

**Patterns of harvest: Investigating the social-ecological relationship between
huckleberry pickers and black huckleberry (*Vaccinium membranaceum* Dougl. ex
Torr.; Ericaceae) in southeastern British Columbia**

by

Andra Forney
BSc, Trent University, 2006

A Thesis Submitted in Partial Fulfillment
of the Requirements for the Degree of

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ABSTRACT

For centuries the wellbeing of rural communities has depended on the health and resilience of local food systems. Over the last century many factors have contributed to declines in the availability and use of important traditional foods. In this thesis I have used black huckleberry (*Vaccinium membranaceum*) as a case study through which I explore the varying roles humans play in influencing the health of a wild forest food. Black huckleberry is one of the most sought after wild berries in British Columbia (BC). Over the past few decades huckleberry pickers and forest managers have expressed concerns over the decreasing quality and availability of these berries. To understand the different roles humans play in the ecology of black huckleberry I interviewed 17 long-time huckleberry pickers and participated in berry picking trips – in the East Kootenay region of southeastern BC. I also reviewed the academic literature on huckleberry ecology. I found that huckleberry pickers have a deep knowledge of factors affecting the health of huckleberry patches. They identify both shifting social-economic and ecological conditions in their local forests as intrinsically linked with declining huckleberry availability and health. In contrast, the scientific literature primarily focuses on ecological conditions and forest management practices, ignoring or downplaying the relationship of berry pickers to huckleberry ecology and overall quality. There are significant cultural differences between the berry pickers' and the scientists' views of the factors impacting the health of the berry patch. I argue that an effective approach to addressing the problem of declining quality and availability must include the valuable insights berry pickers have on how social-ecological factors affect berry health.

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CHAPTER 1 - INTRODUCTION

Historically the forests of western North American provided a diverse wealth of food and medicine plants. Turner (2014) estimates that over 150 different species of plants were used for food by Indigenous peoples of northwestern North America. There is growing scholarship documenting the complex systems of stewardship and cultivation that were used to support the health and productivity of traditional plant foods (Deur, 2000; Anderson, 2005; Deur and Turner, 2005; Turner et al., 2013). Maintaining a diverse and abundant supply of traditional food plants was and continues to be important for physical, spiritual and cultural health of Indigenous communities. Many traditional foods are being forgotten or lost. This is especially true of plant foods (Kuhnlein and Turner, 1991; Kuhnlein et al, 2006 and 2009; Turner, 2014). Decreasing access to, and availability of traditional gathering areas, as well as the restriction and loss of traditional stewardship practices are major reasons for the declining use of traditional food plants (Turner and Turner, 2008).

There is a need to understand present day relationships between traditional wild foods, the people who harvest them, and the environment and social factors affecting their availability. With declining access to traditional foods the richness and diversity of foods in diets of Indigenous peoples has been in decline. This drastic shift in diet is having serious impacts on the health of Indigenous peoples.¹ In less than two generations Indigenous peoples in western Canada have undergone a drastic shift in their diet (Nabhan, 2006; Alfred, 2009). Research into the ecological and social factors that affect access to traditional foods can provide an important bridge between the scholarship documenting historic plant food use and the challenges facing those who call for a renewal in the use of traditional foods to combat the health crisis facing Indigenous communities.

In this thesis I explore the current status of black huckleberry (*Vaccinium membranaceum* Dougl. ex Torr.; Ericaceae), a highly valued traditional food that is experiencing a notable decline in abundance (Minore, 1972; Hunn, 1990:130; Deur, 2009). It is one of many species of *Vaccinium* (huckleberries, blueberries, and cranberries) distributed in northwestern North America, whose berries are an important food source for people and wildlife. Black huckleberry

¹ Type-two diabetes, heart disease and high blood pressure are occurring at higher rates compared with the rest of the Canadian population. Amongst First Nations in Canada heart disease occurs at a rate 1.5 times higher than average and incidences of type 2 diabetes occur 3 to 5 times more frequently (Health Canada, 2009).

is universally appreciated as one of the sweetest and most desirable of all these species. Black huckleberries are only found growing in the wild, and no domesticated berry is equivalent in taste, flavour or nutrient profile. Huckleberries are irreplaceable. Through examining a combination of historic ecological changes, current pressures and the traditional ecological knowledge of berry pickers, this research provides insights into the factors most important for maintaining the health of this species.

1.1 Changing Forests – Changing Food Systems

Over the past 150-200 years the stewardship and management of forests in northwestern North America has shifted drastically from management of forested areas for the production of a diversity of important resources (Turner, 2001), to a narrow focus on timber production (Wilkinson, 1992; Gagne et al., 2004:1). This change has reduced the diversity and quality of non-timber resources (including wild food plants) available to local, rural communities. At the same time this change in forests has altered the nature of the social and ecological relationships that exist between these communities and important non-timber forest products (NTFP). For rural communities these forest products are an important component of their livelihoods and the “social-ecological wellbeing”² of their communities. Both plants and animals from the forest provide a local source of healthy foods, medicines, and shelter, and may supplement income through the trade and sale of locally gathered products. Cultures have been shaped around the seasonal availability, distribution and types of resources available in forests. Generations of interaction and observation have led to harvesting and stewardship practices that consciously influence the ecological structure and functioning of forests in ways that benefit these resources (Boyd, 1999; Turner et al., 2000; Deur and Turner, 2005; Turner et al., 2013). Many traditional forest stewardship practices have been lost or are in decline due to changes in the tenure systems and policies that have accompanied the shift to a timber-focused forest tenure system (Berkes and Folke, 1998: 357). To understand the declining availability and quality of important non-timber forest resources involves an investigation of the connected social-ecological systems that currently and historically supported the wellbeing of these resources.

² Dolan et al. (2005) define the “social-ecological wellbeing” of a system as the capacity of the human-natural world to respond with resilience to stressors. As a term it includes the complex feedback loops between the various social and ecological systems that maintain the intricate relationships that link environmental health to the health of local cultures and societies.

Within the changing forests of the Pacific Northwest, black huckleberry³ (*Vaccinium membranaceum*) is a focal species linking the health of local ecological systems to that of local cultures and societies, and vice-versa (Figure 1). Black huckleberry is one of the most sought after wild berry species in western North America. Its dark purple berries are important in the traditional diets and cultural practices of First Nations groups throughout its range, and in time have become as significant for later settlers of this region (Richards and Alexander, 2006). From the western slopes of the Rocky Mountains east to the Coast and Cascade mountain ranges, annual pilgrimages to upland huckleberry patches for berry picking are still common. This fruit has inspired local festivals, stories, recipes and family traditions. Black huckleberry is central for the social-ecological wellbeing of many rural forest communities in this region. The fruit of black huckleberry is an integral part of local ecology and is a vital summer and fall foodstuff for wildlife including bears, birds, and small rodents. It is an especially important food for populations of the interior grizzly bear (*Ursus arctos*) (McLellan and Hovey, 1995; Rode and Robbins, 2000; Beaudry et al., 2001). Any shift in the health of the black huckleberry directly impacts the wellbeing of the larger forest ecosystem, including local human communities.



Figure 1. Ripe black huckleberries (*Vaccinium membranaceum*) on a bush in the Flathead Valley, BC.

³ This species has a diversity of common names including black mountain huckleberry, mountain bilberry, thin-leaved huckleberry, and in regions where it is common, just “huckleberry”.

During the past 20 years there have been increasing reports of declining availability of western huckleberry, blueberry and bilberry species throughout their range (Figure 2). As of the early 1970s, Minore (1972) warned that huckleberry fields were “*dwindling as trees and shrubs invade the berry fields*” in both Oregon and Washington. Similar concerns have been expressed over the declining availability and quality of black huckleberry within historic berry picking fields in British Columbia (Gravelle, 2000; Burton, 2001; Hamilton et al., 2005), Idaho, and Montana (Richards and Alexander, 2006). These locally observed trends of huckleberry decline have all been closely linked with the encroachment of forests and the suppression of fire within the berry patch. To date, no one has looked at whether these trends apply to the huckleberry across its range, and to what degree berry productivity has been affected across larger regions.⁴ Scientific studies of black huckleberry ecology and forest management have begun to provide explanations for these observed declines, and propose potential solutions (Miller, 1977; Miller, 1978; Minore and Dubrasich, 1978; Minore et al., 1979; Zager et al., 1983; Minore, 1984; Stark and Baker, 1992; Martin, 1996; Burton, 2001; Anzinger, 2002). To date no study has explored in-depth the knowledge berry pickers have of the social-ecological factors that affect the health of the black huckleberry. TEK is the knowledge and beliefs about the relationships living beings (including humans) have amongst themselves and with their environments. It is an applied knowledge that is very specific to a local place or region, it is cumulative over time, and it adjusts to changes in the ecosystem (Berkes, 1999, 2012). The traditional ecological knowledge (TEK) of long-time berry pickers can provide important insights into understanding how current social-ecological systems of resource use and management affect the wellbeing of black huckleberry. The berry pickers’ TEK can provide a unique lens for understanding how current ecological and social relationships affect the health of huckleberry patches. Overall the perceived declining availability and quality of black huckleberry presents a useful case study to explore the interface between the social and ecological elements within a resource management system, and to begin to understand the connections between changes in these systems and the health of local resources and the wellbeing of those who depend on them.

⁴ Depending on regional forest disturbance trends (e.g. frequency of wildfire, prevalence of clear-cutting, etc.) and local ecological conditions there is likely a lot of regional variation in the extent and severity of decline in berry productivity. The combination of climate, soil, aspect, forest composition and disturbance history could have significant influence over the rate of forest encroachment on berry patches. For example, high elevation berry patches often occur where conditions are poor for growing trees. In these areas berry fields are less likely to experience forest encroachment and a resulting decline in huckleberry shrub productivity.

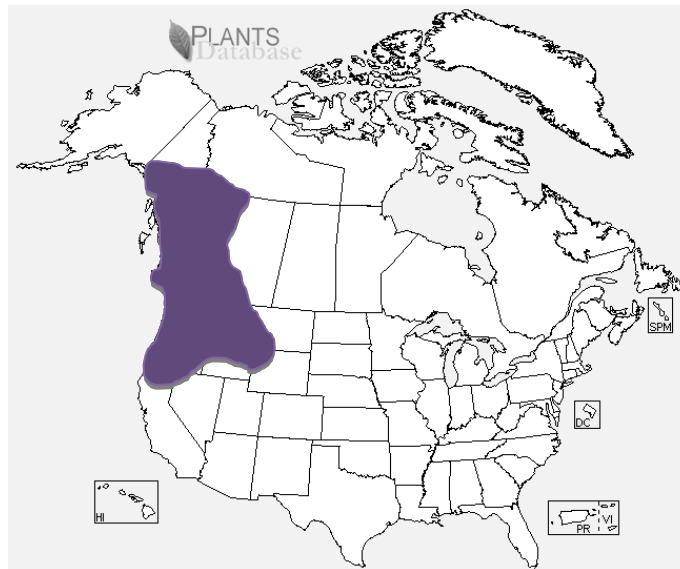


Figure 2. The known distribution of black huckleberry (*Vaccinium membranaceum*). (Map of North America courtesy of USDA Plants Database – www.plants.usda.gov)

1.3 Research Objectives

1.3.1 Purpose & Research Approach

This thesis was developed to address reports and concerns about the declining availability of black huckleberry (Minore, 1972; Hunn, 1990:130; Gravelle, 2000; Deur, 2009), a species of particularly high cultural and ecological significance⁵. As annual users, berry pickers are some of the first people to notice declines in this species' productivity. My thesis research has used pickers' knowledge of black huckleberry ecology, alongside existing scientific research to develop a narrative that re-frames the problem of availability and productivity and lays out the deeper systemic factors affecting black huckleberry productivity. The purpose of this research is to explore which factors long-time berry pickers perceive as affecting the health of black huckleberry and the availability and productivity of its fruit. I compare my findings with the

⁵ Loss of the black huckleberry from the forests of the Pacific Northwest environment would change local food culture as well as bringing a loss of income for some harvesters (Richards and Alexander, 2006). As a traditional food the huckleberry is as much a part of the spiritual rituals of local communities as an important part of the diet (Turney-High, 1941; Trusler, 2002; Richards and Alexander, 2006; Deur, 2009). This importance fits Garibaldi and Turner's (2004) definition of a "cultural keystone species" that serves an important role in the "diet, material and/or spiritual practices" of a group of people or a community and thus shape the cultural identity of this group.

factors of decline presented by natural resource management experts in the scientific literature (e.g. Minore, 1972; Minore et al., 1979; Stark and Baker, 1992; Martin, 1996). Comparing these two perspectives I discuss the insights both provide for the future management and restoration of huckleberry fields and the surrounding forests.

Using the concept of the social-ecological system – linked integrated social systems and ecosystems – as a theoretical framework to approach the issue of black huckleberry decline is the best approach to engage with the TEK of berry pickers. A social-ecological approach is particularly important when considering problems of resource management such as scarcity or conservation of a resource because it includes social factors, which are inextricable from berry pickers' knowledge, but are often omitted from scientific interpretations of natural resource management issues. Understanding and eventually addressing the deeper roots of the declining availability of black huckleberry requires an awareness of how different social and environmental factors interact to affect both productivity and berry quality.

1.3.2 Hypothesis & Research Questions

I hypothesize that the knowledge of black huckleberry ecology held by long-time huckleberry pickers will illustrate complex relationships between traditional knowledge, forest structure, berry picking practices and black huckleberry health.

I explore this hypothesis through my research into the following questions:

1. What characteristics are used by berry pickers to define and evaluate the quality of a black huckleberry patch?
2. What impacts do humans have on the health of black huckleberry patches?

Specifically:

- a. How does picking the berries affect black huckleberry productivity and quality?
 - b. What impacts do logging practices have on black huckleberry productivity and quality?
3. What insights are provided by the traditional ecological knowledge around black huckleberry about the continued availability and productivity of black huckleberries in the East Kootenays?

1.3 Organization of Thesis

This thesis is a synthesis of TEK, knowledge recorded in the natural and social scientific literature, and knowledge acquired from personal observation and survey work. From this research I present an analysis of the factors affecting the social-ecological wellbeing of black huckleberry and its human harvesters in the East Kootenays. I specifically focus on the important role humans' play in maintaining the health of this species. This introductory chapter provides the background context for this study, its purpose and the specific questions I have addressed. In the second chapter I describe my research approach, including the field methods and analytical approach used. As background for the case study the third chapter presents an overview of both the ecology of the black huckleberry and the social-ecological relationship between humans and this berry species. I follow this with an historical overview of how shifting forest tenures over the past century have re-shaped human relationships to the forest, specifically focusing on black huckleberry.

I then present and discuss, in chapters 5 and 6, the results of fieldwork conducted in the East Kootenays. Chapter 5 offers an overview of the ecological characteristics berry pickers identify as important for black huckleberry quality and productivity. I provide a description of the characteristics berry pickers use to find and then evaluate the quality of a black huckleberry patch, and set the background for understanding some of the ecological factors motivating human practices and behaviour in relation to black huckleberry. In chapter 6, I explore the different impacts humans have on the health of huckleberry patches. I describe how picking practices, picking etiquette and forestry are perceived as affecting the quality and availability of black huckleberry. This chapter discusses how these understandings of the impacts humans have on the berry patch can inform better forest stewardship practices to ensure the future wellbeing of black huckleberries and the communities that depend on this berry.

In conclusion I explain the broader implications of my research findings beyond black huckleberry, for social-ecological systems and natural resource management in general. I highlight the importance of these findings for policy and practice around the management of forests especially non-timber resources and suggest areas for further research.

1.4 Region of Study

The East Kootenay region is located in southeastern British Columbia (Figure 3). A mountainous region – bounded by the Purcell Mountains to the west and the Rocky Mountains to the east – the East Kootenays are at the southern end of the Rocky Mountain Trench. The dry valley bottom of the Trench is dominated by grasslands and open forests of mixed ponderosa pine (*Pinus ponderosa* Lawson and C. Lawson) and Douglas-fir (*Pseudotsuga menziesii* (Mirb.) Franco). At higher elevations the pine and Douglas-fir give way to an increasing diversity of conifer species and a unique suite of understory shrubs that take advantage of the greater moisture levels and cooler temperatures⁶. Black huckleberry makes its home in the openings and understories of these higher elevation forests, most commonly growing in Interior Cedar – Hemlock (ICH), Montane Spruce (MS), and Engelmann Spruce – Subalpine Fir (ESSF) biogeoclimatic zones (Haeussler et al., 1990).

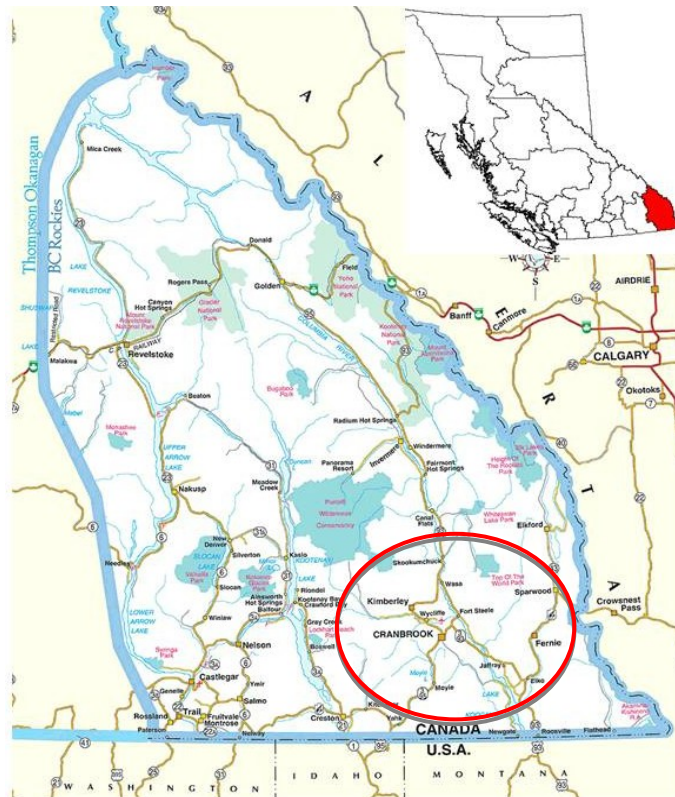


Figure 3. A map of the study area, in the vicinity of Cranbrook (circled in red), in the East Kootenay region of BC (outlined in blue).

⁶ A detailed description of huckleberry ecology and the associated species it is found growing with is presented in chapter 3.

This region is central to a large portion of the traditional territory of the Ktunaxa Nation⁷, with the traditional territories of the Sinixt (Arrow Lakes) to the west, Secwepmec (Shuswap) to the north, and the Bitterroot Salish (Flathead) to the south⁸. The Blackfoot are neighbours on the east side of the Rocky Mountains. Fur traders first entered the region in the late 18th and early 19th centuries (Wikeem and Ross, 2002). Regular trade relationships between Ktunaxa and Europeans developed after the explorations of David Thompson in the early 1800s (Thompson, 1968). Early European settlement of the East Kootenays focused on cattle ranching, with records of ranchers arriving in 1841 to settle in the region around Columbia Lake. By 1865 settlement of the area was rapidly increasing as a result of the discovery of gold at Wild Horse Creek (near the present town of Cranbrook) in 1863⁹. Serious European settlement of the region began during the 1880s with the establishment of large cattle ranches in the Rocky Mountain Trench between the present town of Invermere and south to the border with Montana. Throughout the rest of the 19th century, up until WWI, mining was the dominant industry in this region. Mining still plays a role in the local economy, however, forestry has grown in prominence and now plays a dominant role in the regional economy (Cummings et al., 2009).

For the local Ktunaxa First Peoples, black huckleberry has been an important food source for hundreds, probably thousands of years. Similar to the European bilberry (*Vaccinium myrtillus* L.) and other wild berries of Europe, the black huckleberry was readily adopted by European settlers of the Kootenays, and quickly developed a similar importance for this new population (Hamilton et al., 2003).¹⁰ To this day it remains an important cultural practice for local berry pickers to make their annual journeys to higher elevations in the Purcell and Rocky Mountain ranges from mid-late summer through early fall to pick black huckleberries.

⁷ Ktunaxa territory covers south-eastern BC and extends into northern Idaho and north-western Montana.

⁸ During the early period of European exploration, trade and colonization, the territorial boundaries for all of these cultural groups were in a state of re-negotiation. There is evidence in the historic records that the traditional territories of Ktunaxa, Bitterroot Salish and Nez Perce historically extended into areas east of the Rocky Mountains (Thompson, 1916). It is thought that the Blackfoot forced these groups west when they acquired the power of firearms from European fur traders (Stubbs, 1966). It is these new territories that early explorers and settlers to the East Kootenays experienced and recorded.

⁹ Reports estimate that between 5000-8000 miners moved into the area during this early part of the Kootenay Gold Rush (Wikeem and Ross, 2002).

¹⁰ A more detailed discussion of the adoption of the black huckleberry by European settlers will follow in Chapter 3, section 3.5.

1.5 Terms and Abbreviations

There are terms that appear throughout this thesis that may hold multiple meanings or require clarification. Definitions of these terms are provided below:

Availability (of black huckleberry) refers to both the continued productivity of good sized, high quality berries in patches of wild huckleberry, and pickers having the means, capacity, and permission to access these patches.

Culture is defined as a system of shared beliefs, values, customs, and behaviours that the members of a society use to adapt to their surroundings and for interacting with one another. Cultural practices are transmitted from generation to generation (Davis, 2001).

Cultural Keystone Species is a term coined by Garibaldi and Turner (2004) to identify species that are of such importance to a group of people that their loss would significantly alter their cultural identity and practices. A cultural keystone species serves an important role in local diet, as a material or medicine, and/or in spiritual practices of a group of people, and such species are often harvested and used in large quantities. They are often considered icons of a culture and have been incorporated into local language, stories, ceremonies and trade.

(Ecosystem) Stewardship is the term I use to describe the actions, rituals, and practices regular resource users, such as berry pickers, undertake to enhance the productivity, quality, predictability, and/or health of a culturally and economically important part of their environment. Stewardship practices work with natural processes to maintain or alter the ecosystem in ways that benefit *all elements* of the ecosystem, including humans. A steward generally has deep historic, economic, cultural, spiritual and emotional relationships with the local ecosystem or landscape, and usually provides regular, hands on “day-to-day care”. Ecosystem stewardship has three important elements: it employs an element of sacrifice (through use of limits), it is local, and it is based in long-term thinking (Roach, 2000). Examples of this system of human-nature relations that I describe as “ecosystem stewardship” are also frequently referred to in the literature as “traditional resource management” (Berkes and Folke, 1998).

Indigenous – Charles (2002) uses ‘indigenous’ to designate groups of people with a shared culture, and common knowledge traditions that *“place an emphasis upon (or have arisen from) specific places, ecologies and environments. ... Their knowledge system has grown upon a lengthy tenure of a particular people (in those spaces), ... (and its) designs and forms are intimately connected with the place of their traditional concern”*. Often cultures identified as indigenous hold spiritual and social values requiring that they treat their natural world with respect and reciprocity rather than approaching nature as something to be managed, controlled and exploited for human benefit alone. Indigenous people traditionally rely on wild foods from the local ecosystems for their subsistence (Kuhnlein and Turner, 1991).

An **institution** is the formal and informal rules and structures used by groups of humans to organize and create order within commonly occurring interactions (Ostrom, 2005: 3). They are the means by which a society can act upon its shared knowledge to produce livelihoods from their local environment. There are **formal institutions** with official protocols for rule development and enforcement, and clear guidelines about who must follow the rules. In contrast, **informal institutions** consist of an informal grouping of people with more fluid “membership”. These informal groupings are considered part of an informal institution because they share common rules that can range from clear, universal guidelines to unspoken but commonly understood norms and self-imposed codes of conduct. Berry pickers are an example of a group that is part of a shared social grouping with aspects of an informal institution.

Forest (or Ecosystem) Management is a phrase used to describe the actions of humans on specific features and ecosystems in a landscape. These actions are directed at guiding or controlling a system to meet present and/or future goals and objectives. Natural resource management as practiced in North America and elsewhere is often informed by Western scientific understandings of the resource held by trained professional resource managers. This form of management is frequently referred to as **conventional resource management**. In contrast, **traditional resource management** is used to describe Indigenous or local systems of resource use and enhancement. Traditional resource management often relies on traditional ecological knowledge to guide management practices. Both approaches to resource management

involve a series of processes, policies and/or laws that guide human behaviours toward, and interactions with the environment. Both management approaches guide human relationships with the environment with the aim to achieve a present and/or future goal. Traditional resource management tends to work with natural processes, cycles and systems, enhancing these systems to the benefit of humans and other living things. In contrast conventional resource management often seeks to understand natural systems so that they can be managed, changed, and controlled to better conform to human needs and desires.

In my field research I found that many of the berry pickers I spoke with associated the term “management” with connotations of humans having dominion over rather than being stewards of natural resources.¹¹ An alternative term for describing human-nature relationships is the concept of **(ecosystem) stewardship** as defined above.

A **Non-Timber Forest Product** (NTFP) is any organism or product of cultural or economic value harvested from forests other than wood. This is a term popularly used in governmental and academic writing (i.e. Turner, 2001; Gagne et al., 2004; McLain and Jones, 2005). In this thesis I attempt to minimize reference to black huckleberry as a NTFP for two reasons: black huckleberry pickers do not conceive of, nor classify black huckleberry in this manner, and the use of “NTFP” perpetuates a timber focused view of forests, classifying the resources derived from them as either timber or non-timber.

The term **Social-Ecological System** emphasizes the inextricable integration of social and ecological systems. Berkes et al. (1998) coined the term for use in describing the complex interdependence of social and natural systems. This term describes natural systems, of which humans are a part, without arbitrarily breaking the system into separate social and natural systems. The practice exploring either the social or natural system independently often ignores the existence of the other portion of this interdependent system. An important characteristic of social-ecological systems is their ability and capacity to adapt to external pressures and changes (Ommer et al., 2007). When external pressures alter one aspect of a social-ecological system, there are changes that occur throughout the larger system. Further exploration into the

¹¹ This association may come from the forest management practices of clear-cut logging/forest plantations carried out by local logging companies and supported by the BC Ministry of Forests, Lands and Natural Resource Operations. Clear-cuts are rapidly reshaping forest ecosystems in the East Kootenays.

application of social-ecological systems can be found in Berkes and Folke (1998) and Berkes et al. (2003).

Traditional Ecological Knowledge (TEK) is the knowledge and beliefs about the relationships living beings (including humans) have amongst themselves and with their environments. TEK is very specific to a local place or region, it is cumulative over time, it is transmitted through social networks (including intergenerational), it is dynamic – constantly adjusting to changes in the ecosystem, and it is an applied knowledge, meaning it is created, maintained and transmitted through regular use (Berkes, 1999, 2012). As an essential part of lifestyles and livelihoods, TEK is not a model or set of rules about ecological processes easily transferred to different contexts. It contains a rich constellation of social relations, practices, values and beliefs that are inextricably connected to the local environment.

Resource Tenure is the combination of rights that determine how individuals or groups access, use or hold ownership or proprietorship over a specific resource, these rights are often defined and enforced by institutional (political, social, economic and/or legal) structures. Within systems of tenure if a resource lacks formal or informal institutional structures that govern the use of a resource it is known as **open-access tenure**. In **open-access tenure** systems resource users do not have a formal system that guarantees security in their rights to a resource and this often leads to unsustainable resource uses such as overharvesting (Ostrom, 1990).

Social is anything relating to a society, including its cultural practices, institutions, systems of knowledge, tenure systems and worldview.

Worldview is a term used to describe the shared ‘lenses’ or values through which a culture conceptualizes its own unique perceptions of reality. Reality, being defined as what a culture regards as actual, probable, possible or impossible. Belonging to a culture involves sharing this common set of conceptions that form a collective reality. A worldview is the dynamic core of a culture – influencing, shaping and interacting with the culture. It is “*an implicit set of impressions about the world that are often left unchallenged and discussed*”, because they are so hidden within a culture most people would have trouble defining them (Royal, 2002: 19). These

shared values then shape the common behaviour and knowledge of individuals that share a worldview (Royal, 2002). Worldviews are also often referred to as a culture's philosophical approach to the world or its cosmology.

1.6 Significance of this Study

The general objective of my thesis is to learn what aspects of forestry management systems might be changed or improved to ensure the long term wellbeing of the both forest communities and their local resources. Understanding the social-ecology of black huckleberry is an important case-study for the improved management of wild-forest foods. There is strong interest in replacing timber-oriented forest tenures with policies and practices that are beneficial for a larger diversity of forest resources and forest users (Gagne et al., 2004; McLain and Jones, 2005; Cocksedge et al., 2011). There is a lack of research into the TEK, harvesting practices, and uses around most of these resources (Charnley et al., 2008; Cocksedge et al., 2011). By developing a clear interdisciplinary case-study, drawing from both the TEK of berry pickers and scientific studies of black huckleberry ecology, my thesis supports alternative approaches to addressing the noted declining availability of black huckleberry and other important wild-forest foods. The perspectives gathered from local experts provide unique and important insights on potential ways to address declining availability of black huckleberry. Based in huckleberry pickers' knowledge my research approach has created a human-centered narrative around black huckleberry ecology from the perspective of the picker. In this thesis, as well, I seek to identify underlying principles that might assist in improving the effectiveness of management or restoration of huckleberry patches to ensure sustainable access to black huckleberry.

There is growing literature to demonstrate the importance of the participation of local communities alongside government in the management of natural resources for local social-ecological wellbeing (Ommer and team, 2007; Charnley et al., 2008), this is especially important for First Nations communities (Notzke, 1995; Berkes et al., 2000; Turner and Cocksedge, 2001; Wyatt, 2008). In this thesis I begin to develop a case for alternative tenures and forestry policies that include the involvement of local resource users and knowledge holders in their development. The results of my thesis research provide an alternative viewpoint to the current discussions around the management of NTFP and forest tenure in BC, one that includes the TEK of huckleberry pickers and forest resource users.

CHAPTER 2 – RESEARCH DESIGN

The aim of this research project is to expand the knowledge around the connections between local resource users and the health of the natural resource. I approach this goal through a case-study investigation into the social-ecological systems and traditional ecological knowledge (TEK) around a culturally and ecologically important wild food –black huckleberry (*Vaccinium membranaceum*). In this thesis I work to bring together a diversity of knowledge types and perspectives in my exploration of the concerns around the declining availability of quality black huckleberries. This chapter describes my interdisciplinary approach and the methods I have used to explore my research questions (outlined in chapter 1), followed by a summary of the analytical approach I applied in the interpretation of my data.

2.1 An Interdisciplinary, Ethnographic Case-Study Approach

In this thesis I have contextualized the issue of the declining availability of black huckleberry fruit, particularly in the Kootenay region of southeastern British Columbia, as a problem best understood through the social-ecological system surrounding this species. To investigate this social-ecological system I documented the TEK of huckleberry pickers using an ethnographic research approach. An ethnographic approach is a primarily qualitative, mixed-methods research process. It aims to capture an in-depth characterization of human relationships, actions, and practices: the shared understandings and meanings that form a culture. From within the different ethnographic research approaches I chose the case-study approach as it focuses the research around answering questions directly related to an identified problem. An ethnographic case-study approach has allowed me to collect rich, highly descriptive data in order to begin to examine the declining availability of black huckleberries from the perspective of berry pickers. Qualitative documentation of traditional knowledge has allowed me to construct a detailed narrative that examines the many social and ecological factors affecting the availability and continued health of this plant and its fruits. In my thesis I use this developing narrative to direct my analysis, and to guide it toward identifying the most important questions for future research.

There have been many research initiatives that have approached the problem of declining black huckleberry productivity using quantitative methods¹². All of these studies have contributed significantly to our general understanding of the ecology of the black huckleberry, however, few of these studies incorporate the relationship of humans to the huckleberry in to the design of their research study. In this research I set understanding the role humans play in huckleberry ecology as the focus of my research with the intent of broadening the understanding of black huckleberry health to reflect the essential connection social systems have with huckleberry ecology.

2.2 Huckleberry Pickers as Knowledge Holders

Pickers' continuing dependence on wild huckleberry patches for their annual supply of berries makes them a source of important insights into huckleberry social-ecology. Through their regular trips to huckleberry patches berry pickers develop a detailed understanding of the factors affecting the availability and health of this species over time – including how forestry and berry picking practices affect the availability of quality black huckleberry fruit. Huckleberry pickers' wisdom about black huckleberry social-ecology may spans multiple generations of pickers, but is tested annually by the hunt to find good berries. It includes a mixture of qualitative and quantitative observations of the factors affecting the well-being of black huckleberry patches. Following the research approach of Ballard and Huntsinger (2006), my thesis relies on the ecological knowledge of the resource user to investigate how current provincial forest management practices and berry picking affect the long-term resilience of black huckleberry.

Traditional ecological knowledge is a core component of a social-ecological system. It includes an understanding of the dynamic environmental conditions, the culture around the use of a resource, and how cultural practices, social structures, and environmental conditions impact the health, availability, and productivity of a natural resource. Huckleberry picker TEK includes the social conditions that have been shaped and influenced by the ecology of this species. The influence of social and cultural systems on TEK has caused some to view this knowledge as biased, non-objective or incomplete. Yet, collecting the experiences and knowledge of berry pickers using an ethnographic approach has allowed me to contextualize the general concern

¹² For a summary of the earliest and most extensive work see Minore et al., 1979. Further scientific research into this problem include: Miller, 1977; Zager et al., 1983; Stark and Baker, 1992; Martin, 1996; Beaudry et al., 2001; Burton, 2001; Burton and Mattes, 2001; Anzinger, 2002; Kerns et al., 2004; Keefer et al., 2011.

around declining availability in relation to larger political, economic and social systems. Having this broad perspective allows for the conception of socially and ecologically appropriate potential solutions to the problem of declining black huckleberry health.

2.3 Methods of Data Collection

During my research for the black huckleberry case-study I used both quantitative and qualitative ethnographic methods, including: semi-structured interviews, free-listing, participant observation and a review of written texts on the black huckleberry. Each of these methods is described in the sections below.

2.3.1 Semi-Structured Interviews

My primary tool for data collection was a short, semi-structured, open-ended interview. During the summer of 2010 I conducted interviews with 16 huckleberry pickers in the East Kootenay region of BC¹³. Initial interview participants were identified through the recommendations of local contacts from the Cranbrook area. A “snowball” sampling approach was used to identify additional interview participants. Interview participants were purposefully selected for their picking experience (minimum 25 years); otherwise I attempted to interview people from a range of backgrounds (Table 1). Despite efforts to interview “commercial” berry pickers, all pickers I interviewed primarily picked huckleberries for personal use, including consumption and gifting. All interview participants signed a participant consent form before proceeding with the interview (Appendix A). Interviews were primarily conducted in the home of the participant, or in a public location. They lasted approximately an hour and, with permission of the participant, they were recorded using a digital recorder and were later fully transcribed. The structure of the interview was informal and loosely structured around a series of pre-set questions within three major themes: black huckleberry ecology, the impacts of human activities on huckleberry patches, and the social and cultural factors that shape huckleberry picking practices (Appendix B).

¹³ This research was conducted following both the ethical protocols of the University of Victoria, and those of the Ktunaxa Nation Council. I have obtained ethical clearance from the University of Victoria (Protocol No. 10-216, exp. 26-May-2011), and approval of this project from the Ktunaxa Elders’ Group.

Table 1. Demographics and experience of huckleberry pickers interviewed ($n = 16$)

Characteristic	Participants
Gender	
M	8
F	8
Ancestry	
Ktunaxa	2
European Settler	14
Generations in Kootenays	
1st-2nd	8
≥ 3 rd	8
Picking Experience (years)	
25-50	6
>50	10

2.3.2 Free-Listing Exercise

Embedded within the interview questions about black huckleberry ecology was a successive free-listing exercise (Ryan et al., 2000). This data collection tool was used to identify and define the environmental factors huckleberry pickers recognize as most important for fruit and berry patch quality. Listing of important characteristics was prompted by the following questions:

When searching for a huckleberry site what are important qualities you look for in a good huckleberry picking area?

Based on your experience what factors indicate to you that an area is likely to produce a lot of berries? What clues do you look for to indicate the shrubs will be productive?

Discussions around berry patch quality frequently were used to lead into other lists and conversations around factors affecting berry productivity or quality at a site. To ensure that as much knowledge of berry quality and ecology as possible was obtained from my interviewees I used a series of probes as described by Brewer (2002). For example after the interviewee was finished responding to the prompt I would read aloud a list of main factors they had mentioned and ask if there were more factors they wished to add to this list.

2.3.3 Participant Observation

During the same timeframe as I was conducting my interviews I lived in Cranbrook, BC – a major community in my study area. Living in Cranbrook allowed me to begin to understand the local culture, politics, ecology and landscapes of the East Kootenays. I participated in multiple berry picking trips with both novice and experienced huckleberry pickers, at a diversity of sites. Over the course of the summer, as well as interviewing, I had many informal discussions with individuals about huckleberries. As part of the practice of “participant observation” I recorded informal field notes, and wrote journal entries about my experiences, observations, and conversations. These exercises in observation and reflection allowed me to process my daily experiences as they related to the analysis I was developing for my thesis.

Participant observation also enhanced the effectiveness of my other data collection methods. It provided the background knowledge and experiences that allowed for more natural interactions and engagement with huckleberry pickers during interviews¹⁴. Living in Cranbrook also provided me with experiences that aided in my interpretation of interview responses, improving my understanding of what huckleberry pickers experience as meaningful and important. This empathy assisted me in interpreting deeper significance in how and why certain discussion topics were important for understanding the social and cultural aspects of huckleberry picking¹⁵.

2.3.4 Review of Written Texts

Additional information for my thesis was collected through reviewing a number of primary and secondary sources. This literature included: published studies from academic research in both the natural and social sciences, unpublished research reports and databases, government publications, historical accounts and journals, newspaper articles and other popular

¹⁴ For example, reciprocity is one of the most important social norms when discussing huckleberries. Knowledge about the state of the huckleberry crop in an area, or the location of a good picking site has significant currency amongst serious pickers. In my interviews I found mentioning details of visits to huckleberry sites, such as providing berry ripeness estimates, gave me access to different information.

¹⁵ For example during my stay in Cranbrook a common topic of conversation was the careless and destructive behaviour of Albertans during visits to British Columbia. Residents of the East Kootenays commonly perceive Albertans as leaving trash in ‘the bush’, and causing damage to the natural resources of British Columbia. My knowledge of this stereotype provided insight for my interpretation of huckleberry pickers’ perceptions of the impact of ‘outsiders’ on huckleberry health (Chapter 6).

media. I reviewed these data sources to provide context and improve the interpretation of my interview data by filling in gaps in certain areas or supporting my analyses and findings.

2.4 Data Analysis

2.4.1 Interview Coding

During my initial transcriptions I reflected on the interview responses I was processing. With each interview I transcribed I found common themes, and interesting convergences and contradictions that began to emerge from within the data. To best organize the large body of information contained in these transcripts I identified broad categories that captured major concepts and themes. These categories included: culture, ecology, geography, human-environment interaction, knowledge and social organization. With this broad structure in place I revisited and coded each interview line by line. This first pass of coding was kept fairly open, but focused on major themes within the categories above. After coding three interviews I revised the coding structure, creating a more detailed list of themes and subthemes (Appendix C), focused around addressing my research questions (chapter 1). I used this revised coding format in coding all interviews, adding categories where necessary. All coding and later analysis of transcripts was done using NVivo 8 (QSR, 2008) qualitative data analysis software.

Throughout the coding process I searched for stories and themes that addressed my research questions. I also identified different patterns in the data, specifically looking for: salience, points of contradiction, outliers, signals of avoidance, and triggers or patterns when discussing certain topics. Further consideration of these different relationships was used to help generate new ideas and perspectives on the data, to formulate deeper analyses and further research questions from within my data.

After finishing a complete first round of coding I reviewed sub-sections of the interview data based on their relevance to each of my research questions. During this second pass of coding I re-read parts of the interviews grouped by theme or sub-theme. Approaching the data brought together in this way provided a new perspective, allowing me to catch patterns and ideas I may have missed during the first round of coding. For some of the more complex relationships and concepts I physically diagrammed the connections between the major themes for each of my

research questions. This approach allowed me to better understand the connections and relative relationships of themes within each topic.

In the final stage of analysis I returned to the key literature in the areas of black huckleberry ecology, traditional knowledge, ethnobotany, and social/cultural perspectives on natural resource management to aid in the interpretation of the data. I also reviewed my journals and field notes to help focus and understand the major themes that emerged. The dominant and most powerful themes were eventually arranged into the final results and the analyses presented in chapters 5 and 6.

2.4.2 Analysis – Free-Listing Exercise

Results of multiple free-listing exercises were used to determine the relative social-ecological importance of the different characteristics listed by berry pickers. Free-listing works under the assumption that when asked to recall information, people will list the most important or salient features, with less important features being mentioned later in the conversation, and with some of the least important sometimes being omitted altogether (Martin, 1995: 214). From my interviews I analyzed the relative importance of berry characteristics on overall berry quality, and importance of different environmental factors in determining or relating to berry patch quality based on the frequency of mention by interviewees.

Using interview notes and transcriptions I grouped the responses by common characteristics listed as important for either berry quality or patch quality. From within these groups I looked to develop a common definition for each characteristic mentioned. This process helped to identify redundancy, where different terms might be used to describe the same characteristic. It also helped to identify where one term held multiple meanings to different people. With each unique variable defined, I then calculated the frequency of interviewees who mentioned each variable to determine its relative social-ecological importance. The results of this analysis are presented in chapter 5.

2.4.3 Reducing Bias

I have attempted to root my findings firmly in the data, however, it is challenging for a researcher to remain completely objective in their choices about its interpretation. In this thesis I worked to preserve the meanings and knowledge of the berry picker through presenting

important concepts and definitions in their original wording. I chose to ground my research in the knowledge and experience of the huckleberry picker. Part of this process is re-telling, as accurately as possible, what the huckleberry pickers have shared with me.

2.5 Assumptions and Limitations

My research was bounded both spatially and temporally. I consciously chose to focus my research around the town of Cranbrook in the southern East Kootenays. By concentrating on interviewing individuals within this region I was better able to compare common observations from my interviews with my own observations from fieldwork and berry picking trips, and with prior research on black huckleberry use and ecology from this area. This geographic boundary may limit the usefulness some of my findings to the environmental and social structures of the local area, however, some of the larger themes I discuss hold broader significance. In my discussion and analysis (chapter 6) I make clear how my findings might have larger application in the improved stewardship of black huckleberry and other culturally important forest resources.

Being limited in the length of time to conduct my field research affected the number and diversity of people interviewed. With more time and resources I would have interviewed more berry pickers, especially members of the Ktunaxa First Nation. Other groups of berry pickers that are missing from my research include berry pickers who pick and sell their berries. Increasing the sample size and diversity of berry pickers I interviewed would provide additional insights, and may have revealed different patterns of knowledge and relationships.

With more time I would have conducted more follow-up interviews to discuss some of my interpretations and findings with a few of the expert berry pickers I spoke with during my field research. These additional conversations would have helped in further validating some of my research findings and might have reshaped my analysis and interpretations. A common strategy to increase the validity of qualitative research is triangulation (Creswell, 2003). I have ensured that my findings were validated using this method either relying on three independent sources making similar comments or combining my interview data with findings from other studies. For a few findings from my interviews I would have used additional discussions to both support and flesh out the greater significance of some comments and observations that are more limited in their interpretive power because they were made either by one individual or only by a sub-group of the berry pickers I interviewed.

Subjectivity of the researcher is a common critique of ethnographic approaches to research. As research with a goal to provide an honest portrayal of a culture, ethnography's weakness lies in the kinds of questions posed by the researcher. Cruikshank (1990:4) notes that interview responses or "data" risk being more reflective of the culture of the researcher rather than providing an unbiased portrayal of the community being studied. The interview questions I asked were generated from a combination of my own interests and experience in natural resource management, and from the previous research into the literature on black huckleberry ecology. I developed a list of questions that would guide conversation around factors berry pickers identified as important for the wellbeing and the long-term availability of the black huckleberry. In the generation of these questions I attempted to elicit broad responses that would allow for an extensive analysis of the major themes identified by huckleberry pickers. In so doing I hoped to collect a background of knowledge and perspective as a base of information that future research initiatives could build from. Maintaining an awareness of my own bias and social background allowed me to be critically self-reflective during the fieldwork and throughout my analysis of the data. For example while conducting my interviews I realized the importance of terminology. In multiple interviews I had received unexpected responses to a question I asked about the management of huckleberries. I came to understand that the term "manage" held a different meaning for the berry pickers I spoke with when during one interview I replaced the word manage with improve, and I received a completely different response. In effect this realization has deepened my understanding and interpretation of these responses.

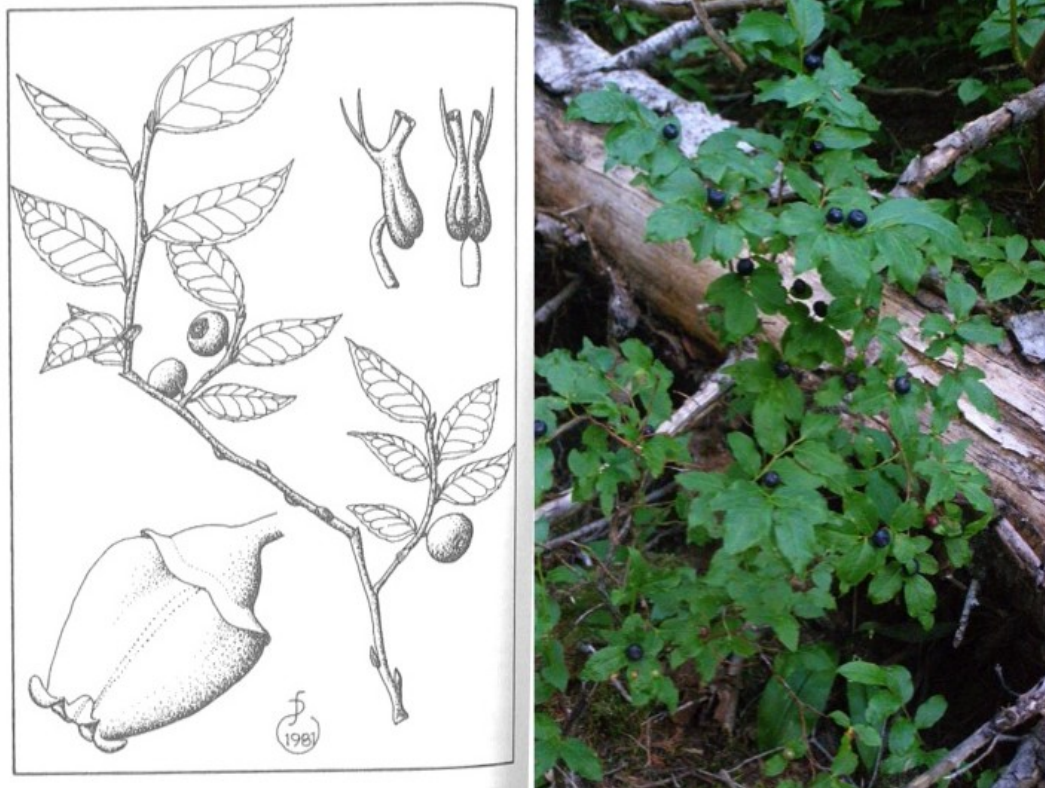


Figure 4. Line drawing of black huckleberry taxonomic characteristics (from Vander Kloet, 1988), and image of black huckleberry with mature fruit taken in August, 2010 in Bugaboo Provincial Park, BC.

Berry pickers frequently shorten the name, black huckleberry to “huckleberry”, a term that also has association with other species of *Vaccinium*²⁰. This casual lumping of many species under one name does not mean that pickers do not distinguish among different types or species of huckleberry. Instead the use of the general term “huckleberry” can be applied at two different levels: to refer to most berries across different species of *Vaccinium*, or in reference to a specific species of huckleberry where the species under discussion has been indicated by other references made during the conversation. Although I frame my thesis as focusing on one species of huckleberry, some of the discussions from my interviews may often refer to “huckleberry” as a generic term, rather than exclusively referring to black huckleberry. Often when discussing huckleberry picking, berry pickers focus on details specific to the process of finding and picking berries. If the topic shifts to berry quality or a particular patch, pickers then become quick to

²⁰ In the East Kootenays the broad term “huckleberry” may include other species of *Vaccinium*, including: *V. caespitosum* (dwarf blueberry), *V. myrtilloides* (velvet-leaved blueberry), *V. myrtillus* (bilberry), *V. ovalifolium* (oval-leaved blueberry), and *V. scoparium* (grouseberry).

distinguish between the different species. Amongst all huckleberry species in the East Kootenays, black huckleberry is the most abundant, and highly prized of the “huckleberries”. For this thesis I consider all information on “huckleberries” from my picker interviews as relevant and true for the black huckleberry, unless there was a clear indication by the interviewee that they were referring to a different species.

3.2 Seasonal Ecology of the Huckleberry

Black huckleberry is a long-lived shrub. It is thought to primarily reproduce vegetatively but there is evidence of new populations of black huckleberry establishing by seed. Dan Barney (pers. comm. 2010) over decades of working with black huckleberry has observed that black huckleberry primarily reproduces vegetatively, sprouting shoots from buds on a network of underground stems (rhizomes). In all of his years working with black huckleberry he has never found a black huckleberry seedling or plant that he could definitely say sprouted from a seed. Stark and Baker (1992: 7) also report having only found 6 naturally established wild seedlings over 18 years of field observations.²¹ Wild huckleberry seedlings are rare, however, in a study by Yang et al. (2008), the authors attribute all *Vaccinium membranaceum* plants found growing on new ash deposits at Mount St. Helens to animal-dispersed colonization²². Many mammals and birds feed on black huckleberries and excrete the seeds. Due to the long-dispersal distances found in their study Yang et al. (2008) hypothesize that larger fruit-eaters such as coyotes and bears may be responsible for dispersing black huckleberry seeds at Mount St. Helens. Supporting the observation that seedling establishment is rare, Yang et al. (2008) cited results of an unpublished study and personal observations that found very low seedling survivorship rates. The ethnoecological literature supports seed based dispersal of black huckleberry. In Turner et al, 2011 they attribute the annual tradition of scattering huckleberries on the ground berries during the “First Huckleberry Ceremony” (practiced by the Klamath of southern Oregon), as

²¹ Stark and Baker also report that the seedlings were extremely slow growing and at an estimated two years of age they were 1-2 cm tall. They observed that seedlings were found growing on rotten wood, and that survival of the seedlings is dependent on moisture from rotting logs and protection from extreme cold events (Stark and Baker, 1992). For a picture of a huckleberry seedling see first page of this report.

²² In their study Yang et al. (2008) looked at the genetic diversity of the *V. membranaceum* plants found growing on the ash deposits. Their results indicated that approximately 11 long-distance dispersal events had occurred (out of 68 sampled), and on average seeds traveled a distance of 4.2 km from their parent plants (Yang et al., 2008).

contributing to high densities of huckleberry shrubs found growing around traditional berry picking campsites.

Black huckleberry plants range in average height from 45-123 cm tall and are formed by small to wide-spread clusters of shoots (also known as ramets). Shortly after snowmelt (in the spring or early summer), small urn shaped, white to yellowish pink flowers are produced in the leaf axils of the new growth (Figure 5). The primary pollinators of *Vaccinium* species (including huckleberries and blueberries) are bumblebees and other species of wild bees that use buzz pollination (a high frequency vibration of the flower) to pollinate flowers (Javorek et al., 2002; Tuell et al., 2009). After pollination these flowers mature over the warm months of summer, developing into berries that begin to ripen in mid-summer continuing through the fall (Vander Kloet, 1988). Black huckleberry produces globular berries averaging 9-15 mm in diameter (Barney, 2005), and each weighing between 0.58 and 0.74 grams. These berries can be quite shiny or dull, and range in colour from black through deep purple and red with some ripe berries being light-blue with a glaucous coating (Stark and Baker, 1992). There are reports of rare yellowish-white berries occurring in isolated patches in Idaho (Anderson, 1935 as cited in Richards and Alexander, 2006; Barney, pers. comm. 2010).



Figure 5. Black huckleberry flower (image credit M. Keller, 2007).

Berry production is a complex process dependent upon the weather over multiple years and seasons. In late summer or early fall, both the flower and leaf buds for the next year form on the stem of the black huckleberry shrub (Gough, 1998). Formation of these buds is determined by the availability of extra sunlight energy and moisture obtained by the plant in summer during the peak growing season. Like many perennial fruiting species, black huckleberry can store up resources in its rhizomes over multiple years to later invest in bud and eventual berry production. The resources stored in the buds are used by the shrub to jumpstart its growth and flower production the following spring. Through the fall, winter and into the spring these buds are susceptible to damage by cold temperatures and hard frosts. An early or late frost can injure buds, flowers or young fruit resulting in reduced fruit production for that season. The best conditions for fruit production include a winter with a consistent snowpack that covers the huckleberry shrubs – insulating against cold temperatures and harsh frosts, a gradual spring without late frosts, and warm sunny days through late spring and the summer that encourage successful pollination and fruit production.

3.3 Geographic Distribution of Black Huckleberry

Black huckleberry shrubs grow in the sub-alpine (600-3300 m), often fir dominated, montane forests from the southern edge of the Yukon Territory to the mountains at the northern edge of California. Their population is bounded by the Continental Divide to the east, and by the Pacific Ocean on the west (Figure 3).²³

Within their range a series of environmental factors limit where black huckleberries are found. Black huckleberry shrubs can be found growing on the steep slopes (16-28%) of mountains (Burton et al., 2000). They grow in acidic (pH 4.0-5.5), light-textured, well-drained, sandy-loam soils. The shrubs thrive when these soils contain large amounts of rotting wood (5-30%) and a surface layer of forest duff, as this is thought to increase moisture and nutrient availability (Stark and Baker, 1992; Barney, 1999). Moisture is important for keeping the shrubs healthy and for berry production (Stark and Baker, 1992). Berry patches found on mesic (moist) sites with northwest- to east-facing aspects were found to be significantly more productive than

²³ Disjunct populations of black huckleberry have been found in western Ontario, northern Michigan, eastern North Dakota, and Arizona. It is suspected that these populations are remnants of a larger historic distribution, as they are found restricted to higher elevation sites and are found growing in association with other locally rare species (Vander Kloet, 1988).

patches on xeric (dry), south- to west-facing slopes (Martin, 1996). Elevation is also an important determinant of moisture. Black huckleberry is most abundant and productive at elevations between 1200 and 2000 m (Martin, 1979; Stark and Baker, 1992; Barney, 1999). At these elevations the plants have sufficient moisture throughout their growing season, through a combination of summer rain and winter snow pack.

3.4 Forest Ecology and Black Huckleberry Productivity

Black huckleberry health and productivity²⁴ are influenced by the forest environment – a composite of the local landscape features, climate, forest conditions (including species composition, density and successional stage), disease and disturbance. The effects of these factors on the health of black huckleberry shrubs vary across the landscape and over time. Annually the interaction between weather events and the cumulative structure of the forest surrounding the huckleberry patch result in the successes or failures of berry crops. Over the long-term changes in forest conditions, especially increasing density of canopy trees or competition from other plants can reduce or completely eliminate the productivity of a huckleberry patch. The black huckleberry is a disturbance adapted, early seral species, requiring regular disturbance to generate conditions that are conducive to huckleberry health and productivity.

3.4.1 Forest Canopy Density

Black huckleberry is often found growing in association with true firs (*Abies* spp. Mill.), hemlocks (*Tsuga* spp. Carrière), lodgepole pine (*Pinus contorta* Douglas ex Loudon) and Engelmann spruce (*Picea engelmannii* Parry ex. Engelm.). Lodgepole pine is a known “invader” of open huckleberry meadows and as pine tree densities increase berry production decreases (Minore, 1972, 1975). Gradually increasing competition for sunlight, moisture, nutrients and space from trees, shrubs, grasses and forbs reduces the productivity and vigor of a huckleberry patch (Barney, 2005). Rarely can a healthy, productive black huckleberry plant be found in

²⁴Scientific studies use estimates of relative productivity as an indicator of huckleberry health. For productivity estimates using volume refer to: Nelson, 1970; Martin, 1979; Minore, Smart and Dubrasich, 1979; Agee, 1993. For estimates using weight refer to: Weaver et al., 1989 in Stark and Baker, 1992; Stark and Baker, 1992; Burton, 1998.

forests with a canopy cover greater than 30-50% (Stark and Baker, 1992; Martin, 1996; Barney, 1999; Burton, 2001). These conditions have been found to decrease overall black huckleberry plant growth – including production of flowers and fruit²⁵.

In contrast, a completely open canopy with full sunlight and exposure to the elements, and especially heat and drought, can be just as damaging (Barney, 1999). Burton (2001) found a minimum of 10% shade (or canopy cover) ideal for black huckleberry productivity. Retaining some overstory protection (i.e. living trees or dead snags) within huckleberry patches is important for providing beneficial protection for black huckleberry shrubs (Minore, Smart and Dubrasich, 1979). Cover and shade can protect against frosts, drought, and too much sun all of which have an effect on black huckleberry productivity. Turner et al., 2003 note that the most productive berry shrubs are often located in the ecological edges between dense forests ecosystems and completely open areas such as clear-cuts or open alpine meadows. In these areas berry shrubs take advantage of the best of both ecosystems.

3.4.2 Disturbance

As an early seral species, black huckleberry grows in abundance in forest openings and along edges created by fires, logging, windfall and other forest disturbances. Natural forest edges including along meadows, creeks, and waterways also have ideal conditions for black huckleberry productivity (Turner et al., 2003). Forest disturbance affects the huckleberry shrubs in two ways: it changes the forest structure creating conditions optimal for berry production (*i.e.* opening up dense forest canopies), and it triggers the growth of new shoots. Both the sudden changes in local climate or direct damage to the plant caused by disturbance trigger the buds on the rhizome to sprout (Miller, 1978). After disturbance new vegetation sprouting from carbohydrates stored in the clonal rhizomes allow the black huckleberry to establish itself quickly. On average it takes the new plants 6-15 years after a disturbance to start producing a significant crop of berries (Stark and Baker, 1992; Anzinger, 2002; Barney, 2005). Recovery time for a huckleberry patch may take longer than this if the underground rhizomes are damaged. Intense, stand-replacing wildfire is known to heat soil to temperatures that can damage or kill the underground rhizomes (Martin, 1996; Stickney, 1981). Also the conventional forestry practice of

²⁵ In contrast to these spatial parameters for shade, Stark and Baker (1992) found that a plant spending about a third of the day in the shade was optimal for huckleberry fruit production.

grading and the impact of heavy machinery at clear-cut sites are known to damage or kill rhizomes, delaying the recovery of black huckleberry shrubs (Martin, 1996; Burton, 2001).

Newer growth may be more productive than older black huckleberry stems. Martin (1996) found that even under ideal canopy conditions (less than 30% cover), black huckleberry shrubs in undisturbed old-growth forests²⁶ had very low levels of productivity (0 to 27 liters of berries/hectare). What fruit production they did find was often restricted to areas where old trees had fallen, creating gaps in the canopy and likely triggering new growth (Martin, 1996). The unique microenvironment created by the fallen trees may have also played an important role in the observed berry production with the coarse woody debris contributing both nutrients, and an increase in available moisture (stored in the decayed wood). This study suggests that the effects of disturbance events are more complex than simply opening up the canopy (to provide sunlight for huckleberry bushes) or changing the structure of the forest. Actual disturbance of the plants themselves is important for renewing the productivity of the berry patch. A study looking at the differences between clipping by hand and pruning with fire found that plants grew more after a controlled burn than a clipping (Smith and Hilton, 1971 in Miller, 1978). This difference was attributed to a release of nutrients and the unique microclimatic changes caused by a controlled burning. In summary, disturbance is an important part of the life history of the black huckleberry. For the huckleberry disturbance can increase berry productivity and trigger the growth of new shoots. The mechanisms behind increased productivity and shrub health include: increased access to sunlight and nutrients, more favorable microclimatic conditions (*e.g.* moisture, temperature), and the renewal of shrubs.

The length of time huckleberry patches remain productive after a disturbance depends on the conditions of the site and how quickly the forest returns. For wildfire-created huckleberry patches, productivity peaks and lasts for 20-60 years post-disturbance before beginning to decline (Martin, 1996). Burton and Mattes (2001) found upper elevation forests along the Skeena River in northwestern British Columbia have an approximate fire return interval of 100 years. They documented black huckleberry stems that were more than a century old suggesting adaptation to survive and persist through an entire fire-cycle. In clear-cut huckleberry patches productivity was found to decline after around 25 years post disturbance (Stark and Baker, 1992). Considering it takes a few years for black huckleberry shrubs to re-establish post-cut the

²⁶ Old-growth stands are defined as stands that have not been disturbed within the last 100 years.

time a huckleberry patch is at peak productivity would be less than 25 years. Daniel Barney estimated that berry patches maintain peak productivity for 10-20 years depending on site conditions (Barney, pers. comm. 2010). As clear-cutting increasingly replaces fire as the major forest disturbance, large, accessible patches that remain productive for decades are giving way to short-term patches with lower productivity (Haeussler et al., 1990).

3.4.3 Maintaining Berry Patch Productivity

When a huckleberry patch is overgrown, the shrubs enter an unproductive, vegetative state waiting for a disturbance to re-create conditions that are best for berry production. Re-introduction of disturbance into the berry patch will reduce competition, renew black huckleberry shrubs by triggering new growth, and encourage productivity. In the long run maintaining regular disturbance is important for the renewal of older huckleberry patches and the creation of new huckleberry patches. Frequent small-scale disturbances are important for creating a mosaic of successional stages across the landscape and are necessary for maintaining productive huckleberry patches.

As weather patterns vary from year to year the forest conditions best suited for black huckleberry productivity change. By creating a diversity of environmental conditions in the forest, disturbance ensures that even with variable weather patterns, at any one time somewhere on the landscape ideal conditions will exist for producing a crop of black huckleberries.

3.4.4 Black Huckleberry Domestication

For decades there have been attempts to domesticate black huckleberry. Research into the ecology of this species has been designed to better understand its environmental and ecological requirements to aid in its domestication (e.g. Stark and Baker, 1992). Most attempts to develop cultivars for commercial production have failed to reach a state for viable commercial production. Daniel Barney, an expert who spent over two decades working on the domestication of the black huckleberry, has listed the following reasons for why this species has been particularly difficult to domesticate: plants are slow to reach maturity (15 + years); black huckleberries require very specific ecological and environmental conditions including specific

seasonal temperature requirements; and huckleberries depend on a mycorrhizal relationship with a soil fungus that may be difficult to nurture in a cultivated environment (Barney, 1999). Despite its challenges, domestication of black huckleberry is often championed as a way to reduce pressure on wild berry populations, but many lovers of huckleberries are very happy to see domestication attempts fail. As one huckleberry lover wrote: “*Blueberries and blackberries have a lot going for them, but somehow huckleberries manage to pack an unparalleled amount of flavor and complexity into a tiny package. Maybe wilderness is the secret ingredient*” (Nicole, 2010).

3.5 Berry Picking – The Relationship Between Humans and Black Huckleberries

Forests throughout the range of the black huckleberry contain a diversity of berry patches. Every summer these patches become an important focal point on the landscape both for local berry pickers and the wildlife that depend on these berries as part of their seasonal diet. For the berry picker, the berry patch is not just a source of healthy food – berry patches and huckleberries are a part of their social and cultural identity. Beyond being food, black huckleberry has been and continues to be an integral part of economic, political, social and ceremonial life. This section provides an overview of the long relationship humans have had with this important fruit. For my accounts of Indigenous peoples’ relationships I have focused on examples from the Ktunaxa, however, where records of practices were scarce or incomplete I draw on comparisons of examples from Indigenous cultures in the broader region.

3.5.1 Importance of Black Huckleberry

Plant foods comprise a large portion of traditional diets throughout northwestern North America. Berries are an important food source, because berry plants often produce an abundance of fruit that can be preserved for future use. For the Ktunaxa, black huckleberries, along with Saskatoon berries (*Amelanchier alnifolia* (Nutt.) Nutt. ex M. Roem.) and choke cherries (*Prunus virginiana* L.) have been the three most important berry foods (Hart, 1974), with the huckleberries being of highest importance. This same level of importance has been recorded for Indigenous groups throughout the range of black huckleberry. Black huckleberry is considered

the “most beloved” of all of the berries amongst the Confederated Tribes of Warm Springs in Oregon (Skelton, 2011). Nlaka'pamux (Thompson) elder Annie York considered the black huckleberry as “the head of all fruits” (Turner, 1990). In Gitksan it is named *simmaa'y* or “the one, the true berry” (people of K'san, 1980), while in Nuxalk the general term for “berry”, *squaluts*, simultaneously refers specifically to black huckleberry (Turner, 2014). Of all of the berries important in the diets of Indigenous groups in northwestern North America, black huckleberry is consistently one of the most important.

First Nations harvesters have been picking and eating black huckleberries for centuries (Gottesfeld, 1994; Turner, 1997; Boyd, 1999; Hamilton et al., 2003), and over the last century many new settlers of this area have adopted the annual tradition. Early settlers to western North America quickly adopted these huckleberries as part of their diet and food culture²⁷. Fruit was scarce in these regions and huckleberries were a treat in the summer and a staple as a food that stored well to nourish them through the long cold winter months. Huckleberries are available in large quantities, store well over long periods of time and are a source of sugars, vitamin C and other important antioxidants.²⁸ Black huckleberries often replaced a similar berry from the new immigrants homeland²⁹, and for many, these berries became an important source of sugar and nutrients. Old-timers³⁰ I spoke with recalled that finding huckleberries was a treat because often they did not have lots of sweets in the house. Settlers who have adopted the black huckleberry as an important part of their diet hold it in the same high regard as their Indigenous neighbors. Grace Reeves calls the huckleberry “God’s ultimate berry” (G. Reeves – interview 2010). In her

²⁷ There are clear written accounts of the use of black huckleberry fruit by settlers as early as the 1890s in Montana (Richards and Alexander, 2006: 9).

²⁸ The consumption of foods high in antioxidants has been linked with good health and a decrease in various cancers and degenerative diseases. Antioxidants help lessen cellular damage in the body caused by free-radical oxygen molecules (Ames et al., 1993). Studies looking at antioxidant levels for other species of *Vaccinium* have focused on levels of anthocyanins within the fruit (see: Prior et al., 1998 and Kalt et al., 2001). Anthocyanins are antioxidant compounds found in the pigments that give blueberries and huckleberries their beautiful color. A study by Taruscio et al. (2004) looked at the antioxidant levels in a variety of *Vaccinium* species including *V. membranaceum*. A general nutrient analysis of *V. membranaceum* can be found in Kuhnlein and Turner, 1991.

²⁹ One example of this type of substitution was shared by Grace Reeves of Cranbrook, BC. Grace explained that she came from a long line of berry pickers, her Swedish ancestors picked lingonberries (*Vaccinium vitis-idaea* L.) back in Sweden. When they immigrated to the Canadian prairies in the mid-1800s, Saskatoons (*Amelanchier alnifolia* (Nutt.) Nutt. ex M. Roem.) replaced the lingonberry. When Grace’s own parents moved their young family to the interior of British Columbia they started to pick huckleberries (interview, 2010).

³⁰ Old-timer is a term frequently used to describe a person who has a lot of knowledge and experience.

view the black huckleberry is the pinnacle of good berries – “*God stopped after he created the huckleberry*”.

3.5.2 Berry Picking

“During the berry season (the Ktunaxa) diligently searched the hillsides for huckleberries, saskatoons, soapberries, etc. and these they dried for winter use. Nuts and seeds were gathered and the women dug roots of various kinds.” (Graham, 1945: 10)

The annual migration to berrying grounds begins with the ripening of black huckleberries in mid to late summer. On foot, later with horse, and currently by automobile, families and other groups travel into the high mountain meadows and forests to pick their annual supply of black huckleberries. Historically this ritual migration was one stage in a larger seasonal pattern of tribal and family groups moving around the landscape to gather, process and trade for the necessary food, medicines and other supplies required during the meager months of winter (Turner et al, 2011).

In the past it was common to spend a month or two between late July to early September at high elevation huckleberry camps (Figure 6). Groups would travel large distances, along a complex network of trails, to establish these camps in or adjacent to meadows and other forest openings near productive huckleberry sites (Mack and McClure, 2002). Huckleberry camps often included multiple groups of extended families, and the areas around the camps were often part of a traditional tenure system. How ownership over harvesting areas was played out varied depending on the various customs of families and culture groups. Generally people from outside the owner’s family or group were expected to ask permission, and possibly negotiate conditions for access to a berry-picking site (Turner et al, 2011). Where large productive huckleberry patches were within the border between cultural groups these areas were, and are, shared by the various tribes³¹. As shared spaces, huckleberry camps were also an important time for socializing and story-telling within and between different family and cultural groups (Deur, 2009; Turner et

³¹ Examples of groups coming together include Huckleberry Mountain in southern Oregon (Deur, 2009), and high elevation berry fields between Mount St. Helens and Mount Adams – parts of this area have been referred to as “Indian Heaven” (Hunn and Selam, 1990: 130; Briley, 1986: 59).

al, 2011). They were also sites for engaging in exchange and trade with neighbors.



Figure 6. Man with huckleberry baskets back at berry picking camp, Gifford Pinchot National Forest, Washington, August, 1933 – (photo by K.D. Swan - USFS photo # 281590 courtesy of OSU Archives, Corvallis, OR).

Huckleberry camps were not just important for berry picking, they were hubs for the collection of a host of important high elevation resources including other food and medicinal plants. While women, children and the elderly gathered berries and other plant resources the men would often hunt upland game species or fish for trout (Stubbs, 1966:3; Mack and McClure, 2002; Trusler, 2002; Deur, 2009; Turner et al, 2011). Huckleberry picking time was especially important for training adolescent girls about the rituals and practices around picking, processing and maintaining the black huckleberry (Baker, 1955: 50). The Ktunaxa have many legends that involve huckleberries, and teach the youth about good stewardship, respect, sharing and safe practices (Williams and Clarricoates, 2002). Most importantly huckleberry camps allowed groups a space to collect and to process enough huckleberries for both personal use over the coming year and extra berries for future trading (Boyd, 1996; Briley, 1986: 60-61; Turner et al, 2011).

Gathering and processing huckleberries is reported as women's work in the ethnographic literature (People of 'Ksan, 1980; Turner, 1997; Deur, 2009). Huckleberries and blueberries were picked by hand, and by using berry combs constructed from wood or the backbones of fish, such as salmon (Hunn and Selam, 1990: 178; Turner, 1997). Amongst the Yakama, Warm Springs, and other groups huckleberries were gathered into smaller baskets attached at the waist (Figure 7). The smaller baskets were then periodically emptied into a larger basket or container often carried on the back (such as the larger basket visible in Figure 6) (Mack and McClure, 2002)³². The women and youth would pick berries, and bring them back to the camp where the elderly and young children were involved in the processing and drying of the huckleberry crop.



Figure 7. Woman picking berries in the Gifford Pinchot National Forest, southern Washington, August, 1933 - (photo by K.D. Swan - USFS photo #281588, courtesy of OSU Archives, Corvallis, OR)

Early settlers developed their own cultural practices and knowledge around the huckleberry. One practice that developed (which was similar to that of the local natives) was to spend weeks camping out near berry fields and picking a year's harvest. With black huckleberries available only at higher elevations, the journey to a good picking site could take many hours or even days (Figure 8). Camping allowed families to gather and process enough

³² For more detailed descriptions of the baskets used for collecting huckleberries see Briley, 1986: 60-61.

berries for the winter in one trip. Early settlers also adopted the berry comb picking technology, building pickers from knitting needles and old tin cans.



Figure 8. Berry pickers at Larch Mountain, Oregon- August 14, 1943 (photo by G.E. Griffith - USFS photo #426838 courtesy of OSU Archives, Corvallis, OR).

Over time there have been changes to berry picking practices. Today huckleberry pickers include a mix of local First Nations, descendants of European settlers, and more recent immigrants. These people pick huckleberries for a diversity of reasons, from personal consumption through to selling the berries as a source of income (Keefer and McCoy, 1999; Carroll et al., 2003; Hamilton et al., 2003; Richards and Alexander 2006). The automobile has made such long extended berry picking journeys unnecessary. Shorter camping or day trips have replaced month long gatherings of berry pickers. Automobiles have enabled berry pickers to transport large quantities of berries back home for processing making it unnecessary to process the fruit for long-term storage in camps on the mountain. Changes in livelihoods have also shifted berry-picking practices away from long concentrated periods in the bush toward shorter day trips over a weekend.

There have also been small changes to picking technologies. Woven baskets were replaced by recycled metal tins and eventually by plastic buckets hung around your neck or strapped to a belt. Cardboard boxes or large plastic bins are the preferred method for transporting berries home. Wood and bone or metal berry combs have been replaced by

lightweight plastic berry pickers. Despite the shift in materials, the overall designs have remained the same.

With all of these changes in harvesting practices there have been shifts in the traditions around berry picking, however, even as berry picking practices evolve the black huckleberry continues to remain an important part of the rural diets and economies. Even with significant changes in how huckleberries are picked, the practice of making the journey to the mountain to pick huckleberries remains an important time for Indigenous families of the Pacific Northwest to teach cultural laws, traditions and practices, and to honor and renew their connections to the land (Turner et al, 2011).

3.5.3 Berry Processing

Black huckleberry's importance comes from its ability to retain flavor and preserve well for long periods of time. In the late summer many berries were consumed fresh, and these fresh berries could last for quite a while if stored in a cool place (Trusler, 2002: 44). For longer preservation, huckleberries were dried either whole or as mashed berry cakes to be stored for use in the winter or for later trade (Hart, 1974)³³. Huckleberries were such an important food source and trade item that there are records of villages filled with vast quantities of huckleberries drying on roofs and platforms (Derig and Fuller, 2001). Indigenous groups throughout the western range of the black huckleberry frequently employed the indirect heat from a smoldering log to assist with drying out berries³⁴ (Figure 9). Further north amongst the Gitksan of BC, berries were dried on elevated drying racks over the heat of a low fire (Trusler, 2002: 47). In the more arid eastern parts of the black huckleberry's range, berries were simply spread out on hides and dried in the sun (Stubbs, 1966: 49). The Ktunaxa dry huckleberries singly or in cakes and would store these dried huckleberries in folded cedar bark boxes, covered with a lid of the same material (Baker, 1955)³⁵.

³³ Similar preservation techniques have also been recorded for other species of *Vaccinium*, especially the blueberries (*Vaccinium corymbosum* L. and *V. angustifolium* Aiton) of eastern North America (Richards and Alexander, 2006: 5-7).

³⁴ See Mack and McClure (2002) for detailed description of this complex process of drying huckleberries by a smoldering log.

³⁵ Due to their relatively easy construction (Schlick, 1994 in Mack and McClure, 2002) these folded boxes were used by tribes throughout the Northwest for storing both dried and fresh huckleberries (Stubbs, 1966; other reference to: Turney-High, 1941:79; Teit, 1928; Mack and McClure, 2002). Trusler (2002: 49) reports the use of cedar bentwood

Drying huckleberries is the best method for preserving vitamin C and other nutrients found in this fruit (Norton et al. 1984). Techniques for preserving black huckleberries have changed along with new innovations in preservation technology. With the invention of freezers and canning technology, drying huckleberries as a preservation technique has become quite rare. Henry Alfred (Chief Ut'akhgit) recalled this transition: *"I remember my mother and grandmother drying berries in Moricetown using the traditional berry racks. Dried berry cakes were then stored in elevated cache boxes to avoid spoilage. In later years my mother jarred or froze our berries"* (cited in Trusler, 2002: 90). As with Henry Alfred's experience, most berry pickers now freeze their berries, however, many can whole berries and batches of huckleberry jam in sealed jars.



Figure 9. 85-year-old woman drying huckleberries at Meadow Creek Forest Camp, Gifford Pinchot National Forest, Washington - 1935. (photo by R.M. Filloon - USFS photo # 436968, courtesy of OSU Archives, Corvallis, OR)

boxes for berry storage amongst the Gitksan and Wet'suwet'en. The neighbouring Salish (Flathead) often stored dried berries in rawhide parfleches (Stubbs, 1966).

3.5.4 Huckleberries for Sale

Huckleberries have always been a part of local economies, and have a long history of being an important trade item for indigenous peoples of north-western North America (Hunn, 1990). With European settlement huckleberries also became a source of income for many families. Ktunaxa Elders remember their families selling huckleberries to non-natives to provide money for things such as school clothing for their children (Williams and Clarricoates, 2002). In the early 1900s huckleberries began to be sold for money by both settlers and indigenous peoples (Mack and McClure, 2002). This trend rapidly increased during the Great Depression as the unemployed looked for alternative livelihoods. The sale of huckleberries as a form of seasonal employment, or income supplement, has added a new dimension to human-huckleberry relationships, and continues to be an important form of supplementary income during economic downturns for rural communities. As berry picking “commercialized” an increasing number of people from outside regions rushed in to traditional picking areas to take advantage of the financial value of this berry. Commercialization led to increase competition for huckleberries and increased pressure on the berry patch. The relationship these for-profit pickers have with the black huckleberry is quite different from that of more traditional huckleberry pickers as these “outsiders” are unaware of the informal rules and proper etiquette and customs for picking berries.

The biggest difference between traditional trading of huckleberries and commercial harvest has been the corresponding change in tenure or traditional ownership of berry patches. Under the traditional system berry patches were owned and managed by families. Currently all berry pickers local and not local, commercial and those picking for personal use are operating in an open access tenure system. Ballard and Huntsinger (2006) found that in areas with open access commercial harvesters of salal were more likely to practice unsustainable harvesting techniques compared with areas where they felt they had more security over access. In the next chapter I discuss in more detail how historical shifts in tenure have changed the relationship between humans and huckleberry patches.

3.6 Conclusion

Black huckleberry is one of the most important wild berry species in the diets of residents of western North America. Its productivity is dependent upon a cycle of regular disturbance, and a series of specific environmental conditions including: sunlight, moisture, temperature, and soil and nutrients. These environmental requirements restrict the huckleberry to cooler temperature, high-elevation sites in the mountain ranges of the Pacific Northwest and have made it difficult to domesticate this species. For thousands of years berry pickers have made special trips to mountain berry patches to pick black huckleberries. In the next chapter I explore the history of systems of forest and berry patch management and discuss the social, cultural and ecological changes that have happened over the past century that have led to decreasing berry patch productivity.

CHAPTER 4 – CHANGING FOREST TENURE & BERRY PATCH STEWARDSHIP

“The health of the land and the health of the community are one and the same... because the local environment is considered to be a part of social and cultural identity” (Parlee et al., 2005).

“A long time ago the Indians use to live good. They lived on many things like wild fruit, roots, and animals, but now we live on white people and the old timers are all gone. Now the old people live on old age pensions from the government, but my people are very hard put, and we have to more or less beg for existence, and of course, my people are suffering. When we go out hunting we are always afraid of game laws³⁶. Now I’m asking if there is any possible way or means of use being able to bring back better times than we have known.”
(Lasso Stasso, Ktunaxa Elder in Malouf and White, 1952).

Restructuring of the management and use of the forests and lands that followed European settlement and colonization of North America fractured many of the connections between Indigenous groups and their traditional livelihoods. There is an extensive body of literature documenting these changes and the resulting decline in the health of both Indigenous peoples and their local environments (Anderson, 2005; Deur and Turner, 2005; Turner and Turner, 2008; Turner 2014). This shifting relationship between peoples and the land has interconnected social and ecological elements. As Parlee et al. (2005) wrote of the Teetl’it Gwich’in, the health of the land and the health of the community are the same, meaning what happens to one happens to the other. The high rates of non-communicable diseases in Indigenous communities serve as the canary in the coal mine. Declining health of the people is one indicator of an imbalance in the forests and lands. Restoring the health of the forests, including the uses and stewardship practices around wild forest foods is a necessary part of rebuilding a vibrant community of healthy people. Forests will never be the same as they were prior to European contact, however, shifting more focus onto eco-cultural restoration of traditional foods is one way to “bring back (the) better times” of Lasso Stasso’s nostalgia.

In this chapter I provide background and context for understanding the current state of the health of wild forest foods. I describe the forces of change experienced in the forests, and rural

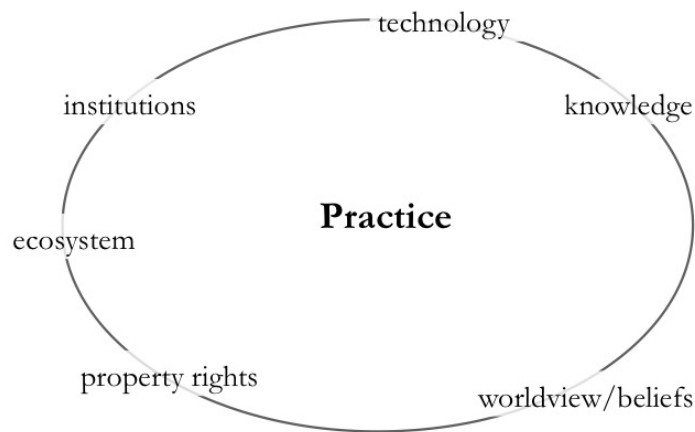
³⁶ Malouf and Thain (1952) comment that, although no treaties have been signed which remove the rights of the Ktunaxa to hunt within their traditional territories, they are still held to following the hunting laws of the state. This has led to much confusion about the regulations around hunting, and members of tribe have been arrested for trespassing and hunting out of season. Since the 1960’s court cases have been won which exclude Indigenous peoples from aspects of BC’s hunting laws and allow them to practice their traditional right to hunt (e.g. *R. vs. White vs. Bob*, 1965). Also since this time the rights of Indigenous peoples in Canada have been included and protected in section 35 of the Constitution Act (1982).

and Indigenous communities of BC. I explain how the theory of the social-ecological system is a useful conceptual framework for understanding the relationships between people and the land. As background context for my research into the black huckleberry I present an historical description of how the shifts in property rights, changes to forest tenure and policies, and the social-economic impacts of colonization have changed BC's forests over the past 150 years. This provides an historical background for understanding current forest tenure and management relationships. I use the black huckleberry (*Vaccinium membranaceum*) to provide examples that illustrate the impacts these historic shifts in forest management have had on the relationships between local communities and an important wild food source.

4.1 Human-Environment Relationships and the Social-Ecological System

Communities of people who directly rely on their local environments for some aspect of their livelihood often develop intricate systems for ensuring the wellbeing of local ecosystems. These systems of stewardship are based in the recognition of a deep connection between the health of humans and the health of the environment. The diversity of types of traditional stewardship systems is as great as the diversity of ecosystems, languages and cultures. In BC and across North America natural resource management agencies apply universal policies and practices with political boundaries that encompass a diversity of ecosystems – ignoring natural ecological and cultural boundaries. In many regions these local and state led approaches to resource management co-exist and shape how humans use their local environments and what relationship humans have with the land.

How humans actually behave on the land is shaped by a complex combination of worldview or beliefs, knowledge, technology, property rights or tenure, institutions, and the condition of the ecosystem (Figure 10). Any valuable part of the environment is accompanied by local social systems of rights and responsibilities (Berkes et al., 1998: 7). These rights and responsibilities are a part of the formal and/or informal institutions that govern how humans use and manage their local environments. “Institution” is a term used to describe the mediating factors that govern the relationships between a social group and their life supporting ecosystems. Both institutions and practice are shaped by underlying worldviews of the participants.



Framework based on Colding, Berkes & Folke, 1998

Figure 10. Diagram illustrating the relationship between practice and the various factors that interact to shape how humans behave within their environment. Most of the factors included in this diagram include structures for communicating knowledge about local environments and/or rules for behaviour of humans with local environments.

4.1.1 Cultures of Natural Resource Management

Academic studies of traditional stewardship practices reveal common underlying values that reoccur across different cultural systems and practices. The concept that ‘everything is one’ or more specifically that the health of social systems, including the health of the culture, language, people, and their economic livelihoods, are intricately linked to the health of their local environments, and vice-versa reoccurs as a foundational principle in many stewardship systems (Turner, 2005). An aspect of the application of this principle is described as a ‘kincentric’ approach to the environment. This approach is based in the worldview that all elements of the environment are family members/relations and should be treated with the same respect and social practices used to maintain balance within a family and larger social order. Practices that maintain a healthy, balanced relationship between humans and the environment follow a kincentric approach. Contrary to the Western concept that human use mostly harms and damages plants, in a kincentric approach, proper, respectful use and stewardship of plants by humans for food or other uses is a relationship necessary to ensure the health of the plants themselves. Traditional stewardship systems are based around maintaining mutual reciprocity. Harm in this system comes from inappropriate interactions and is not an inherent consequence of human interactions. These are the values that shape resource management practices for many Indigenous communities.

In contrast, a dominant view in North American approaches to natural resource management often portrays humans as negatively impacting the environment.³⁷ Humans who have a direct reliance on the environment for their livelihoods are referred to as ‘resource users’, and those invested with the power to make decisions and to set laws and policies around how humans use the environment are known as ‘managers’. The concept of user and manager are very different compared with the concept of relationships reflected in kincentricity (Richard Atleo in Turner, 2005). This is one illustration of the cultural differences in how the environment is viewed. In the same way that a kincentric worldview shapes many indigenous management systems, the cultural view of humans as separate from, and “above,” other species and their environments has been the underlying value shaping land and resource management decisions by governments across North America over the last couple of centuries (Devall and Sessions, 1985: 65).

For the forests of BC there is a complex series of formal and informal institutions that govern the use of timber and non-timber forest resources. Provincial forest use policies have developed from the dominant resource management view based on the underlying assumption that local communities and groups of resource users cannot self-organize to develop policies and systems that will ensure sustainable use of a resource. This is often done at the expense of or detriment to local stewardship systems (Berkes and Folke, 1998: 357). Most forest policies that regulate timber harvest are completely focused on trees and timber production. They have been designed from a science-based approach without consideration for local cultural uses or values and other social aspects of managing for a diversity of forest resources. For many non-timber forest resources there is little to no regulation. Even where formal forest policies or systems of tenure do not exist, or have been lost through larger changes in the system, there are local stewardship practices that may include incipient property rights and informal rules to guide the use of an important resource. These informal management systems co-exist with and are shaped by the official forest management policies and practices meaning there are multiple formal and informal rules for forest use. These informal systems contain strong elements of traditional indigenous systems of managing the land, but have been reshaped by larger changes in forest tenure and policy.

³⁷ This view is based in ideas and theories presented by Garrett Hardin in his writings on the “Tragedy of the Commons” (Hardin, 1968).

4.1.2 Social-Ecological Systems

Understanding the relationships between changes in political, social and ecological systems and the corresponding effect on the short- and long-term wellbeing of local communities and ecosystems is important for creating policies and practices that ensure the overall sustainability and resilience of these systems. Berkes and Folke (1998) and colleagues (Holling 1986; Gunderson and Holling, 2002) developed the concept of the social-ecological system as a useful framework for evaluating problems with resource management. A social-ecological systems approach to resource conservation and management bridges disciplinary divides by taking into account the intricate relationships that link cultural, social and environmental health in what has been termed “social-ecological wellbeing” (Dolan et al., 2005). It operates on the understanding that interdependent, reciprocal relationships and feedback effects exist between the local environment, local culture and social organization, including the economy (Ommer, 2007). Within a social-ecological system, the health of one aspect of the system affects all other components and processes; therefore, “social-ecological wellbeing” is the capacity of the human-natural world to respond to disturbances and stressors.

The social-ecological system is an appropriate theoretical framework to use when exploring the reasons behind the declining availability and quality of traditional plant foods such as black huckleberry. As a framework its premise that social and ecological systems are not just related, but exist in a reciprocal relationship pairs well with the worldview that ‘everything is one’. It was developed to look at how changes in one part of the system affect the other parts. As a framework it is robust and can accommodate the complexity of factors that have contributed to the declining availability of traditional foods. Richard Atleo (in Turner, 2005) describes changes in stewardship systems as being a shift from one complex set of systems to a different arrangement of complex systems. He explains that traditional ecosystem stewardship systems are not about dominating nature for human gain, but rather about maintaining balance and harmony between life-forms. It is about humans providing respect and recognition to the other components of their local environments and vice-versa. From this perspective, the declining availability of traditional foods is not a management crisis it is a loss of balance. Using the social-ecological system as a framework this research applies the approach that understanding species decline is not just about understanding the species’ life history and

mechanisms of productivity. It is about exploring the larger social, cultural, political and economic components and contexts to better understand the main factors contributing to the imbalance that has led to the decline of such an important wild food as black huckleberry. Aspects of these factors can be found in the knowledge held by berry pickers. Ballard and Huntsinger (2006) found that resource users knowledge offered more in-depth understanding of the ecological features of a resource as linked to the social, cultural and economic factors that have shaped the human relationship with the land.

In the following sections I provide an overview of traditional management practices surrounding the black huckleberry and an history of changes in forest stewardship that have impacted traditional use and management of this important berry and other traditional foods.

4.2 Forests of Change – An history of forest stewardship in British Columbia

4.2.1 Traditional Systems of Forest Stewardship

Since time immemorial Indigenous peoples have been managing the forests of British Columbia for a diversity of foods, medicines and materials (Turner et al. 2013). Scholarship on indigenous resource management have described a diverse array of cultivation techniques and stewardship practices that were, and in some cases still are, used to increase populations of useful plants and modify plant communities to ensure sustainable harvests over multiple generations (Deur and Turner, 2005; Turner et al. 2013). These complex harvesting and management practices mimic natural disturbance regimes in ways that embed them in the local ecological systems, their continued practice overtime being ensured by their place in cultural institutions. Over the past 150 years various aspects of colonization and settlement of British Columbia have disrupted and changed traditional management practices (Turner et al. 2013). Black huckleberry is one example of how changes have impacted traditional stewardship practices.

4.2.2 Traditional Methods of Black Huckleberry Stewardship

For black huckleberry a variety of complex stewardship systems and unique cultural practices were developed to ensure quality and quantity of future berry harvests. Despite cultural and regional differences there were many similarities between groups in these practices, including: berry picking etiquette, the use of controlled burning, ceremonial practices and systems of ownership.

Berry picking

For all berries the act of berry picking itself contained stewardship practices to ensure future berry harvests. Berry picking was often women's work, and as part of learning to pick berries important knowledge, rituals, and cultural practices for picking, processing and maintaining a productive berry patch were transferred through generations of women (Baker, 1955: 50). These stewardship practices included respecting and conserving other forms of life, being generous especially to Elders, and practicing gratitude often by leaving a small gift (Boas 1930; Turner et al., 1990; Turner 2005). Proper picking etiquette was one part of ensuring the continued availability of huckleberries.

Berry patch burning

The most important tool in black huckleberry stewardship was fire. There are many reports that berry patch stewardship practices took advantage of the huckleberry's adaptations to disturbance, and that First Nations (including the Ktunaxa) used fire to actively maintain prime habitat for the black huckleberry (Fisher, 1997: 192; Boyd 1999; French, 1999; Turner, 1999; Mack and McClure, 2001; Deur, 2002; Trusler, 2002; Lepofsky et al., 2005; Deur, 2009; Gravelle, 2010). Through regular burning, local communities could create sites of concentrated productivity across the landscape and ensure the availability of huckleberries (Deur, 2009). Burning is described as a tool for improving the predictability of the berry crop, the productivity of black huckleberry plants, and the quality of the berries. In burning huckleberry patches and other parts of their forest environments Indigenous groups were "...*substituting fires of choice for fires of chance*" (Henry Lewis as cited by Pyne, 2001: 52). Burning provided some control over certain elements of the landscape and prevented intense wildfires that might cause damage to the huckleberry patch.

As a practice burning also exploited an aspect of black huckleberry's ecology to enhance fruit productivity. The practice of burning rejuvenated older huckleberry shrubs through the stimulation of new growth and the burst of nutrients released from the ashes. Intentional use of fire in berry patches maintained a more frequent disturbance cycle, regularly returning the ecosystem to the period of lush growth and productivity that follows a disturbance. Some details of this practice are found in these records from the Gitxsan and Wet'suwet'en of northwestern BC:

"He (the Chief) knows the territory. When it is the right time he burns the berry patches so the berries are fat and plump. If he didn't do that the berries would become old and overgrown and there would be berries but they would just be small. But he knows when to burn so that it cleans up just the berry patch and doesn't spread to the trees." (Pat Namox – Wet'suwet'en as recorded in Mills, 1994)

"I remember when my grandfather burned the area at Luumina axa Asa'anseegit ... (They) pretty well burned the area every two years because this is their livelihood where they pick their berry crop. The berries are used for a feast that is why they take care of the patch." (Evidence of Chief Xhliimlaxha - Martha Brown, as cited in Trusler, 2002: 55)

Despite the existence of many accounts of burning huckleberry patches, very few details exist on how landscape burning was carried out. Many Elders remember being told about burning huckleberry plants to improve the productivity and berry quality, however, few recall the specifics of how it was practiced. Burning practices required special knowledge of weather patterns and the landscape to determine when and how to burn berry patches (Gottesfeld, 1994; Ross 1999; Lepofsky et al. 2005). It is also likely that burning would have been carried out at different scales and intensities depending on the purpose. Low-impact fires over smaller areas were likely used to remove dead stems, killing the bushes back to ground level, while causing minimal damage to the rhizomes. A regular rotation of this practice over a larger area would serve to continuously renew productivity of the huckleberry shrubs and sub-patches ensuring continuous long-term productivity of a larger berry patch. Deur (2009) found Elders who remembered fires being set every other year at the end of the berry-picking season. Others report times between burning huckleberry patches to have ranged from 3-6+ years (Lepofsky et al. 2005; Turner, 1999; Ross, 1999). It is important to note that these recorded estimates of time

between burning often did not specify the size of the area being burned. Accounts of burning every other year may refer to burning different sections of the same berry patch with the type of light fire described above. Those reporting every 6 years or longer may refer to how often the whole patch would be burned. In St'at'imx Elder, Baptiste Riche's account of burning practices he provides a spatial estimate that suggests large areas would be burned all at once, accompanied by a longer time between burning (Turner, 1999: 189)³⁸. Differences in frequency may also be reflective of landscape and environmental diversity. Berry patches in wetter climates likely had very different requirements from those in drier regions. Burning practices may have been as varied as the diversity of both the cultures that used black huckleberries and the selection of landscapes where the black huckleberry grows.

Berry patch ownership

Burning, as a stewardship practice, was not just a part of the ecological processes. It also had important economic, political and spiritual implications. It was common for family groups to govern the use and maintenance of berry patches (Thornton, 1999; Trusler, 2002; Turner et al., 2005; Deur, 2009). Those groups with ownership rights were also responsible for the stewardship of their berry patches. As suggested in the testimony of Chief Xhliimlaxha, an individual's or a group's right to use a resource also came with the responsibility and duty to ensure its continued health and well-being. Continued stewardship of a resource, such as the proper burning and tending of a berry patch, is a gesture indicating tenure over a piece of land or a specific resource (Pyne, 2001: 48).

The practice of burning to ensure a good huckleberry harvest was also an essential part of traditional economies and political institutions (Pyne, 2011). In addition to their nutritional value black huckleberries were also highly valued for the access they provided to other foods and resources through their value as a trade item³⁹. Amongst the Wet'suwet'en some of the knowledge necessary to carry out good fire management was held (and passed down) by

³⁸ Baptiste Riche recounts: "*They used to burn one hill and use the other. ... It was a few years, I guess it was almost around three years, before those things grew there again. Then there were really lots of berries.*" (Turner, 1999)

³⁹ The use of black huckleberry as an important trade item has been documented amongst the Wishram of the Columbia region (Spier and Sapir, 1930: 185). In this region fresh and dried berries were traded at the Dalles – a large center of trade on the Columbia River (Briley, 1986: 60-61). Amongst the Gitksan and Wet'suwet'en of BC's interior huckleberries were traded with groups from the coast for highly valued coastal foods such as oolichen grease, seaweed and herring roe (Trusler, 2002: 50).

hereditary chiefs. A chief's ability to practice or direct good stewardship of important resources in essence was part of their political power. Traditional knowledge of huckleberry patch stewardship practices held great economic and political importance.

Ceremonial life is often linked to political life in many tribes. Through ceremonies and feasts, with witnesses, ownership or stewardship rights were established and renewed. The ability to provide berries for a feast could serve as proof of good stewardship practices and support the continued right of an individual or family to have control or ownership over a resource. Cultural ceremonies directly or indirectly incorporated practices that would enhance the resource, while also establishing or reinforcing tenure. These ceremonies had political, spiritual and ecological connections with berry picking season being described as being like “*one great holy-day*” (Methodist minister Henry Perkins, of Wascopam as cited in Boyd, 1996: 275-276 in Mack and McClure, 2002). Huckleberry practices such as “feeding the earth,” which involved giving the berries back to the earth through the practice of scattering the first basket of berries on the ground, were associated with an improvement in the health of the berry patch (Deur, 2009). Similar practices were likely carried out in other “First Food” or “First Fruit” ceremonies by tribes throughout the range of the black huckleberry (Hunn, 1990: 129; Mack and McClure, 2002; Fisher, 1997 in Richards and Alexander, 2006). Ktunaxa Elders reported that women would pick the first huckleberries of the season, and when they returned the family would pray for an abundance of berries for the rest of the season (Williams and Clarricoates, 2002). Later in the year huckleberries were an important part of mid-winter or new-year celebrations for the Ktunaxa (Turney-High, 1941). The preservation of huckleberries for winter allowed this food to be part of celebrations throughout the year – not just in huckleberry season. Huckleberries were also an important part of milestones throughout an individual's lifetime. For Robert Williams' grandmother (a Ktunaxa Elder) the black huckleberry was the last meal she requested on her deathbed. This story was told by Williams to communicate the importance of the black huckleberry to those gathered in Cranbrook for the Western Huckleberry Forum held in February 2011.

Through the use of a stewardship system embedded in local cultural and ecological systems productive huckleberry patches were maintained across the forested landscape for thousands of years. The changes to the culture and ecological systems that have come with

settlement and colonization over the past 150 years have disrupted major parts of this system. This next section provides an historical overview of the changes that have occurred.

4.2.3 Settlement and Colonization of British Columbia's Forests

With European settlement and colonization of Indigenous' territories west of the Rocky Mountains (from the mid 1800s – early 1900s), ownership and control over forest resources in this region underwent major changes. From 1858 to 1864 Indigenous peoples' traditional territories were reduced significantly as they were forced onto reserves. At this same time the new colony of BC proclaimed that all land in the new colony of British Columbia belonged to the British crown, setting the groundwork for the young colony to begin a process of excluding Indigenous peoples from accessing and applying their traditional management practices to the full extent of their traditional territories. In 1867, while finalizing the *British North America Act*, the newly created Dominion of Canada solidified ownership over all of the land and included wording to transfer jurisdiction of all public or “crown” lands to the provinces (UBCIC, no date). British Columbia official joined Canada in 1871, and a few years later passed the “BC Land Act”, an Act allowing the province to alienate land without regard for aboriginal title (Drake-Terry, 1989:113).

From these Acts BC worked to establish policies and laws to regulate activities on “crown” land, including a formal system for leasing the provinces' forests to private individuals and companies for timber harvesting. By 1880 the province had formed the Timber, Mines and Grazing branch within the Department of Interior to oversee and regulate the management of what was now viewed as the province's forests. This agency facilitated the growth of BC's forest sector as a major source of revenue for the province, and by the early 1900s timber harvesting was one of the top industries in BC's economy. By this time the province was also well established as sole tenure holder over most of the province's forests.

These new natural resource management institutions helped BC secure government control over forest resources as part of building a capitalist economy for the young province. With these new institutions came a major shift in power away from local systems that managed forests for a diversity of resources to a centralized organization with a focus on timber

production. From the beginning, BC's view of its forests has been timber-centric. The best illustration of this is the definition of 'forest land' as: "... *land which will find its best economic use under a forest crop*" used by the province in its *Forest Act* of 1947 (Reid and Project, 1982). This definition reflects the commonly held cultural view of forests as timber farms. This historic attitude is the base upon which BC's current Ministry of Forests Lands and Natural Resource Operations has built its policies and practices for provincial forest management. This attitude is also reflective of larger European cultural myths of an under-utilized or unmanaged "paradise" that supported the colonization of North America (Anderson, 2005:63; Deur and Turner, 2005:3-4). These dominant cultural myths of the untouched wilderness and uncivilized inhabitants were used repeatedly across North America as justification for the taking of Indigenous peoples' land by colonial governments, to put the land to more "productive" uses. This shift in tenure and use gradually eroded traditional stewardship systems.

Policies of fire suppression

To protect its timber interests the province of BC began a serious campaign to suppress wildfires and incorporated fire suppression into their provincial forest management policies and practices. In 1905 the first fire wardens were appointed by the province (Parminter, 1978). Still, numerous wildfires were reported in BC's interior between 1914-1931, prompting further legislation to regulate campfires and to fund fire-fighting costs. Over this same period active efforts were being implemented to suppress wildfires throughout all of the Pacific Northwest (Helmets, 1933 in Richards and Alexander, 2006; Burke, 1979; Gottesfeld, 1994).

Despite new policies of fire suppression from 1900 to the 1930s there are many records of intentional burning of huckleberry patches taking place throughout BC and the northwestern United States⁴⁰. Minore (1972: 68) found accounts of a US Forest Service Ranger who used to: "*rave at the Indians about their "carelessness" with fire*". This ranger attributed many late summer season fires to this "carelessness", not appreciating that these fires were an important tool for managing huckleberry patches and promoting forest health. A similar report of numerous fires occurring in the late summer due to neglected campfires, "*in isolated areas*

⁴⁰ Allen (1904 and 1905) reported that at least half of the fires on Forest Service land were intentionally set by "Indians", many being set adjacent to existing huckleberry fields. Plummer (1910, as cited in Mack and McClure, 2002) observed that Indians started fires to promote the growth of huckleberries.

frequented by Indian berry pickers” is found in the Annual Report for the Prince Rupert Forest District from 1934 (as cited in Trusler, 2002: 59).

Eventually, all burning was discouraged through threats of criminal charges and fines. Trusler (2002: 59) reports that these policies were effective in BC from the 1940s onward as mention of “Indian ignitions” ceases within the annual provincial fire reports. Up until the early 20th century, fire was the dominant disturbance type within the mountain forests of the black huckleberry’s range. Across the ecosystems of western North America one of the most dramatic ecological changes has occurred as the result of loss of traditional burning practices. Fire suppression has greatly decreased the incidence of wildfire, and completely ended traditional burning practices in huckleberry patches. This policy quickly led to a loss of many of the traditional stewardship practices used to promote the productivity and health of the huckleberry patch. Loss of traditional burning practices has been clearly linked to conifer encroachment and reports of declining productivity in huckleberry patches (Minore, 1972; Deur, 2009). Less obvious have been the effects of the loss of cultural practices, knowledge, and the gradual social changes that accompanied the loss of traditional burning.

Changing tenure systems

Accompanying the growth of the BC forest industry – the formation of a provincial Forest Branch (est. 1911) and the passing of the BC Forest Act in 1912 (UBCIC Timeline) – were two key steps in formalizing the province’s claim of tenure rights over “crown land”. Designation and control of “crown land” in BC was unsanctioned appropriation of the traditional territories of Indigenous people by the federal government and the province. Claims of ownership, the accompanying forest acts and policies, and the colonial worldview of BC’s forests as untouched and unused “wilderness” have led to the gradual decline of traditional tenure and ownership systems within berry picking areas. The losses of control over access to berry picking areas and the ability for regular maintenance of traditional areas through burning mutually reinforced a loss of Indigenous ownership of berry patches. Under current forestry policies huckleberries are what is known as an “open access resource”. In Canada and BC the only official law or policy governing human use of huckleberries is the prohibition of picking huckleberries in a National or Provincial park. This is in contrast to indigenous systems of berry patch tenure that had complex laws regulating access, picking practices, and good stewardship

practices to ensure sustainable and abundant harvests. In the United States a policy of open access was openly embraced and advertised to the general public, as described in this report from Idaho: “*We have loudly acclaimed our free use business in the press, over Station KHQ, and in other ways. The value of huckleberries was not overlooked and received notable attention.*” (E.F. Helmers in report from Coeur d’Alene National Forest, Idaho: Helmers, 1933 as cited in Richards and Alexander, 2006). Huckleberry fields, whose productivity had been carefully built and maintained by Indigenous peoples, were freely opened up by the federal government of the United States for use by the larger public. At the same time Indigenous communities were restricted to small reserves, their movements regulated and legislation passed to prohibit the use of fire for maintaining huckleberry patches.

Other impacts/factors that disrupted traditional stewardship practices

The impacts of changing ownership and stewardship practices were accompanied by major social and cultural changes that came with colonization. In the mid-19th century epidemics of measles led to drastic population declines, followed by the Spanish flu in the early 19th century. Population losses from these epidemics are estimated at 50-90% of the population (Kelm, 1998). Amongst those lost to these epidemics were important community leaders and knowledge holders. These epidemics left communities weakened and less able to resist the rapid changes imposed by settlement and colonization and likely had unrecorded impacts on traditional resource stewardship.

Indigenous economies also underwent rapid change as new trade relations developed, first with early explorers then with settlers. The inherent value of resources changed in some cases quite dramatically and the indigenous values of the components of society and ecosystems shifted to incorporate European and capitalist values. It is likely that this caused shifts in the political, social and cultural components within and between Indigenous communities. It is difficult to know what specific changes occurred but there are records and stories of conflict – a symptom of the social and ecological imbalances created by the arrival of these new economic systems⁴¹. A common effect of the introduction of a capitalist based, European economic system has been the loss of or damage to resources and culturally important species (Ommer and Turner,

⁴¹ For a more detailed discussion of the economic impacts of colonization on Indigenous societies in western Canada see Ommer and Turner, 2004.

2004). This case study of black huckleberry is just one example of an important species that is being damaged by an economic system that values timber and monetary outcomes over all other contributions of the forest.

Along with trade and new economic systems came the rapid introduction of new technologies, including new practices of managing the land. These new practices were adopted to adapt to changing economic circumstances and livelihoods that accompanied colonization. With their adoption, time for traditional activities now had to be balanced with some of these new practices. Ktunaxa Elder Liz Gravelle illustrated this when explaining how her family timed their berry picking around agricultural activities: *“We would wait for haying season to be over and when the haying season was over then we went (berry picking) and that was a special time of the year for us.”* (L. Gravelle, pers. comm. 2010). Secwepemc Elder Mary Thomas talked about the losses her family experienced as they adapted to the changes brought by colonization, explaining: *“... my mother talk(ed) about this, that it wasn’t their way of life, but they had no choice, they had to accept the way they were taught how to survive was to chop down all these trees and cultivate (the land) into European way of living. I guess that’s where we began to lose a lot of the traditional food.”* (Turner, 2003). These two examples illustrate the struggles and trade offs faced by individuals and cultures as they adapted to the rapid changes brought by colonization.

Finally, traditional activities and management systems were further eroded and often lost due to the federal government’s policies of cultural genocide enacted through the residential schools. Family structures, language and cultural practices were deeply damaged through the systemic practice of removing children from their families and stripping them of their culture in an attempt to “civilize” them. Young children were taught to be ashamed of their culture and language. Through the residential school system children were kept away from their parents and extended families for most of their childhood – robbing them of the opportunity to learn traditional practices, and robbing the parents and grandparents of the satisfaction of sharing their knowledge with the children and youth (Truth and Reconciliation Commission of Canada, 2015).

Colonization as carried out through the forced movement onto reserves, mandatory placement of children in residential schools, and through policies that prevent traditional management practices, combined with the social and environmental degradation caused by the economic development activities of a new, capitalist economy, caused significant damage, loss

and disruption to traditional forest management practices. In the case of black huckleberry, the combined loss of fire as a management tool and traditional ownership of berry patches has resulted in a loss of the skills and knowledge for burning black huckleberry patches, as well as for maintaining a diversity of other plants and animal habitats traditionally enhanced through fire and by other practices. The cumulative impact of these series of different policies is leading to a gradual loss of productive huckleberry patches. Turner et al. (2008) have named this type of phenomenon as an “invisible loss”. An invisible loss, is a loss that may be felt by a community or an individual but is not obvious to others, it is difficult to measure its impact, it is not easily connected to one original action, and the consequences of the loss are invisible despite their significance (Turner et al., 2008). The potential consequences of declining black huckleberry productivity are significant for the social-ecological wellbeing of communities throughout its range, however, under the current culture of BC forest management the value of the black huckleberry and other non-timber forest products (NTFP) are not recognized.

4.3 Modern Forest Management in British Columbia

Ninety-nine percent of British Columbia’s forests are classified as “crown” land and are under the jurisdiction of the province.⁴² Over the past century the BC Ministry of Forests has built a detailed series of laws and policies around the access to, use of and regeneration of trees on crown land through the Forest Act and other legislation. This act and associated policies have been built on a modern approach to natural resource management based upon scientific principles (Sloan, 1956), and the underlying values of extracting economic value in the form of cash profits from the forest. During the middle of the 20th century the BC forestry industry focused on logging the large old growth trees of the most desired species in a process known as high-grade logging. Over the past couple of decades the industry has become increasingly mechanized and the practice of clear-cut logging and re-planting trees has become the norm. Conventional forestry as practiced in BC is an approach based on an allowable annual cut that focuses on sustainable timber production to ensure a continued harvest of trees over time. This approach to managing forests is tree or “fibre” focused, and only considers the sustainability of

⁴² Currently 94 percent of land in BC is classified by the province as “crown land” under the jurisdiction of the province (http://www.for.gov.bc.ca/resort_development/crown_land/index), and it is estimated that 99 percent of crown land is forested.

the diversity of other values found in the larger forest ecosystem as an after-thought to timber extraction.⁴³

Within BC's Forest and Range Practices Act (FRPA) the current approach toward maintaining the health of all non-timber forest values has been designed to ensure the sustainability of forest resources and environmental values through science and stewardship. Monitoring systems for the effectiveness of this policy have been established and maintained by resource management experts, and are a part of what is known as the Forest and Range Evaluation Program (FREP). Within this policy where it discusses the non-timber values of forests, the traditional or local knowledge of these values has largely gone unrecognized or has been ignored by forest and natural resource managers.⁴⁴ There is little to no space within provincial forestry legislation for considering protection of the needs and values that local communities derive from forests.

Pinkerton (1998) identifies three critical problems with provincial forest management in BC: overharvesting or unsustainable harvest; inadequate compliance to existing regulations; and a lack of involvement or power for local communities in planning the use of forest resources. The government ministries and industry currently making decisions on forest management often view the forest with a different set of cultural assumptions, and values compared with those of local forest communities (Hammond, 1991), including the values held by Indigenous communities. In the current system traditional users of wild food and other forest products have little to no input in the land use planning and forest management process – and virtually no value is placed on maintaining the health of non-timber forest resources.

From accounts of huckleberry pickers, there is often an antipathetic relationship between berry pickers and forest managers. As the provincial ministry enforced laws prohibiting burning, and in general imposed “top-down” restrictive regulations against other types of forest users, little to no work has been done to enhance berry productivity or address issues of tenure and

⁴³ The 11 values considered by the MFNLRO in forest management in BC are described at the following website: <https://www.for.gov.bc.ca/hfp/frep/values/index.htm>. BC has been using the Forest and Range Evaluation Program system for over a decade. In May 2004 the Forest Practices Board - FPB (an independent auditor of forest practices in BC) published a special report on best practices for integrating NTFP into forestry in BC (Gagne et al., 2004). In this report FPB state that they receive numerous complaints and concerns regarding the effects of timber harvesting on NTFPs, and the sustainability of current NTFP harvesting.

⁴⁴ Nadasdy (1999:3) points out that natural resource managers often ignore or exclude local and traditional ecological knowledge from their larger plans and practices because they have strong doubts about the value and possibly even the legitimacy of these forms of knowledge. Instead they favor and privilege scientific knowledge.

access. Berry pickers and other NTFP users complain of the overharvesting and destructive harvesting practices of some forest users (Keefer, 2005: 13). There are also concerns around the use of herbicides in the tree plantations that follow clear-cutting, and the potential effects these herbicides are having on the health of both the huckleberry shrubs and the potential health effects for berry pickers. The overall legacy of government and corporate policies and practices has been the degradation of local natural forest resources and a reduction in the overall health and diversity of the local forest.

4.3.1 Modern Forest Management & Black Huckleberry

Human-caused disturbance of forest ecosystems still plays a major role in the creation of black huckleberry habitat, however, the influence humans have on this habitat has shifted from an intentional to an unintentional relationship. New huckleberry habitat is currently unintentionally created as a side-effect of timber-harvesting (Vander Kloet, 1988). For the black huckleberry, clear-cuts do provide forest disturbance that promotes its productivity. Black huckleberry habitat created as an indirect side effect of another land use is problematic and the overall impacts of forestry policies and practices have been negative. Relying on clear-cutting to create habitat is very different than the intentional act of maintaining and enhancing the productivity of a traditional berry patch.

Despite black huckleberry habitat creation through clear-cut timber harvesting there remains a lot of concern about a decline in both the availability and quality of huckleberry stands throughout the berries range. Fire suppression has meant that traditional berry patches are shrinking in size and decreasing in productivity as shrubs and trees invade berry fields (Minore, 1972; Hunn, 1990: 130; Deur, 2009). Even with clear-cuts opening new areas there is still likely to be a shortage of huckleberry patches as the forestry industry slows due to changes in log markets (Stark and Baker, 1992), and as the stand densities increase and canopies close within older clear-cuts (Klinka et al., 1996). Current post-harvest replanting of clear-cuts is problematic for the health and wellbeing of black huckleberries in both the short and long-term. In the short-term tree planting prescriptions often include the use of herbicides with poorly understood effect on the health of huckleberry plants. Over the long term clear-cuts that have been replanted are stocked at much higher densities of trees than natural stands. Compared with mature natural stand densities of 600 stems/hectare, the majority of planted stands have densities over 1000

stems/ hectare (Beaudry, Martin and Paczkowski, 2001). Black huckleberry shrubs are not productive in dense closed canopy forests – which is what most plantations become as the trees mature.

The underlying issue with viewing clear-cuts as an alternative to wildfires is the problem that larger commercial forest interests have no stake in the sustainable use of forest resources from any particular locality. Logging companies tend to focus on the most accessible and profitable resources, and as profitable resources disappear so do the companies. Scientific knowledge, known best practices, and the TEK that does exist for protecting and improving the health of non-timber forest products is not applied by timber companies nor the BC Ministry of Forests because there has been too much political pressure to ignore these values if they impede timber extraction (Pinkerton, 1998: 367). A description of the Canadian Forest Service’s work on NTFPs illustrates this attitude. Their website explains: “*while NTFP businesses may never come close to matching the economic contribution of the timber industry, they may still be important in the rural Maritime economy* (Canadian Forest Service, no date). At present the Canadian Forest Service does not fund research on NTFPs. For the Ministry of Forests, Lands and Natural Resource Operations (MFLNRO) they list “developing management guidelines for huckleberries” as a current activity, however, much of the work on NTFPs was funded by the Forest Science Program, funding which ended in 2010. It is not clear what, if any research into NTFPs has been supported by the province since the ending of this program. The shift in forest tenure from local indigenous stewardship practices to management by provincial and federal governments has led to management for timber production and a neglect of other important forest resources including the black huckleberry. Modern initiatives to bring better management practices for huckleberries and other NTFPs in to forest management lack genuine sustained political and financial support.

4.3.2 Adaptive Traditions – the Modern Huckleberry Picker

As outlined in the previous sections a complex series of changes to forest stewardship systems in BC has resulted in significant changes to the social-ecological system surrounding black huckleberry and have contributed to the declining availability of this iconic fruit. With declining or complete loss of access to a traditional food, the related institutions, practices, and knowledge surrounding that resource either change to adapt to these new conditions or disappear

completely. For black huckleberry, fire suppression combined with the declining productivity of berry patches and shifting social-economic conditions has led to a loss of the time, knowledge and security of access (tenure) that would be required to support intensive stewardship of berry patches by local berry pickers. The stewardship practices of berry pickers now focus more on good harvesting techniques rather than on altering forest or berry patch structures as was practiced with traditional burning. The result of this changing relationship has been a shift in the knowledge and knowledge systems surrounding black huckleberry ecology and stewardship. Figure 11 shows a highly simplified diagram of this transformation that colonization and settlement has created in the social-ecological system surrounding black huckleberry.

In addition to the major shift in huckleberry patch stewardship the shift in tenure to an open access resource has also affected berry-picking practices. The most obvious change has been a loss of security and an increased sense of competition for picking the berries. This manifests itself in a few ways. Many berry pickers are highly secretive about where they pick their berries. Having secret patches is the closest thing to “ownership” or control in an open access system. A second example is how people pick berries. There is more of a ‘pick them while you can’ mentality that can lead to picking under-ripe berries. Minore and Smart (1975) observed this phenomenon at a popular berry-picking site. They found that huckleberries were at their peak ripeness after most berry pickers had finished picking for the season.

Mitchell and Hobby (2007) characterize all use of NTFPs in BC as “extractive”, explaining that in an open access system there is no way to ensure or protect an investment made in that system. In an open access system developing knowledge of where to find berries on the land and within the berry patch has a much greater value than building an understanding of how to enhance the productivity of berries at one particular site. Much of the knowledge huckleberry pickers have is a broad knowledge of recognizing good berry habitat, and insights into the factors affecting black huckleberry productivity.

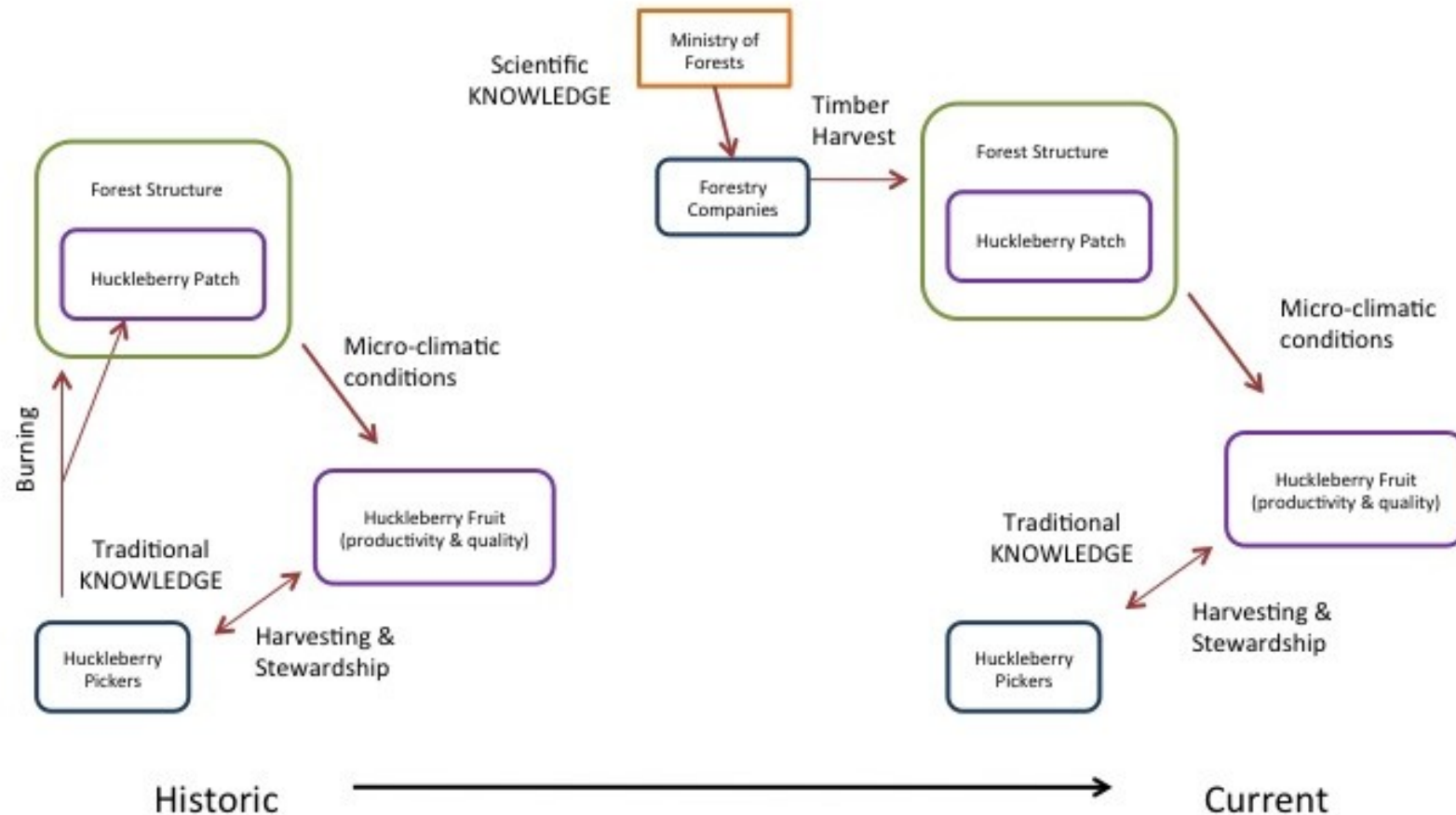


Figure 11. Schematic diagram illustrating basic historic and current models of the relationships between human stewardship of forests, black huckleberry habitat and huckleberry shrub productivity. The arrow at the bottom indicates the progression of time, and shifts in tenure and policies around the management of forest resources.

4.4 Traditional Ecological Knowledge & Forest Management

Natural resource managers and academics increasingly view the ecological knowledge of Indigenous and local communities as an important complement to scientific knowledge for informing the sustainable management of natural resources (McLain and Lee, 1996; Folke et al., 1998; Sillitoe 1998; Berkes et al., 2000; Berkes, Colding and Folke, 2003; Ballard and Belsky, 2010; Kimmerer 2015). As a result researchers have been developing models and approaches for involving knowledge holders and incorporating their insights into resource management decisions, policies and research (Stevenson, 1996; Huntington, 2000; Ticktin and Johns 2002; Ballard and Huntsinger, 2006; Fortmann and Ballard, 2009). It is widely viewed that a combination of traditional, local and scientific knowledges will improve management of complex social-ecological systems (Berkes, 1999; Berkes, Colding and Folke, 2003). Effective integration of conventional science with traditional and local ecological knowledge requires careful attention to process to ensure genuine knowledge integration rather than co-optation of traditional knowledge (Nadasdy, 1999; Ballard et al., 2008). Meaningful incorporation of traditional ecological knowledge (TEK) into the monitoring and study of natural resources should be driven by local values, and incorporate local knowledge holders in key aspects of the research design (*i.e.* identifying the research questions). In this section I explore the incorporation and application of TEK into natural resource management and the potential role of this integration for providing new understandings of the current factors affecting the productivity and quality of black huckleberries.

Successful integration of conventional scientific knowledge and traditional and local ecological knowledge systems promises a comprehensive set of tools and approaches with which to better manage and monitor important forest resources. Both types of knowledge are products of the interactions between the knowledge creators, their history and observations, and the social environment that influences what they know, their observations and how they interpret that knowledge and those observations (Neis and Morris, 2002). The meaning and importance of both conventional scientific knowledge and local forms of ecological knowledge come from the complex network of social relations, values and practices in which the knowledge is embedded (Nadasdy, 1999). The biggest challenge for meaningful incorporation of conventional scientific knowledge and TEK often involves recognizing and addressing cultural differences between the two knowledge systems in a way that emphasizes the strengths of both knowledge systems.

Conventional scientific knowledge (SK) is based on data collected using the traditions of Newtonian science (Berkes et al., 2000). It is viewed as being universal, unbiased and able to test and support theories – theories that help us understand how complex systems work. Scientific knowledge derives power from the certainty it promises through easily quantifiable data. Conventional scientific knowledge is a product of traditional Euro-North American values and conceptions of the world, including the separation of human beings from the environment or ecosystem. Although scientific disciplines, especially ecology, are beginning to recognize human interaction with the ecosystem as a valid field of study, many traditional scientific experiments specifically controlled for any human interference or interaction with the environment. It is the results of these studies that continue to be used as a basis for future scientific knowledge, and in the generation of models used for the management of natural resources.

Traditional Ecological Knowledge is a “*cumulative body of knowledge, practice and belief, evolving by adaptive processes and handed down through generations by cultural transmission about the relationship of living beings (including humans) with one another and with their environment*” (Berkes, 1999:8). Traditional knowledge is place based – it is the knowledge derived from generations of experimentation and observation that inform a set of practices and beliefs for living with the natural resources of an area (Turner, Ignace and Ignace, 2000). TEK is shaped by the worldview of the local community and incorporates the associated attitudes, spiritual beliefs and ethics including the moral and value-based rules for resource use (Berkes, 1999:6; Turner et al., 2000). Local ecological knowledge (LEK) refers to local expertise of peoples that may not have a long-term relationship with the local environment, yet have experience, local wisdom and practices that are adapted to local ecosystems (Berkes and Folke, 1998). Both LEK and TEK are central to alternative ways of imagining resource management regimes (Gadgil et al., 2003). The social-ecological systems embedded within LEK and TEK offer potential alternative resource management institutions.

Since 1980 interest in the integration of TEK and conventional science has been increasing in popularity amongst natural resource, wildlife and fisheries agencies across North America. This trend was in part a response to the recognition that using only ecological or conventional science to make decisions around resource management may in fact exacerbate management problems (Gunderson et al., 1995). In BC this move toward integration has garnered momentum from negotiations of land use planning protocols and agreements between

the province and First Nations around improving forestry practices to protect unsettled rights and title claims (Clayoquot Scientific Panel, 1995; Government of British Columbia and Coastal First Nations, 2001). In theory the integration of both knowledge systems would strengthen natural resource policy and management practices. In practice, integration of these two knowledge systems has proven difficult. Nadasdy (1999) drew attention to issues that have occurred with the practice of incorporating TEK into scientific research. He illustrated how sometimes conventional science views and approaches TEK as a supplementary body of information capable of being “integrated” with science, instead of considering TEK as an alternative resource management paradigm. The approach of extracting data from TEK or LEK removes the knowledge from the larger system of social and ecological relationships where it developed. By extracting the knowledge to complement science without understanding the corresponding values and practices opportunities are lost for gaining deeper insights in to resource management approaches. It is important to recognize not only the social institutions and cultural practices that accompany this knowledge, but also the unique worldview that frames this knowledge. Finding a way to meaningfully integrate the strengths of both types of knowledge systems involves finding a balanced forum through which each system can meaningfully contribute. In response, researchers are increasingly recognizing that natural resource management can only benefit from a combination of both scientific and traditional ecological knowledge if they are combined and considered in a way that directly addresses the underlying political context in which knowledge is generated and used (Calheiros et al., 2000; Berkes et al., 2003).

An important component of traditional and local ecological knowledge is its practical, applied nature. When environmental or political changes affect access to or the health of an important resource, people’s relationship with that resource is affected, and the knowledge associated with that place and resource is changed and often lost (Turner, 2005: 201-206). It is important to consider this phenomenon when contemplating the application of traditional and local knowledge in making decisions around natural resource management. To find a meaningful approach for integrating conventional science with traditional and local ecological knowledge in a way that leads to genuine knowledge integration rather than co-option, the approach to integration must recognize and meaningfully address the historic and current social and ecological changes that have occurred to the natural resource. If TEK is to be used to

significantly improve natural resource management policies and practices in a meaningful way the systems or practices that have damaged the relationships between local people and their environment must be addressed. Use of traditional and local ecological knowledge will be meaningless unless it is used and incorporated into policies and practices that foster and strengthen relationships between the resource user and the natural resource.

At the heart of the politics behind natural resource management regimes are the formal institutions that set natural resource management policy and that govern practice, and the tenure structures that support these institutions. It is a combination of these institutional structures and the culture of scientific knowledge that create barriers to the integration of TEK and LEK. For incorporation to be successful natural resource management regimes must have the flexibility to incorporate aspects of local and traditional regimes into the new approach for managing the resource. Only through a power shift that allows for real participation of the resource user can TEK and LEK play a significant role in informing and improving natural resource management practices. Ruppert (2003) provides an example of meaningful incorporation of traditional knowledge into conventional natural resource management regimes – in the United States federal agencies have handed over the authority to set rules over harvesting of certain resources and have worked with Indigenous communities to create management plans. For many Indigenous communities there is a need to rebuild management and stewardship capacity to be successful. Transfer of management planning authority is one step in a longer process of rebuilding this capacity.

A starting point for the evaluation and use of TEK and LEK is recognizing that both are embedded within their own formal and informal institutions/regimes that have rules, values, etiquette and protocols that guide the use and stewardship of the resource. Understanding these relationships is important for how TEK is collected and interpreted, and how it is incorporated into natural resource management practice. Both traditional and local knowledge are central to imagining and creating alternative or novel resource management regimes, alternatives to systems that are not working (Gadgil et al., 2003). It is not the knowledge itself, but how the knowledge works and is a part of these local regimes/informal institutions that can provide clues and strategies for improving natural resource management policies and practices.

4.5 Conclusion

This thesis is not about using traditional knowledge to understand where conventional resource management practices can improve the management of black huckleberry. Forestry practices based in principles of resource management have been a system of human relations with the forest that has ignored and suppressed the ecological needs of black huckleberry. Instead of attempting to incorporate or compare traditional knowledge to scientific knowledge this thesis focuses on bringing a stronger voice to the knowledge and perspectives of the berry picker. It looks to the communities of people actively engaged with black huckleberry for new insights and perspectives for understanding the decline of this highly valued fruit.

CHAPTER 5 – “THE BERRIES GROW BIGGER UNDER THE PINES”: TRADITIONAL KNOWLEDGE OF BLACK HUCKLEBERRY (*VACCINIUM MEMBRANACEUM*) ECOLOGY AMONGST BERRY PICKERS IN THE EAST KOOTENAYS OF BRITISH COLUMBIA

For many rural communities forests have served a central role in their livelihoods for generations, sometimes thousands of years – providing water, food, shelter and medicines – the essentials for survival. The health of the forest is important for the social, economic, and physical wellbeing of these places, and the continued survival of rural communities is dependent upon their ability to sustainably manage their natural resources. Accurate knowledge of ecological processes and a strong understanding of local natural history are part of this ability to maintain the health of local environments (Turner et al., 2000). As noted in the previous chapter, this knowledge is often referred to as traditional ecological knowledge (TEK). Traditional ecological knowledge is shaped by the geo-physical environment, regional climate, local ecology, local cultural practices and social systems a combination that has and continues to support social-ecological wellbeing. The social relations, practices, values and beliefs that are part of TEK are just as important as the ecological knowledge for maintaining the health of local forest resources.



Figure 12. Ripe huckleberries in a berry picker's hand.

In this chapter I present huckleberry pickers' knowledge of the ecological factors affecting black huckleberry productivity and quality. The depth and diversity of knowledge I present supports the argument that berry pickers in the East Kootenay region of BC have unique, complex and extensive understandings of the environmental and social factors influencing black huckleberry (*Vaccinium membranaceum*) health. The TEK I present is a snapshot of the depth and diversity of knowledge held by huckleberry pickers. Its purpose is to inform a broader audience and it is not intended to serve any practical application or prescription for managing huckleberry patches. Another caveat is that this knowledge is specific to the geographical environment, local climate and local ecology of the East Kootenay region of BC. In other areas different local environmental conditions could mean that factors affecting black huckleberry productivity and quality have distinctly different importance. Some of the larger themes found in this knowledge may share strong similarities with the knowledge and practices of other berry pickers and non-timber forest product harvesters. The TEK presented here is intended to give a voice to the berry pickers and provide an overview of the values that are important to them. It is a potential tool for informing a larger conversation that needs to take place between provincial forest managers and NTFP users in BC. It provides a valuable alternative, complementary to the scientific literature on black huckleberry ecology.

This chapter illustrates the rich knowledge berry pickers have of huckleberry ecology and provides a foundation for chapter 6 in which I discuss how present social-ecological systems are influencing the overall health of the black huckleberry. To provide an overview of the knowledge held by huckleberry pickers I present and discuss the results of my research into the question: *What characteristics are used by berry pickers to define and evaluate the quality of a black huckleberry patch?* In response I assemble – in the words of the huckleberry pickers – their definition of a high-quality huckleberry patch and the many factors huckleberry pickers identified as affecting patch quality. Due to the nature of the question this chapter will focus on the ecological components of huckleberry productivity⁴⁵. In this chapter I include the results of a free-listing exercise⁴⁶ to evaluate the relative importance of each factor across the larger group of berry pickers.

⁴⁵ A more detailed discussion of the social factors is covered in chapter 6.

⁴⁶ A detailed description of the data collection methods for the free-listing exercise, and other traditional ecological knowledge has been discussed in detail within Chapter 2 of this thesis.

5.1 Berry Pickers as Local Experts

“Remember the book⁴⁷ that said there were always berries in higher elevations? Well, that’s not right. (Huckleberries) are not always (at higher elevations). They are in certain sites, but you can’t just walk to the top of the mountain and pick berries. There are quite a lot of criteria (for finding huckleberries): you have to have enough cover so that (the site) retains moisture, and the berry bushes have to be developed, and you don’t just find the bushes everywhere.”

(John Mennie, 2010)

For a serious berry picker finding a good huckleberry patch is not dependent upon chance, nor is it as easy as following a simple maxim like – huckleberries grow at higher elevations. As old-timer, and avid huckleberry picker John Mennie astutely notes: the criteria for locating a good berry patch are numerous and complex. Through a combination of perceptive observations of forest conditions and individual plant health, and wisdom shared by family and friends who pick huckleberries, a dedicated berry picker develops a unique and sophisticated model for understanding the local ecology of the huckleberry. Every year the berry picker’s criteria for identifying quality huckleberry sites are tested and refined through their ability to efficiently locate productive berry patches, and to obtain an adequate harvest of good quality berries to last through the winter. As regular monitors of the productivity of huckleberry patches, berry pickers are great observers of the health of forest ecosystems. In addition to ecological factors berry pickers also consider human or social factors that affect the health of the berry patch, and their access to the huckleberry. Long-time huckleberry pickers are local experts in the social-ecological well-being of the black huckleberry. Understanding where to find good huckleberries is as much about the knowledge of where berries grow in the physical environment of the East Kootenays as it is about treating the bush right, finding untouched berry patches, and keeping your best berry patches as a closely guarded secret.

The practice of berry picking is taught and transmitted within families, friend to friend and through social connections. It is a cultural practice that has been maintained for generations through formal and informal teachings of where to pick berries, how to pick berries and etiquette for how to behave in the bush, and in the berry patch. Most of the berry pickers I spoke with

⁴⁷ The book being referred to may be “The Huckleberry Book: All About the West’s Most Treasured Berry – From Botany to Bears, Mountain Lore to Recipes” (Bowen, 1988).

remember learning to pick huckleberries from their parents or grandparents. Long time berry picker Sherry Waites (2010) remembers her dad teaching her to pick berries:

“I just kind of watched him. He was not one who believed in using those pickers, because he didn’t want to damage the plants, so basically he would walk around with a bucket around his neck, tied around his neck and he would just pick. ... We always looked for the windfall areas, where there would be trees down. They seemed to grow better there, then out in the wide open.”

“I would be 5 when I started picking huckleberries and I started with a picker. I remember I got my Dad to make me a smaller picker out of maybe a tomato can or something. He would teach us... He taught us to grab the bush and kind of spread it out between our fingers and kind of tip it so that the berries were kind of hanging down and kind of pick with the points of your picker. ... And I took to it. It is like a lot of things the adult does and the kid wants to do it, eh. So I grew up thinking that picking huckleberries was a real pleasure. And that’s remained with me to this day. I just love it...” (John Mennie, 2010).

Some berry pickers I spoke with who did not grow up in Cranbrook remember picking other wild fruit such as Saskatoons, wild blackberries and raspberries. They learned about berry picking later from friends, or their spouses who grew up picking huckleberries. For many pickers the culture of huckleberry picking is tied to living in the Kootenays, and one berry picker I spoke with felt that huckleberry picking should be passed on to other local residents as part of the experience of living in the area. As Judy Daniels (2010) explained: *“I would introduce people to (huckleberry picking), because it is part of living in Kimberley.”*

Traditional ecological knowledge of how to pick huckleberries is rarely knowledge that is communicated through writing. It is demonstrated within the forest, or is described orally through stories about berry patches that exhibit certain characteristics, or tales of past berry picking experiences. It is applied and practical knowledge that has aspects that cannot easily be described in writing and are best passed on through practice and experience. Huckleberry productivity shifts from year to year depending on the weather – this seasonal and inter-annual variability makes recording a set of guidelines set in stone impractical. As John Mennie pointed out, there are a lot of complex criteria to consider. Berry pickers are keen to keep learning. One long-time berry picker told me that he has a friend who has joked about hiding in the bushes to observe and learn his berry picking techniques, as he has a reputation for being a fast berry picker. And as Bob Duthie (2010) explained: *“I just go and try to pick someone’s brain about the good berries... where the good spots are.”*

As with any coveted, patchy resource there is a complex culture of secrecy around where good berry picking spots can be found. There are dimensions of sharing and passing on knowledge that are highly guarded and secretive and dimensions and times when knowledge is shared freely. Berry pickers must navigate stories about huckleberry patches with a discerning skepticism. Judy Daniels (2010) explained that she works at a bank where she has the opportunity to talk to customers about huckleberries: *“There are a lot of old-timers that pick, and I know that they are huckleberry pickers, and they will say, “Oh it is not going to be a very good year this year”. Oh yes it is, because I see them [when] they are in bloom, and the bushes are kind of pretty.”* Other experienced berry pickers are skeptical when someone less experienced tells them it is going to be a good year. John Mennie talked about how he was training a timber cruiser to assess the berry crop for him. *“I’m trying to teach Nick to give me an accurate appraisal of the berry crop and he is getting better as the years go by. At first he would just tell me there were great berries and that meant that there were 3 or 4 on one bush, you know, and you could wear yourself out trying to get enough for a pie.”* (John Mennie, 2010).

Knowledge transmission is linked to the patchy nature of huckleberries and the spatial and temporal scarcity of this important resource. All knowledge of huckleberries is transmitted through trust networks. Knowledge is more freely shared within these networks when berries are abundant. How to find huckleberries is shared between family and friends, however, some berry pickers have added to their knowledge of huckleberries through a few books, and with information on the internet. The internet is also introducing people from outside of the local area to the locations of huckleberry patches in the Kootenays. Through information on websites new people are finding huckleberry patches and picking berries without learning the ecological knowledge and social customs that are taught when berry picking is passed down *in situ* from a long-time berry picker.

5.2 Finding a “Bonanza Patch”: Descriptions of Huckleberry Patch Quality

“From what I recall you would try to find a spot where you could hunker down and just sit and pick. And sometimes it would be good to sit in a spot for 20 minutes. ... you could find some spots where you could sit on a log and just (pick) for quite a while before you had to move on to the next little batch. Again, probably just because I don’t get exploring as much for berries, but I haven’t gotten into that real money patch or whatever you want to call it... you know that real rich spot, for a while actually.”

(Chris New, 2010)

BM: *Yep, you can't believe it until you see it. That was the best that I have seen in about 40 years and it was only in about an acre of berries. We took, what did I figure, maybe 5 or 6, 20-liter pails off of it. ... You could hand pick or pick with a picker. You couldn't go wrong.*

JM: *Bill has this picture and he is looking up and it just looks like a sea of grapes and it is amazing! And that is what a huckleberry picker is always looking for.*

PF: *That is what I call a bonanza patch.*

JM: *Yep, a bonanza patch.*

(Bill Mennie (BM), John Mennie (JM) and Pat Fennesy (PF), 2010)

Mention black huckleberry to anyone who has picked its fruit, and the conversation will quickly shift to a description of the best berry patch that person has ever picked. Tales of acres of berries hanging like grapes, or bushes with branches weighed to the ground with berries are common. Behind these stories is a profound knowledge of huckleberry ecology and the environmental conditions that have helped to create this abundance. Buried in these story-telling sessions are important jewels of wisdom about where huckleberries grow best, or deeper reflections on how the location of that “money patch” or “bonanza patch” contradicted the berry picker’s long standing knowledge of where to find good berries. In this section I describe what experienced huckleberry pickers consider to be a high-quality picking site and what signals these pickers use to help them find good huckleberry patches.

5.2.1 Berry Pickers’ Definitions of a High Quality Huckleberry Patch

Opinions on what makes a good berry patch are as diverse as the berry patches themselves, however, certain patch characteristics are universally important for berry pickers. During the interviews berry pickers discussed what qualities they look for in a good berry picking area, and what signs they use to identify areas that are not good for finding huckleberries. Based on my interviews the following is a compilation of paraphrased descriptions of the primary characteristics huckleberry pickers use to describe a high-quality huckleberry patch, in approximate order of relative importance (based on frequency of mention):

- **Productivity:** A good patch has an abundance of berries, and remains consistent in its productivity between years, so that a picker can return each year and find berries. The reliability of productivity ensures the efficiency and success of a berry-picking trip.
- **Fruit Quality:** The berries in a patch are large, shiny, black or dark, flavorful, juicy and ripe.
- **Accessibility (of patch/berries):** Berry patches reachable by a maintained road and closer to where the picker lives are preferable. Within the forest being able to get to the berry bushes without dense underbrush, windfall or a really steep slope allows for easier berry picking. Many berry pickers prefer to have taller berry shrubs for easy picking.
- **Secret Patches:** Berry picking is best at a site that is fresh, and untouched by other pickers. Some pickers also prefer a patch that is isolated from other pickers.
- **Visibility/Safety:** The berry patch is relatively open, with a clear line of sight to allow pickers to better see any bears within a patch. A safe patch also has few wasps' nests.

These definitions are quite generalized. Amongst huckleberry pickers there are a diversity of interpretations about the importance and exact nature of each characteristic I have listed above. For example the definition of a “productive site” varies between pickers, based on their individual experience and expectations for the quantity of berries they wish to pick in a day or over a season. For one less experienced picker I spoke with, he was happy to find a patch where he could pick enough berries for a few pies and some to eat fresh (approx. 6-8 L); what he would classify as a “money patch” would be quite different than for more serious berry pickers (Chris New, 2010). On the other end more serious berry pickers will pick 75-150+ L of berries a year, especially in a productive berry year where picking is easy (John Mennie and Pat Fennesy, 2010). For this later group of pickers, their expectations of a “bonanza patch” differs significantly from those pickers who are happy to have enough berries for a few pies. Both types of berry pickers place high value on productive berry patches to maximize the reward for their time and efforts spent berry picking. On average the berry pickers I spoke with reported picking between 25-50 L of berries per year.⁴⁸ In a survey of Kutnaxa berry pickers the amounts of

⁴⁸ Berry pickers reported averaging between 10-15 L of berries from a full day of berry picking, and report picking at a rate of 1-2 L of berries per hour. I was told that the fastest berry picker in the Cranbrook area, Fred VanderMollen could pick berries at a speed of 4-5 L/hr in a really good patch of huckleberries.

huckleberries picked each year also showed a range with approximately 40% of berry pickers reporting to pick 20 L or more per year, 10% picking between 7.5-20 L /year, and 50% reporting to pick 8 L or less per year (Williams and Clarricoates, 2002). This distribution of berry picking amounts is likely a more accurate estimate of the volume of berries picked by the average picker than my numbers, because they surveyed a much larger sample, and a broader cross section of berry pickers.



Figure 13. A modest harvest of black huckleberries (*Vaccinium membranaceum*).

Elements of a Productive Patch

Finding a productive field of huckleberries is enough to make a berry picker squeal with delight. Berry pickers consistently emphasized productivity as an important feature of a huckleberry patch. Both where and how people pick huckleberries is ordered around the productivity of huckleberry patches. On the landscape berry pickers prioritize visiting specific patches that have been consistently productive in the past. Within a berry patch berry pickers target bushes or areas that are more productive and have high quality berries, Sherry Waites (2010) explains: “*our time to pick is limited too, so we usually maximize (it) by going where we know, or where we have had lots of berries in the past.*” Having an abundance of berries at a site directly impacts the efficiency with which berries can be picked, as it allows pickers to fill their

buckets quickly and with ease. Efficiency in picking is especially important for many of the serious pickers who, in a good year, may harvest over a hundred liters of berries.

The importance of productivity has led berry pickers to develop a variety of quantitative and qualitative metrics to measure and describe the productivity of a berry patch. These metrics include estimates of the volume of berries picked over a fixed period of time, the length of time a person can pick in an area without moving, and detailed accounts of the physical appearance of berries on the bushes in a patch. For John Mennie (2010) a berry patch is worth picking if he can get 7-10 berries for each sweep of his berry picker. He also measures the quality of the berry patch by how quickly he can fill a 4-liter pail. The rates at which people reported picking berries ranged from 1-5 L/hr, with 2 L/hr most frequently mentioned as good berry picking. Productivity of a patch has also been described based on how long a person can stay in one spot and pick berries before they have to search for a new picking spot. A lot of time can be wasted if a picker has to move around a patch to find the berries. Good picking means the ability to pick berries for a long time – 20 minutes to an hour – in one spot (Chris New, 2010; Bev Bell, 2010). Using these quantitative measures of productivity berry pickers are able to evaluate the relative productivity of patches between years or picking areas. These measures also help the berry picker to communicate about the quality of a berry patch with other pickers.



Figure 14. Picture of Bob Duthie's homemade huckleberry picker.

Qualitative descriptors are also used to portray the productivity of black huckleberry patches. Those who do not measure the rate at which they pick berries might instead describe being able to use both hands to pick berries straight into their buckets (Sherry Waites, 2010; Bev Bell, 2010). Ktunaxa Elder, Liz Gravelle (2010) remembered a site where the berries were thick: *“Boy, oh, you just couldn’t sit down without having to sit on them, that is how good it was”*. In years of high fruit productivity whole hillsides are described as appearing blue or black with huckleberry fruit (Bowen, 1988). Productive patches sometimes have berries so heavy that: *“the weight of the berries is bending the bushes over”* (John Mennie, 2010). These descriptors may lack the level of precision associated with the more quantitative measures of huckleberry productivity, but they can still elicit strong images of the abundance found in a “bonanza” berry patch.

Description of Berry Quality

“Big and dark. – That’s what qualifies as a good berry to me.” (Chris New, 2010)

“Ripeness. It is hard to get them just right – they can be a little too green or a little too ripe... it’s nice if they are that really deep purple and firm, sweet and juicy.” (Bev Bell, 2010)

Good huckleberries are: *“... a good eggplant color, a deep, dark (purple). They are big, juicy and flavourful.”* (Judy Daniels, 2010)

“Big ones – marble sized ... My dad would say that the black shiny ones have the best flavour.” (Gail Goyer, 2010)

“(Huckleberry) skin it is quite firm and they crack when you eat them. It is a very nice experience... not like (high bush blueberries) they are pretty soft.” (Bob Duthie, 2010)

The berry pickers I interviewed are connoisseurs of berry quality. They hold quality at equal importance with productivity in defining a good patch for picking huckleberries. Pickers seek out large berries that fill their buckets quickly. These berries should be fully ripe as indicated by the colour, sweetness and full flavour of the fruit (Figure 15). Juiciness is another highly sought after characteristic of a good quality huckleberry. During our interviews I asked berry pickers – *what are the characteristics or qualities of a good huckleberry?* A full ranking

and description of the factors berry pickers found to be important for defining quality huckleberries is presented in Table 2.



Figure 15. Black huckleberry (*Vaccinium membranaceum*) bush with berries at different stages of ripeness ranging in color from green to red to dark purple. The wrinkled, yellowing berry to the middle-right is infected by mummy berry (*Monilinia vaccinii-corymbosi*), a fungal infection that prevents berries from ripening and causes them to dry out.

Table 2. Free-list ranking and a summary definition from huckleberry pickers of the characteristics of a good huckleberry ($n = 15$)

Characteristic	A good huckleberry is ...	Frequency
size	a big huckleberry, one that is the size of a thumbnail or the top of your thumb (Fig 4.2). Bigger berries are also considered to have better flavor.	13
flavor	sweet, juicy, tart, and has a flavor that is incomparable with other berries. Juiciness and sweetness are the most important components of good flavor. Location is another component of flavor; some mountainsides, huckleberry patches, or even individual shrubs may produce better tasting berries than others.	12
color	<i>"dark, black, shiny ... the darker the better, and if they are shiny that is a bonus"</i> (GG). Berry color is an indicator of ripeness and flavor. A few pickers prefer the flavor of the less common huckleberry that is dark red when it is ripe.	11
juiciness	juicy. Juicy berries are big, firm and sweet, not shriveled-up, soft and dried out.	10
ripeness	dependent on the ripeness of the berry. A fully ripe berry has a deep, dark color, it is firm and at the peak of its sweetness. Ripe berries have the best huckleberry flavor which is important for eating fresh, making jam, pies and other uses. Both under-ripe and over-ripe berries are undesirable, yet many pickers make the mistake of picking huckleberries while they are still under-ripe.	7
scent	fragrant. Huckleberries have a unique smell. This smell can be used to detect patches of ripe berries.	5
firmness	firm. It is not too soft (overripe) or dry and shriveled (lack of moisture).	4
wildness	picked in the wild. Part of the flavor of a huckleberry is imparted on the berry by the landscape or wilderness where the berry grows. This quality of wildness is highly valued by long time huckleberry pickers. The taste of the berry would not be the same without the experience of traveling into the bush to pick the berries.	3
freshness	fresh. Fresh huckleberries have the best flavor and texture for eating, compared with frozen or canned berries.	2
nutrition	full of healthful antioxidants. <i>"What they call the black huckleberry is black all of the way through, and (the color) is good for so many things like brain function, immune system. ... Dad thought that this was what made grizzly bears and black bears so strong, (from eating) huckleberries."</i> (JM).	1
shape	round in shape, but some varieties are pear shaped. The berry shape does not effect the quality of the fruit itself.	1

GG = Gail Goyer, JM = John Mennie



Figure 16. Black huckleberry (*Vaccinium membranaceum*) fruit the size of a thumbnail.

The value of a huckleberry is held in the quality of the berry. Berry quality is primarily evaluated through visual appeal, scent and flavour. Visually a picker can measure the relative size and shape of a berry and vividly describe the rich color – a deep purple bordering on black. On a hot summer afternoon a trained nose can sniff out a patch of ripe huckleberries based on their scent. Through a taste test the tongue of a veteran berry picker can describe the flavour – a mix of sweetness and tartness. A ripe berry has the perfect balance of sweetness and tartness. The teeth and tongue can test for a firm, juicy berry. All of these qualities are best presented in berries that are fresh from the mountain. Freshness, flavour, colour, texture, and size are all standard qualities of fruit.

Hidden amongst these easily identifiable characteristics is a less tangible component of berry quality – wildness. For anyone who has picked their own huckleberries the mountain and forest are an integral part of a great tasting huckleberry. Some pickers would even categorize the high mountain forest as a part of the flavour of the berry - a quality detectable by the

experienced. During one of my interviews with a veteran huckleberry picker compared the flavour of a blueberry to that of the black huckleberry. He noted that although they look similar, *“(blueberries) don’t have the flavour, it is just not there in comparison. You just have to get (huckleberries) in the wild. And you have to suffer the climb or whatever to get there, even if it is a hot day.”* (Bob Duthie, 2010). This wild mountain flavour may be a combination of terroir⁴⁹, the actual experience of picking the berry from the forest, and the association with a deeper connection to the huckleberry that has been built over a lifetime. Many berry pickers mentioned particular berry patches or even areas within a berry patch where they found particularly tasty berries.

“Up at the ski hill (the huckleberries) taste different in different areas. Sometimes they will be quite bitter and you can almost tell from the leaves. If the leaves on a plant are red then I’m tasting the berries first because they might not be worth picking. ... Some just taste better (than others). ... Would that be from the acidity of the soil?” – (Judy Daniels, 2010)

“One of the best times I ever had was with my oldest brother and my sister. ... Well we got up there and it started to rain, and it was absolutely pouring. But we found an incredible bush, so my sister and I, we were the only ones who were still going to pick. We thought we don’t care if it is raining, we are not leaving these berries. So we went in and we’re sitting on this rock, and she’s on one side and I’m on the other picking away, and the rain is just dripping off of our hats and we were absolutely soaked and it’s probably the best time I have ever had huckleberry picking. Those were the best tasting berries.” (Gail Goyer, 2010).

“For me it is about going out in the bush for the whole day, and taking a picnic lunch and hanging out and having a great day. Coming home dirty and tired. I mean, where’s the fun in picking them in your backyard? ... I think that would change the berry. Then is it really a true wild huckleberry? ... It is not the same thing, to me.” – Bev Bell, 2010

Turner et al. (2011) have also found that berries and other wild plant foods gathered from mountain environments are preferred by harvesters because they have a concentration of flavour,

⁴⁹ Terroir is a term used to describe the unique flavour present in a food that results from a combination of geo-physical, climatic and ecological characteristics unique to a region or landscape. For more writings on terroir in food see Nabhan, 2012, or Jacobson, 2010.

preserve better, and are picked in the clean air, and beauty of the mountain top. In the study by Parlee et al. (2005) of Gwich'in berry harvesting they found that wild berries held important values of connection with the land and forest. Harvesting berries for the Gwich'in is both about accessing a higher quality fruit (compared with store bought fruit), and about connecting with land and with nature. The act of picking berries provided a sense of emotional, mental and spiritual wellbeing. For the berry picker the taste of huckleberries from the wild goes deeper than a familiar flavour, it may serve as a connection to the land and mountains where the berries have been picked. Even for those that can no longer go out to pick huckleberries wildness is still an important characteristic of huckleberry flavour. This deeper value, this connection to the forest and land, may be why huckleberries are requested by Ktunaxa Elders as a last meal (Robert Williams, 2011).

Black huckleberry is tied to the wellbeing of cultures of people, and these groups of berry pickers care about the health of the berry patch. Huckleberry pickers regularly observe the ecological factors that affect the quality of this fruit. Through years of experience and lessons learned from more experienced berry pickers, the pickers I interviewed knew many different indicators for finding the best quality huckleberries.

5.2.2 Berry Picker Description of Factors Affecting Berry Patch Quality

“How to find (huckleberries)? ... look under pine trees.”

(Gail Goyer, 2010)

“(Huckleberries) don’t just pop right up into your eyes. If you can find a bush where you can get in underneath the boughs of another tree or something sometimes you run into a good batch.”

(Bob Duthie, 2010)

“At the ski hill there are a lot of bushes growing up with little pine trees, so (the bushes) are right under (the trees) and those berries seem to taste better, you know. They are way more juicy and the berries grow bigger under the pines.”

(Judy Daniels, 2010)

“Usually you get a real mix of size of berries. Often times if you want the really big ones you look for ones that are growing under a tree or on the lower side in the shade, on the bottom. ... So, know where to look, and you can do pretty well.”

(Bev Bell, 2010)

Huckleberry pickers rely on a myriad of ecological signals to help them locate the high quality berry patches and berries discussed in the previous section. Pickers recognize that ecological features of the berry patch and surrounding forest affect the availability of huckleberries. Their knowledge is both unique to the individual berry picker and part of a larger understanding of berry ecology that underlies the stories shared about the berry patch. Through multiple tellings of the same story common themes emerge that speak of important patterns on the landscape. Much like the practice of checking in the shade of a small pine tree for good huckleberries, these commonly understood patterns serve as signals that regularly guide the decisions and actions of the berry picker. Serious berry pickers can identify and describe how numerous social-ecological factors impact the quality of huckleberry patches. From my interviews berry pickers identified a total of 32 variables they use when evaluating if a site is a good area for picking huckleberries (Table 4). The importance of these factors was ranked based on the frequency of mention across all interviews. Berry pickers also defined each variable and described how they influence the quality of the berry patch – especially the quality and availability of black huckleberry fruit (Table 3).

Table 3. Paraphrased definitions from huckleberry pickers of environmental characteristics affecting huckleberry shrub health and productivity ($n = 15$).

Characteristic	A healthy and productive huckleberry patch is found where...
Moisture	There is moisture at a site. Lush green sites with moss, a small creek or damp depression all indicate good moisture conditions for huckleberries. Having cover and protection helps huckleberry plants retain moisture.
Clear-Cut	There is an area that was clear-cut (in the past 3-10 years), and the trees and shrubs at that site have regrown to provide shade and protection for the huckleberry shrubs. This ideal successional stage lasts for approximately 5-8 years. Conversely, huckleberries do not grow well in young clear-cuts, as shrubs are unprotected. Some huckleberry pickers will not pick in areas that have been clear-cut.
Trees	Trees are present to provide shade and protection to huckleberry bushes. Trees help retain moisture and provide protection from extreme weather events. All sizes of tree are important for huckleberry shrubs. After a disturbance young conifers provide cover in the newly open forest. In mature forests both large trees and standing dead trees protect huckleberry shrubs.
Weather	The weather has been good for the health of the shrubs and ripening of the berries. In winter the depth and duration of snow cover is important for insulating plants against cold temperatures and hard frosts. Snow also provides moisture for the plants during the spring and early summer months. A wet spring or summer showers influence berry size and sweetness. A hard frost in early fall or late spring can damage foliage, flowers and young fruit. A summer hail storm when fruit is ripe can damage the berries. Many of these impacts vary spatially depending on the other physical and ecological site characteristics. Sometimes the weather of the previous year will affect the quality and productivity of the berries found in a patch the following year.
Tree Density	The tree canopy is open to let through sunlight, but at the same time provides shade to help retain moisture & protect huckleberry shrubs from frost. In clear-cuts tree height is an indicator of the openness of the canopy. If trees are too tall (approximately 3.5-5m) the canopy is often too dense and huckleberry plants will decrease in their productivity.
Sun	Huckleberries have sunlight to grow and ripen their berries. Too much sun can dry out the berries, while not enough sunlight can harm productivity leading to no berries.
Shade	Huckleberries have a balance of shade and sun; shade is particularly important for berry quality, as it helps a plant retain moisture throughout the season. Shade is also an indication of protection or cover (see “trees”) for description.
Elevation	The elevation is higher than about 900 m. Above a certain elevation the climatic conditions are best for the growth and productivity of the huckleberry. Productivity at specific elevations varies both within the season and between berry seasons depending on the weather.
Streams	There is a stream or a creek that is irrigating the huckleberry shrubs.

Characteristic	A healthy and productive huckleberry patch is found where...
Huckleberry Shrub Health	Huckleberry shrubs look healthy (lots of green, lush leaves). Unhealthy huckleberry shrubs have leaves with yellow spots or signs of turning red early (before fall).
Fire	There was a fire that burned the area sometime in the past, and the huckleberries have re-grown and reached productive maturity. The Ktunaxa use to burn small areas to encourage constant productive new growth. Now people pick in old wildfire burns where huckleberries have returned.
Huckleberry Shrub Maturity	The huckleberry bushes are big (mature) enough to bear fruit, but have not grown too tall that their productivity has declined. Shrub height can be a signal of shrub maturity. It can indicate some aspect of the environment a shrub is growing in (i.e. moisture, sunlight, etc.). In general pickers prefer productive sites with taller shrubs.
Indicator Plants	Plants associated with huckleberries also grow, indicating the right conditions for huckleberries (see Table 5.4). Plants can also indicate areas where huckleberry will not be found.
Temperature	The shrubs have not been frozen in winter and where the temperature has been warm enough to ripen the berries but not too hot, causing the berries to dry out in the spring and summer.
Logs & Dead Trees	Huckleberry shrubs are growing close to, or out from under, the shade and protection of a fallen log, an old stump or a standing dead tree.
Windfall	Huckleberry shrubs can hide under and are protected from extreme weather by windfall.
Untouched Huckleberry Plants	No one has been picking berries. In an untouched patch other people haven't damaged the bushes by trampling on them or by over picking, and there is no one competing for the berries.
Topography of Patch	The local physical features of a site creates microclimates by collecting moisture or influencing sunlight availability in ways that increase berry productivity or quality.
Steepness	Huckleberry bushes grow on steep slopes.
Season	The time in the year when the berries growing at a site have ripened (generally August to September, even as early as July or as late as October). Between years and between sites within a year the timing of areas that are best for finding ripe huckleberries will change.
Forest Openings	A gap or opening in the forest lets through enough light to produce good berries.
Underbrush	The huckleberry shrubs are protected from extreme weather and drought by shrubs and tall plants of other species.
Stand Age of Forest	The trees and shrubs in a stand have reached a certain stage in succession after a disturbance. This is marked by the height of the trees and/or shrubs, and corresponding productivity of huckleberry bushes. Exact age varies greatly depending on specific site conditions and the nature of the disturbance.

Characteristic	A healthy and productive huckleberry patch is found where...
Soil	Soil is acidic, and has lots of organic matter to help retain moisture. Soil is also important as a place for beneficial relationships to form between huckleberries and other forest species.
Aspect	Aspect combines with seasonal weather conditions to create a climate that is good for the huckleberry shrub. The aspect that produces the best berries varies from year to year; however, in general N facing aspects are often the best (NE facing in years when berries are scarce elsewhere).
Edge of Forest	The forest borders a disturbed area (i.e. clear-cut, wildfire burn or road). Good berry picking is found in the strip of forest adjacent to the disturbance.
Bears	There are signs that bears have been eating huckleberries.
Moss	There is enough moisture for moss to grow.
Rock	There are large rocks that absorb and reflect heat increasing local temperature for the surrounding huckleberry shrubs.
Pollination	Huckleberry flowers have been pollinated by bees.
New Huckleberry Growth	Huckleberry shrubs that have been disturbed, are growing back and have reached a productive maturity.
Mulch	Leaf litter from trees creates a layer above the soil that helps retain moisture.

Table 4. Relative importance of the 32 environmental characteristics affecting huckleberry health, as mentioned by huckleberry pickers ($n = 14$).

Ecological Variable	COUNT
Moisture	14
Forestry Clear-Cut	14
Trees	13
Weather	12
Tree Density	11
Sun	10
Shade	10
Elevation	9
Streams	8
Huckleberry Shrub Health	8
Past Wildfire	7
Huckleberry Shrub Maturity	6
Indicator Plants	6
Temperature	6
Logs & Dead Trees	5
Windfall	4
Untouched Huckleberry Plants	4
Topography of Patch	4
Steepness	4
Season	4
Forest Openings	4
Underbrush	4
Stand Age of Forest	3
Soil	3
Aspect	3
Edge of Forest	3
Bears	2
Moss	2
Rock	1
Pollination	1
New Huckleberry Growth	1
Mulch	1

Tables 3 and 4 ranked the importance of environmental characteristics that affect berry shrub health and productivity. One of the characteristics was indicator plants, these are plants that frequently grow with huckleberries and indicate to berry pickers that an area contains the right growing conditions for huckleberries. Berry pickers also identified plants that indicate when an area is not good for growing huckleberries. Table 5

contains a list of species mentioned by berry pickers, including a paraphrased description of what each species indicates. This list is presented alphabetically, there was not ranking of importance for indicator species.

associated species

Table 5. Species that indicate the presence or absence of huckleberry habitat as identified by berry pickers.

Species	What it indicates
Alder (<i>Alnus</i> sp. Mill.)	Alder grows in the same open forest habitat where huckleberries are found. Although the two can be found growing together, when the alder dominates a site it affects the abundance of huckleberry bushes. If alder is really thick most berry pickers interpret it as a sign of poor huckleberry habitat.
Bear (<i>Ursus</i> spp.)	Bears really like huckleberries. Any sign of bear activity in an area during berry season is a good indication huckleberries are in the area.
“Bearberry” or black twinberry (<i>Lonicera involucrata</i> (Richardson) Banks ex Spreng.)	Bearberries grow in damp forest areas, and are an indicator of moist conditions. They grow in habitat that is good for finding huckleberries.
Beargrass (<i>Xerophyllum tenax</i> (Pursh) Nutt.)	Beargrass grows in open forest habitat where huckleberries can be found growing. It can serve as an indicator of a huckleberry patch.
Conifers	Coniferous trees in a huckleberry patch are good indicators of areas for finding berries of high quality. The shade and protection provided by larger trees is important for creating microclimatic conditions ideal for huckleberry fruit production. In areas that have been planted after a clear-cut ideal berry productivity is reached when the conifers have grown to approximately 1.5-2.5 m in height. If trees are too dense at a site this can indicate a poor area for picking berries.
Cedar (<i>Thuja plicata</i> Donn ex D. Don)	Usually huckleberries are found growing at a higher elevation and under more open conditions than those of cedar dominated forests. There was one report of huckleberries growing in cedar forests. (Gail Goyer, 2010)
Pine (<i>Pinus</i> sp. L.)	In any berry patch pines indicate good areas for finding quality berries for the same reasons mentioned for conifers in general.
Ponderosa pine (<i>Pinus ponderosa</i>)	Ponderosa pines grow at lower elevations and under drier conditions than huckleberry. They indicate areas where huckleberries will not be found growing.
Spruce (<i>Picea</i> sp. A. Dietr.)	Spruce trees indicate good areas for finding huckleberries. Both full grown and smaller trees provide the same benefits mentioned above for other conifers.

True fir (<i>Abies</i> spp.)	True firs are always an indicator of good huckleberry sites, especially later in the berry season. They provide the same benefits outlined above for all conifers.
Falsebox (<i>Paxistima myrsinites</i> (Pursh) Raf.)	Falsebox is commonly found growing in huckleberry fields.
Fireweed (<i>Epilobium angustifolium</i> L.)	Fireweed grows under the same disturbance created forest openings where huckleberries thrive. It often grows in areas that have burned, and indicates a certain stage of vegetation recovery after a fire. Fireweed is used as an indicator for finding huckleberry patches.
Grasses (Poaceae)	If it is a really grassy area this indicates that it will not be a good area for huckleberry bushes.
Grouseberries (<i>Vaccinium scoparium</i> Leiberg ex Coville)	Wherever grouseberries are found growing it is a good sign that huckleberries are growing somewhere close by.
Kinnikinnick (<i>Arctostaphylos uva-ursi</i>)	It is not common to find kinnikinnick growing in areas where you find huckleberry.
Moss	Moss is a good indicator of moisture at a site and berry pickers notice that mossy areas produce bigger huckleberry fruit. In dry years these areas may be more productive than sites without moss.
Mountain ash (<i>Sorbus</i> spp. L.)	Mountain ash can be found growing in huckleberry fields.
Saskatoon berry (<i>Amelanchier alnifolia</i>)	Saskatoon berries are rarely found growing in the same areas as huckleberries. Saskatoons indicate that the area is likely not suitable for huckleberries.
Thimbleberry (<i>Rubus parviflorus</i> Nutt.)	Thimbleberry requires some of the same growing conditions as huckleberry.
Wild raspberry (<i>Rubus idaeus</i> L.)	Wild raspberries do not grow together with huckleberry, but they are a good indicator that huckleberry may be growing a little higher up the mountain. Patches of wild raspberries may even border fields of huckleberry as they both grow well in open forests.

As a comparison in the scientific literature the following are species were found growing in association with black huckleberry. In terms of overstory trees, black huckleberry is often found growing in association with true firs (*Abies* spp.), hemlocks (*Tsuga* spp.), lodgepole pine (*Pinus contorta*) and Engelmann spruce (*Picea engelmannii*) (Minore, 1972; Minore et al., 1979; Barney, 1999). Seedlings of these species are found in the understory. Models by Burton et al. (2000), suggest the most productive berry stands are found in subalpine, true fir dominated forests, while lodgepole pine is a known invader, encroaching on once open huckleberry meadows, and resulting in decreasing berry production (Minore 1972 and 1975). In the understory black huckleberries are often found growing with beargrass (*Xerophyllum tenax*), birch-leaved spiraea (*Spiraea betulifolia* Pall.), false azalea (*Menziesia ferruginea* Sm.), falsebox (*Paxistima myrsinites*), fireweed (*Epilobium angustifolium*), grouseberry (*Vaccinium scoparium*), mountain ash (*Sorbus* spp.) and oval-leaved blueberry

(*Vaccinium ovalifolium* Sm.) (Minore, 1972; Minore, 1975; Minore and Dubrasich, 1978; Martin, 1979; Minore et al., 1979; Minore, 1984; Barney, 1999; Barney, 2005). For the East Kootenays, black huckleberry is also commonly found growing in association with alder (*Alnus crispa* (Aiton) Pursh), elderberry (*Sambucus* sp. L.), swamp gooseberry (*Ribes lacustre* (Pers.) Poir.), fly honeysuckle (*Lonicera utahensis* S. Watson), prince's pine (*Chimaphila umbellata* (L.) W.P.C. Barton), thimbleberry (*Rubus parviflorus*), and willow (*Salix* spp. L.) (Keefer Ecological Services, 2011). Amongst understory species beargrass and mountain-ash are the most commonly cited competitors with the black huckleberry (Minore and Dubrasich, 1978; Barney, 2005), but Martin (1979) found that an abundance of competition from any species or combination of species at a site will negatively affect black huckleberry productivity.

The huckleberry pickers I interviewed mentioned most of the species listed above. They did not mention: hemlock, spiraea, false azalea, other *Vaccinium* species, elderberry, gooseberry, prince's pine, or willow. Cedar was not found mentioned as associated with black huckleberry in the scientific literature. This may be because this association is rare⁵⁰. Berry pickers may have lumped hemlock in with "conifers" or any of the evergreen tree species because hemlock was relatively rare, found only in a few plots (Keefer, 2011). The other species of *Vaccinium* that were not mentioned by the berry pickers are all shrubs of a similar size to the black huckleberry and likely lumped in with the black huckleberry rather than being seen as a separate species⁵¹ growing in association with black huckleberry. The other five species not mentioned by the berry pickers are primarily shrubby species. There are a few potential explanations as to why these species were omitted. These species may not be common in the areas where the berry pickers I interviewed pick berries. Another reason could be that the berry pickers simply overlooked or forgot to mention these species. Interviews were conducted indoors. There may have been more species mentioned had interviews been conducted in a berry patch. Or finally, the berry pickers I spoke with may not be familiar with these species.

In interviews berry pickers identified specific criteria they use to evaluate the quality of a berry patch. They provided vivid descriptions of the properties of a good quality huckleberry, and berry pickers listed many different indicators for finding the best huckleberry patches. Their answers to questions about berry quality and patch quality all included rich, detailed accounts of past picking experiences that illustrated the usefulness of the indicators they identified.

⁵⁰ The berry picker who mentioned cedar commented on its rareness noted: "Usually the huckleberries are found higher than cedar. Or maybe I've never really noticed cedar before." (Gail Goyer, 2010).

⁵¹ See chapter 3, section 1 for a discussion on lumping different species of *Vaccinium* under "huckleberries".

5.3 Finding the “Bonanza” Patch – Descriptions of Huckleberry Ecology

“You have to map out where the most abundant berry patches are in an area and focus on those. As you pick berries you observe little things and begin to analyze where the good berries grow and draw conclusions as to where you will find the best berries and what the best berry habitat is made of.” (Fred VanderMollen, 2010)

Seasoned berry pickers map out good berry picking areas, both across the landscape and within a patch, and focus on those areas when determining where to pick huckleberries. They use up to 32 individual variables as signals that help them to quickly evaluate the potential quality of the berry patch (Table 4). For the berry picker each of these variables works in combination with the others to create the right conditions for finding a “bonanza” berry patch. As signals they are part of larger environmental and social systems that define the nature of the berry patch, including: the natural landscape patterns, local ecological systems (including forest structure and disturbance events), climate and weather events, and the social and cultural systems that shape human behaviour in the forest and berry patch. Huckleberry pickers’ understanding of how the variables they identified relate to these larger systems provides a different perspective on berry patch productivity and quality. The individual variables mentioned are signals to the berry pickers of how the berry patch and/or individual berry shrubs will respond to growing conditions or disturbance events. As a patchy resource black huckleberry availability varies not only spatially but also over time. The importance of each variable, and what type of forest habitat makes for good berry picking varies seasonally, interannual and on larger timescales. In the following section I explore the interrelationships of the variables berry pickers use to evaluate berry patch quality.

5.3.1 Landscape Patterns

“You tend to get better (berry) picking at higher elevations. There’s always more at higher elevations.” (Bev Bell, 2010).

“Huckleberries are hard to pick because they grow on steep terrain and don’t grow in places that are easy to access.” (Mel Downing, 2010).

“I’ve picked berries holding on with one hand and picking with the other... and if you happen to drop your bucket under those conditions the berries are gone.” (Bob Duthie, 2010).

Underlying all other environmental and social characteristics that shape the berry patch is landscape. In the East Kootenays huckleberries grow in the subalpine starting at 900 + meters, on mountains that can be rugged and steep (Keefer et al., 2011). The berry pickers I spoke with recognized this and evaluated the ability

of the forest landscape to support huckleberries by considering: elevation, steepness, aspect (or exposure), streams, topography, soil, and rock. As Fred observed, good berry picking sites are found sporadically both within the berry patch and across the larger forest. Understanding the relationship of landscape to black huckleberry productivity is an important foundation for developing a sense of where good berry patches are located.

The most commonly referenced landscape characteristic was elevation. Berry pickers observed that the ideal climatic conditions for huckleberry growth only occur above a certain elevation. The associated species found growing with huckleberry also reflect the climatic conditions that come with elevation.

“You can always tell when you are going up (the mountain) that it changes. Like there’s different (plant communities)... When I look for huckleberries I always find a place where it is more protected and thicker, and green. Huckleberries don’t grow out in the open, you know, where it is dry.” (Liz Gravelle, 2010).

“Usually where there are Saskatoons you wouldn’t find huckleberries, typically. I mean, there might be the odd bush, because there are Saskatoons all over, eh.” (Gail Goyer, 2010).

Some berry pickers also use elevation in combination with season and climate to map out when huckleberries might be ready during specific times of the year. Within a berry patch elevation can mean picking ripe berries over a longer period of time. John Mennie (2010) described one large patch where people were able to continually pick berries over the season:

“What (the logging company) did there was a clear-cut from Kootenay Lake, right up the mountain, and so as the berries ripened at each elevation the guys were working their way up (picking). When we got there I would say we were at 5,000 feet.” Other berry pickers apply this same principle across the larger landscape taking advantage of the differences in elevation between berry patches to find ripe berries at different times over the course of the season. Berry picker Judy Daniels explained how she takes advantage of this: *“I start at the ski hill. That is where the season starts, and then St. Mary’s is probably the middle, and then quite often I will go up Lumberton in early September. Usually I date my bags of berries, because I’m curious, when did I pick these? ... You can go (berry picking) in to September, and I know last year we picked and it was in to September.”* (Judy Daniels, 2010). Unlike John Mennie’s site where the berries were all exposed to the same aspect. Judy’s sites are across a larger geographical area and a more complex combination of landscape features that may be contributing to the differences in when the huckleberries are ripening.

Aspect is another landscape feature affecting huckleberries. In my interviews aspect was always mentioned in relation to weather. Unlike elevation where the biggest climate factor between different elevations would be temperature, for aspect – moisture and a longer snow pack were important factors. *“I’ve often wondered whether it made a difference which direction the slope faced. Mostly whether the weather would be better on one slope instead of another, especially in the spring when they are going to get frost and that.”*

...Seems to me a lot of slopes I've picked on are kind of facing east. East and north facing slopes are the slopes that the snow lasts the longest." (Norm MacLennan, 2010). One of the more serious berry pickers I spoke with takes aspect seriously and uses it to his advantage to find good berry picking locations: *"What I find is that I pack a compass when I go berry picking and it is amazing how often you will find just the NE exposure will have berries, you can come along this flat and if you don't go into this little draw at just this right aspect you won't get berries."* (John Mennie, 2010). At a landscape level elevation and aspect have a big influence over where berry patches can be found, when berries will ripen, and the quality of the berry-picking site.

At the level of the berry patch, the local topography, or shape of the land, affects where moisture is found within the berry patch, including where streams travel through a site. In drier years moister parts of the berry patch are where the good huckleberries can be found. Moisture is one of the most important variables mentioned by huckleberry pickers for finding good berries.

You find some of the best berries *"where there is a suspected creek bed, or where the water runs down the hill. Sometimes you go down in to a groove and (the huckleberries) may have had more water because the rain has come and run off the top parts down to that area, that makes them grow better."* (Bob Duthie, 2010).

"If there is an area with moisture or water sometimes you will find really nice berries in that area. You may be picking over on a (cut)block and see that there is an area that has a creek, and you go over there, you may find better picking." (Bev Bell, 2010).

"Sometimes we have stopped at a creek for a drink... There would be a really nice little patch there, and we would sit there for an hour and never move, just pick berries. Like this one place was shady, but there was a creek running down, there were bigger trees with lots of shade. They were really big berries and lots of them." (Jim Sherret, 2010).

In the dry rocky mountain trench environment of the East Kootenays dry summers are common. Landscape features that signal water are important, and moisture was mentioned by all of the berry pickers I interviewed. The underlying landscape at all levels has significant influence over moisture within the huckleberry patch, however, landscape alone does not determine site moisture. In addition to the physical landscape berry pickers look at how forest structure shapes local microclimates, and affects berry productivity and quality.

5.3.2 Forest Structure

"If the trees are really growing close together you are not going to get good (huckleberry) bushes or good picking, and you may not even have many bushes. There has to be openness. You want some space. You need an open forest more than a really dense (forest). If it is too dense you are not going to get (huckleberries). ...

sometimes the shade of the canopy is actually where you find the nice (huckleberries) if (the canopy) is fairly open. You have to have that room, because you have to have light.” (Bev Bell, 2010).

“The best place to find berries is up on an old clear-cut or up on an old burn that has gone to a certain stage of succession. Once the trees get up too high and the brush gets up too high they shade the berries out. There’s about 5-8 years when a patch is really good after a burn or a clear-cut. It takes a while after the clear-cut or burn before the berry bushes develop but then you have 5-8 years with good picking.” (John Mennie, 2010).

Forest structure is a combination of variables that are indicators of what balance of sunlight and shade or protection is available to huckleberry.⁵² Some of the variables berry pickers described are indicators of past disturbance events that have opened the canopy while others indicate a need for disturbance to alleviate too much shading or high levels of competition from trees or other shrubby species. Other variables describe forest structures that provide important protection and shading to huckleberries where a site is too open (*i.e.*, in a clear-cut). In their evaluation of forest structure when berry pickers look at signs of forest disturbance (including clear-cuts, past wildfire, windfall, forest openings), tree density, shade, indicator plants, logs and dead trees, the type and density of underbrush, forest stand age, and forest edges. These characteristics build on the existing landscape to create conditions for finding productive huckleberry patches.

The largest factors that have shaped forest structure both historically and contemporarily are the forest stewardship and management decisions that humans have made. For the berry pickers that I interviewed they were not part of the contemporary forest stewardship decision-making process, but their knowledge of where to find huckleberries on the land is reflective of forestry decisions and practices that have been made over the past 50-100 years. Clear-cutting has been a major disturbance shaping forests across the landscape. The importance that berry pickers place on the benefits of cover and protection that small trees provide to huckleberries may reflect the prevalence of dry, open clear-cuts. Many berry pickers I interviewed mentioned looking for huckleberry shrubs under pine trees or hiding under the boughs of another tree. The title of this chapter refers to the importance of shade and protection for finding good berries. No one specifically listed protection as a variable, but it is used frequently as a descriptor for many variables. Protection can be linked to: moisture, trees, weather, shade, logs and dead trees. Many of these are structures that provide protection and are part of an ideal forest structure for huckleberries.

In contrast berry pickers who pick in more mature, old growth – open forests highlighted the importance of sunlight for the sites where they pick berries. *“If you watch how the sunshine goes down the mountain you can actually follow the trail, the berries will follow the trail of sunshine.”* (Gail Goyer, 2010).

⁵² In the scientific literature the right balance of sunlight and shade for huckleberry productivity was found with a minimum of 10% cover (Burton, 2001), and with huckleberry productivity started to decline above 30-50% cover (Stark and Baker, 1992; Martin, 1996; Barney, 1999; Burton, 2001).

“You find (huckleberries) on the hillside where the sun is shining but they are good in where there is some shade – eh. That is what I have found. If you go in to a shady spot you can find some nice berries in there.” (Jim Sherret, 2010).



Figure 17. Sunshine streaming in through openings in the canopy of a mature forest on to huckleberry plants in a patch near Cranbrook, British Columbia.

Edges or the boundaries between a forest and large disturbance areas – such as a clear-cut - are another place where berry pickers find that good balance between sunlight and shade or protection. As berry picker Bev Bell (2010) observed: *“(at) that edge of the cut block, you might find really good picking there, like bigger berries.”* Similar to a disturbance edge, some berry pickers target areas of patchy disturbances within a forest. They look for areas where natural disturbance events, such as windfall, have opened the forest to provide a balance of sunlight and protection. *“We always looked for the windfall areas, where there would be trees down, and you could get up and under. (Huckleberries) seemed to grow better there then out in the wide open.”* (Sherry Waites, 2010). Windfall provides a good balance of openness and shaded protection. Shaded protection is emphasized most by berry pickers who pick in open areas such as clear-cuts, old burns, ski hills and transmission line corridors. These types of forest disturbance can open huckleberries to the hot, drying sun in the summer, hail from thunderstorms, and frosts and freezing during colder times of the year. This exposure to the elements creates a climate that can be equally as damaging to berry productivity as a forest that is too dense

and has shaded out huckleberries. When picking berries with Mel Downing (2010) he explained the importance of having cover in a disturbed area. Mel explained that trees hold moisture in the forest while in more open areas moisture is lost and often the berries dry out. Tree cover protects huckleberries from frost and hail, and shaded bushes (such as those growing under windfall) have bigger berries. Other berry pickers I spoke with supported Mel's observations:

"When it is too open (the huckleberries) dry out too fast. The bushes go all red, and they (the berries) shrivel up and get soft." (Sherry Waites, 2010).

"Sometimes when there are no trees around (the berries) have a tendency in the hot weather to dry up. (This happens in clear-cuts, but) ... after a couple of years, you're getting trees growing up and brush and that sort of thing, it protects (the huckleberries)." (Norm MacLennan, 2010).

Turner et al (2003) observed that humans have been taking advantage of the increased productivity and species richness that occur at ecological edges for thousands of years, and cite subalpine forest edges as an important ecological edge for indigenous peoples of the interior of British Columbia. They report that this use of edge habitat was exploited, and that edges were actively created and maintained by indigenous peoples (Turner et al., 2003). Historically traditional burning practices were reliable ways to create disturbance in the berry patch to ensure consistent productivity of huckleberries. Ktunaxa Elder Liz Gravelle mentioned that when she was young she remembers Elders speaking about burning berry patches, and the importance of controlled burns for maintaining productivity in a berry patch. *"You take a place where there has been a fire or something, and you get the new growth. When they are about that high they produce lots of berries. Once they get growing too tall they don't produce the big berries any more. That's why in the old days they use to burn sections, you know. Not big large areas, (just smaller sections) so there would always be something new coming up."* (Liz Gravelle, 2010). With policies of fire suppression has come the loss of this traditional practice and the loss of the knowledge of how to burn the berry patch. The recognition of the importance of this maintenance practice is gone, remembered only by Elders. Despite the loss of traditional burning practices, burning as a result of wildfire was mentioned by half of the berry pickers as a signal of a good huckleberry patch.

"Places where there has been fires we seem to find better berries for a couple of years, and sometimes they are just gone after a couple of years." (Sherry Waites, 2010).

"My husband used to work in the States logging, and we camped up there where they logged off that one place, and kind of burned. I don't know if there was a fire, but... The first year we went up there the year after the new growth, and there were just berries all over. We went back up there a couple years later and there was nothing." (Liz Gravelle, 2010)

"I don't know whether it's best (for huckleberries) after a clear-cut logging or fire. I harvest (huckleberries) in both types." (Norm MacLennan, 2010)

"Like the best place to find berries is up on an old clear-cut or up on an old burn -- that has gone to a certain stage of succession. Once the trees get up too high and the brush gets up too high they shade the berries out."

There's about 5-8 years (of good berry picking)..." (John Mennie, 2010)

At present clear-cut logging and unplanned wildfires are the most common types of disturbance with the forests of BC including those around Cranbrook. Over the past century clear-cut logging has replaced fire as the primary forest disturbance. Berry pickers listed both of these types of disturbance as an important variable for evaluating patch productivity. Berry pickers generally use signs of past disturbance as a signal of good berry picking, carrying on the tradition of using edges documented in Turner et al., 2003. Many berry pickers see the shorter-term benefits of a clear-cut as having a similar maintaining property as wildfire. Both John and Norm mentioned that they pick berries both in old burns and in old clear-cuts. Another long time berry picker, Fred VanderMollen (2010), noted the importance of logging for creating berry habitat: *"if it wasn't for logging you wouldn't be able to get into areas to pick and there wouldn't be huckleberries to pick"*. Another berry picker mentioned to find good huckleberries *"you want elevation, and lots of times cut blocks, if there has been a clear-cut... not brand new ones, you want older (clear-cuts)." (Bev Bell, 2010).* Gail Goyer (2010) spoke more about the importance of timing after disturbance: *"After they have logged it usually destroys (the huckleberry patch) for a bit, but then they come back."* In the interviews berry pickers observed that clear-cuts that have had 3-10+ years to recover where the trees have grown back in and are a meter or two tall, and where the huckleberry shrubs have re-established themselves provide berry pickers with 5-10+ years of good berry picking. Over time the trees in these cut-blocks grow in too thick and the productivity of the berry shrubs declines. A few berry pickers told me stories about good berry-picking sites where the forest had grown in too thick, and the productivity was lost.

Clear-cutting is not seen by all as a benefit. A few of the berry pickers I spoke with will not pick berries in clear-cuts.

"We don't usually go to harvest in clear-cut areas. We go to a little bit thicker areas. ... If it is a clear-cut area we don't even go look." (Sherry Waites, 2010).

"If it is clear-cut the (huckleberries) are not as good. The plants and the berries are smaller." (Gail Goyer, 2010).

Ktunaxa Elder Liz Gravelle (2010) told me she picked in clear-cuts, but found low reliability and quality of berries from these areas. *"Even when the berries started coming back in they didn't last too long. They dried up, too dry."* One of the berry pickers I spoke to told me that he doesn't pick in clear-cut areas, but will pick huckleberries from areas that were high grade logged in the past: *"One time me and my brother were up there where there were some big dead trees. They had been there for years... That area had been logged, oh seventy years ago, in the early 1900s. Now there are big trees there, but I couldn't believe the berries beside them big dead logs."* (Jim Sherret, 2010).

Berry pickers pay special attention to the structure of the forest when evaluating areas for good berry picking. They have detailed understanding of how different disturbances alter forest structure to create good berry picking conditions and what changes over time can lead to a decline in berry productivity. Berry pickers also look for patch level structures to help them find good berry-picking sites.

5.3.3 Climate and Weather

“The growing season is generally late July to the beginning of September. ... Getting close to October (the huckleberries) start to dry out. After that they get frozen and that will eliminate them.” (Bob Duthie, 2010).

“One year there is an abundance, the next year there is nothing.” (Sherry Waites, 2010).

“It is unpredictable. You have good seasons and bad seasons.” (Bob Duthie, 2010).

The local climate and seasonal weather conditions are ephemeral yet constant variables important for black huckleberry productivity. Weather both regionally and locally combines with landscape and forest structure to create the microclimates that huckleberry pickers have learned to identify and target when out picking huckleberries. Berry pickers identify and understand the importance of moisture, sun and temperature on the development of ripe, juicy berries. The relationships between landscape or forest structure and weather were highlighted in the previous sections. Landscape and forest structure are spatially fixed variables that remain relatively consistent from year to year, while climate and weather are temporal, changing year to year, and shifting across larger time scales. Year to year, and within a season, weather is carefully tracked by berry pickers. Seasonal weather and even specific weather events are regularly discussed by berry pickers when evaluating if it is going to be a good year for berries.

Weather is the most important factor that berry pickers cite for determining whether it will be a good berry picking year and which site characteristics will be important for finding good berries. For example in dry years more protected and shadier sites will have better berries, while in cooler, wetter years you may find good berry picking in more open and sunnier locations.

“I knew (the huckleberries) were ready and I thought I had time, and that hail storm came and destroyed the ski hill berry crop last year.” (Judy Daniels, 2010).

“Last year I was directed to an area that was supposed to be hugely abundant the year before and we drove and drove and drove and found nothing. So it is hit and miss. ...It seems to go in a series, where you have a couple of good years, but I think that it depends if it is too wet and not enough heat. It is hard to say. Sometimes one place has it one year, and the place we usually go had nothing last year, and then a place we never heard of had lots...” (Sherry Waites, 2010)

“Huckleberries are such a particular plant. ... One year it might be good here, and then there is nothing there for a couple of years in a row.” (Gail Goyer, 2010).

“Every year the climate is a little bit different, and some years are just better than others depending on precipitation, temperature or you get a latter frost. If the berries are starting to come on and then you get a frost in May – there you go, you’re not going to have much of a year.” (Bev Bell, 2010).

“I’ve never figured out the seasons and why we get a good season and a bad one, except it could be a late frost kills the blossoms or something. Or it is too dry... (and the berries) dry out before they mature. It is hard to tell.” (Bob Duthie, 2010).

Shifting weather conditions within a season, within a year, or from year to year makes huckleberries a patchy and unpredictable resource. Berry pickers have developed a diverse and long list of variables for finding productive berry patches that accommodate the inter- and intra-seasonal variations in berry productivity. To successfully locate a bonanza patch berry pickers require an understanding of this complex interplay between landscape, forest structure, weather and the huckleberry patch. For this same reason it is important to have a diversity of habitat types where huckleberries can be found to ensure a successful berry harvest under a variety of conditions.

5.3.4 Comparing Models for Berry Productivity

As noted previously, my research found 32 different environmental variables identified by berry pickers as influencing berry productivity. When considering how variables work together to find a “bonanza” berry patch, I found that these variables are small components of a more complex berry patch. They combine in a diversity of ways to create a diversity of berry patch types across the landscape. In a similar study on the local ecological knowledge of bakeapple (*Rubus chamaemorus* L.) it was found that berry pickers knowledge correlated trends in bakeapple productivity and fruit size with complex combinations of annual weather patterns and broad habitat types (Karst and Turner, 2011). Broadly berry pickers are keen observers of habitat and weather, and from observations of both they learn to predict where to find the best berries from year to year depending on weather events and habitat types.

In his research on traditional Gitxsan and Wet’suwet’en huckleberry picking sites in northwestern British Columbia, Trusler (2002) found that berry picking sites included a complex diversity of sites that did not fit easily in to an empirical model of site conditions for ultimate berry productivity. The diversity of ecological variables Trusler identified meant some sites varied significantly from what had been typed as an “ideal” huckleberry site in an earlier study by Burton (1998). Trusler (2002) found that low elevation sites favoured cool northeastern aspects while high elevation sites had “warmer” aspects. These traditional berry-picking sites showed a sophisticated understanding of what huckleberries require to thrive over a complex diversity of

conditions. In my interviews I found similar complexity in the traditional ecological knowledge of the berry pickers in the East Kootenays.

Listing the factors identified by berry pickers as important for finding a good berry-picking site illustrates the diversity of variables considered by berry pickers, but it also decontextualizes these variables from the specific set of conditions that give them their importance. This section attempts to put the long list of variables in to the larger context of how they interact to create a productive berry patch within the context of the East Kootenays. Understanding the contextual relationships brought forward in my interviews and in the results of Trusler's research is important both for developing more accurate and robust models of black huckleberry productivity and for providing important insights into how forest managers can better interpret the variability found within scientific models of huckleberry productivity. For example the scientific literature places a range between a minimum of 10% shade (or canopy cover) (Burton, 2001), to maximums of between 30 and 50% (Stark and Baker, 1992; Martin, 1996; Barney, 1999; Burton, 2001) as ideal for huckleberry productivity. In order to successfully apply those ranges to a site prescription for selective logging or a restorative forest thinning there needs to be consideration of the site-specific landscape patterns and existing forest structures. TEK of huckleberry pickers reflects the practical, on the ground, experience with huckleberry wellbeing that has the potential to help guide the application of scientific models of berry productivity for use in forest prescriptions.

5.4 Conclusion

Huckleberry pickers apply detailed criteria for evaluating the quality of huckleberries and huckleberry patches, and what factors are important for a good huckleberry-picking site. They have unique and complex understandings of the environmental factors influencing berry health. With this knowledge berry pickers identify and respond to the ecological factors that affect the quality, health and availability of black huckleberry fruit in where and how they pick huckleberries. I found that berry pickers identified over 30 unique signals they watch for to indicate a good berry picking area. I also found that there is no one set model or combination of factors for finding a quality patch – the ecological characteristics that are most important differ greatly over space and time. Berry pickers identified a diversity of approaches for applying their knowledge to their annual search for a good berry patch. This knowledge can help shape both the construction and interpretation of models of huckleberry ecology developed through scientific studies. Also embedded within the ecological knowledge of what makes a good berry patch are a series of values that define the overall quality of the berry picking site. Protection of these broader values is key to the longer term survival of the black huckleberry, and continued existence of good quality huckleberry patches.

CHAPTER 6 – BERRY PICKERS’ PERSPECTIVES ON THE ROLES OF HUMANS IN BLACK HUCKLEBERRY (*VACCINIUM MEMBRANACEUM*) WELLBEING

“It’s not the same, in them days there was no logging. No roads, or anything up there. It was just the Indian trail, just a horse trail. And nothing was destroyed. It was all in its natural state, and there were berries, lots of berries. Now, especially (in) those clear logging places, where they take all of the shade from the berries... (the huckleberry plants) don’t produce. (The berries) dry up. ... When we were young, my sister and I, we were in the back of Jaffrey, up there back in the mountains where our family always went (huckleberry picking). There were berries just hanging, great big ones just hanging. Nowadays you don’t see those kinds of berries any more because the bushes once they get too tall they don’t produce the big berries. ... Now (the huckleberries) get over-picked. Commercial pickers are coming in with picking machines, which not only take the crop, but also strip the leaves and ruin everything. ... I notice now that clear-cuts provide berries for the first few years after logging but then the berries dry up. The trees, they provide protection for the huckleberries.” – Ktunaxa Elder, Liz Gravelle, 2010

“We use to go (huckleberry picking) up Sand Creek all the time, down behind Galloway. There were lots of (berries) down there. Like I say, they are not near as good down there now, because the trees have grown up so much. ... (The province) could have taken a few trees out, but that will never happen. ...It wouldn’t be practical. I would think if they took away some of the canopy, (the huckleberries) would be more productive. But it wouldn’t be practical, financially. ... They don’t even manage for roads now. The roads are terrible, so I can’t see them managing for huckleberries.” – Norm MacLennan, 2010

For forest communities throughout British Columbia’s interior, black huckleberry (*Vaccinium membranaceum*) is a feature of the landscape that is recognized, created and maintained by local residents (Johnson, 2010: 72). Humans are part of the ecology of the berry patch, and the berry patch is an integral element of local culture. The health and wellbeing of the huckleberry patch can be directly linked to the physical health of the berry picker, and the wellbeing of the social and cultural practices that are tied to this species. For the black huckleberry there are many different forms of connection humans have with the huckleberry patch – from the berry picker to the provincial forest manager. In combination the local social and ecological systems, and all of the various types of human-huckleberry relationships comprise the larger social-ecological system surrounding the black huckleberry (see Figure 11 in chapter 4). Dolan et al. (2005) explain that changes in the wellbeing of an ecological or social/cultural systems are linked through a series of complex feedback loops. In this chapter I explore huckleberry wellbeing from the perspective of the group of humans most interested in the continued health of this species – the huckleberry picker. The first part of this chapter takes a closer look at the social and cultural dimensions berry pickers identify as shaping the core qualities of a good berry patch. Building from the qualities that berry pickers use for evaluating the wellbeing of the huckleberry patch, I explore the broad range of human-huckleberry relations including how these relationships affect the wellbeing of the black huckleberry.

In this chapter I specifically explore the question: *What impacts do humans have on the health of huckleberry patches?* from two different angles. First, I consider the direct impacts of berry picker actions within the huckleberry patch. This is followed by the impacts that BC provincial forest management practices – especially logging – have on black huckleberry productivity and quality. The direct interaction of berry pickers with berry patches can influence the health of the black huckleberry, past and current forest management practices have an even stronger influence over the health and location of good berry patches.⁵³ In this chapter I also discuss how the local stewardship of berry pickers and the forest management decisions around logging are part of informal and formal forest stewardship institutions that impact black huckleberry health. To investigate this question I present the perspectives brought forward by the berry pickers during my interviews. I also discuss how the scientific literature on black huckleberry ecology portrays human-huckleberry relations. Finally, using a social-ecological framework, I discuss what can be learned from this research that may better ensure the continued availability of black huckleberries in the East Kootenays and the forests of British Columbia (BC).

6.1 Within the Patch: Social and Cultural Dimensions of Selecting a Good Huckleberry Patch

Although most berry pickers use environmental signals to locate areas with high productivity and good quality berries, the selection of berry picking locations by berry pickers often considers social, cultural and economic factors, including cultural values, practices, unwritten rules, and behavioural etiquette. When asked about the qualities they look for in a good huckleberry picking site the berry pickers I interviewed identified five key values: productivity, fruit quality, accessibility, secret patches and openness (visibility/safety).⁵⁴ Berry picking practices are shaped around protecting these core values. These values are part of informal stewardship institutions, established to protect and enhance the wellbeing of the huckleberry patch.

In the following section I focus on what the values of openness, secrecy, and accessibility mean in practice. I have focused on these three values because they illustrate examples of human social and cultural relationships to the berry patch. I then explore the informal rules followed by berry pickers. I particularly draw on the traditional knowledge and insights shared by berry pickers to understand the informal systems that exist to ensure the long-term availability of black huckleberry.

⁵³ The ecology of huckleberry patch productivity is described in chapter 3, section 3.4. The changing influence humans have had on berry patch productivity is detailed in chapter 4, section 4.2.

⁵⁴ These values are broad categories used by berry pickers to evaluate wellbeing of berry patches. Detailed definitions of these values have been presented in chapter 5, section 5.2.1.

6.1.1 Berry Patch Openness

In selecting a good berry picking site, berry pickers described looking for open huckleberry patches. This site quality reflects a complex mix of social and ecological factors. Open berry patches are important to berry pickers because they offer a combination of sunlight (for berry productivity), good visibility (for safety), and accessibility. As Judy Daniels explains:

“I don’t think (forestry) has affected (huckleberries) really negatively, it has opened up areas. ... It has given access. ... I’ve certainly picked in places where they have logged. I’m more likely to go and pick in (a logged) area than to head to really thick, thick bush where I’m a little bit scared, because what is on the other side of that bush? ... We are talking bear country aren’t we?” (Judy Daniels, 2010).

Wasps, bears and cougars are common dangers that were frequently brought up during interviews with berry pickers. Having an open field or forest for picking berries increases the ability of berry pickers to detect these threats. For berry pickers open huckleberry patches are preferred because the berry picker has a clear line of sight and feels safer about being in bear country.

6.1.2 Secret Berry Patches

High levels of secrecy and careful guarding of knowledge of good berry patches is a widespread part of huckleberry picking culture. Standard etiquette follows the adage: never ask a berry picker about where they pick their berries. In my interviews berry pickers shared many stories about the levels of secrecy practiced by berry pickers. Sherry Waites told me that a friend shared with her a map of her favourite sites only because she had moved over 500 km away to the Okanagan. Another berry picker I interviewed told me that she will only share the locations of her best berry picking sites with her sons after she dies. These stories reflect a common trend wherever huckleberries are found growing.

In my review of the literature in chapter 4 (section 4.3) I discussed the connection of this behaviour to the shift from a system of berry patch ownership to a system of open access. Within the current forest tenure system in the East Kootenays secrecy over berry patch location is the only tool that berry pickers have for controlling who accesses berry patches, and for limiting potential damage that may be caused by other humans accessing a good huckleberry picking site. Of the main values identified by berry pickers secrecy is the value that most closely links to controlling direct human interaction with the huckleberry bushes. Good berry patches are described as having “untouched huckleberry plants”. The potentially damaging effects that humans can have on huckleberry bushes can be caused by over picking the berries and trampling on the bushes by berry pickers who do not know, or choose not to follow proper behavioural rules. Also when a lot of people know about a berry patch, this increases the risk of going to a favourite berry patch only to find no berries left to pick.

Given open access conditions, secrecy about the locations of good berry fields is the strongest tool berry pickers have to preserve quality berry picking sites, and to ensure the availability of huckleberries.

6.1.3 Huckleberry Accessibility

Access to berry patches and to the berry shrubs and berries is an important value. Having access to the quantity of berries required for personal uses, including as food, and gifts (e.g. huckleberry jam) is an important part of this value. At the patch level interviewees described the easiest access to berry bushes as open forests with even ground that is clear of debris. At the landscape level accessibility is defined as being relatively close to where people live, with berry pickers often preferring patches that are a shorter drive from home. To access berry patches, all of the berry pickers I spoke with rely on logging roads created by forestry development.

In the East Kootenays forestry has opened up access to remote berry patches increasing access to these patches for berry pickers,⁵⁵ however, all berry pickers do not see having open and accessible berry picking sites as a good thing. As Ktunaxa Elder Liz Gravelle described in her quote at the beginning of this chapter – forestry and logging roads have not just changed the forest – but have increased access to berry patches. An important downside of having easy access is that it opens up access of the forest and berry patch to anyone. Roads open access to strangers or people from outside the local community and make it more difficult to keep berry patches secret. Once a road is built, people do not need knowledge of traditional trails to access berry patches. For the Ktunaxa, this has meant the loss of control over who accesses their traditional berry patches, and how those who do gain access pick the berries and treat the berry patch. In the quote at the beginning of this chapter, Liz lists the inappropriate practices of over picking and damaging berry picking practices, and attributes these behaviours to those who have gained access to berry patches as a result of logging roads. Road development has promoted use of the forest, Ktunaxa traditional territory, by “outsiders” who do not necessarily understand or conform to Ktunaxa values or traditional laws. These outsiders may not know the rules about leaving berries for other pickers and for the animals. A common complaint by Ktunaxa berry pickers was competition and over-picking from the increased access to berry picking sites (Williams and Clarricoates, 2002). This increased pressure on huckleberry patches is displacing Ktunaxa families from some of their traditional berry picking areas.

Exploring these key values of a good picking site has been shaped by the large social, cultural, political and economic contexts, and provides insights into the social and cultural dimensions of how berry pickers select berry patches, how they behave in relation to the berry patch, and what current trade offs exist with each value.

⁵⁵ Most berry pickers I spoke with pick berries from patches easily accessible from a road – only a handful of pickers I spoke with regularly hike in significant distances to access good berry patches.

Access to berries and to berry patches, and how people visit a berry patch has strong connections to the fact that the huckleberry is an open access resource with a lack of formal rules. Describing all of the benefits and current issues that have been brought up in relation to these values is one method for exploring what are the issues around berry patch stewardship. Each berry picker may prefer a berry patch with a unique combination of each of these values along with their own additional criteria, such as a patch that is a traditional family picking area. Within these values (and how they translate into behaviour) are elements that shape how humans relate to and behave within the berry patch. These values are also an important base for the informal rules berry pickers have for the forest and the berry patch.

6.2 “Bush Etiquette”– Rules for Good Berry Patch Stewardship

Social norms and values around the picking and use of berries have been developed to protect and enhance the health of the huckleberry. Long-time huckleberry pickers have an informal “bush⁵⁶ etiquette” or a sense of a common set of rules around picking huckleberries. This is an essential part of the informal stewardship institutions that safeguard huckleberry health at the patch scale. Most of these rules are directly related to the perceived protection of the health of the huckleberry patch and/or individual plants. Other rules describe how to behave with respect around other berry pickers. In the interviews I asked berry pickers to tell me about “unwritten rules” or etiquette around huckleberry picking. I present a summary of their responses in Table 6. This table is a compilation of all of the rules mentioned by berry pickers, not everyone agrees with or shares all of the rules presented in this table.

Table 6. A summary of informal rules and berry picking etiquette mentioned by huckleberry pickers (in order of frequency mentioned). Explanations given by berry pickers for why specific rules are important are presented in parentheses.

Informal Berry Picking Rules or Etiquette
Share huckleberries with those who cannot get out to pick berries.
Never ask someone where they pick berries. Locations of huckleberry patches are a secret. If someone shares their secret spot with you, keep it a secret.
Do not use a berry picker, or berry rake, to pick berries. (Pickers/rakes may damage the bushes.)
Allow everyone their own picking space, provide at least 50-200m + space between yourself and other groups of berry pickers.
Do not break branches or trample the bushes. (It damages the plants)
Respect the 'bush' and the berry patch, leave both as you found them or better. Clean up any garbage.

⁵⁶ The “bush” is a local term commonly used to refer to the undeveloped forest area used locally for hunting, berry picking, and outdoor recreation.

Never pick all of the berries from a bush or patch, always leave berries for other berry pickers and for the animals.

Do not pick more berries than what you need.

Pick berries from one spot, don't move around from bush to bush when you are picking. (It is more efficient to pick berries this way)

Wait until all of the berries are fully ripe before your pick.

Pick clean - avoid picking leaves and twigs into your bucket of huckleberries.

Huckleberries grow on crown land. No one "owns" a huckleberry patch. Huckleberry patches exist on a first-come, first-serve basis.

Do not eat berries while you are picking.

To give the berry patch a rest, rotate where you pick from year to year.

Be friendly, helpful and respectful of others who are picking berries.

Do not sell huckleberries.

The list in Table 6 contains many rules for controlling human actions and behaviours. These rules are based on knowledge of how different practices of huckleberry picking effect the productivity or quality of huckleberries. This knowledge comes either from the berry picker's observations or knowledge passed along from other berry pickers. The rules listed by berry pickers relate to the berry picking practices, social institutions, and cultural practices around picking huckleberries. Many of the rules relate to maintaining both healthy social relationships and healthy black huckleberry plants. Broadly, the rules listed above can be organized into larger categories relating to the following: using caution to avoid damaging the plants, guidelines for how and when to access berry patches, proper behaviour while berry picking, how to behave in the bush (or how to treat the forest), and appropriate uses of the berries. In a study of the traditional knowledge of bakeapple (*Rubus chamaemorus*) Karst and Turner (2011) documented similar categories of harvesting rules used by local residents to ensure future bakeapple abundance.

Sharing huckleberries with those who cannot get out to pick was the most frequent practice mentioned by berry pickers. It is not as obvious a rule as the behavioural guidelines around protecting the bush and the berry patch from damage, but it is an important practice carried out by most of the berry pickers. For many berry pickers it was seen as an obligation to share huckleberries with elders, old-timers and those who could no longer get in to the bush to pick huckleberries for themselves. Mel Downing described bringing a few branches with huckleberries on them for residents at the Kimberly nursing home to be able to pick the berries right off of

the branch. Other berry pickers emphasized the special value huckleberries' hold when given as a gift to a family member, friend or acquaintance. One berry picker I spoke with told me she was going to bring huckleberry jam as part of a wedding gift for a niece, another mentioned shipping huckleberry jam to family members in Ontario. For residents of the East Kootenays giving huckleberries holds special social and cultural values, and many berry pickers said that they would give their berries away before they would consider selling them.

Amongst the other rules listed by berry pickers are guidelines for respectful interaction with the berry patch, with other berry pickers and with the forest. Ktunaxa Elder Laura Birdstone noted that her grandparents taught her that, when picking huckleberries it is important to leave some of the berries for the other wildlife that lives in the forest. Gail Goyer practices a similar ethic, she explains: *"We try to go in different spots. We don't like to pick in the same spot all the time. We save some (berries) for the bears. I don't believe in people that go, and park their trailers, and just pick the whole area clear."* Leaving berries for others shows restraint. It is an acknowledgement of other berry pickers and sharing the local resource. It embodies respect for both the fellow berry pickers, and the other animals that rely on huckleberries as a food source. The practice of leaving berries is also seen by some berry pickers as respectful treatment of the huckleberry plants. Berry pickers also spoke about taking care of the "bush", Bev Bell (2010) explained: *"Be respectful of the bush. Don't leave the juice box behind, and make sure that it is pristine, just the way that you found it. I think that is really important, and I think that is how just about everyone in the Kootenays feels if they have any respect at all."* Respecting the bush is about practicing good stewardship. Bev's explanation implies that there is a broader conservation ethic that anyone living in the Kootenays should feel and follow for taking care of the forest and the land.

Every berry picker I spoke with knew of at least a few behavioural rules and guidelines to follow when picking berries. Despite the informal nature of these rules there seems to be a universal understanding of many of the rules. Sherry Waites (2010) reflected: *"I think everyone has some what of an idea (of the rules). I would think so. At least the old timers, you know the people who have been doing it a long time"*. These rules regulate the behaviour of berry pickers when in the bush, and are part of a local stewardship institution that exists to ensure good stewardship practices, and the continued availability of huckleberries for all resource users. The rules also reflect a set of actions berry pickers abide by to preserve order within the social-ecological system that exists around the black huckleberry.

6.2.1 Informal Berry Picking Rules – Creating Order within Open Access

Under current forest tenure systems in BC black huckleberries are an open access resource - meaning there are no formal federal or provincial government rules, policies or laws regulating access to, or behaviour in, berry patches on crown land. When I asked berry pickers about rules, some listed informal rules and also

commented on the lack of formal regulations.⁵⁷ For example Bob Duthie (2010) remarked: “*There’s no restrictions on reselling (huckleberries), whereas if you go fishing you can’t sell your fish. So some people that are fast pickers, and they get good, they will sell some. But not so much around here.*” As Bob Duthie notes, there are no formal regulations in BC, even for commercial berry pickers. Most berry pickers I interviewed recognized the responsibility of the provincial government and the Ministry of Forests for the development and enforcement of rules around the management and use of the forest.

Without formal regulations in place the rules and etiquette around picking huckleberries are passed on and reinforced through the same social relationship networks that convey the traditional ecological knowledge related to huckleberries. Sharing knowledge within this network informally creates, builds and reinforces an unofficial etiquette around harvesting huckleberries. Breaking these informal rules is a social faux-pas, but other than the social stigma attached to an inappropriate action or other informal enforcement mechanisms, there is no formal system that enforces picking etiquette and no clear consequences to breaking these “rules”. For example in discussion around the rule about providing space to other berry pickers Jim Sherret (2010) reflected: “*I don’t know what would happen if I were sitting here picking and you came around the corner, and sat down right here. I guess that I couldn’t stop you. Well I couldn’t. That’s not polite to sit too close – if I’m here first, this is my bush.*” A bold berry picker could scold someone who encroached on their berry picking space. This would teach these outsiders about the rules, and bring them closer in to the loose social network of berry pickers. In theory this could work as a solution, however, the few pickers I spoke with who described similar situations stated they would simply move on to another area rather than confront a stranger.

For the black huckleberry many of the traditional laws regulating the use and stewardship of this species were either forgotten or suppressed during the restructuring of forests in BC. Yet the huckleberry pickers I interviewed were all taught and share a common set of standards for berry picking that guide their behaviour in the berry patch. Berkes et al. (1998:86) note that important resources have local social systems of rights and responsibilities, and even where change has disrupted social systems a form of incipient property rights exists. For the huckleberry all berry pickers stated that no one “owns” a berry patch. Amongst the rules I discussed with berry pickers was the idea that berry patches are secret. This may be the incipient property rights referred to by Berkes. Also some of the rules (such as giving other berry pickers a buffer while they are berry picking) are about creating social structures that ensure informal, temporary “tenure”, to provide small measures of security around having access to a good huckleberry picking spot. The rule about leaving berries for others is also about providing access in an open access system.

⁵⁷ As discussed in chapter 4 the only formal regulations of berry picking occurs in provincial and federal parks. These rules were not mentioned as most berry pickers I interviewed do not pick in parks as there is adequate crown land available. However, one picker did discuss regulations on berry picking in parks. Bill Mennie told me he had picked commercially in Glacier National Park prior to legislation that prevented berry picking in parks. He discussed how good berry patches were now becoming inaccessible based on this legislation.

6.2.2 *Breaking the Rules*

Those berry pickers who approach the berry patch with respect and follow the rules would be seen as good stewards. In their study of bakeapple Karst and Turner (2011) found that learning rules and proper harvesting practices was social and cultural learning that occurred at the same time as knowledge transmission about the ecology of the plant, and practical knowledge for being in the bush. But not everyone who picks huckleberries is a good steward. Not everyone knows or chooses to follow the unwritten rules. For many berry pickers I spoke with there are two types of people: those who know and follow the rules, and outsiders whose behavior does not follow the known rules. Those who know and follow these “unenforceable” rules are the locals, the old-timers, and the experienced berry pickers. Often the rule breakers are referred to in ways that designate them as outsiders – many of them coming from other parts of BC or out-of-province to pick the berries.

In the East Kootenays it is those who don’t know the rules who are often viewed as part of the decline. These “outsiders” may be physically from outside the geographical area, the East Kootenays, but they are also likely cultural outsiders – lacking the experience and the in-depth social, ecological and cultural teachings that accompany learning to pick huckleberries. In addition to not having learned berry picking rules and proper “bush etiquette” – these outsiders often do not have social ties to the local community where social norms and “bush etiquette” are both maintained and reinforced.⁵⁸ The outsider also symbolizes extra pressure on, and competition for a limited resource.

In my interviews mention of over-picking or damage to berry bushes often identified an outsider and/or a lack of tenure as part of breaking the rules:

“Boy, oh, you just couldn’t sit down without having to sit on (huckleberries) – that is how good it was. ... One year I went back there and I made two trips. The first time I went there and I picked and the second time I went back and these commercial pickers had come in from Alberta with their pickers [picking tools]. You know they don’t use their hands.” (Liz Gravelle, 2010).

“I remember reading articles about Ma and Pa pickers pushed out of areas where they had been picking for 20 or 30 years. These commercial harvesters came in. There’s not really a whole lot of... that is so and sos patch. If you are there first then that is your (patch).” (Chris New, 2010).

⁵⁸ In chapter 5 I discuss how the internet provides the locations of berry patches to anyone. This creates access to knowledge of berry patch locations that are viewed as secret. It is granting access to berry patches to people without teaching them about the complex social and ecological connections that are to be looked for as part of protecting the health of the berry patch.

“Last Sunday, (the ski hill) was like an ant hill. They were everywhere. There were a lot of people. The parking lot was full. I think more people are aware of (huckleberries) this year. And more new people are coming to Kimberley.” (Judy Daniels, 2010).

“I was talking with (my friend) yesterday. He said he ran into some people up Lamb Creek⁵⁹. He asked them where they where they came from... “Calgary.” “How’d you know about this?” They said “off the Internet”. This was 5 years ago. Someone put (the huckleberry patch) on the internet and here the Albertans are coming. It’s bad enough they come and take our fish.” (Jim Sherret, 2010)

The berry pickers I interviewed identified the following behaviours as damaging to the berry patch: over picking, damaging the bushes (e.g. trampling, breaking branches, stripping leaves), and general disrespect (e.g. leaving garbage in the forest). Poor stewardship practices such as these are attributed to a decline in the health and wellbeing of the berry patch. In addition to the outsider, commercial berry pickers were also sometimes viewed as likely to over-pick and cause damage to the plants. Competition or lack of access due to other people picking all of the berries in a patch was a common factor identified as negatively affecting access to good huckleberry picking spots. Ktunaxa Elders I spoke with specifically referred to this being a problem in their traditional family berry picking sites. In the Ktunaxa-Kinbasket Huckleberry Use Study they asked berry pickers about competition and conflict in huckleberry patches. In response to this question berry pickers listed: over-picking, the use of berry pickers (or berry combs/rakes), people damaging the bushes and leaving garbage, and issues with non-native berry pickers as problems they encountered while berry picking (Williams and Clarricoates, 2002).

In the East Kootenays, I found perceptions around different types of people picking huckleberries are shaped by how the berry pickers behave in the berry patch. The two categories of berry pickers are based around a social nuance of those who know and follow the rules, and those who do not. Most berry pickers assumed that someone picking huckleberries at a commercial scale would not follow the rules, while someone selling locally at a smaller scale could still do so while carrying out good stewardship practices. In their study Carroll et al. (2003) found similar tensions between groups of berry pickers, with household harvesters expressing concerns over commercial pickers treatment of the bushes and picking practices, and specifically mentioning harvesting all of the berries as an issue. In this study I did not interview someone who picked berries to sell at a large scale, and cannot speak to the berry picking practices or knowledge of a commercial picker. What is important from my findings is the understanding that local or long-time huckleberry pickers hold a common set of values, and carry out regular stewardship practices, including following a series of informal rules. The rules and berry picking etiquette followed by berries pickers is based on common principles

⁵⁹ Lamb Creek is the name of a popular huckleberry picking area near Cranbrook, BC.

intended to protect the health of the huckleberry shrubs and the forest, as well as the social and cultural values linked to the black huckleberry. These rules are embedded within the social networks, and cultural practices of the berry picker. They are learned and passed down from generation to generation and between friends while picking berries in the bush. Berry pickers recognize the benefits of following these rules and express frustration with those who do not follow the rules.

As described by berry pickers the effectiveness of these informal rules and practices are limited by the inability to enforce these rules in what is an open access tenure system. In their study of Ktunaxa-Kinabasket huckleberry pickers Williams and Clarricoates (2002) noted a few requests for the Ktunaxa-Kinabasket Tribal Council to take action, and to develop regulations and restrictions on huckleberry picking, and policies that protect huckleberries from damage by other activities in the forest. One anonymous respondent stated: “*We need our own conservation by-laws and an official to enforce the by-laws*”. At the same time there have been calls from the natural resource management experts, and First Nations organizations for the provincial government to develop formal regulations for the NTFP industry, and to establish legal objectives within the provincial forestry legislation that require forest companies to manage for NTFP habitat (Gange et al., 2004; FNFC, 2008).

The stewardship relationships between berry pickers and huckleberry patches in the East Kootenays reflects the split relationship that exists for all non-timber forest products in BC – a series of informal rules and practices focused around stewardship of the berry shrub and berry patch that are disconnected from, and reactive to the formal management policies and practices carried out in the larger forest. The province has not developed formal rules for regulating huckleberry use, or for protecting berry habitat. Based on my findings, should the province begin to develop regulations for NTFP harvesting and better forest management, they should recognize and incorporate the existing informal systems of stewardship and build regulations around addressing the concerns of the berry pickers. In the next sections I explore the impacts of provincial forest management approaches and practices on black huckleberry wellbeing.

6.3 Huckleberries and Provincial Forest Management in the East Kootenays

Most, if not all, huckleberry patches in the East Kootenays are on crown land, and fall under a provincial forest management tenure. The forest tenure system in BC leases access to timber on this land to forestry companies through different types of short and long term forest licences and agreements.⁶⁰ Under these agreements registered professional foresters in BC are the forest management experts who have a professional responsibility to sustainably manage the forests by following the laws and policies of the province. These

⁶⁰ In chapter 4, section 4.3 I discuss the impacts modern forest management has on the health of the black huckleberry as presented in the literature.

experts are trained in science and applied theory, and they do not necessarily interact with the forest and its resources the way a berry picker or other forest user would experience. The provincial laws and policies that professional foresters are required to follow do not contain guidelines or objectives for protecting NTFP habitat, and professional foresters and biologists are often not aware of NTFPs and have little to no training or skills in managing ecosystems for NTFPs (Gange et al., 2004: 21).

Under provincial forestry laws in BC non-timber values can fit somewhere under the eleven values identified by the *Forest and Range Practices Act* (FRPA); however, within these eleven categories huckleberries, traditional foods, and other NTFPs have no clear place. Under FRPA huckleberries indirectly could be considered “cultural heritage” or “biodiversity” values. Most often they are ignored and forgotten within the broad FRPA categories of non-timber forest values. Without a clear category for “traditional food”, and with a focus on the best available science, the FRPA system for forest stewardship has established a monitoring system that often unintentionally excludes locally important values⁶¹ and the local and traditional ecological knowledge that is associated with them. In this omission the province has also ignored the wellbeing of the local social and cultural systems that connect rural communities with BC’s forests. In this section I highlight the experiences and perspectives on forestry impacts, as shared by berry pickers in the East Kootenays. I discuss berry pickers’ perspectives on huckleberry stewardship and management. In contrast, I present perspectives on berry pickers found from a review of the scientific literature, and discuss how this view both impacts and is reflective of the approach being taken by provincial forest management professionals and agencies.

6.3.1 Clear-cuts and Berry Patches – a Berry Picker’s Perspective

In the East Kootenays past and current logging has increased access to remote huckleberry patches and clear-cuts have opened up large areas of the forest. As the most common form of forest disturbance, logging and the associated clear-cuts are the primary locations for productive huckleberry patches. Most berry pickers have favourite berry picking sites in old clear-cuts, and this landscape feature is incorporated in to the knowledge and culture of berry picking in the East Kootenays (see Table 3). The berry pickers I spoke with in this region note that on average clear-cuts remain productive for less than a decade. As the trees grow taller in the cut block they become too tall and too dense and shade out the black huckleberry shrubs. Once trees grow tall very little grows in the understory of the dense plantations. When a clear-cut is no longer productive, berry pickers stop using that site and shift their focus to a different area. In addition to short periods of productivity, Liz Gravelle (2010) notes that the berries and shrubs often dry out due to the openness created by clear-cuts. In the Ktunaxa-

⁶¹ As evidence of this many indigenous nations in BC are beginning to develop their own sets of standards, values and indicators for regulating and monitoring forestry impacts within their traditional territories (Colin Richardson – Haida, pers. comm.; Steve Lehnert – Metlakatla, pers. comm.; Kipp Fennel – Bonaparte Indian Band, pers. comm.; Mike Reid – Heiltsuk, pers. comm.)

Kinbasket study berry pickers frequently mentioned the increasing number of clear-cuts and generally reported these as a negative development that destroys the berry patch (Williams and Clarricoates, 2002). Berry pickers noted that in clear-cuts berries decrease in quality, they dry out and are smaller, and the trees come in too thick after a clear-cut and shade out the berries (Williams and Clarricoates, 2002). For berry pickers clear-cuts have mixed reviews because they can destroy good berry sites, or open up a dense forest and create a new site that produces great berries for a while, but the timespan of berry productivity within clear-cuts is much shorter compared to the decades or even centuries of berry productivity estimated for traditionally maintained berry patches (Mack and McLure, 2001).

In his quote at the beginning of this chapter, Norm MacLennan mentions the loss of a productive berry picking area near Sand Creek. When I asked Norm about what could be done about forests growing dense and shading out productive huckleberry patches, he mentioned thinning the trees. But then he spoke of the disconnect between provincial forest management and huckleberry health. Norm commented on the lack of value provincial government managers place on huckleberry. Observing that the province does not even maintain the roads, he has a hard time imagining them managing the forests to increase huckleberry productivity. He emphasised this lack of value and commented that thinning the forest is not something he could see the government investing money to do.

This same Sand Creek area where Norm noted that canopy encroachment had caused a decline in huckleberry shrub productivity was also identified as a traditional berry harvesting area for the Ktunaxa. Until recently, groups would camp out or take day trips to Sand Creek to pick huckleberries. In an interview with Ktunaxa elder Laura Birdstone (2010) she mentioned that parts of the Sand Creek area are no longer used because the province has closed off a lot of roads, inhibiting access, and she noted the productivity of some of the patches has been in decline. Many other berry pickers also told stories of a loss of their favorite berry picking sites:

“We use to have a campground up where some of the (housing) developments have happened. They use to have beautiful berries up there, just down below the hill. That was a great place to take little, tiny kids. They could just have fun.” (Sherry Waites, 2010)

“We use to have an area right close to us where we live, up in the Bull River and we use to go there when we first moved out there. Every year we’d go there, and then one year we went there, and there were no huckleberries. They’re not there anymore. So the last 10 years there has been nothing and it use to be great, right. So now we have to go other places.” (Bev Bell, 2010)

Both of the berry patches that the pickers Bev and Sherry mentioned were close to where they lived, but due to either a complete loss of the patch (to development) or declining productivity, they now have to go pick at other

berry patches further from where they live. As these recollections of favorite berry patches illustrate a lack of forest management for multiple values creates unreliability and can mean travelling around chasing productive berry patches. In more recent years this has meant longer drives for many berry pickers in search of a good berry patch. In the longer run, the lack of formal management of forests for productive berry patches has led to important berry-harvesting sites becoming unproductive.

In her quote at the beginning of this chapter, Ktunaxa Elder Liz Gravelle observes that the provincial approach to forest management has destroyed the “natural” state of the forest. This relatively new culture of industrial forest management has disrupted traditional livelihoods. It goes against many of the traditional laws and cultural values of the Ktunaxa. In addition, provincial laws and policies favoring open access and fire suppression have broken many of the traditional stewardship connections that more directly link berry pickers to the wellbeing of berry patches. For Liz Gravelle the “natural” state of the forest is a forest where huckleberries are healthy and found in abundance. In this “natural” state, people care for the huckleberry bushes and forests in ways that prevent the bushes from growing too tall, from being over picked or damaged, and from drying out due to a lack of trees. In her assessment of the current status of huckleberry patches, Liz Gravelle has captured the consequences of forest restructuring⁶² on the wellbeing of the huckleberry within the forests of the East Kootenays.

This destruction of the “natural” forest state is being caused by an imbalance in the relationship that humans have with the forest. Later in our conversation, Liz Gravelle said she would know how to improve the way forests are managed by re-establishing the balance for all parts of the forest. She observed that the current imbalance has resulted in a broad range of consequences that can be observed locally. She notes: *“that’s why bears are coming down into (town)... there is nothing left for them up there. (Huckleberries were) their main food. And I told them years ago. They are going to come down and eat you people if you don’t quit destroying their habitat. And now it is happening... (The bears) come down right into towns.”* (Liz Gravelle, 2010).

6.3.2 Managing Huckleberries – A Critique of the Approach of Provincial Forest Managers

In discussing the health and productivity of huckleberry patches I asked berry pickers how habitat could be better managed or improved. Of those pickers I asked, approximately one third responded that they did not have ideas about how habitat could be improved, while others strongly suggested that humans should not “manage” huckleberry patches.

“I don’t think you should mess around with Mother Nature. Whatever is going to be, is going to be. And you should let Mother Nature call the shots... it’s not something you should screw around with.”

⁶² A description of this restructuring is provided in detail in chapter 4, section 4.3.

– Bev Bell (2010)

“I don’t know. Huckleberries they are a wild plant and they grew up without man touching them or anything. So that’s all I know. Just don’t destroy the bush. Don’t destroy where they are growing.”

– Liz Gravelle (2010)

“Huckleberries don’t need to be managed. They have survived on their own for such a long time. It is the people who are using the berries and picking all of them that need managing.... People need to take care of the bushes. Don’t step on or trample them... and they need to leave some of the berries for the bears, and the other animals.”

– Laura Birdstone (2010)

“I don’t know. To improve it... to improve Mother Nature. Mother Nature has a big say in that.”

– Gail Goyer, (2010)

Rather than changing the forest or the berry patch, these berry pickers focused on leaving the patch alone and instead controlling humans and their actions within the forest. As Laura Birdstone said – it is humans who need to be managed. Better management of humans is about both conventional forest management (*don’t destroy the bush*), and berry pickers (*people need to take care of the bush*). It is about adjusting the dominant social, and economic values held by the province that have led to destructive forestry practices. It is about addressing the issues and problems arising not just from the mismanagement of the ecosystem, but also from the current social, cultural, economic and political systems that are negatively impacting the health of the black huckleberry. It is about addressing the issues and problems arising from huckleberries being an open access resource including finding solutions that prevent “outsiders” from carrying out damaging and destructive behaviours. Berry pickers see misuse of berry patches as affecting both the health of the berry patch and their access to the fruit they love.

Managing humans is also about recognizing and acknowledging the role that the culture of timber-focused forest management plays in the health and wellbeing of huckleberries. As Norm MacLennan points out, within the current provincial forest management system it is not practical for the province to manage the forests for huckleberries. He cites economics as the main reason for this impracticality. In the provincial view, and in the larger cultural view forests are perceived as a dichotomy of timber and non-timber forest products. Timber being the primary source of wealth and value. In the case of the black huckleberry, and other important traditional foods, this approach has significantly contributed to systems of management that devalue and neglect the health of the ecosystems that support these species. Rather than looking at the forestry practices that are causing the damage, and creating change, many forest management agencies focus on monitoring the damage to

understand how to improve future practices, or they emphasize technical solutions (such as restoration) for mitigating the damage caused by forestry.

6.3.3 Ecological Science Assumptions about Berry Pickers

In BC provincial forest managers and registered foresters practice management based on scientific principles and values. This section looks at how berry pickers are portrayed within the scientific literature on black huckleberry ecology and management.⁶³ This is important because forest managers at government agencies rely heavily on ecological principles, methods and research to shape and to justify their management plans and actions.

Previous ecosystem-science research on black huckleberry productivity has focused on identifying ecological variables promoting berry productivity, and considered how to adjust forestry practices to increase berry productivity. Studies in ecosystem science have great explanatory powers for understanding black huckleberry ecology. This work is important for understanding ecological factors that are important for the health of the huckleberry. The underlying cultural assumptions and values behind the a lot of natural resource management science is often reflective of the values that underlie North American approaches to land management. In my review of the literature on black huckleberry ecology I found that authors typically remove or exclude human connections to berry ecology. Much of this literature views all berry pickers as being the same, and does not distinguish between berry pickers who practice good stewardship and those that do not.

Within the scientific literature on huckleberry ecology and management, the role that humans play in the health of the huckleberry patch is often portrayed in three ways, the authors either: ignore or exclude the relationship humans have with the huckleberry; marginalize the role that humans play in huckleberry ecology; and/or views humans as being extractive and potentially damaging to the berry patch. These first two ways that berry pickers are presented in the literature classify humans as benign or unimportant for consideration in the ecology of the huckleberry. The third presents humans as having a negative impact, and is reflective of a conservation approach that classifies most human interactions with the natural world as damaging and negatively affecting the health of the environment. These findings are in stark contrast to the role that berry pickers can play in enhancing berry patch productivity, which is addressed in the social science literature (Fisher, 1997: 192; Boyd 1999; French, 1999; Turner, 1999; Mack and McClure, 2001; Deur, 2002; Trusler,

⁶³ The ecological scientific literature reviewed for this analysis focused on all academic and forest management technical papers and reports that have been prepared on black huckleberry (*Vaccinium membranaceum*) ecology. I reviewed 25 papers and reports that came from the following Canadian and American sources: British Columbia – Ministry of Environment – Habitat Branch Report, Canadian Journal of Botany, Environmental Management, Forest Ecology and Management, International Association of Bear Research and Management, Journal of Horticultural Science and Biotechnology, Northwest Science, Publication of University of Montana, and United States Forest Service Research Notes, Research Papers and General Technical Reports.

2002; Lepofsky et al., 2005; Deur, 2009). How humans are portrayed reveals a deeper value structure held by ecological science.

Ignoring or Excluding Berry Pickers

Studies that looked at black huckleberry ecology as it relates to food for bears often completely omit mention of the use of huckleberries by humans. As an example, Martin (1996) conducted a study on huckleberry ecology that excludes any mention of human use of huckleberries – unless humans are understood to fit into the general category of mammals mentioned in their introduction: "*this study was undertaken to clarify (thinleaf huckleberry's) status in grizzly range, and to obtain basic data about huckleberry distribution, productivity, physiological requirements and responses to disturbances such as fire and logging. Information about huckleberry fruit production will benefit not only grizzlies but the many other birds and mammals that rely on the berries for fall sustenance.*" An important variable in this study is forest disturbance specifically logging and wildfire. In Martin's discussion of fire there is no mention or connection to historic landscape burning (French, 1999). Although there were multiple points where Martin's research could have addressed the relationship humans have with huckleberries, berry pickers are excluded. As a second example Miller (1977; 1978) conducted a study on the response of huckleberry to prescribed fire that makes no mention of humans or historic burning.

Marginalizing Berry Pickers

In the 1970s and early 80s Don Minore conducted a series of experiments, and detailed study into huckleberry ecology for the United States Forest Service (USFS). His research looked at varying technological solutions for better huckleberry management (Minore, 1975; Minore and Dubrasich, 1978; Minore et al., 1979; Minore, 1984). It was driven by the recognition of the USFS of importance of huckleberry to berry pickers, and their management interests in reviving a "dwindling resource" (Minore, 1972). In the introduction to the final report on his huckleberry experiments, Minore discussed the role of fire in huckleberry ecology, and the loss of traditional burning practices with the introduction of fire suppression. In his subsequent section – an historical account of the field site, Minore wrote: "*members of early expeditions in the area near Mt Adams noted the extensive burned-over areas in this vicinity and found many Indians picking and drying berries there in 1853. One member recollected 'a full tribe', and wrote 'I never saw so many (Indians) and so many kinds of berries in all of my life.'*" (Minore et al., 1979) Following this description of historic use and stewardship the next line reads: "*Eighty-one years later, in 1934, an animal exclosure was constructed...*" in a stark transition to more recent scientific experiments (Minore et al., 1979:8).

Minore's abrupt transition from a story of abundant berries, a diversity of traditional food resources, and a large gathering of people to a study on the management of livestock within the berry patch is quite a contrast. Where did all the people picking berries, and maintaining these berry patches go? This story found within the introduction of Minore's paper unconsciously mirrors the shifting tenure over huckleberry patches that came with the colonization of western North America. Over the course of those 81 years, between the documentation of berry picking and the grazing experiment, the berry patch has increasingly become disassociated from the stewardship and ownership of the descendants of the Native Americans who were picking berries back in 1853. By 1934, the berry picking grounds are part of United States Forest Service (USFS) land. The USFS enforces its legitimacy as land owners and resource managers through experiments, conducted with the goal of managing the land according to the best science. Minore's experiments and publications further add to this narrative. At the same time Minore unconsciously excludes and marginalizes berry pickers, whether Indigenous or not, not recognizing them as contemporary users and stewards of the berry patch.

This is not a critique of the work, or of Minore's contributions to the understanding of huckleberry ecology. Rather, I bring this example forward as an illustration of a tendency to exclude or erase humans from the bigger picture of huckleberry ecology. By ignoring the relationship between the berry picker and the huckleberry patch, researchers have compartmentalized the huckleberry into a berry patch ecosystem to be studied and understood outside of its historic and current relationship to humans and the knowledge that berry pickers may have about the social-ecology of this system. This subconscious or unintentional removal of berry pickers from the ecology of the berry patch is reflective of a colonial worldview that sees humans as separate from nature, and values human domination and ingenuity in forest management.

Berry Pickers as Extractive or Damaging

In a study on black huckleberry growth patterns in the wild, Gough (1998) cites the damaging impacts that berry pickers are having on wild populations of black huckleberry as justification for the research to support domestication of the black huckleberry: "*The intensity and method of harvest, using rakes and beaters, increases the potential for damage to the plants and destruction of its fragile ecosystem. Because of the potential for destruction of the native habitat through uncontrolled harvest and because of the increasing popularity and economic value of this fruit some growers have begun to cultivate this species (for domestication).*"

These examples of how humans and huckleberries are portrayed in the scientific literature reflect a worldview that has many complex, and sometimes, contradictory views on the impacts humans have on the wellbeing of the black huckleberry. These different views on the role of humans include: the berry patch (or forest) without humans; humans as the manager – outside of and controlling nature; humans as historic stewards

of the berry patch; humans as gathers – reaping the benefits of nature’s bounty; or humans as greedy exploiters damaging a shared resource. Aspects of these different cultural perceptions of humans are reflected in the examples I have presented in this section. They reveal assumed truths or unconscious assumptions found in the approaches to the management of huckleberries and other non-timber forest products. Studies such as these create and reflect the knowledge base that informs the provincial forest management decisions. Furthermore, the underlying stories, culture, and values of these forest management institutions (as reflected in the scientific literature) have been born out of and embody the colonial processes and narratives that form the current forest tenure structures. The most powerful narrative is the myth that gathering wild foods is not a productive or valuable use of the forest, and that local communities lack the complex and “sophisticated” knowledge to understand how to manage their local forests.

One of the first steps to addressing the complex issue of the declining health and wellbeing of the black huckleberry is the need to recognize the limitations that a compartmentalized and prescriptive approach to provincial forest management in capturing all of the factors that affect declining black huckleberry health and wellbeing. As a key barrier, the traditional scientific approach has a “pre-determined” scope of solutions for addressing the issues of resource decline. Without the social context science can become a tool offering only temporary solutions that uphold and reinforce the status quo. The scope of the solutions currently being considered often involve understanding the mechanisms of the problem and tweaking management of the ecosystem to treat the symptoms without really identifying and addressing the underlying problem. When partnered with the social, historic and economic contexts, however, science can be a powerful tool for understanding the ecological shifts that often accompany social change. For the black huckleberry taking a social-ecological approach can produce a different definition of the problem, which can lead to potential solutions that differ from those that have been proposed within the scientific literature to date. Understanding how different approaches contextualize the problem of declining black huckleberry health is important for evaluating and considering what elements are drivers of this decline. In the next section I discuss some of the insights that a social-ecological approach offers for understanding the continued availability and wellbeing of black huckleberry.

6.4 A Social-Ecological Challenge: Striving for Black Huckleberry Wellbeing

For huckleberry pickers in the East Kootenays the health and wellbeing of black huckleberry is defined by berry pickers as having reliable access to productive huckleberry patches that have high quality fruit.⁶⁴ Throughout this thesis I use my interviews with berry pickers to present insights into black huckleberry

⁶⁴ For more detailed descriptions of these values see chapter 5, section 5.2.

wellbeing from social-ecology perspective. To summarize from my interviews, the main reasons for declining access to huckleberries included:

- increased demand/pressure from human berry pickers (spreading declining resources thinner)
- mistreatment of berry patches by those who don't follow the rules (trampling on bushes, leaving garbage)
- a reduction in landscape fires and traditional burning resulting in tree and shrub encroachment in traditional picking areas
- unpredictable and often poor quality of berry habitat produced by clear-cutting (berries dry out and are smaller, berry patches only stay productive for approximately 10 years, clear cuts full of slash making them difficult to access)
- loss of access to an area (already picked over; road closures; out-of-state pickers, poor road conditions)
- a reduction in clear-cutting resulting in fewer patches (logging often stops during downturns in the economy)

As a point of comparison with my interview findings, the scientific literature presents tree and shrub encroachment, impacts of clear-cutting, and increase competition from other pickers. In this final section I will synthesize my findings on the varying roles that humans play in affecting the health of the black huckleberry and discuss insights for understanding the larger factors affecting the health of black huckleberry patches within the East Kootenays. Broadening from the discussion of black huckleberry I will consider what insights my findings provide for the better stewardship of traditional foods.

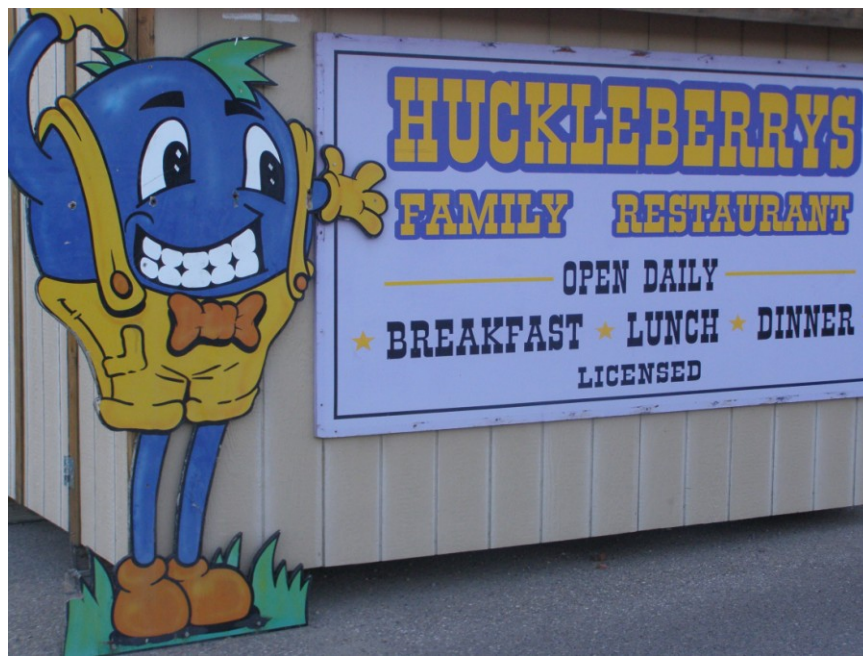


Figure 18. Huckleberry's Family Restaurant, Invermere, East Kootenays, British Columbia.

6.4.1 Different Value Systems, Engaging the Provincial Government

As an integral part of the social, cultural and ecological experience of living in the East Kootenays, the black huckleberry is invaluable to the region's rural communities. Most area residents can explain at some level of detail the best forest types for finding big, juicy huckleberries. In contrast, the current forest tenure holders and managers have not recognized the value of the huckleberry. There are no formal laws, policies, or management practices to ensure the productivity and long-term health of berry patches, although there are detailed laws around sustainable timber management. For any significant change to occur in huckleberry health provincial forest managers (and tenure holders) need to begin to recognize both the value of the huckleberry, and the value of managing forests in ways that protect non-timber forest resources for local communities.

Under the present provincial forest management system, local communities have little to no input into most forest management decisions. For example, there is no forum for berry pickers to communicate the value of huckleberries to forest managers. One point of leverage that First Nations have influencing forest management decisions is through the province's duty to consult on, and avoid damage to, their rights (as protected under section 35 of the Canadian Constitution). For Ktunaxa Nation members who wish to see better stewardship of forests and berry patches, berry pickers can begin demanding better forest stewardship by engaging with the province's referral and consultation process. This is one pathway for getting the province to recognize and acknowledge the importance of the black huckleberry as a culturally significant food source, and for initiating conversations with provincial forest managers about how to improve forest practices in ways that will protect and possibly benefit the health of huckleberry patches in the East Kootenays.

6.4.2 Local Communities, Values-Based Forest Stewardship

As described above, berry pickers identified many values that they felt are important for a good berry patch, and for appropriate berry patch stewardship. To implement better stewardship of huckleberry patches these and other local values should be considered, along with the stewardship principles they inform. This would include engaging in further discussion about how to avoid stewardship approaches that might be viewed as attempting to manage or control mother nature. In the scientific literature forest managers and forest ecologists have focused on measures to improve or maintain berry productivity as a blanket solution to the problem of declining huckleberry patches. The potential solutions offered within the scientific literature do not currently reflect the values or issues that berry pickers have identified as affecting black huckleberry wellbeing. For the berry picker the solution to black huckleberry decline is not as simple as improving productivity, domesticating the black huckleberry or finding funds for large scale forest restoration projects. In contrast to the scientific approach, the berry pickers I spoke with identified problems with a lack of regulation of human behaviours and how humans are treating the forest as a reason for declining access to huckleberries. In their

values and assessment of the stewardship issues berry pickers compose a more holistic and experiential portrait of how human, social, cultural and economic institutions have contributed to the decline in the health of the black huckleberry. They understand that the ecology and better control of the productivity of this wild species is not what is driving the decline, and the answer is more complicated than a purely ecological or technical solution. Any stewardship action or existing actions needs to incorporate huckleberry pickers as part of defining the problem and considering potential solutions. Their input must not just be considered, but must be meaningfully incorporated.

To even begin to consider incorporating local values into forest stewardship forest managers and forest ecologists must begin to include humans into their view of forest ecology. How humans are thought of as part of the berry patch will determine how they will be seen as part of any potential solution for improving berry stewardship. Forest managers will have to recognize that berry pickers operate with their own set of informal stewardship rules and ethics. For indigenous berry pickers many approach and use the forest following their traditional laws and practices. Historically (as evidenced in the scientific literature), forest ecologists did not see berry pickers as a connected part of the berry patch. Recognizing the historic and present stewardship connections berry pickers have with the huckleberry patch is an important part of considering local values within forest stewardship and management practices.

Many of the principles and larger structural relationships that I found for black huckleberry are similarly replicated for a larger range of traditional wild forest foods. For those who wish to restore and promote the increased use of traditional foods, understanding the different value systems and relationships that exist around the stewardship of the traditional food is important. To bring meaningful solutions provincial forest management approaches will need to better recognize the relationships between traditional wild foods, the people who harvest them, and the environment and social factors affecting their availability. There is a need to better educate forest managers about the historic and current relationship forest users have with non-timber forest resources. New approaches to forest management would need to recognize and begin to more meaningfully incorporate multiple values in to provincial approaches to forest management.

6.4.3 Addressing Provincial Forest Tenure

The deepest underlying structural factor that has contributed to the declining productivity of the black huckleberry is the shift in forest tenure and the policies that suppressed traditional stewardship and forest governance practices. In chapter 4, section 4.2, I consider the shifts that have led to the current state of BC forests, and discuss how shifting forest tenure has led to a disconnect between berry pickers and the health of the forest and larger berry patch (Figure 11). This shift to an open access resource has contributed to the current social-ecological conditions for berry picking, such as heightened secrecy around berry patch locations, the

inability of berry pickers to enforce berry picking rules, and a decreased ability to rely on regular berry picking areas to access good berries from year to year. In the previous sections I have discussed the importance of recognizing berry pickers values, their traditional ecological knowledge of huckleberries, and their individual agency as good stewards of the berry patch. Recognizing these important characteristics is a key step toward finding meaningful solutions to addressing the declining availability of good quality berry picking sites, however, recognition of these alone is not a meaningful solution. These findings apply to a range of traditional forest foods.

Better stewardship of traditional wild forest foods must include either some form of tenure or governance structure for traditional food gathering areas. For huckleberries without addressing the unregulated and open access nature of the berry patch, any proposed solutions for improving or restoring berry patch productivity will have great difficulty providing a sustainable solution in the long term. This same open access issue can be applied to a multitude of traditional food systems.

An important aspect of the stewardship of social-ecological systems is the reciprocal relationships social systems have with local environments. Historically, indigenous peoples burned huckleberry patches to ensure future berry harvests for their families. The work they put in to maintaining the health of their family owned berry patch was secured within a system of berry patch tenure. In another management intensive traditional food system – the coastal root garden – Lloyd (2011) observed that to succeed these systems “*require cultural mechanism such as spatial ownership to ensure that the work invested to improve a resource will benefit the family or owner in the future.*” In a scientific study on black huckleberry ecology, Stark and Baker (1992) noted the hard labour required to rejuvenate huckleberry stands, and recommended the option of creating tenure security through a government controlled system of long-term berry patch leases.

It can be difficult to shift policy within the entrenched bureaucratic forest management structures. Within the cultural value of the black huckleberry there may be hope for improving the stewardship of berry patches. All over huckleberry country, berry pickers are taking steps to improve the health and productivity of berry patches. In the Cranbrook area one berry picker I spoke with mentioned a group of berry pickers that had come together to successfully lobby BC Hydro to stop spraying vegetation under the Hydro lines (Grace Reeves, 2010). This area is an important opening in the forest that often contains huckleberries. There are also examples of First Nations developing their own guidelines through joint land use plans developed with the province, or independent resource management strategies (Cocksedge et al., 2011). Other First Nations are developing their own forest governance tools including the reintroduction of their traditional laws back into forest stewardship, writing policies to protect important traditional forest foods and medicines, and establishing their own forest monitors to enforce these laws and policies. Both of these are examples of local communities building governance capacity and influencing forest stewardship practices.

In addition to these examples, there are legislative tools that could be used to support an alternative forest governance structure that protects local non-timber forest values, especially traditional foods. The most well established tool that is coming from within the provincial Ministry of Forests is the Community Forest and First Nations Woodlands Licence forest tenures. These area based tenures are the only forest licence that allows the licensee to manage for non-timber forest products. These tenures are also a way for rural communities or First Nations to regain control over forest stewardship, in addition to secure tenure of important resource areas, such as berry patches. A second example is the Huckleberry Handshake agreement between the Yakama Nation and the United States Forest Service. This agreement set aside about 3,000 acres of huckleberry meadows and forest for the exclusive use of members of the Yakama Nation for huckleberry picking in recognition of their treaty rights (Fisher, 1997). Accompanying this agreement has been dialog between tribal resource managers, Elders and Forest Service Managers about tools for better stewardship of these forests and huckleberry fields.

These are all potential tools for building governance structures around the huckleberry patch. Implementation of such tools for the protection of huckleberries within the East Kootenays could take years or even decades of negotiations with the province. Also, even in areas where these tools are being used, there are still considerable issues around applying these tools to achieve meaningful change in huckleberry stewardship.

6.5 Conclusion

A social-ecological approach to understanding black huckleberry wellbeing is particularly important when considering problems of resource management because it includes cultural and social factors. A social perspective on the factors contributing to the decline of black huckleberry are inextricable from berry pickers' knowledge, but are often omitted from scientific interpretations of natural resource management issues. Understanding and eventually addressing the deeper roots of the declining availability of black huckleberry requires an awareness of how different social and environmental factors interact to affect both productivity and berry quality. The long-term wellbeing of the black huckleberry depends not only on better ecological stewardship, but on addressing the underlying structural and social changes that have led to and continue to contribute to the loss of important forest stewardship practices that improved the health of this species. In this chapter I have argued that improved huckleberry stewardship requires addressing forest governance issues, including the involvement of berry pickers in forest governance decisions and addressing the lack of berry patch tenure. Many of these solutions were clarified through the perspectives gathered from local experts who provided unique and important insights on potential ways to address declining availability of black huckleberry.

CHAPTER 7 - CONCLUSIONS

In this thesis I have explored the social-ecology of black huckleberry (*Vaccinium membranaceum*) as a case study for understanding the different factors that affect and wellbeing of this important traditional food. I documented how historic changes in forest tenure and stewardship practices have impacted the present day health of a traditional food. Through a review of the literature and from the results of my interviews I show how modern forest management practices in British Columbia fail to protect the ecological needs of black huckleberry both in the short and long terms, and are contributing to the declining availability and health of black huckleberries. Using the rich traditional ecological knowledge of berry pickers I explore the complex ecological and social relationships that exist around the black huckleberry. I also documented a series of values that berry pickers use to define the overall quality of the berry picking site. Protection of these broader values is key to the longer term survival of the black huckleberry, and continued existence of good quality huckleberry patches. Finally I make the case that the long term wellbeing of black huckleberry depends upon a shift in forest stewardship that begins to include berry pickers in the governance of the resource, and that must address berry patch tenure. The results of this thesis provide an understanding of the social, economic and political factors that underlie the challenge of re-building stewardship practices and restoring the health of many of the important traditional food and medicine plants within the forests of British Columbia.

From this investigation of huckleberry social-ecology I found that a solution to improving the wellbeing of the huckleberry is not as simple as increasing productivity or better berry patch management. A meaningful solution needs to consider:

1. How human social, cultural and economic institutions impact the health of the huckleberry and how they have contributed to the decline in health of this species.
2. Local berry pickers values and what these complex values reflect as being important. In considering local values there will need to be conversations around what actions are appropriate to take to improve the health and productivity of the berry patch, including what role regulating humans should play in berry patch stewardship.
3. How to re-incorporate berry pickers in to the long-term stewardship and restoration of berry patches. This would include providing some level of security and control over access to berry patches.

In this thesis I just begin to identify some of the key components for improving black huckleberry stewardship from within the current forest stewardship system. These findings have inspired new questions and highlighted areas for further clarification. Reflecting back on this research I propose the following next steps or future research questions:

- Do the key values that I identified resonate with huckleberries in the East Kootenays? What values and/or principles are missing?
- What are the Ktunaxa traditional laws, stories and principles that relate to huckleberry picking and stewardship?
- What are case studies or examples where tenure systems exist in wild berry patches? What are the stewardship practices and governance structures for those systems?
- What can the principles and methods of eco-cultural restoration bring to this discussion of improving forest stewardship practices for the long-term health of a wild food?

The challenge of re-building stewardship practices and restoring the health of huckleberry patches seems daunting. In the previous chapter I cautioned that it may take years or even decades to successfully implement some of the potential policy and governance tools that I present. The ecology of the black huckleberry can teach us lessons about survival and perseverance when conditions are not in our favour. Huckleberries have patience - as a disturbance adapted species black huckleberry shrubs will stop producing berries when the canopy of the forest becomes too dense. In northwestern British Columbia, Burton and Mattes (2001) found black huckleberry stems that were over a century old. These plants were adapted to survive and persist for decades waiting for fire or another disturbance to open up the canopy and to create the right conditions for a bonanza berry patch. Much like the black huckleberry waiting to fruit, berry pickers adapt their stewardship practices in response to the forest stewardship and tenure systems. The traditional laws and versions of the stewardship practices persist. As long as there are human-huckleberry relationships there is the opportunity for forests to be opened up, and there is hope for the renewal of more traditional huckleberry stewardship practices. Huckleberries are persistent and when the timing is right they will be there ready to continue on in their role as an important cultural keystone species within the forests of BC.

This case-study of the huckleberry provides an important perspective for the renewal and restoration of traditional foods. The answers for the restoration and improved health of traditional foods include social, cultural and ecological elements. Finding value in their restoration should come from communities of resource users. While efforts to revitalize and restore the health and the use of important traditional foods must address barriers to their participation. The successful renewal and restoration of traditional foods will require more than understanding historic management practices, and addressing current ecological conditions. It will require the rebuilding of social and cultural capacity for local stewardship of these traditional foods.

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APPENDIX A. HUCKLEBERRY PICKER INTERVIEW, PARTICIPANT CONSENT FORM

Participant Consent Form

Investigating the relationship between black huckleberry, *Vaccinium membranaceum* ecology and huckleberry harvesting

Project Summary:

The primary researcher on this project is myself, Andra Forney, a graduate student in the School of Environmental Studies at the University of Victoria. I am conducting this research as part of my degree requirements for a Masters of Science degree under the supervision of Dr. Nancy Turner. My research is funded with a fellowship from the Social Sciences and Humanities Research Council of Canada.

This research project will use both local knowledge (from interviews) and ecological data to investigate the effects of forestry management practices on the abundance and productivity of black huckleberry (*Vaccinium membranaceum*) in the East Kootenays. My research will begin to document the relationship between forestry management practices, huckleberry productivity and the practices of huckleberry pickers. The final product of this research will be a Master's thesis presented to the School of Environmental studies in the spring/summer of 2011. The results of this research will also be published in an academic journal.

You are reading this form because you have been identified as someone with a lot of experience picking huckleberries. If you agree to participate in this study you will be asked to commit a 1-2 hour long interview about your knowledge of and experience with black huckleberries. This interview may be recorded with your permission. A small token of my appreciation will be provided for your participation in this process.

If you agree to participate in this study you are guaranteed the following rights:

- You may withdraw your participation at any time, or choose not to answer certain questions
- You have the right to confidentiality of personal information and anonymity. Unless you wish otherwise, neither your name nor identifying information will be used in our research paper.
- There is no deception, or known risk to yourself or other participants involved in this exercise.
- If you wish to receive a digital copy of the final thesis and/or a transcription of the interview one will be available to you by the summer of 2011.

In addition, it should be noted that as a researcher I, reserve the right to terminate the research at any time. If you need to contact me with any further questions, I can be reached through the following:

(mailing address)
(phone numbers)
(email address)

If you have any questions or concerns about this research project that you are uncomfortable discussing with me, please contact my academic supervisor:

Dr. Nancy Turner
(phone number)
(email address)

If you would like to verify the ethical approval for this study or raise any concerns you might have about the ethics of this study, please contact the Associate Vice-President Research of the University of Victoria:

(phone number)
(email address)

After this consent form is signed, you will receive one copy and I will retain the other copy.

I, _____ on _____:

(participants full name)

(day, month and year)

- a. have read and understood the project summary and list of guaranteed rights provided by Andra Forney on the front of this page.
- b. am aware that my participation in one or more interviews with Andra Forney is completely voluntary, that I can withdraw participation at any time without consequences.
- c. am aware that the information that I provide in this interview with Andra Forney is completely voluntary. I have the right to chose not to answer certain questions. I am aware that I can withdraw information at any time and that I have the right to review and edit all publications and presentations pertaining to the specific information that I provide in the interview.
- d. am aware that should I chose to completely withdraw my participation from this study at any point, all copies of any information related to my interview will be completely destroyed either by permanently deleting transcripts and photos from digital memory and/or shredding any paper copies. I am aware that the information that I provided will not be used in the final thesis or publication, unless otherwise stated.
- e. ☐ consent / ☐ do not consent (*please check one box*) that should I chose to withdraw my participation part-way through the study, or after the data has been collected, Andra Forney may still use the information collected up to the point of withdrawal, in the analysis for her study.
- f. ☐ consent / ☐ do not consent (*please check one box*) that this interview with Andra Forney be recorded on a digital audio recording device. I am aware that the interview can proceed without the interview being recorded. Even if I do consent to have this interview audio-recorded, I am aware that I am free to request that the audio recording be turned off at any point.
- g. ☐ consent / ☐ do not consent (*please check one box*) that this interview with Andra Forney be photographed and that photographs from this interview may be used in publications and presentations pertaining to the specific information that I provide in the interview. Even if I do consent to have this interview photographed, I am aware that I am free to request that photographs not be taken at any point during the interview.
- h. ☐ consent / ☐ do not consent (*please check one box*) to having my name associated with the information I provide, in publications and presentations prepared by Andra Forney. I am aware that I have the right to confidentiality of personal information and anonymity in my participation.
- i. ☐ consent / ☐ do not consent (*please check one box*) that with my permission, information from this project may be used for future projects conducted by Andra Forney that are related to huckleberries, non-timber forest products, forestry management and traditional resource management.
- j. ☐ wish / ☐ do not wish (*please check one box*) to receive a digital copy of the finished thesis project.
- k. ☐ wish / ☐ do not wish (*please check one box*) to receive a full transcription of this interview.

(Participant)

(Date)

(Andra Forney)

(Date)

APPENDIX B. HUCKLEBERRY PICKER INTERVIEW QUESTIONS

INTERVIEW PREAMBLE

I am here today to ask you a couple of questions about huckleberries. During our conversation, I want to talk with you about your experience picking huckleberries and your observations on where huckleberries grow best.

Before we start I wanted to remind you that I am not here to learn about your secret picking sites. If there is anything you do not want to share with me, that is fine, you do not have to answer all of the questions. Do you have any questions for me before we start?

BLACK HUCKLEBERRY ECOLOGY

1. When searching for a huckleberry site what are important qualities you look for in a “good” huckleberry picking area?
2. Based on your experience what factors indicate to you that an area is likely to produce a lot of berries? What clues do you look for to indicate the shrubs will be productive?
3. What are signs that an area is not a good area to search for huckleberries?
4. What are the characteristics or qualities of a good huckleberry?
5. FREE LISTING: (*Read site characteristics listed by participant*). Is there anything else I should add to this list that is an indicator of a good place to pick huckleberries?

IMPACTS OF HUMAN ACTIVITY ON HUCKLEBERRY PATCHES

6. How are huckleberry patches created? How are they maintained? (What different factors create new habitat for huckleberries to grow?)
 - a. If talk about forestry **are there distinguishable types of forestry practices** that have different affects on huckleberries? What are they?
 - b. Are there differences in the quality of huckleberry sites depending on how they were created (logging, fire, “natural”, old growth, etc.)? What are the differences?
7. What is the average “lifespan” of a huckleberry picking site? How does a huckleberry patch change over time?
 - a. Are there any factors that maintain good huckleberry harvesting areas? What are they?
 - b. After a disturbance such as a fire or logging, generally how long does it take before a huckleberry patch starts to produce berries? (Is there a difference between burn site and logging?)
 - c. How do the berries in a patch change over time? Why?
 - d. How do the shrubs in a patch change over time? Why?
8. Does harvesting huckleberries have any effects on how the shrub will grow and produce berries next year?

SOCIAL AND CULTURAL ASPECTS OF HUCKLEBERRY PICKING:

9. What are some of the reasons you pick huckleberries? (including personal use, gifts, special occasions, commercial/trade)
 - a. Have you ever sold or traded huckleberries with anyone?
10. Do you know of any practices for taking care of huckleberry bushes, or areas where huckleberries grow?
Are there any ways that you can think of that would improve huckleberry habitat?
11. Who do you think should be responsible for managing huckleberry habitat?
12. Are there any rules or etiquette a picker should follow when picking huckleberries?

Is there anything about huckleberries that we haven't had a chance to discuss that you were hoping to talk about?

Do you have any questions for me?

APPENDIX C. FINAL CODING STRUCTURE USED FOR ANALYSIS OF HUCKLEBERRY PICKER INTERVIEWS

Main Theme	Category	Sub-Category	Description
Knowledge			Explores the importance of knowledge, specifically Traditional Ecological Knowledge (TEK), of the huckleberry as part of the SES. This section captures comments that characterize the knowledge and describe how this knowledge is developed & transmitted. I also code sources of knowledge under this component.
	Knowledge Experts		Any mention or description of how huckleberry pickers are experts in understanding the ecology of huckleberry patches.
	Depth of Knowledge		Illustrations of variation of knowledge levels between pickers
	Knowledge Creation		Descriptions of picker observations & adding these to TEK
	Knowledge Transmission		Descriptions of knowledge sharing experiences & practices
	Knowledge Types		Examples & explanations of informal versus formal TEK
	Folk Taxonomy		Discussions surrounding folk taxonomy.
	Source		Codes for the information source.
		TEK	Code for information provided by huckleberry pickers.
		Academic Literature	Code for information provided through academic literature & formal reports. This category will include second code for academic discipline or institution that generated the report.
		Grey Literature	Code for information from grey literature. This category will include a second code that is more descriptive of the source (ie newspaper, blog).
		Field Notes	Codes for information obtained from field notes, and personal observations.
Interaction			Explores the perceived effects that human actions have on the health & wellbeing of huckleberries. Specifically impacts that are related to berry picking, silvicultural practices & direct actions taken to enhance huckleberry patches.
	<i>(intentional/direct)</i>	Picking	Describes the various impacts that the practice of berry picking has on the wellbeing of huckleberry shrubs, especially on their future productivity.

		Harvesting Practices	Describes all practices related to picking berries including how often a picker will go out, the amounts that will be harvested, harvesting techniques and practices, etc.
		Bush Etiquette	Descriptions of behaviors other than the direct picking of berries that also impact berry productivity, for example littering, trampling, etc.
		Impacts of Harvest	Descriptions of effects of harvesting practices, included in this are the perceived impact that "pickers" or mechanized picking have on the health of huckleberry shrubs.
<i>(intentional/direct)</i>	Enhancement		Descriptions & knowledge of past and present actions that have been or could be taken to increase the wellbeing of huckleberry plants (including mention of burning, site management & restoration).
<i>(unintentional/indirect)</i>	Silviculture		Observations & discussion on the effects that silvicultural practices have on huckleberry shrubs & the berries they produce.
	Domestication		Opinions expressed about the domestication of huckleberries and how it would change interactions with the berry species.
Social Organization			This section attempts to characterize the social institutions that exist around the huckleberry. It does so by exploring how huckleberry pickers describe the various institutional components & the values that shape how pickers behave.
	Rules		Describes specific rules & etiquette, perceptions of the importance of these rules, enforcement mechanisms, and opinions of rules around picking huckleberries.
		formal/policy	Knowledge of rules or government policies around huckleberry picking and the use of forest resources.
		informal/unwritten	Pickers knowledge and descriptions of informal rules, and bush etiquette.
		purpose of rule	Perceived importance of a rule or practice including the social and/or ecological impacts that this rule has including benefits or costs related to following the rules.
		enforcement	Describes any enforcement mechanisms that exist for encouraging people to obey the "rules" of the berry patch or general rules of the woods.
		practice	Observations & opinions about what actually happens in the field or how huckleberry pickers behave. Includes of the effects of a lack of formal rules or policies around berry picking and any expression of desire for changes to formal and informal policies.

	Networks		Includes descriptions of networks of huckleberry pickers including: how they form, who is included (or not), how they function including their purpose & importance, etc.
	Resource Tenure		Includes any mention of resource tenure, ownership (or lack of) in relation to huckleberry patches, picking and forest resources in general.
Culture			This section includes insights into the cultural beliefs and practices of huckleberry pickers.
	Worldview		Includes comments from interviews that provide insight into the cultural framework(s) that huckleberry picking operates within, especially those that provide insight into how this culture shapes the social institutions that exist around berry picking.
	Values		Describes and explains the values that exist around berry picking and their role within the social institutions of pickers.
		Trust	Includes examples of the importance of trust for sharing knowledge and information about huckleberries
		Respect	Describes how respect for the bush and for other pickers in the bush is a very important part of the rules, values and practices around huckleberry picking.
		Reciprocity	Examples of the importance of exchange for sharing knowledge about huckleberries. May also include examples of the importance of reciprocity with the huckleberries themselves.
	Secrecy		Examples of the role that secrecy plays in protecting the knowledge (and possibly health) of this resource.
	Deception		Tales of deception related to huckleberry picking and knowledge of huckleberry health, patch location, etc.
	Ritual		Descriptions of rituals that relate to the huckleberry including
	Use		Includes uses for the huckleberry including how the berry is incorporated into cultural practices. Also might include ideas about selling huckleberries.
Ecology			This category codes interview transcriptions and scientific literature for descriptions of factors affecting huckleberry ecology and wellbeing.

	Berry Quality		Characteristics of berry quality used in evaluating huckleberries, including descriptions of these characteristics.
	Berry Productivity		Examples that will be used to define quantitative or semi-quantitative measure or description of what constitutes a productive huckleberry patch.
	Patch Quality		Descriptions of the characteristics that make a patch "good" or of high quality as a place to pick berries.
	Associated Species		Plant species that are reported as an indication or the presence or absence of huckleberries in the forest.
	Non-Plant Indicators		Other factors used as a signal for the presence of huckleberries (including human, wildlife, etc). These are characteristics that would not be captures under ecological variables used to evaluate site quality.
	Ecological Variables		These are variables identified as important for creating productive huckleberry patches. Under this section I will code for both mention of specific variables and descriptions or definitions of these variables.
		geophysical	Geophysical characteristics include: slope, aspect, soil, moisture, etc.
		biophysical	Biophysical characteristics include: canopy cover, competition, coarse woody debris, etc.
		disturbance	Disturbance includes type of disturbance, and patch features that are formed through disturbances.
		shrub characteristics	Descriptions of huckleberry shrub characteristics that indicate if the berry patch may contain good berries, includes size, age, density, etc.
	Weather		Descriptions of knowledge about the importance of various weather phenomenon for huckleberry productivity, including descriptions of how these weather events affect huckleberry productivity.
	Scarcity/Abundance		Knowledge and perceptions of scarcity and abundance of huckleberry patches in the area. Including mention of patches that were once productivity but have declined or completely lost productivity over time, and theories of why a patch becomes less productive.
	Huckleberry Health		Observations on the health of huckleberry shrubs and diseases affecting berry production.