystem types that she studied. It is mentioned generally as a plant included within the study (2003, p215). Iverson's work

does contain multiple references to the Black Cottonwood - Red Osier Dogwood site series within the IDFxh1 variant of the BEC framework.

This site series dominates much of the low elevation riparian areas of the Central Okanagan. This particular site series would aptly define many of the quadrats on the periphery of the areas of the dense stands of *S. canadensis* sampled, including the sites MCG, MCG 1, and MCG 4. The Black Cottonwood – Red Osier Dogwood (CD) ecotype would also be an apt description of some of the other riparian areas associated with this research that did not contain occurrences of *S. canadensis*, including all the sampling plots at Hardy Creek and Bear Creek. This implies that the dense stands of *S. canadensis* in the middle of Figure 3.2 are likely a variant of the Black Cottonwood – Red Osier Dogwood site series and likely constitute a unique site series within this larger Biogeoclimatic (IDFxh1) grouping. Perhaps the stand of *S. canadensis* within the Mission Creek Greenway would best be described as a hypothetical Black Cottonwood – Soapberry (BC-S), to support the presence of *S. canadensis* as the major understory shrub.

When this information is coupled with the work of Ted Lea (2009) a possible explanation arises as to why the Mission Creek Greenway contains the only occurrence of dense low elevation stand of *S. canadensis* found within the scope of this study. His work assessed various aerial photos of the Central Okanagan. He was attempting to historically retrace the distribution of ecosystems from pre-settlement times until the present. His conclusions showed the CD ecosystem type to have a 58% loss of habitat from 1800 to the present for his total study area and with an 86% loss in the City of Kelowna. Taking this into account it could be said that multiple occurrences of a hypothetical Black Cottonwood – Soapberry ecosystem type would have been affected by this larger loss of habitat. Inclusion of this information does provide a potential explanatory model for what could have happened to abundant low elevation distribution of *S. canadensis* in the Central Okanagan. As these larger areas of riparian ecosystems containing Black Cottonwood diminished, perhaps so did the community's access to low elevation *S. canadensis*. This does not negate the fact that a variety of potential historical situations could have influenced what we see at present, such as the effects of climate change or other environmental factors such as fires. This model does provide a way of

explaining the WFN TEK asserting accessible *S. Canadensis*, through an ecosystem still witnessed in the region today.

### **3.6.2 Relevance of Research and Suggestions for Further Inquiry**

The relevance of these conclusions about *S. canadensis* is relevant to the designation of sensitive ecosystems. There is already awareness amongst ecologists and management professionals about the general sensitivity of riparian ecosystems (Iverson, 2003). More specifically, the Red Osier – Dogwood site series has been provincially designated as a sensitive ecosystem within the Central Okanagan (BCCDC, 2010). It could be said then that when *S. canadensis* exists within a rarely occurring subset of that site series, then equal energy for conservation efforts should be targeted towards these unique low elevation occurrences of *S. canadensis* within riparian areas. Moreover, the current existence of a unique riparian habitat filled with dense numbers of *S. Canadensis* bushes supports a historical reality that there was the possibility of more robust populations of *S. Canadensis* within the larger CD ecosystems of the past. This prompts questions as to what can be done with that information. In other words are these unique habitats worth restoring and reclaiming?

Regarding *S. canadensis* itself, there should be continued research on the details of the succession of this plant. There was no indication from community members that there was fear of diminishing populations at typical high elevations. However, if this plant had a robust distribution at low elevations which disappeared, the possibility of its disappearance at high elevations should be considered. Primarily, I would recommend WFN go to some lengths to document the current state of stands of *S. canadensis* of value to community members. This could include mapping and analyzing characteristics of harvest stands, measuring predominant reproduction patterns, rates of fruit production and fruit nutrition to get a picture of the ecological health of this plant at higher elevations at present.

In terms of continued management, considerations should be made about other research observations about this plant. There should be recognition that *S. Canadensis* has a fragile relationship with its ecological surroundings, most predominantly the resident soil composition of these habitats. This was previously observed through an



analysis of the affects of clear cutting on *S. canadensis* populations. (Knight, 1999) This particular study showed that clear cutting with “post logging treatment” involving scarification of the soil had an extremely detrimental effect on bush density (ibid). Conversely, simply clear cutting with no treatment had a positive effect on bush density (Zager, 1980; Knight, 1999). To put this into context, the degradation of soils at low elevations, through deforestation and digging for residential development in the central Okanagan likely had a similar effect to scarification. This process disrupted the ability of *S. canadensis* to propagate asexually through rhizomes, and disrupted the mycorrhizal associations *S. canadensis* forms with the soil. As a recommendation for management directed at promoting *S. canadensis*, it should be noted that logging sites should not treat soils with scarification if they are accounting for *S. canadensis* density. At low elevations, consideration could be made in conjunction with development that certain culturally relevant plants will be impacted and a consorted effort for reclamation in appropriate areas would have to happen if the historical distribution range for this plant was to be recreated.

As an anecdotal observation, the morphological characteristics represented in the low and high elevation stands were substantially different. The higher elevation plants reflect characteristics of asexual growth through rhizomes (low branching, bunchy distribution within stands, uniform sexes) and the low elevation stands reflecting reproduction from seed (uniform distribution, solitary tall plants, increased occurrences of monoecious plants). Since the range of elevation between the high and low elevation stands in this study is significant (approximately 1000m), it would be worth assessing whether the species within the low elevation stands are genetically distinct from the high elevation species. This could further explain whether the one species truly existed in a gradient associated from higher elevation stands through the riparian areas to lower elevations, or if the lower elevation riparian stands were an isolated population.

This field work also begins to present some potential plant community models for restoration and reclamation utilizing *S. canadensis*. As shown in the literature review, this plant has shown great adaptability to various ecotypes. Moreover, it is present at various densities within riparian areas at a wide elevation range within the central Okanagan. *S. canadensis* has been targeted as a reclamation species in previous works

due to its general adaptability and nitrogen fixing abilities (Russell, 1985; Winterhalder, 1990).

It is worth noting that the general community characteristics of *S. canadensis* described in the results section could serve in targeted reclamation in riparian sites overrun by invasive species or other ecological disturbances such as fire. When presented with the research findings on *S. Canadensis*, one elder replied, “If you moved some of the Soapberry from mission creek it would probably survive better around here than the stuff you would gather from up the hill.” EE This community response provided immediate insight into the potential applicability of defining this unique ecosystem, and shows a desire for action within the community in restoring and working with habitats. One potential site to target within the lower Glen Canyon was completely overrun with invasive species *Arctium lappa* – Greater Burdock and *Rubus discolor* -Himalayan Blackberry. Based on its elevation range (approximately 350 m) and surrounding tree species could be targeted as a site to mimic the distribution characteristics within the Mission Creek Greenway. Therefore, targeted reclamation of this site including *S. Canadensis* and other complimentary species (Black Cottonwood, Red Osier Dogwood) could be carried out to attempt to reassert community access to this plant near the WFN reserve lands.

There is also a general relevance to this component of the research with regard to the significance of traditional Aboriginal TEK in the context of plant succession, conservation, and restoration. Some researchers argue that applying historical accounts of distribution to a succession research question aimed at restoration is important. This has been done with various values placed on how much significance should be placed on these perspectives. Many researchers claim it should be used sparingly (Luken, 1990; Bazzaz, 1996) where others claim its significance to be central (MacDougall, 2004). Many Aboriginal researchers have claimed TEK to be essential in assessing complex problems within local ecosystems (Turner, 2001; Moeller, 2004). One goal of this component of the research was to assess the value of analyzing Aboriginal perspectives of ecology via Aboriginal accounts of plant distribution. The significance of these low elevation stands of *S. canadensis* present one substantiation of what the Sylix people remember about what the land used to be like and how it has changed. Without their

input, the low elevation stand of *S. canadensis* at Mission Creek Greenway would have been overlooked with the rest of the landscape. And if this site was overlooked, then the potential reality of reestablishing community access to a culturally significant NTFP would never have been a possibility.

Moving forward, a general recommendation would be to engage in robust analysis of Sylix understandings of the ecologies of culturally significant plant species. What was realized within the published research was that the majority of work with Indigenous people and plants concentrates on ethnobotanical uses of plants and their existence on the land as commodities, rather than conceptions of how they function on land and subsequently how the land functions as a whole. My recommendation would be to encourage WFN to engage in an analysis of their traditional flora which includes elders' perceptions of how ecologies have changed. This work could include the more conventional methods of mapping current harvesting, but would include this information on the dynamic nature of plants, to provide a context to look at projects in reclamation and restoration if these plants start to disappear. If *S. canadensis* reveals unique distribution characteristics when view through TEK, then a logical assumption would be that this would be the case for many plants within the rapidly changing ecosystem of the Okanagan. This would furthermore provide legitimization for the need for unique Aboriginal indicators for ecological health and Indigenous land management tools.

The BEC framework was significantly utilized for this component of the project. What was obvious from the information about *S. canadensis*, was that WFN community knowledge provided information unavailable to the managers and researchers within the BEC framework. This information represents a great deal of potential if the BEC framework for BC was applied to reclamation work. Therefore, another recommendation would be to design a provincial initiative to create a traditional ecological supplement to the BEC database based on Aboriginal perceptions of changing access to NTFP. This information could be a valuable supplement to the BEC framework if the long term modeled projections of changing BEC zones as a result of climate change are to be taken seriously (Hamann and Wong, 2006). This process would also provide opportunities for Aboriginal people to engage in the management modeling that is currently happening within the forest and ecosystems of their traditional territories.

### 3.6.3 Challenges to the Nature of the Data and Overall Methodology

The data presented here included several challenges in terms of extrapolating general assumptions about the nature of *S. canadensis* distribution. In reference to the details of this analysis, the establishment of a comparative template of “typical” *S. canadensis* high elevation habitats would have been strengthened through increased sampling of these particular quadrats to a point of statistical validation. This would have provided stronger assurances about the nature of what makes a typical *S. canadensis* community, thereby validating the use of the BEC framework. Because of these sampling issues, this project is best viewed as a pilot to inform modeling decisions for future quantitative analyses of *S. canadensis* within this region.

Challenges concerning the data should not overshadow the positive aspects of this analysis. Within British Columbia, the low elevation communities of *S. canadensis* within riparian habitats are not currently described in the literature. Therefore, these high density low-elevation stands of *S. canadensis* could be considered anomalies until a further explanation is reached. With this in mind, a broad methodology that served as a quick analytical tool for identification of low-elevation occurrences was a logical first step. Since the BEC framework is a detailed research project with statistically validated methods for describing each site series, the overall concept of developing quick comparative examples from that database allowed for more time and energy to devote to exploring novel lower elevation occurrences of *S. canadensis*.

### 3.7 Conclusion

When unpacking the unique distribution characteristics of one particular plant species as part of a community, there is a range of possible explanations as to how we arrive at the present. In the case of *S. canadensis*, there was never an indication of the need for project because no established scientific methodology has shown a need to consider *S. canadensis* endangered. The qualitative components of this research established that when discussing how access to traditional flora has changed, WFN elders shared a picture of a different ecology than what we see at present. This raises questions about when would be the right time to consider conservation and/or management

initiatives around plant species. If the Central Okanagan was ever considered for a robust restoration effort, what would it look like? The examination of the changing distribution of this particular plant is cause for reflection about the innate value of Aboriginal perspectives of the land, and how they can affect decision making. If we are to follow the logic of MacDougall (2004), who argued eloquently for the inclusion of historical accounts of ecology whenever possible, then what would this say about the inclusion of traditional knowledge? The elders within WFN knew of a time where *S. canadensis* was readily accessible to them near their living space. Inquiry into this issue showed the abundant distribution of *S. canadensis* at low elevations to be possible. This makes a point about what we know about the past and how we might prepare for the future. Research on the projections of the BEC zones in reference to climate change implies that the low elevation ecotypes will be at the summits of the mountains of the Okanagan Valley within 70 years (Hamann and Wong, 2006). If a fraction of these projections became a reality, how much do we need to know about from the past should be informing our future decisions? In the past, development of the Central Okanagan seems to have had the most significant impact on access to *S. Canadensis*. Although the future environmental impacts of climate change may not mirror that of development exactly, the disappearance of *S. Canadensis* at low elevation gives us a potential marker for assessing the changing environment in the future. The sensitivity of *S. Canadensis* to environmental disturbance gives us a potential tool for monitoring the capabilities of habitats to support biodiversity through looking at the continued success of their distribution. Using Aboriginal knowledge about how their access to the environment has changed is a way to begin to get a view of the past trajectory of particular plant species, thereby providing a way to ensure we have covered some of the anomalies in our steps along the way.

## **Chapter 4: Research Summary and Conclusion**

Several research projects in Canada have asserted that Aboriginal communities have lower health outcomes when compared to the rest of the population (Waldram, 2006; Frolich, 2006). This project acknowledges this reality and endeavours to address health promotion by focusing on the connections Aboriginal people make between the health of the land and the health of their community (Johnston, 2007). The rapid urbanization of the Central Okanagan has changed the physical characteristics of the region, and this changing physical environment has impacted the community members of WFN in numerous ways. This research focused on how the changing environment of the Central Okanagan affected WFN access to NTFP and how those changes have impacted community perceptions of health. Moreover, the research provides data on how WFN community members would address the promotion of human and environmental health through action. The aim of this inquiry was to establish how Aboriginal participation in resource management can be positioned as a beneficial health promotion practice, and to explore the applicability of TEK toward improving resource management practice.

### **4.1 Summary and Response to Research Questions**

The following section reviews the research questions for this project and discusses the relevance of the data provided by the qualitative and quantitative results. The research questions are further contextualized within the relevant research literature to give an overall picture of how this project could relate to future research.

- *How do WFN community members connect changing access to native flora and health?*
- *What are some WFN definitions and conceptions about health?*
- *How has access to native flora changed in WFN?*

These questions were addressed from a general perspective, predominantly from the qualitative components of this research. The connection of plants and health within WFN cannot be separated from the connection which community members make with the land and human health. The land is central to how Okanagan culture is expressed. In

a sense the land defines culture, as manifest in the traditional saying “the land is the culture” **SM**. The land gives meaning to traditions by contextualizing stories through geographical place, and by providing a context for the descriptive nature of Nsylixcen, the Okanagan language.

The rapid urbanization of the Central Okanagan, coupled with the advance of economic development and the looming impacts of climate change all contribute to a fertile backdrop for WFN community members to discuss the changing relationship their community has with the land. There were various opinions amongst WFN community members about whether the ecological trajectory of the Central Okanagan is beyond repair. There was equal diversity about what specifically can or should be done to promote engagement with the land in their community. What was consistent within the variety of opinions was the concept that the health of the land is inextricably linked to the health of the people. Equally consistent was a general concern about the changing landscape and its impact on the health of WFN community members. These data frame the discussion of the specific understanding of the relationship between plants and health.

Access to non-timber forest products was not necessarily a primary issue when engaging in direct communication with community members about priorities for promoting health. However, community responses to questions and discussion concerning the connections of plants and health highlighted a great deal of information on the importance managing NTFP for their future health. There was agreement amongst the participants that utilizing NTFP was an important aspect to traditional practice, and subsequently that traditional practice played a significant role in health.

More generally, WFN conceptions of health go beyond simply believing that the role of ecological health is manifested in water quality, air quality or the direct impacts of the environment on human health. WFN conceptions about health recognize the land as an element fully integrated into their community. This view transcends the physical characteristics of the land. It relates to the land as a living entity that is woven into every aspect of WFN culture. Following this line of thought, the impacts of an unhealthy local environment would have negative effects community health. When addressing the research question, the connection between plants and health within WFN aligns with a more complex connection that community members recognize between the land and their

general health. Therefore, some of the priorities around health promotion within WFN might focus on this general connection with the promotion of plants and health existing as a complimentary health priority.

***What is the purpose of supporting Aboriginal participation in resource management planning?***

Based on my experience, the development of effective strategies in any area, including Aboriginal health and resource management, is intimately related to the effectiveness of the stakeholder engagement process. This is consistent with the message of many ideals and best practices established on working within an Aboriginal community context in Canada (Kirkness & Barnhardt, 1999). Many of these examples come from university research and interactions with Aboriginal communities, industry, and government within the environmental assessment (EIA) process (Usher, 2000). The consistent message from these works is to engage and incorporate Aboriginal participation as early as possible within any project. In this work, I recognized that message and attempted to follow this general rule. However, a number of questions arose as to what the motivations are for establishing these conventions of Aboriginal community engagement.

There are potential responses to conventions requiring Aboriginal participation in resource management described in some research works engaged in the utilization of TEK in resource management practice (Usher, 2000; Campbell, 2003; Nadasdy, 2003). The current reality is that resource practitioners have to incorporate Aboriginal participation based on Canadian legislation (Usher, 2000). The real insightful information within this legislative reality is whether or not they want to. This issue could be simplified by analyzing the benefits that resource management practitioners see in Aboriginal engagement. Simply put, are practitioners going through the motions of engagement to appease the requirements of law and to mitigate community aversion to projects, or are they recognizing the value of Aboriginal TEK and engaging with it to better protect the land and the ecological vision of their projects?

Much of the literature concerning Aboriginal research ethics dictates that any research project, regardless of discipline, should include community participation at all



stages (Kirkness & Barnhardt, 1999; Sharnarch, 2004; CIHR, 2009). When applied to resource management, the resulting discourse has provided a number of models for engaging Aboriginal knowledge in a process of co-management (Berkes; 2002; Moller, 2004). This concept has been more specifically applied to techniques of using TEK and Aboriginal knowledge applied to technical settings (Sherry, 2002). Despite the amount of work constantly going on in this area in Canada, there have been a number of difficulties cited within the research. These include the difficulty in assessing effective TEK, a lack of simple examples of successful integration of TEK into management planning, and the policy structure of the Environmental Assessment process not providing an appropriate process for complete Aboriginal engagement as relevant examples (Usher 2000; Davis & Wagner, 2003; Whitelaw 2009).

A great deal of information on the engagement of Aboriginal perspectives within resource management planning has been generated through federal and provincial legislation aimed at protecting the environment. What can be missed by this process is the value of Aboriginal knowledge. When the process of engagement and co-management is legislated, the focus can be centered around fulfilling the requirements of the law rather than focusing on the potential benefits of co-management in providing effective solutions for ecological and social issues such as health (Berkes, 2002).

This research attempted to circumvent much of the specific dialogue challenging the effectiveness of co-management based on the history of challenges of Western resource development and Aboriginal responses to that development. Instead, it focused on promoting an integrated approach to conservation, restoration and management of NTFP. In so doing, two simple principles regarding the benefits of engaging in this type of work were established: 1) land resources are intimately connected to Aboriginal perceptions of health and 2) Aboriginal TEK can illuminate both management questions and research opportunities due to its historical connection to place. The hope garnered from this project is that after reflecting on these general understandings, discussions about Aboriginal engagement can be moved from “have to” to a position of “want to.” A corporate understanding of the positive elements of Aboriginal inclusion in co-management would make engagement appealing to Aboriginal communities, professionals, researchers and industry.

Within WFN, understanding of the land as a manifestation of culture and health became the impetus in creating a strategy for the management of NTFP. There was community empowerment in realizing that any activity on the land had the potential to positively affect health. Moreover, the specific knowledge provided by community members about the historical distribution of *S. canadensis* provided a concrete example of the impacts of urbanization on ecological health and subsequently community health. This example provided a tangible target to address the connection of community and environmental health through planning for specific action. In response to the original research question, it can be established that effective co-management in an Aboriginal context recognizes the integrated perspective that the land has within Aboriginal worldview and the value of Aboriginal TEK.

As to more specific recommendations, effective co-management needs to take the extra time and energy to ensure that effective examples connecting the land and health are being highlighted. This would entail taking extra time to search for ways that Aboriginal knowledge is beneficial to the future of the ecology and health of a geographical space. This specifically means taking extra time to respectfully postulate the ethical boundaries around the TEK within a community, and taking extra time to translate the current relevance of TEK within a local context.

#### **4.2 Final Community Responses to Presentation of Findings**

The final community workshop was treated as a post-project opportunity for community evaluation. The six core points summarizing the qualitative responses of the participants and the field results from the analysis of *S. canadensis* were presented for interpretation by the community participants. A separate meeting with WFN Chief and Council was held to present the same data. The community participants highlighted various characteristics of the qualitative data and field work as being particularly relevant to their needs moving forward.

The participants at this final meeting showed particular interest in how they could include elements from their cultural understandings of sustainability and ecological health into the strategies towards future development in the central Okanagan. There was continuous discussion on how WFN community members could work with both their

own community governments and other stakeholders within an Environmental Assessment process. There was also discussion about the opportunity that WFN has through their self government agreement to engage in an Environmental Assessment process for reserve lands. The idea would be a mirroring strategy which integrated the core principles used in environmental assessment off reserve with the cultural perspectives of the Okanagan people. The participants were concerned that the land base of both the WFN reserve and the Central Okanagan as a whole is deteriorating rapidly. They expressed the importance of using the traditional cultural perspectives of the Okanagan people in the process of development. In turn this might be a way to stimulate further work on the significance of native flora and more generally improve the overall health of the land.

There was enthusiastic discussion about future opportunities for capacity-building. The manager of the WFN Community Forest was invited to the final meeting to discuss the current work that his team is undertaking to construct a terrestrial ecosystem mapping (TEM) tool for both understory shrubs and timber within the community forest. For many of the community members present, this was their first opportunity to hear about this work. Discussion then moved to potential opportunities for future research within the community forest where traditional perspectives and contemporary approaches to forest management could be integrated. Further training for community members in the applications of the TEM was suggested. There was also an enthusiastic response towards the predictive nature of this tool for traditional practices of harvesting NTFP. Moreover, community members postulated a reintegration of traditional forest management practices such as controlled burning to test plots within the community forest, then analyze the effects of their practices on NTFP of cultural significance.

The final community evaluation on the research project was mixed. In reference to *S. Canadensis*, there were many questions as to what the true nature of the plant's distribution within the Central Okanagan. It was reasserted that at present there is sparse distribution of low elevation *S. canadensis* and their harvesting practices are always at higher elevations from the time that they were children. Integrating these perspectives into the overall conclusions about *S. canadensis* presents varying views and possibilities. One explanation from community responses postulates that the fragment distribution of *S.*

*canadensis* has existed for over a generation. The second explanation postulates that the geographic representation initially given by the elders in the interviews was not accurate and that the large concentration of lower elevation stands of *S. canadensis* at the Mission Creek Greenway is an anomaly. There was interest in Mission Creek Greenway site by the community members. They expressed the possibility of samples being extracted from this site for targeted planting for site restoration of the low elevation riparian areas on the west side of Okanagan Lake. This particular suggestion reiterated the consistent desire of the participants in this project to find practical uses for the discussions within the workshops.

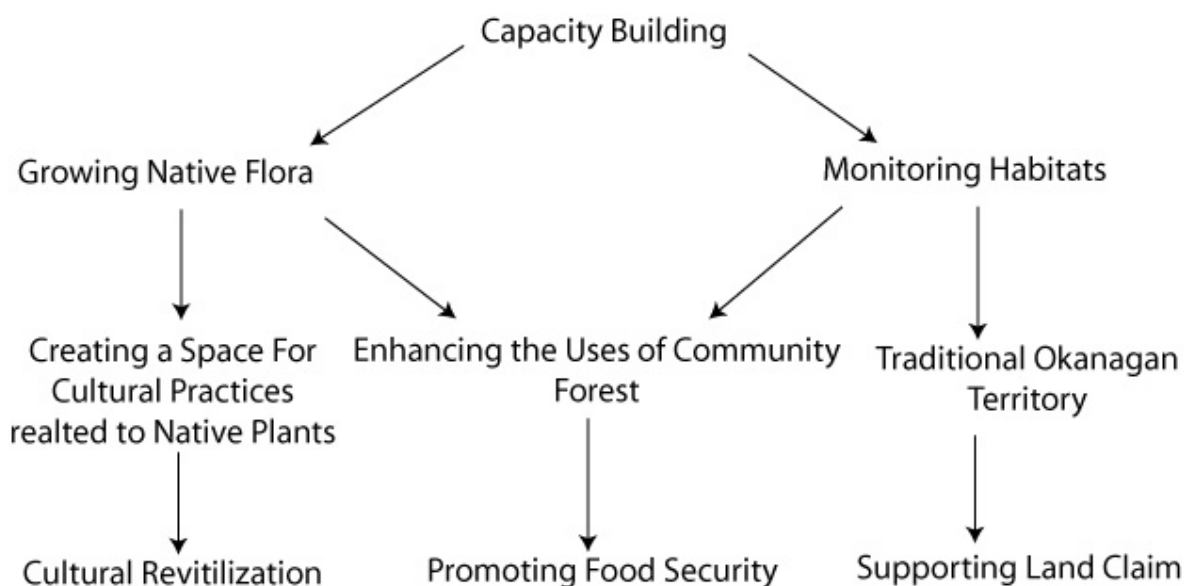
### **4.3 Research Applications**

#### **4.3.1 Research Applications for WFN**

When assessing what a model for resource management would look like within WFN, capacity-building through youth education would be a central function of engagement in this type of work. Although there was collective recognition of potential financial benefits to managing natural resources, the priority for the community rested on the need to engage youth in working with the land for the land itself and for the promotion of Okanagan culture. Included in the responses from community members about the current state of their land, there was enthusiasm about researching and remembering past ecological conditions of the Central Okanagan. Moreover there was an interest in revitalizing current ecosystems within the Central Okanagan to a state similar what WFN elders remembered. There was collective agreement that before effective projects are possible, WFN community members must make some strides in educational opportunities. Participants expressed interest in the areas of monitoring habitats in the wild and cultivating native flora with the aim of site restoration and habitat improvement within the community. A potential model for including the various interests for capacity-building in NTFP management represented by the community members is presented below in Figure 4.1.

This model includes the aspect of the cultivation of native flora with the recognition that habitat restoration was a long term goal of the responses of the community. Various initiatives responding to this goal, including community gardens

and a greenhouse for the propagation of native flora, were carried out throughout the course of this project. Since these initiatives lacked any detailed research components, they were treated as complementary initiatives to support the research goals established by community responses. The purpose in mentioning them here is to establish the community interest in the cultivation of native flora as a compliment to field monitoring.



**Figure 4.1 - Proposed Model for supporting NTFP management within WFN**

The field work in this project focused closely on habitat monitoring of one species in a smaller geographical area than the limits of Okanagan traditional territory. Therefore, the rest of recommendations regarding future research within WFN will be related to considerations for future monitoring studies and the potential impacts that could have on community and ecological health, food security, and issues around rights and title. The experience of monitoring *S. canadensis* within the Central Okanagan represented an opportunity to analyze the effects of conservation and restoration. The knowledge garnered from WFN community members presented a distinct possibility that low elevation populations of *S. canadensis* did occur within riparian areas. The extent to which they occurred on the west side of Okanagan Lake remains a mystery. One opportunity for future research of *S. canadensis* could be a more detailed analysis of plant compositions in association with *S. canadensis* in what are considered typical

habitats. This was mentioned in the discussion section of Chapter 3. This might support *S. canadensis* at lower elevation as a unique ecosystem unit included within the larger set of red listed Black Cottonwood-Red Osier Dogwood ecosystem. This could potentially elevate the status of these ecosystems within riparian areas for further efforts towards conservation. Therefore, when low elevation ecosystems with *S. canadensis* as a significant understory plant exist, they should be an urgent site for conservation and project to mitigate the impacts of invasive species, similar to the red listed Black Cottonwood-Red Osier Dogwood ecosystem.

Beyond researching the present distribution characteristics of *S. canadensis*, this project focused on further opportunities within the infrastructure of WFN. WFN is well suited for a variety of capacity-building and research opportunities working with native flora. The WFN community forest could serve as a venue for research projects looking into NTFP contribution. The management team of the WFN Community Forest is in the process of creating a predictive index for potential habitats of various NTFP. A field-based terrestrial ecosystem mapping (TEM) methodology is being utilized for this index. This TEM project has yet to integrate WFN community knowledge as a factor in its analysis. If the community knowledge concerning *S. canadensis* is an accurate depiction of historical distribution, the value of this type of knowledge for long-term forest planning would be extremely valuable. The community knowledge could help postulate changes to date in the distribution of plants, thereby postulating where areas for restoration and research within the community for could take place.

There could be a great opportunity with the community forest to further understand the role of traditional Aboriginal management practice (prescribed burns, harvesting methods) on the distribution of NTFP. The active Aboriginal management and harvesting practice has had a great effect on the distribution of other shrubs such as Black Huckleberry (*Vaccinium membranaceum*) (Thorton, 1999; McDonald, 2005; Trusler, 2006). There was no specific reference on the effects of traditional Aboriginal management practice on *S. canadensis* distribution in the interviews. However, various participants cited the general effects of traditional practice on all native flora, and stated an interest to establish an integrated approach to management which includes traditional Aboriginal management practice. Establishing spaces where these traditional practices

were able to be reintroduced would further highlight some questions around the role that these practices played in the succession of plant species.

One of my recommendations would be more sharing between the forest management team and the work being conducted through the WFN Title and Rights department on traditional land use. Furthermore, I would recommend WFN support the forest management team to conduct their own plant specific research surrounding the general changing distribution of various flora. This research could remain general without imposing on specific guarded harvesting areas, but could ask where community members had recollections of harvesting NTFP where stocks have since disappeared. This information could then be integrated into the predictive TEM information being conducted by the WFN forest management team. Lower elevation habitats with the potential to support *S. Canadensis*, could be targeted for plot-based reclamation research, looking at the impacts directed planting for restoration, forest harvest practices, and traditional forest management techniques on NTFP distribution. As specific recommendations for plants to study, I would suggest shrubs with similar biological characteristics to *S. canadensis*. Most notably, other nitrogen-fixing shrubs, due to their established benefits for restoration and sensitivity to large scale disruptions to soil structure should be considered. A particular species of note would be *Ceanothus sanguineus* - Buckbrush, a nitrogen fixing shrub which, like *S. Canadensis*, has a fragmented distribution at low-elevations and is abundant in higher elevation ecosystems.

The benefits for the community in this type of work could cross several areas of study. It could positively affect WFN Title and Rights work in that it could provide an opportunity for continued engagement in the monitoring and usage of the land. It would also provide community members with opportunities for capacity-building through development of a predictive mapping tool for NTFP. Moreover, it would provide the general public with further evidence of the benefits of integrating Aboriginal knowledge into management planning. The potential secondary benefits of this work for applications in community health have been discussed at length in previous sections of this dissertation. As a review, it would provide the overall WFN community with further opportunities to be on the land and work towards enacting their vision of a healthy Okanagan community. This is representative of the community responses given towards

an integrated picture of the broad spectrum of health, the connection of health to the land as well as opportunities to further educational opportunities through capacity-building.

Beyond the possibilities within the community forest, there were other suggestions drawn from the community, including WFN interaction with development both on reserve and in the larger region of the Central Okanagan. Community participants showed a keen interest in the transformation of development that better represents Okanagan perspectives about land stewardship and ecological health. Suggestions put forward included creating an Okanagan methodology and process for assessing the environment. This would include a cultural analysis of the impacts of development from an Aboriginal perspective. In essence this would be an Aboriginal environmental assessment. This process would go beyond simply finding archeological evidence of usage of a space, but would include a framework that all parts of the land, including plants and animals. Therefore, the loss of potential land use for traditional practices should be evaluated with equal rigor to assess the impact of changing the environment on the health of the community.

WFN is uniquely situated through their self government agreement to create a framework for development that highlights the fundamental care that Aboriginal people have towards the land. Creation of an Aboriginal environmental assessment process, one that goes beyond technical characteristics and reaches into potential impacts on culture and health, would provide a model for other urban Aboriginal communities to emulate as well as inform planning within the Central Okanagan of how Aboriginal values could impact the economic development of the region.

#### **4.3.2 General Research Applications**

Two main concepts summarize the outcomes of this research project. The first is that this work supports engagement with Aboriginal communities in resource management planning because this work is intimately connected to Aboriginal conceptions of health. Resource management in an Aboriginal context could be more readily understood as a community health concept. This is not saying that simply the natural resources affect Aboriginal health through the consumption of the physical components of the environment (water, food, air). This concept works on the realization



that Aboriginal definitions about health do not separate what is healthy about the land from their community. In the case of the Sylix people, the land is a physical representation of community through culture. Therefore any work involving the land is considered a cultural process, and by extension health practice.

The second outcome of this research project was gaining the understanding that Aboriginal knowledge about the physical characteristics of a space through Aboriginal TEK can provide data that facilitates a better understanding of 'place'. Aboriginal consultation in terms of development and environmental protection is far more than a constitutionally-mandated hurdle in completing a project. The process can be an opportunity for engagement to gather technical data then integrate Aboriginal knowledge, and to improve the health of the local community through capacity-building opportunities.

There have been past epidemiological studies looking at cultural continuity as manifest in community infrastructure to support better health, particularly in the mitigation of suicide (Chandler & Lalonde, 2009). Of particular interest would be the impacts of community-directed land management programs on Aboriginal health. An epidemiological approach analyzing the importance of the land within Indigenous communities in influencing health outcomes would be worthwhile. It remains unknown as to how much of a direct influence the changing access to a sustainable land mass has had on Aboriginal health. While influences are represented in the qualitative data drawn from WFN community members and researchers, further research to postulate the influence of this particular determinant in comparison to SES or other conventional determinants of health is worth investigating.

In reference to NTFP, broader research is needed to study how Aboriginal communities within BC view changes to their ecologies and, more specifically, what resources they believe have been affected by these changes. The Central Okanagan has been experiencing a rapid population growth for some time. It has also been designated as a particularly sensitive area for the looming ecological issues of climate change (Cohen, 2006). There has been great attention by anthropologists, sociologists and scientists towards discussing the uses of various native flora and fauna and their

applications in medicine, food and culture. Applying that knowledge is difficult because it does not provide Aboriginal conceptions of macro-scale ecological issues.

Overall, there is a shortage of information on Aboriginal conceptions of larger scale ecological function. The BEC system has created an integrated model for describing the context of ecologies of BC for purpose directed management practices. However, a mirrored Aboriginal process, which speaks to the macro-level environmental characteristics of each successive region, giving thought to plant interactions, geophysical characteristics and Aboriginal conceptions of the function of climate is recommended. Not only could such a process provide a larger framework for co-management, it could also provide a better set of shared principles to mitigate areas of doubt and confusion with Aboriginal engagement in regards to economic development within the province. One suggestion would be to develop a traditional ecological supplement to the BEC database based on Aboriginal perceptions of changing access to NTFP. This information could be a valuable resource to inform more long-term modeling of changing BEC zones as a result of climate change (Hamann and Wong, 2006).

#### **4.4 Reflections on the Research Process and CBPR**

When reflecting on the general research process as a whole there are various aspects within the successes and challenges of this project which are of benefit to share to other researchers considering CBPR. The first point is that CBPR takes a tremendous amount of time. This issue is highlighted more specifically with CBPR and Aboriginal communities. Although universities in Canada are highly organized around research ethics, it should be noted that there is still a great deal of capacity-building from both sides (the university and Aboriginal communities) on what the implications of the new policies for research ethics will have on individual projects. Having a draft research agreement in hand at our initial meetings with the WFN Chief and Council was a great asset in establishing trust within the community. However, the amount of time to formalize that agreement was not accounted for within the timeline allotted for in this project. A formalized research agreement which accounted for issues like intellectual property and ownership of data was an emergent concept at the inception of this research project. Still, in retrospect, the extra time was worthwhile. Because of the detail put into

the characterizations of this research agreement, questions among participants about data ownership, informed consent, and their role in research were readily answered when they arose. Many of these questions extended beyond the provisions of a typical BREB application through the university.

Another aspect of timelines in association with CBPR and Aboriginal research was the importance of relationship building and developing trust. There was no way to assess how long this process might take. In this project, as a non-Aboriginal guest/researcher it became apparent that there was historically bad connotation associated with research among Aboriginal people. Moreover, I am asking questions about native flora, an area of inquiry where the Okanagan people feel they have been betrayed by historical cross-cultural sharing. The act of developing relationships needs to be allotted within the planning process of CBPR. This is not a type of research that can be conducted effectively in a fly in and fly out situation. Before any real field work was done on this project, it took a year and a half to build and establish trust among the participants and prove that my work would not exploit traditional knowledge and culture.

In highlighting such challenges, there are numerous benefits to CBPR. CBPR is intellectually framed as a process you must enact as a researcher working in Aboriginal communities. It appears that engagement is presented as something that Aboriginal communities want and therefore the researcher needs to appease that desire. This presents a vignette of cross-cultural interactions between Aboriginal and non-Aboriginal culture in Canada.

When looking at the state of shared ecologies, it becomes apparent that we are in need of creative solutions for action. What is desperately needed is the development of areas of synergies in the cultural knowledge of various communities. Therefore, when viewing CBPR from a technical perspective, the influx of new or varying ideas towards problem solving would certainly increase the opportunity to develop creative solutions. In this way notions of a layperson versus expert researcher have equal value regarding creative solutions. This concept could be where the power of CBPR functions.

## 4.5 Conclusion

WFN is a vibrant community located in a rapidly expanding part of Canada. They face constant questions about how to express their identity within the rapidly changing dynamics of the Okanagan valley. They have made great strides at addressing many of these tough questions. Through the establishment of self-government, and unique elements within their infrastructure, they have managed to collectively present a community that is grounded in a strong sense of their cultural traditions while simultaneously engaging larger surrounding communities. The role of this research project was to assist in presenting the voice of the community in reference to an issue of importance to them - access to and management of non timber forest products. This issue is intimately linked to how WFN community members view their overall health. In addition there is evidence to support the idea that the time to act is now towards ensuring that plants of great significance to the community are protected. This research on *S. canadensis* indicates that access to flora (and hence traditional practice) has likely changed substantially. If climate change and continued development of the region persist, then that access will be affected to a greater extent.

The engagement of community perspectives and knowledge into these research questions has presented a picture for moving forward with effective management of NTFP. The ideas and concepts shared by the community members, has resulted in a model which includes more than technical process, but one which also include healthy community action. These tools go beyond simply answering questions for what is best for WFN but extend to areas of concern for all people both Indigenous and non-Indigenous. This process begs the question as to how we are working together to develop creative solutions for solving problems which accompany such development. How we approach the significance of plants in the forest, while seemingly simplistic, becomes a mirror of how we interact with each other, our livelihood via our ecosystems, and ultimately our collective health.

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## **APPENDIX I: COPY OF INTERVIEW OUTLINE**

**The following were the topical areas for the semi-structured narrative interviews.**

- 1. Questions about personal definitions of Health: health of the individual, health of the community, health of the land**
- 2. Questions about the current state of health in the central Okanagan**
- 3. Questions about changing traditional practices and the role traditional practice plays in health.**
- 4. Questions about specific issues which affect the health of the land.**
- 5. Questions about specific plants which have been affecting by the changing ecology of the central Okanagan.**
- 6. Questions about personal experiences in gaining knowledge.**
- 7. Questions about perspectives around priorities for education.**

## APPENDIX II: WFN CODE OF RESEARCH ETHICS DOCUMENT

### WESTBANK FIRST NATION AND THE UNIVERSITY OF BRITISH COLUMBIA INSTITUTE FOR ABORIGINAL HEALTH

#### CODE OF RESEARCH ETHICS

##### INTRODUCTION

The Westbank First Nation (WFN) people, the University Of British Columbia (UBC) Institute for Aboriginal Health (IAH) are co-researchers in an innovative research project, *Promoting the Relationship between Plants and Health within the Westbank First Nation*. This research partnership was initiated by WFN, and through an ongoing collaboration process the research focus was identified. The Chief and Council represent the Westbank First Nation.

This interdisciplinary collaborative approach applying Community-Based action research principles contributes to a new era of research. A CBAR approach will guide this research process and contribute towards building respectful and mutually empowering relationships, while producing sound academic research results. The foundations of this research are based on communication and understanding between all research partners, including the development of protocols outlining ethical, legal and practical aspects of the research.

This code of research ethics will ensure the protection of the WFN traditional knowledge and to address issues of intellectual property rights this project applies the research and scholarship guidelines of the Tri-Council Policy: Section 6, Research Involving Aboriginal People; BC ACADRE 4Rs: Respect, Relevance, Reciprocity and Responsibility (Kirkness & Barnhardt, 1991); and the National Aboriginal Health Organization (NAHO) principles of Ownership, Control, Access, Possession, (OCAP; Schnarch 2002).

##### PURPOSE OF THE CODE OF RESEARCH ETHICS

This code of ethics is necessary to establish a set of mutually agreed upon principles and protocols that will guide the research process and contribute toward building a community- based collaborative research environment. This is accomplished by:

1. **Promoting the 4R's : responsible, respectful, reciprocal, and relevant research**
2. **Establishing ethical principles and review procedures** – All components of community based research reflect the values and standards of the community participating in a project through a clear ethical framework
3. **Outlining the expectations and obligations** - Each research partner will have input in all phases of research from the development of the research design to

the communication of results. This includes expectations over the nature of the research relationship between partners, and steps to ensure that the research is culturally relevant and will effect the improvement of the health of WFN people.

4. **Addressing issues of protecting WFN knowledge and territory** – Issues of WFN knowledge and territory ensuring culturally appropriate, economical integrity and environmentally friendly research.
5. **Enhancing collaboration between research partners** - Ensuring the research is academically sound, respectful of the concerns and needs of each research partner, and culturally appropriate.

## OVERALL GUIDING PRINCIPLES

In respect to this collaborative research, Westbank First Nation and the University of British Columbia Institute for Aboriginal Health are recognized as full research partners, actively contributing towards these common and agreed upon research principles.

**A. Nature of Research Relationship** - UBC IAH will protect the cultural, mental spiritual, physical, and emotional interest of participants throughout the research process people. This will be obtained through:

1. **Informed Consent** - Informed consent must be obtained from community members who volunteer to participate in this study. The process of obtaining consent will include dialogue, process, rights, duties and requirements of free and informed consent. Participants have given informed consent when they have freely agreed to participate in a study as the result of clear and concise information, regarding the objectives of the study, the risks, and the possible benefits of their participation. No form of coercion or undue inducement shall be used to obtain consent. The right to withdraw without repercussions will be made clear to participants. Confidentiality will be maintained using a coding system, unless a participant gives written request to be publicly noted. Participants shall be recognized and engaged as equals in the research conducted instead of as “informants” or “subjects”.
2. **Respect for Vulnerable Persons** – The UBC IAH will ensure that high ethical obligations are maintained regarding those who are vulnerable or lack decision-making ability. The disclosure of consent will be offered in the traditional Okanagan language to those who prefer Okanagan over English. Provisions will be made for elders and youth to participate in the activities of the project even when assenting from contributing to research data. For persons under the age of majority, consent will be sought from a legal guardian and assent from the participant. UBC IAH will endeavor to ensure participants understand information presented, appreciate the potential consequences of a decision, and provide free and informed consent.

3. **Respect for Intellectual Property** – Westbank First Nation people are recognized as holding the rights and obligations to control their cultural and intellectual properties and knowledge. Westbank First Nation people are acknowledged as the guardians and interpreters of the culture and knowledge system in past, present, and future. Therefore, it is understood their culture, language and traditional norms of communication will be respected and utilized in the research process whenever possible. UBC IAH will respect and safeguard rights to sensitive or personal information in order to maintain the cultural integrity of information provided. As well as access to all such information and sharing of benefits, which accrue from informed sharing. UBC IAH will engage in an ongoing consultation process with WFN to facilitate clear communication between researchers and community and to empower the community decision-making concerning the proposed research, including research design, data collection, analysis, interpretation and dissemination of results. The release of intellectual property will commence at the request of the researchers and the approval of a community research steering committee comprising of WFN community members.
4. **Minimize harm and maximize benefit** – UBC IAH will ensure anticipated results and benefits far outweigh potential harms when conducting community-based research. Participants will not be subjected to unnecessary risks of harm, and researchers will be obligated to assist the participants in reassuring or eliminating any adverse effects that may arise from the research.  
All research conducted with WFN will serve the community's interest and contribute to it's overall health, social, educational and economic goals.  
Research partners will ensure a research environment that is equitable, life enhancing and free of oppression.
5. **Consultation with Members of the WFN Community** – Collaboration with the WFN community is an essential component of community based research. As much as possible WFN community members will be given the opportunity to include research questions of a cultural nature as well as questions that specifically address pressing community concerns.
6. **Research and Ethics Review** – All research projects embarked upon by the UBC IAH involving community participation will require review and approval by the UBC Research Ethics Committee, with WFN community members designated as researchers having full access to that ethics proposal. This community based project will also require approval of the most relevant WFN agency (e.g. Tribal Council, Board of Directors, Research steering committee). The Tribal council or chosen WFN agency may approve, reject, propose modifications or terminate any proposed research conducted by any member of the research team on behalf of the research institution or funding agency if it fails to uphold ethical standards.

**B. Analysis, interpretation and communication of results** - The Westbank First Nation community and UBC IAH will be involved in the process of analysis, interpretation and communication of results. This is essential for cross checking and triangulating data supporting its accuracy. The research partners must first approve



any communication of results, including written or oral presentations before they occur. Proper acknowledgment for those involved in producing and disseminating research results is facilitated by listing authors in order of contribution.

1. **Authorship guidelines** – Authorship guidelines for reports, papers, and oral presentations shall be reserved for those who have made significant intellectual contributions to the research and manuscript writing including: authors who have made a substantial contribution to the conception, designing, analysis, and interpretation of data; authors involved in writing and revising the manuscript for intellectual content; authors responsible for approval of the final draft.
2. **Guidelines for graduate thesis work** – There will be no co-authorship on graduate thesis work derived from this research project. In order to ensure that the intellectual property of WFN is protected in this process there will be specific measures taken in regards to the preparation of any graduate studies thesis. The tribal council or research steering committee will maintain access to all research data used for any thesis work, throughout the course of data collection, thesis writing, and post-thesis storage of data. Tribal Council or the WFN research steering committee will also have an opportunity to review the thesis for sensitive data or cultural information. The tribal council or WFN research steering committee will have the opportunity to legislate the removal of sensitive data which infringes on their traditional knowledge. Approval of the final draft of the thesis by the tribal council or WFN research steering committee will be required before publication.

#### **C. Protection of knowledge derived from WFN community during research.**

1. All research, study, or inquiry into Westbank First Nation knowledge, culture, and traditions, involving any research partner, belongs to the community and must be returned to that community as grouped results.
2. To ensure fair and equitable sharing of economic benefits that may arise as a result of this study suitable economic benefit-sharing agreements will be established. These will observe international agreements such as found in article 27.3 (b) of the WTO TRIPS and article 8 (j) of the Convention of Biological Diversity (CBD), as well as agreements and laws the BBFN and UBC IAH are bound to.
3. In specific, the principles of Ownership, Control, Access, Possession (OCAP; Schnarch 2002) will be used to define intellectual property rights.
4. UBC IAH and the WFN community will collectively own the research reports resulting from the research, and any other materials involving significant participation of the community members unless: UBC IAH or WFN approve, reject, propose modifications or terminate any proposed research conducted by a member or the research team on behalf of any of the above if their contribution fails to uphold ethical standards.

**D. Secondary Use of Data** – Secondary use of data refers to the use of materials in research other than reports beyond uses initially consented to by the participants. If the researcher is attempting to access primary sources of information, such as audio/video tapes or transcripts and the participants have agreed to the tapes being used only for the purpose of conducting research, participants informed consent must be solicited

prior to its use in subsequent research. If a person is no longer available to give consent, consent may be obtained from the executor of his/her estate or a person deemed to be appropriate by traditional WFN community protocols.

## IMPLEMENTATION OF RESEARCH PROTOCOLS

### A. Expectations and Obligations of Research Partners and their Researchers

#### Westbank First Nation

1. To ensure the community's integrity and autonomy is not jeopardized through the research.
2. To ensure the research is culturally relevant and contributes toward the overall health and economic aspirations of the WFN community.
3. To inform UBC IAH immediately if, following internal consultation, the community decides to withdraw from research project. This should include reasons for the decision.
4. To serve as the guardian of returned data and results once the research project is completed. This includes making decisions as to who will have access to data.
5. To approve or give written disagreement to the interpretation or communication of research results.
6. To achieve the long-term goal of creating economic and educational opportunities for the community members.

#### UBC Institute for Aboriginal Health

1. To ensure the full participation and vision of WFN community members is integral in the research process and definition of research agreements.
2. To ensure the design, implementation, analysis, interpretation, and communication of results are in agreement with standards of competent research.
3. To uphold the highest standard of research ethics by following the WFN agreements and the UBC Behavioural Ethic Review which include adherence to the guidelines assuring confidentiality of each research participant's identity.
4. To inform the Westbank First Nation community immediately if for some unexpected reason the original objectives, or the foreseen benefits cannot be met.

### B. Researchers: Community and Academic

#### Community

1. To maintain a dual role as researcher and steward/educator, with the community needs given priority in the decision-making process.
2. To communicate with the academic researcher and community research partner in all phases of research.

### Academic

1. To do no harm in the WFN community.
2. Assume responsibility to learn and respect Westbank First Nation protocols and traditional knowledge, and exercise sensitivity to cultural practices and issues.
3. To conduct research with the intention of providing the community with a research process that will reflect their ideals and perspectives.
4. To promote active participation of community members in the research project and to facilitate building research capacity within the community.
5. To have a long-term commitment to supporting the community through building research capacity related to health or social issues.
6. To be the guardian of data until the completion of the research project when the data and results will be transmitted to the community for safekeeping.
7. To promote and participate in the translation and diffusion of academic and traditional knowledge gained through research initiatives. This may include communicating results in oral or written form.

## **DEFINITIONS**

### Aboriginal peoples

“Aboriginal people” are the descendants of the original inhabitants of North America. The Canadian Constitution recognizes three groups of Aboriginal people – [Status, Non-status people], Métis people and Inuit. (INAC 2000)

### Participants

Individuals who provide primary information for a specific research project.

### Research

A systematic investigation and presentation of information involving community participants in a detailed and accurate manner. This presupposes that informal communication between the Aboriginal community member and academic researcher, used to lay the foundation of the community-based project, is not considered research.

### Researcher

- Any person who conducts research on behalf of or in partnership with the UBC IAH and WFN.
- Any person who conducts research using UBC or Aboriginal community resources in pursuit of established and mutually agreed upon research goals including research space, material, equipment, or financial and human resources.

### Community Based (CBAR)

Community-based action research develops a collaboration between a community group(s) and researchers for the purpose of creating new knowledge or understanding about a practical community issue in order to bring about change. The issue is

generated by the community and community members participate in all aspects of the research process. Community-based research therefore is collaborative, participatory, empowering, systematic and transformative (Hills & Mullett, 2000).

## **ACKNOWLEDGEMENTS**

This Code of Research Ethics was drafted using other established research ethics principles and protocols available. These include that of the Kahnawake Schools Diabetes Prevention Project and Carrier Sekani Family Services (2004) Written permission was sought and granted to use their developed Codes of Research Ethics Policy as primary templates. Other documents included that of the Association of Canadian Universities for Northern Studies Council (1997), Kateri Memorial Hospital Center (1997), and the Mi'kmaq College Institute (2004) and the First Nations Chied Health Committee, First Nations Longitudinal Regional Health Survey (2004). Carrier Sekani, Boston Bar, Heiltsuk, Stolo, and Musqueam First Nations also provided feedback for this document.

The UBC IAH gratefully acknowledges the contributions of the above mentioned Code of Ethics which have served as a guide and inspiration to developing this document intended to make the research process equitable meaningful, and under the control of Aboriginal people.

Note: This is an evolving document. Your comments, suggestions and new ideas to improve these guidelines are welcome. Please send you correspondence to Dr. Eduardo Jovel, Director of the UBC Institute for Aboriginal Health, Co-PI BC Aboriginal Capacity and Development Research Environments (BC ACADRE), email: [ejovel@interchange.ubc.ca](mailto:ejovel@interchange.ubc.ca) or fax: 604-822-2495.

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## SIGNATURE PAGE

We agree to follow the code of ethics as outlined in the document ***Westbank First Nation and UBC Institute for Aboriginal Health Code of Research Ethics*** while participating in the research project titled: *Community-based Capacity Building in Traditional Nutrition and Science-based Knowledge Focusing on Diabetes Prevention*.

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Dr. Eduardo Jovel  
Director, Institute for Aboriginal Health

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Robert Louie  
Chief, Westbank First Nation

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Dr. John Gilbert  
Principal, College of Health Disciplines

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Councilor, Westbank First Nation

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Representative  
UBC Industry Liaison Office

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Councilor, Westbank First Nation

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Date

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Date

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Witness

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Witness

*Traditional Nutrition and Science-based Knowledge Focusing on Diabetes Prevention.*

### APPENDIX III: LIST OF PLANTS IN STUDY WITH PLOT COUNTS

Plot Name	Elevation	SEC	ZO	S	DF	PP	BC	ES	WRC	WB	PB	LPP	PY	MA	TA	ROD	DM	OG	NR	PR	BW	SB	SAS	SA	MO	P	S	BLS	ThB	FdB	OS	BsW	Y	FSS	HFB	WS	P	P	CH	TL	KK	HT	SHT	FW	PT	MW	Uhs	SA	R	P	QC								
HC1	348 PP				3	1	4									8			5		15		4						8																						2								
HC2	352 PP				2	3	5									4			4		9		2						6																						1								
MCG	354 DF				2		8								6	6	1						2									9																											
HC3	355 PP				2	2	3									6			2		11		6																																				
BC1	360 PP				4		6		5							2		5			23									2					8	6																							
BC2	362 PP				3		7		7							8	5	7			15														6	2																							
MCG1	367 PP				3			5	1								28			24																																							
MCG1C	368 PP	34			1		7								12			4	26			16	6																																				
MCG2	373 PP	14			1		12								12	12	1	12															6																										
MCG3	375 PP	16			1		14								4		8	2																																									
MCG4	376 DF	2					4		15							1		6	36																																								
MCG5	382 DF	6					12										3	4	12	6													4		6																								
MCG6	385 PP	12	16						14									10	18			6											2																										
LGC1	428 PP	1			6		2											2	12			1	6																																				
LGC2	435 PP	2			3		7												16	6																																							
OMP1	443 DF	6					4																								1						12	10																					
OMP2	458 DF	1					4																																																				
UGC1	575 DF	3			4		2											8	8																																								
UGC2	583 DF	1			3		4	6																																																			
UGC4	1818 DF	1			6		3											2	3	22		16	28																																				
UGC5	1824 DF	4			1		6												4	16		31																																					
UGC3	1864 DF	2			4						2	3	3					1	2	15		30		12	2	2																																	
CM1	1868 DF	5							11										11					1			T4		48																														
CM2	1872 DF	4								3									6																																								
SL1	1267 DFMS	8				6		4					2			2							4	2																																			
SL2	1269 DFMS	11				6		6					4			1																																											
SL3	1273 DFMS	9				1		2					3			4																																											
JL1	1215 ESSE	4						7	4													12																																					
JL2	1218 ESSE	2							5	6													14																																				

**Plant Abbreviations in this list:** TREES: So – *Shepherdia canadensis*, DF- *Pseudotsuga menziesii*, PP – *Pinus ponderosa*, BC - *Populus trichocarpa*, ES – *Picea engelmannii*, WRC - *Thuja plicata*, WB - *Betula occidentalis*, PB - *Betula papyrifera*, LPP - *Pinus contorta*, PY - *Taxus brevifolia*, MA - *Sorbus sitchensis*, TA - *Populus tremuloides*, SHRUBS: ROD - *Cornus sericea*, DM - *Acer glabrum*, OG - *Mahonia aquifolium*, NR - *Rosa nutkana*, PR - *Rosa acicularis*, BW - *Paxistima myrsinites*, SB - *Symphoricarpos albus*, SAS - *Amelanchier alnifolia*, SA - *Alnus viridis* subsp. *sinuate*, MO-*Philadelphus lewisii*, PyS - *Spiraea pyramidata*, BLS - *Spirea beauifolia*, ThB - *Rubus parviflorus*, EdB - *Sambucus cerulea*, OS - *Holodiscus discolor*, BsW - *Salix bebbiana* HERBS: Yw - *Achillea millefolium*, FSS- *Maianthemum racemosum*, HFB - *Prosartes hookeri*, WS - *Aralia nudicaulis*, PrP- *Chimaphila umbellate*, CHL- *Fritillaria affinis*, TL-*Lilium columbianum*, KK - *Arctostaphylos uva-ursi*, HT- *Equisetum arvense*, SHT- *Equisetum fluviatile*, FW- *Epilobium angustifolium*, PT- *Antennaria racemosa*, MW- *Asclepias speciosa*, Uhs - *Lonicera utahensis*, SA - *Aster conspicuous*, RSP - *Goodyera oblongifolia*, QC - *Clintonia uniflora*