

**WHEN SEAFOOD FEEDS THE SPIRIT YET POISONS THE BODY:
DEVELOPING HEALTH INDICATORS FOR RISK ASSESSMENT
IN A NATIVE AMERICAN FISHING COMMUNITY**

by

Jamie Donatuto

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Abstract

Current US government risk assessment and management regulations and policies are based on a position that views risk as an objective measure of a predictable physiological morbidity or mortality outcome that is not otherwise connected to social or cultural beliefs and values. Whereas human health risk assessments are meant to determine the probability of adverse impacts from particular hazards, the conventional risk assessment framework fails to consider Native American definitions of health and so risk. This study was conducted with the Coast Salish Swinomish Indian Tribal Community of Washington State, where contamination of their aquatic natural resources has been found. By conducting two series of interviews with traditional high-use seafood consumers, experts and elders from the Swinomish Indian Tribal Community, and by averting use of what I describe herein as ‘conventional’ fish consumption survey, the study allowed interviewees to provide a more complex narrative set of details and information that bestowed a much more accurate picture of the reasoning behind seafood consumption habits within the community. Among the more salient points that emerged from the interviews was that seafood represents a symbolic, deeply meaningful food source that is linked to a multi-dimensional ‘Swinomish’ concept of health. Yet drastic changes in access, harvest and consumption have occurred over time, and continue to this day. A health evaluation tool was also devised using simple descriptive scaled rankings to elucidate non-physiological health risks and impacts in relation to contaminated seafood. Findings demonstrate that community cohesion, food security, ceremonial use and knowledge transmission all play primary roles as concerns the Swinomish notions of health, and that these indicators are regarded as equally important when juxtaposed to

physical indicators of health. Thus, to eat less seafood—as prescribed by current policy and decision-making procedures when contamination is present—is actually detrimental to the multi-dimensional concept of health as defined by the Swinomish. The evaluation tool may be used in conjunction with the conventional risk assessment framework to more accurately and comprehensively deduce risks and impacts.

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For Phil.

Co-Authorship Statement

Aside from chapter one, the introduction, and chapter six, the conclusion, all chapters represent stand-alone manuscripts intended for submission to peer-reviewed journals.

Chapter two has been accepted for publication, chapter three has been submitted for publication, and chapters four and five will be submitted for publication within the year.

I am the senior author on all of the chapters, and I assumed primary responsibility for the design, implementation, analysis, and writing of co-authored papers. The contributions of co-authors to chapters two through five are summarized below.

Chapter two is co-authored with Dr. Barbara Harper. Dr. Harper aided in the identification of the project detailed in this chapter--to correct the shortcomings of fish consumption surveys, which based on her earlier work identifying these shortcomings. Dr. Harper also provided guidance on the manuscript preparation. The section “Multidisciplinary reconstruction of heritage rates” recounts Dr. Harper’s current research. Dr. Terre Satterfield provided guidance on designing the interview questions and feedback on the manuscript.

Chapter three is co-authored with Dr. Terre Satterfield. Dr. Satterfield provided feedback on the analysis and guidance on the manuscript preparation.

Chapter four is co-authored with Dr. Satterfield and Larry Campbell, Sr., the Swinomish community liaison and elder. Dr. Satterfield provided guidance on the findings and

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Chapter five is co-authored by Drs. Terre Satterfield and Robin Gregory. Both Drs. Satterfield and Gregory provided guidance on designing the second set of interview questions and the manuscript preparation.

1 Introduction: Representing Culture in a Risk-based Regulatory Context

The next necessary thing...is neither the construction of a universal Esperanto-like culture...nor the invention of some vast technology of human management. It is to enlarge the possibility of intelligible discourse between people quite different from one another in interest, outlook, wealth, and power, and yet contained in a world where tumbled as they are into endless connection, it is increasingly difficult to get out of each other's way (Geertz 1988: 147).

The work that follows in this thesis chronicles a Native American fishing community's response to reports of chemical contamination in its local aquatic resources. The account is one of human behavior in light of identified risks, and an investigation and prioritization of how to define impacts from these risks based on values and beliefs identified as significant to community members. Although the types and potential sources of the contamination are mentioned, my main concern is not about measuring and identifying concentration or toxicity as a risk assessor and even community knowledge expert might do, but about examining closely how and why a particular community characterizes risk and responds to it.

The research described in the thesis chapters is borne of my work as an employee of the Swinomish Indian Tribal Community (Swinomish), a Native American community who live alongside coastal waters in northwest Washington State. What started as a project

based in the environmental sciences studying the extent of contamination in local shellfish soon developed into a more expansive, yet deeper critical analysis of the meanings and implications of words such as “health” and “risk” to the Swinomish people. Although these words are common in the world of policy and regulation, they are laden with complex, diverse and often blurred meanings. Yet within particular communities, especially governmental bodies at once charged with the protection of human and ecological health and of minimization of costly regulations and enforcement (albeit often at the requests of separate entities), the definitions of these terms are comparatively simple, taken-for-granted, whereas the upholding of law and policy is not.

In 1983, the National Research Council (NRC) first formalized the framework that defined human health risk characterization as functions of toxicity (hazard identification and dose response) and exposure (NRC 1983). Health, by this measure, is said to exist when given thresholds of mortality or morbidity are not exceeded. To this day, this equation is the basis of all human health risk assessments performed by regulatory agencies. Seeking to build on and improve more than a decade of human health risk-related work, in 1996 the NRC published *Understanding Risk*, which warned that any risk assessment that does not address the issues deemed most important by the affected group is doomed to failure. Yet the original 1983 framework continues to be employed, omitting the ability to elucidate the risks and impacts prioritized by groups in question, or incorporate the knowledge base from which these priorities originate. Based on the shortcomings of the health risk assessment framework, the initial, relatively simple study of toxics in shellfish that I had planned to prepare soon progressed through several

iterations, was subject to extensive research review, and was properly held to epistemological scrutiny.

The first iteration of assessing the health risks and impacts of contaminated seafood to the Swinomish people involved what I term the conventional risk assessment framework, the one formalized by the NRC in 1983. The conventional framework was used when analyzing the risks to the Swinomish from locally contaminated seafood. Yet, when presenting the results to the Swinomish governing authority, the Swinomish Senate, more questions arose than the risk assessment's mortality/ morbidity assessment outputs could answer, thus stimulating the research herein. I was asked questions such as how the findings represented impacts to Swinomish health, that is, health as defined by the Swinomish: on a community scale instead of an individual scale and with the inclusion of vital social, mental, cultural and spiritual facets. Questions such as these ignited additional enquiries: what definition of health is reflected in the conventional risk assessment, and how does it differ from the Swinomish definition? What is missing in the conventional version and not the Swinomish one? How can it be included? In searching for answers to these questions, this thesis first explores the shortfalls of the conventional risk assessment in the context of contaminated seafood and Swinomish health. With a clearer understanding of some of the conventional risk assessment limitations, guidelines are then suggested in order to amend some of the current obstacles in accurately evaluating the definition of health, and risks and impacts to health, from contaminated seafood. From this juncture, an alternative data collection and evaluation tool that [re]defines and assesses health based on context-specific prioritizations is presented.

Recommendations for parallel changes needed in policy and decision-making are touched on as well. The overall aim of this work is to move toward a health evaluation tool that accurately assesses the impacts, in this case, of shellfish and seafood contamination as defined by the group in question, that is, the Swinomish.

A Sovereign Struggle: Understanding the Importance of Swinomish Seafood

The Swinomish Indian Tribal Community is a federally recognized tribe, established in 1855 by the Treaty of Point Elliott. The Swinomish are one of many tribes and First Nations known as the Coast Salish people, whose territory stretches from the southern end of Puget Sound in Washington State to the northern end of the Georgia Strait in British Columbia, west into the Pacific Ocean and east into the Cascade and Coast mountains. Living in this resource-rich region since time immemorial, the Coast Salish people are known for their art, cedar longhouses, lavish potlatches, and seasonal migration between winter villages and summer fishing camps (Gunther and Haeberlin 1930, Snyder 1964, Suttles and Lane 1990).

The Swinomish Reservation sits on the southeast portion of Fidalgo Island, formally called Shais-quihl, the gateway to the San Juan Islands in Puget Sound, Washington State (Figure 1.1). The reservation comprises more than 7,000 upland acres and approximately 3,000 tideland acres; more than 90 percent of the reservation is surrounded by water. There are approximately 850 enrolled Swinomish tribal members, of which many participate in one or more of the diverse array of fisheries the local area provides. There

are more than 58 species of fish from 26 families in the local waters, including all five anadromous salmonid species, Dungeness crab, and several species of clams (SITC 1996).

Interest in testing local seafood¹ for contamination was piqued in the Swinomish community following the release of several Washington State Department of Ecology reports about the health of Puget Sound. Investigations found a variety of chemical contaminants in the water, sediments and shellfish tissue near the Swinomish Reservation, including but not limited to heavy metals, dioxin, pesticides, and polychlorinated biphenyls (PCBs) (Johnson 1999, 2000a, 2000b, Johnson et al. 1997, Long et al. 1999, Yake et al. 1998). The majority of these chemicals are bioaccumulative—they are persistent compounds that remain in whatever media they reside, increasing in concentration as they travel up the food chain. There are numerous potential industrial and municipal sources of chemical effluent in the local area, for example from: extensive agricultural operations, two large oil refineries and associated co-generation plants, transport operations and waste facilities, landfills (including historic unregulated landfills that have yet to be cleaned up), historic and current plywood and paper mills, several marinas, two boat yards, and a log storage yard.

The reports' findings concerned the Swinomish because contamination directly impacts Swinomish priorities. Of the eight Swinomish Planning Mission Statement goals, three

¹ Seafood is the collective term used at Swinomish to refer to the many species of estuarine and marine finfish and shellfish.

are: protect Reservation residents and the environment from exposure to pollutants; protect and preserve cultural, historic, and archaeological resources; and, conserve and manage tideland ecosystems and inter-related aquatic systems (SITC 2002). Based on the findings, the Swinomish prioritized further investigation of the contamination, specifically in the local seafood resources. Swinomish staff initiated a project to determine the types and concentrations of contaminants in local shellfish (bivalves and clams), and to determine what health risks the toxics posed to the Swinomish who harvest and use the shellfish.

The Swinomish study focused on shellfish because shellfish are important resources to the community. Studies with other Coast Salish tribes have documented that these tribes consume shellfish in significantly larger quantities than the average American (Judd et al. 2004, Suquamish 2003, Toy et al. 1996). More than a food source, however, shellfish are considered part of the Swinomish diet of traditional foods. Kuhnlein and Receveur (1996: 418) define a traditional food system as one that is:

Used to identify all food within a particular culture available from local natural resources and culturally accepted. It also includes the socio-cultural meanings, acquisition/ processing techniques, use, composition, and nutritional consequences for the people using the food.

Numerous studies have documented that traditional foods provide important sources of many essential nutrients for indigenous groups around the world; equally numerous

studies have demonstrated that eating these same traditional foods creates a harmful exposure pathway to bioaccumulative toxics, with serious physiological health implications for the people who consume these foods (e.g., Harris and Harper 2001, van Oostdam et al. 2005). Adding to the complexity of the situation is the social and cultural importance traditional foods hold for indigenous peoples.

Traditional foods are intricately tied to the broader social and cultural context of tribal life. Beliefs about the qualities received from consuming a particular food and the reasons for adopting a particular diet structure are often central to cultural expression and participation. Studies of traditional foods state that degradation or loss of a traditional food directly contributes to loss of cultural morale (Kuhnlein and Receveur 1996, Mos et al 2004, Norgaard 2004). This is the case for the Swinomish people, who view traditional foods such as salmon and shellfish as keystone to their communities; much more than a food source, these foods are a vital contribution to cultural, spiritual, and social life (Garibaldi and Turner 2004). For the Swinomish, shellfish are part of their cosmology, incorporated in ceremonies and gatherings, and connected to teachings about community responsibility and sharing resources. None of the aforementioned studies, however, elucidate or evaluate the connections between degradation of traditional foods and impacts to the people who rely on them; for instance, no one has specified whether a contamination threshold exists, what indicators of social and cultural health are most impaired, how they are impaired, and to what degree.

In many Native American communities, the Swinomish included, health is defined on a community level, consisting of inseparable strands of human health, ecological health, and cultural health woven together, all equally important. Within this definition, many of the dimensions of good health as defined by the Swinomish are difficult to quantify, such as participation in spiritual ceremonies, intergenerational education opportunities, and traditional harvesting practices, yet they may be negatively impacted or even destroyed when resources are contaminated (Arquette et al. 2002, Harris and Harper 1997, 2000, 2001, Wolfley 1998). The conventional risk assessment of dose and toxicity has no room to evaluate these integral components of health.

As Swinomish staff working on the contamination project, and given the knowledge gained there of the importance of shellfish to Swinomish, I searched for alternative risk assessment methods within or outside the NRC framework that evaluate how contamination impacts the social, spiritual and cultural dimensions of health. What I found, however, is that the conventional risk framework ignores data that do not conform to the rather 'reductionist' definition of health (i.e., limited to morbidity and mortality). This is largely consistent with the tendency in the fields of natural science, engineering, and economy to employ a model of human behavior that is comparatively monolithic, ordered, and governed by biologically or demographically predictable givens.

As Sheila Jasanoff (2002b: 260) explains, "With prediction and control as their central objectives, these disciplinary frameworks have little patience for the ambiguity of history and experience, the variability of cultures or the uncertainty of knowledge." It is

difficult if not impossible to draw linkages between conventional assessment outcomes and actual implications for a small group of individuals in question. As such, the conventional risk framework's failure to acknowledge cultural heterogeneity or, invoking the NRC (1996), the affected group's knowledge and priorities, generates flawed and incomplete risk assessment results.

In addition to the methodological problems and derived social implications of conventional risk assessment, the Swinomish are also, legally speaking, a sovereign nation as determined by their treaty. One must then ask, as they have, what obliges the Swinomish to follow the policies of the regulatory agencies since the Swinomish are a sovereign nation? An answer can be found in the Indigenous and Tribal Peoples Convention 169 adopted by the International Labour Organization in 1989. The Convention, which provides the most quoted definition of "indigenous people," contains numerous articles calling for equitable consultation with indigenous peoples on the myriad issues of social, economic, cultural and political rights. These consultations are to occur with the governments *within* which the indigenous people reside (emphasis added by Hodgson 2002: 1039). The term *within* is used because writers feared that governments would not ratify the Convention without it (Swepston 1989: 261). So, in essence, the policies and regulations of the US federal government apply to the tribes as well. That is not to say that those policies and regulations, and in particular here the ones specific to Native American peoples, cannot be changed. The risk assessment method and associated risk management decision-making provide examples, yet although it is a widely controversial method, no alternative methods have been promulgated to date.

Since the inception of the health risk framework in 1983 by the NRC, some small alterations have occurred, such as inclusion of risk communication, yet the framework itself remains the same (Figure 1.2). Figure 1.2 illustrates how dimensions of social and cultural health are not considered an integral part of the assessment process, but rather lumped together with the nonessential “other economic and social factors” for discretionary consideration at the end of the risk management paradigm. Recognizing the 1996 NRC’s recommendations, efforts by some government agencies are underway to understand other components that are vital to health as defined by Native Americans (Cirone 2005, USEPA 2002, 2006). However, the proposed small adjustments do not do justice to the pressing need to recognize and incorporate Native Americans’ knowledge and priorities in an equitable manner. Without specific evaluation tools and protocols in place to ensure that health is assessed based on the health issues prioritized by the affected group, there are no requirements to define and assess more than physiological health in an equitable manner. Additionally, without accompanying policies and decision-making in place that set thresholds and response procedures to address these additional health indicators, decision-makers will ultimately rely on the current yet incomprehensive regulatory policies.

Researchers, planners and politicians often cannot see beyond the “hard science” calculations of toxicology on which risk assessment is based because, they claim, the social and cultural realms are too laden with subjective judgments and uncertainties. Yet many scholars have shown out that the conventional risk assessment results also are laden

with subjective judgments, errors, and uncertainties.² It is the standards imposed by the regulatory science of risk calculations that ignore and are unable to address the fundamental values underlying the issues at stake (Yearly 2000). Moreover, the focus on calculated risks is too narrow because only risks to individuals are analyzed. This personalization of risk does not allow for defining or assessing health at the family or community level. By focusing on physiological individual risks, the non-individual, socially and culturally constructed risks are neglected (Jasanoff 2002a; Rayner 1992).

Meanwhile, tribal understanding of the need to find alternatives to the conventional framework is increasing. Through tribal representatives, some progress has been made in suggesting appropriate methodology for evaluating social and cultural risks and impacts in risk assessment equations (Harper et al. 2002, Harris and Harper 1999, 2000). Yet to date, the proposed alternatives are not accepted nor widely followed. Although the reason why the proposed alternatives have not been accepted is unclear, tribes continue to push for an alternative method in order to address social and cultural health indicators in a risk setting (USEPA 2006).

² The issues of accuracy and subjectivity in risk assessment, and in the bigger picture, of the controversies between “hard” and “social” science, comprise a long-standing and contentious battle. For more details on these see, for example, Finkel 1989; Jasanoff 2002a; Russell and Gruber 1987; Salter 1988; Slovic 1992; Wynne 1992.

On Recognizing Culturally-informed Risk

In light of the above, I began to explore how to enact an evaluation based on Swinomish health priorities and the risks posed to those priorities by contaminated shellfish. The first problematic domain that I encountered was the notion of culture itself, and whether culture can be considered a ‘class of things’ or more simply and ideationally a guiding influence in how groups of people define and prioritize health and risks. Asking any Swinomish community member whether there is such a concept as culture, and whether it guides the meaning and importance of health, risks and impacts will inevitably result in a surprised look of amusement and an answer along the lines of, “Of course.” As a Swinomish employee, this answer is satisfactory; however, for my work as a doctoral student, the epistemological questions about culture required additional attention before I was able progress further in the study.

I began with a literature review of scholars of culture, most notably anthropologists across several subfields, but others as well. The field of ecological anthropology draws on the connections between risk, culture and politics in an endeavor to create “culturally informed solutions” to dilemmas facing people and the environment on which they depend (Kottak 1999: 23). Politics is emphasized because the cultural rights that protect and promote a group’s knowledge and priorities are addressed “*within* the [political] state” where the group resides (emphasis added by Kottak 1999: 29). Just as in the ILO Convention 169, again we encounter the point that cultural issues are to be addressed within the political realm in order to achieve any feasible success, an important point to

keep in mind when creating an evaluation tool to address Swinomish health risks and impacts. Yet that culturally-informed solutions are called for implies that they are in answer to culturally-informed risks. In this regard, culture can be thought of as a “mnemonic system which helps people calculate risks and their consequences” (Douglas 1985:81 in Lupton 1999:38).

Considering that culture is viewed here as that which shapes the meanings, risks and impacts to health, from this premise, the question of what is meant by the term culture requires additional review. More broadly, and to complicate matters, the definition of culture is hotly contested. Culture was first conceived of by European theorists in an effort to explain how and why groups of people differed (Clifford 1988, Kuper 1999). E.B. Tylor (1871), was the first to use the term “culture” in anthropology, and famously defined it as that ‘complex whole’ of ideas, knowledge, institutions, and material expressions that constitute a people.³

Since its initial conception, anthropologists have debated and reworked the definition to include or exclude aspects relevant for their own specific theories. The idea of culture as a group with identifiable qualities, world views, and histories nonetheless endures. Long gone, however, are the original assertions that ‘authentic’ cultures (e.g., Sapir 1924) are bounded (one is a member of culture ‘x’ and so not another), static, unchanging, or

³ Fortunately, Tylor’s eugenics-equivalent notion of culture as ordered on a continuum of ‘higher’ versus ‘lower’ societies was soon replaced by a more relativist Boasian conception of cultures as plural, unique and different *but equal* (Stocking 1996).

singular entities in which all members ascribe to a common set of positions, values and beliefs (Kuper 1999, Wolf 1982).

Several respected scholars have gone so far as to argue that culture is too elusive a concept or entity to be meaningful and in this sense ‘does not exist.’ One argument surmises that by trying to pick apart pieces of the many and diverse interconnections we call humankind without considering their connections produces more errors of assumption than it corrects. The argument is that these inter-connected relations are neither fixed nor separate, and cannot be analyzed as such (Wolf 1982). Another argument attacks the notion of culture from an opposing point of view—that culture is used as a heading for different interconnected components and each component must be deconstructed and analyzed separately, along with their connections with biological, social, and economic processes in order to understand them (Kuper 1999). Although both arguments indeed have merit, they can be successfully countered by thinking of culture not as a partitioning off of separate, discrete groups (i.e., us vs. them), nor one that resides in a continuous, fixed state in which the interconnections between all of humankind are too dense to tease apart, but rather as a negotiated process occurring in the present (Clifford 1988).

In this sense, culture is rooted in a foundational belief system yet is not a static, idealized totality, but more accurately expresses itself in a variety of forms and through the medium of identity wherein parts of cultural histories or ‘cultural fields’ are actively taken up by groups of social actors who are both defined and define themselves as a

cultural group (Holland et al. 1998). Culture thus exists in a continual state of change as new aspects are incorporated and old ones are discarded, building on the foundation (Clifford 1988, 1997, Geertz 1973, Kirsch 2001, Ortner 1984). Culture has “porous boundaries” (Kuper 1999), yet culture is not “a boundary to be maintained, but as a nexus of relations and transactions actively engaging a subject.” (Clifford 1988: 344). One could conclude that cultures vary by the beliefs and values that they hold. Thus, beliefs and values that are not held universally, but exist in one or more cultures, may be used to describe a culture.

The morals and beliefs that may be used to help describe a culture are generally defined by other social scientists as governed by deep-seated values (Stern and Dietz 1994). These values are called held values--values that determine moral principles, standards, and qualities that are deemed worthwhile (Brown 1984). Stern and Dietz (1994) characterize held values as those that guide people in the information they seek, how they interpret the information, and how they act on their interpretations. Therefore, held values create the moral and cultural foundation that determines how and why humans interact with their environment—the social construction of knowledge (Felt 1994). In this way, a particular culture can be thought of as a group of people who share some held values in common (Atran et al. 2002), shaping but not determining the underpinnings and reasoning behind their activities and interactions. It is the group identity formed by these held values that in turn provides foundational support for its members as individuals and as a collective in common (Douglas 1985, Ortner 1984). Identity is, again, the medium through which social groupings are aggregated; identity determines how knowledge is

absorbed, filtered, and critiqued (socially rather than cognitively), and ultimately, how people view themselves in the world (Wynne 1992). Challenging identity is akin to disputing people's held values—their culture, their entire moral core.

While culture is largely thought of in these above ideational and identity terms, it expresses itself as well – through particular practices and institutions such as knowledge systems, ceremonies and sacred sites. Articulations of culture can be found in the symbolic and material—in a dancer's regalia, the first salmon in the spring run, or particular burial location or place names (e.g., Basso 1997, Turner et al. in press). Risks can equally affect these practices and institutions. A famous example is provided by the Nuclear Claims Tribunal case in the Marshall Islands, where the US government tested nuclear weapons in the 1950s and 1960s. There, the forced alienation of the indigenous people from their lands caused irreparable cultural loss because the land was an “inalienable possession” to the Enewetak people. The connection to the land represented as more than simply a way to survive, provided “continuity of social relations by presenting an alternative to the ephemeral nature of human existence” (Weiner 1992:4 in Kirsch 2001:11).

Working with the aforementioned concepts of culture and values, my next step involved examining how to think about risk itself, over and above the conventional framework definition of potential physiological harms. The conventional framework is that of the realist position on risk, where risk is defined as a measurable index of the probability of physical harm, but not otherwise thought to be connected to social or cultural beliefs and

values (Lupton 1999). This realist, technocratic view assigns the same meaning to risk across all populations without consideration of both its own intrinsic assumptions (including the idea that those who define the risk govern its outcome) as well as to those definitions of risk so clearly evident in other public worlds or cultural groups.

A more constructivist view of risk recognizes from the outset that the beliefs and values that form a group identity also shape how threats and dangers to that identity are characterized, classified, and prioritized. These threats and dangers (also called risks) may be physically manifest and known hazards, yet they can never be understood nor assessed outside of the social and cultural constructs of those experiencing them (Douglas 1992, Lupton 1999, Nelkin 2003). Cultural theory argues that social groups prioritize risks on the basis of the type of social organization: the framework invoked to support the moral, political, or religious order (Rayner 1992, Tansey 2008). Beliefs are functions of these social organizations (Wynne 1992). Put another way, risks cannot be viewed as unbiased and independent objects that operate separately from the world view of those who are threatened by them. Cultures prioritize risks as those that are the most salient threats to the beliefs and values that shape the community's identity⁴ (Douglas 1985).

Just as culture permeates the risk event, it also influences the outcomes. How risk is reacted to and addressed varies across groups (Satterfield 2000; Slovic 2003; Wynne

⁴ Community is best taken as a self-assigned label and the Swinomish do regard themselves as a community in many though not all regards. For the purpose here, the term refers to community based on common goals and values that are held and respected in the aggregate despite variation across specific points and values within the community.

1992). The perceived risk school has produced a vast body of literature that explores how people conceive of and react to risk when confronted with thorny questions and situations (e.g., What is the risk of losing territorial homelands to rising sea levels?). The psychometric paradigm, one of the most famous outcomes of this body of work, demonstrates that risks that are seen as increasingly dreaded, uncontrollable, or unfamiliar, are also those perceived as most risky. Characteristics such as inequity, high risks to future generations, newly discovered risks and involuntary risks all also produce heightened perceptions of the risk (Slovic 1992). Yet these findings, and the considerable work done in parallel to them, also point out that although different people assess the severity of risks differently (e.g., the argument between “experts” versus “lay people”) those who are not considered experts have their own ordered ‘rationality’ and in this sense produce equally rational assessments of risk as do experts.

Many factors influence perceptions; among them are gender, race, socio-economic status, and associated feelings of vulnerability and [in]justice about the risk event (Flynn et al, 1994, Satterfield 2000, Satterfield et al. 2004). Judgments may also be formed based on the stigmatizations of specific goods, events, or locations when such targets are marked as dangerous and are thus avoided, for example, areas near contaminated sites marked for remediation (Gregory et al 1995, Pidgeon et al. 2003, Slovic 2000). Particularly when vulnerability and injustice are at play, communities themselves may be stigmatized by sheer association with the risk object (Satterfield 2000). Perceptions can intensify to the degree that the risk burden feels unbearable, yet there is often no recourse for reconciliation, so people live with the weight of worry (Erikson 1994). Mental and

public health professionals have widely documented negative impacts to health from worry, stress, and sense of loss of control, (e.g., Bokak et al. 2000, Marmot et al 1997, Santiago-Rivera et al. 2007), demonstrating that perceived risks can and do foster ‘real’ outcomes. All of this work points to the necessity of better incorporating community definitions and perceptions of risk into decision making and policy contexts.

The social amplification of risk model provides a more comprehensive view of risk events as they play out in public and policy life. Each component—from the risk event itself, through the event characteristics, information flow, interpretation and response, spread of the impact and type of the impact—is said in this model to be influenced by culture (Kasperson and Kasperson 1996, Pidgeon et al. 2003). This is best understood in the earlier words of Rappaport (1988: 191):

The human world, the world inhabited by humans, is not constituted by physical, chemical, and biological processes alone. It is also constituted culturally. As such it is not simply made of trees and rocks and water and organisms, but also furnished with and by such conceptions as truth, honor, democracy, ancestors, and gods. These conceptions figure as largely in the motives of individuals and in the ordering and governance of societies as do trees and rocks and life itself. Threats to them are not simply figments of ill-informed people who will use such understandings to resist the realistic calculations of dispassionate experts (although they may so use them). They are real.

For any kind of risk assessment to accomplish its purpose, it must be based on a group's beliefs and values—i.e., what is at risk and how it may be impacted (NRC 1996). This fact brought me full circle to some of the earlier stated shortcomings of the conventional risk assessment framework--that if one does not recognize that beliefs and activities vary between different cultures, then whatever risk assessment is conducted will most likely fail. In addition, inclusion of the group's knowledge, and the values originating from that knowledge, must be an equitable part of the decision-making process (Ellen and Harris 2000, Nadasdy 1999, Turner et al. 2000), yet still situated within the political state.

The beliefs and values most germane to human health risk assessments guide how health is defined and prioritized by the group in question (Airhihenbuwa 1995, Garrett 1999, Harris and Harper 1999). Although the central roles that beliefs and values play in health have yet to be widely legitimized in health policies and regulations (Airhihenbuwa 1995), there are influential examples of organizations and decision-makers who have advanced the scope and evaluation of health beyond the physiological limitations. The World Health Organization (WHO), in its 1946 Constitution, defines health as, "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (WHO 1946). Over the years WHO has maintained and improved its definition of health; during the fourth International Conference on Health Promotion, health was defined as, "a resource for everyday life, not the object of living... a positive concept emphasizing social and personal resources as well as physical capabilities" (WHO 1998). Many countries in the European Union officially recognize the WHO definition of health and employ it in health impact assessments that measure the impacts

of policies on a multitude of factors including the environment, employment, economic growth, socio-cultural values and beliefs, ethnic groups, and gender (WHO 1999).

Governments in Canada are also involved in the dialogue of health impact assessments that employ this broader definition of health (Frankish et al. 1999). In fact, there is a large body of literature in the public health field that advocates the broader definition of health (e.g., Banken 1999, Eyles 1999). Yet agreement on which health indicators are most important and how to evaluate them is far from settled (Frankish et al. 2002).

The health literature provided me with the broader view of health I was seeking for performing health assessments, yet no consensus on prioritizing health indicators for specific groups of people. Finding that prioritizing indicators is a contentious matter (Frankish et al. 2002) did not surprise me considering that most often the indicators are meant for large-scale health assessments of nation-states, wherein many diverse cultures reside. From that point of view, determining the health priorities of Swinomish in relation to contaminated shellfish and then assessing them seemed a less daunting task than creating an equivalent evaluation tool meant to represent the beliefs and values of many groups of people.

Creating a Culturally-informed Health Evaluation Tool

From this point forward, I began researching how to construct an evaluation tool that would be based on, and able to evaluate, the major parameters of Swinomish's definition of health. In order to define and prioritize the dimensions of health and well-being for a

particular group, knowledge of and familiarity with the historical, social and cultural context of the group is key (Carter 1991); with this knowledge, it can be determined which health factors may be impacted by the exposure to a hazard and to what extent (Harper and Harris 1999). My experience in the Swinomish community provided me with some knowledge and leads to uncovering additional knowledge sources that outside researchers may not have had access to (e.g., casual conversations with Swinomish elders who do not discuss topics such as health problems on the Reservation with unfamiliar individuals).

My data collection methods consisted of two sets of ethnographic-based interviews. Detailed information on the data collection and analysis methods can be found in each of the following chapters; the overview here is meant to provide initial insight. Since this is a manuscript-based thesis, in lieu of traditional methods, data and discussion chapters, each of the chapters herein is meant to be a publishable manuscript that provides a unique look at the data and the importance in the bigger picture of working to rectify the oft-times awkward relationship between culture and regulatory risk. As such, the overview of the methods here provides the opportunity to explain the basis on which each chapter is derived. It is also important to note that since each chapter is meant to stand alone as a publishable manuscript, there will be some unavoidable repetition between chapters. Another detail worth mentioning in regard to a manuscript-based dissertation is that it allows for different stylistic conversation across the chapters. Therefore, while chapter two is presented in a more formal, classical style, chapter four has a narrative, discursive style.

The first set of interviews (n=76 adults) was conducted with a broad swath of tribal members ranging in age from 16 to 83 years old. We purposefully oversampled the Swinomish members whom we identified as potential high consumers of fish; the data for these individuals are most often absent in conventional surveys, yet these data contain some of the most pertinent data. We hypothesized that the highest fish consumers are also the traditional knowledge holders in the community—indigenous groups who follow a “way of knowing” and “a way of living” that closely links them to their local environment in a reciprocal relationship that is stewarded over many generations. This dynamic relationship is based on the beliefs and values that comprise and guide the complex social structure of the Indigenous group (Berkes 1999; Menzies and Butler 2006; Nadasdy 2003). The traditional foods mentioned earlier are a part of the traditional knowledge system.

Swinomish members and staff conducted the oral interviews based on methods drawn from Hora (1992) and Meyer and Booker (1991). Interviewers asked open-ended questions, allowing for a story-telling format, more conducive to the transfer of traditional knowledge. The interview questions pertained to current and historic fish consumption patterns and reasons for changes over time. Current pollution in the natural resources and resultant risks and impacts for Swinomish were also touched on.

After coding the data, mental models were constructed to better elucidate Swinomish beliefs about the connections between fish consumption patterns, changes over time,

pollution and health. Mental models help tease apart how interviewees think about cause and action, which in turn enables researchers to interpret observations, infer cause, and make judgments or predictions about the multiple impacts and consequences of particular actions (Medin 1989, Morgan et al. 2001). The mental models also helped determined data gaps that could be addressed in the second interview set.

The second set of interviews focused on knowledge held by Swinomish elders and experts (n=15). Building on the data from the first set of interviews, additional questions were asked about the Swinomish definition of health, current health status, and impacts to the health status from contaminated shellfish. Again, the data were coded and analyzed. These data were used to create an evaluation tool by first determining the key Swinomish indicators of health in relation to shellfish, then constructing scales to ascertain how contaminated shellfish impact the key health indicators.

Throughout the project, several levels of Swinomish community guidance and approval were sought. Recognizing that communities are not homogenous entities (Butler 2004, McDonald 2004, Menzies 2004), I worked to ensure that multiple groups within the community understood and approved of the project. The Swinomish Cultural Resources Committee, the Swinomish Indian Senate, Tribal elders and experts, and the Tribe's approved Institutional Review Board (with Northwest Portland Area Indian Health Board) were all consulted prior to initiating research, and throughout the project.

These methodological efforts and the findings and discussion they produce are manifest in the four paper or dissertation chapters of this thesis, chapters two through five. What is revealed in these chapters is an approach to improving how risk assessments are conducted so that the definition, evaluation and prioritization of risks and impacts are based on what is deemed most important by the affected people, in this case, the Swinomish Tribe in the context of their relationship with seafood. With the proposed approach comes both an advance in defining and assessing health and risk in a context broader than solely physiological risks, and an advance in detailing the ways health and risk can be culturally specific. An evaluation tool to define and assess social and cultural health indicators is proposed and tested; the tool is meant to be employed in parallel to the conventional risk assessment. Recommendations for changes in policy and decision-making accompany the proposed risk assessment amendments and evaluation tool, as the recommendations are not enforceable without policy specific to their use.

What I found is that the Swinomish relationship with seafood is intricate, deeply meaningful and complex. The relationship spans across time: from traditional knowledge passed down through generations about specific harvest, preparation and use practices, to past events when access to seafood has been restricted and even banned against the will of the Swinomish people, to current suppressed consumption rates, in part due to past events, to a rightful future wherein community members have access to as much seafood as is desirable and necessary for health. Although most Swinomish community members know that contamination exists, they continue to eat seafood because it is an integral part of sustaining health; it nourishes the spirit as well as the body. As such, Swinomish

health is as much concerned with social and cultural risks and impacts as it is with the physical ones. The key health indicators of community cohesion, food security, ceremonial use and knowledge transmission all play primary roles in health in relation to seafood, and are equally as important as physiological indicators when seafood is contaminated. Seafood contamination strongly impairs food security, particularly availability of and access to seafood. These health indicators and their status due to contaminated seafood demonstrate that grave risks and impacts have been overlooked by relying solely on the conventional risk framework to delineate risk. For any resolution to the dichotomous condition between Native American rights to health and welfare and current government risk regulations and policies to be feasible, all prioritized risks and impacts, not solely the physiological ones, must be equally and suitably addressed in policy and decision-making.

The progress toward realizing this thesis begins in chapter two, which explores the many, and at times contradictory, policies and procedures that govern US regulatory agencies' work in risk assessment. Chapter two focuses on the exposure analysis component of the conventional human health risk assessment, specifically the ingestion pathway for exposure to contaminated substances. Agencies use fish consumption surveys to determine exposure calculations used in the risk assessments, yet I posit that both the data from fish consumption surveys and how the data are employed by regulatory agencies are inaccurate and detrimental to Native Americans. I point out key problems in the context of Native American fishing communities and provide recommendations for amending some of the shortcomings. Included in this chapter is a deeper explanation as to why the

traditional use fish consumers in tribal populations are often missed in conventional data collection procedures, the negative consequences when the average consumer rates,⁵ or even current “traditional-use consumer” rates, are used in risk assessment because these rates are suppressed, and the bleak implications for Native American tribes. A ‘suppression effect’ occurs when a fish consumption rate for a given population, group, or tribe reflects a current level of consumption that is artificially diminished from an appropriate baseline level of consumption for that population, group, or tribe (NEJAC 2002: 43-45). An initial description of the methods for the Swinomish interviews is put forward as an alternative to conventional fish consumption survey methods.

The results from the first set of interviews at Swinomish are discussed in chapter three. Based on the reasons why conventional fish consumption surveys fail and what can be done to amend some of the problems as stated in chapter two, this chapter details the proposed alternative to fish consumption surveys, called seafood diet interviews.

Through the interview approach employed in the seafood diet interviews, I work to improve the accuracy and the representation of Native American practices and concerns. I discuss how and why the interviews afford a novel perspective into the meaning of fish for the Swinomish people through details of current harvest and consumption, reasons for changes over times, and impacts of contamination. The interview results demonstrate why there is a range of fish consumption rates between and within Native communities, e.g., differences between traditional use consumers and other community members, and

⁵ The use of the term “average consumer” in chapter two refers to consumption rates that reflect the mean consumption rate of the consumer group in question.

also that the myriad changes in fish harvest and use during the most recent generations cannot simply be thought of as resulting from changes in voluntary lifestyle preferences. Indeed, the interviews provide evidence that the current consumption rates in the Swinomish community are suppressed, and likely rates are suppressed in other Native American fishing communities for similar reasons. This is vital information in the struggle to improve the risk analysis and risk management decision-making processes that affect Native Americans.

After conducting the first set of interviews at Swinomish, I discovered some unexpected results. Chapter four details those results, which illustrate why assumptions about traditional knowledge in Native American communities may miss important changes in the status of that knowledge in Native American communities today. Traditional knowledge is both a “way of knowing” and “way of living,” yet situations that may not have existed in the past but are present today, e.g., diminishing access to traditional foods, are creating heretofore unseen issues in how the knowledge is maintained within the community, as well as studied by researchers outside of the community. The changing state is discussed in reference to the many “invisible losses” Native communities face today, wherein an “invisible loss” may not be readily understood nor easily identified, yet has seriously damaging implications for the social structure of the group (Turner et al. in press).

The thesis culminates in chapter five, which focuses on the construction and use of a health risk and impact evaluation tool that employs the definition of health from the

group in question, in this case Swinomish. Based on the findings as depicted in the previous chapters and the second set of interviews with experts and elders, I discuss the Swinomish definition of health, current health status, and impacts due to contaminated shellfish. By presenting an evaluation tool based on the Swinomish health priorities, I enact what the NRC recommended in 1996 but regulatory agencies have not accomplished to date--to employ the affected group's knowledge and priorities in a risk assessment that addresses the issues the group deems most important. I forward the evaluation tool as a meaningful and equitable way for tribes to address health risks and impacts to often intangible and difficult-to-quantify indicators of health. The evaluation tool is founded on the understanding that health priorities and health risks are not a universal constant, but are defined by a group's deep-seated beliefs and values; these same guiding principles define the culture of the group and are as unique as the group itself.

When the Swinomish project investigating contaminated shellfish started, I did not foresee the many iterations I would experience, nor that the iterations would lead to the creation of the health risk and impact evaluation tool. One of the watershed moments occurred as I listened to Tribal elders and experts explain to me why numerical outputs, as required for the conventional risk assessment framework would never be able to encompass and assess their health priorities. Before that moment, I had envisioned creating an evaluation tool for dimensions of health not currently assessed that could be incorporated *within* the conventional framework. After that moment, I knew that the evaluation tool must be separate from the conventional framework because it is the only

viable avenue to ensure that the Swinomish knowledge is presented and assessed in an equitable manner compared to the Euro-American knowledge that devised the conventional framework. Had I tried to fit Swinomish health priorities into the conventional framework, they would have been subjugated in the framework, and continue to be an afterthought in the “other economic and social factors” category at the end of the conventional risk paradigm.

Inherent in forwarding an evaluation tool based on Swinomish health values is the importance of holding government agencies to their charge of protecting human health and welfare. Yet protection is impossible if what is meant to be protected is not correctly defined and prioritized. For Native American tribes this is particularly true in light of their sovereign rights to define health and to protection of that health for themselves and their natural resources (NCAI 2004, USEPA 2006). If the status of health risk assessments goes unchanged, the “burden of proof” is left in the hands of the groups who suffer the highest risks and impacts. In the case of Swinomish, without proper evaluation of the risks faced from contaminated shellfish, government agencies are ignoring their mandate to protect health, forcing groups like Swinomish to provide the proof themselves within the constraints imposed by current policies. A double edged sword, the only solution within the imposed regulatory setting is to avoid the risks, in essence coercing Swinomish to stop eating cultural keystone species, thus generating additional invisible losses while ignoring the alternative option of determining the risks and implementing risk reduction strategies (O’Neill 2003). Even though tribes are obliged to push for their rights *within* the political state where they reside, they are not required to concede to use

of State regulatory policies that do not and cannot uphold the inherent treaty trust and responsibility obligations of the State.

Figure 1.1 Swinomish Indian Reservation

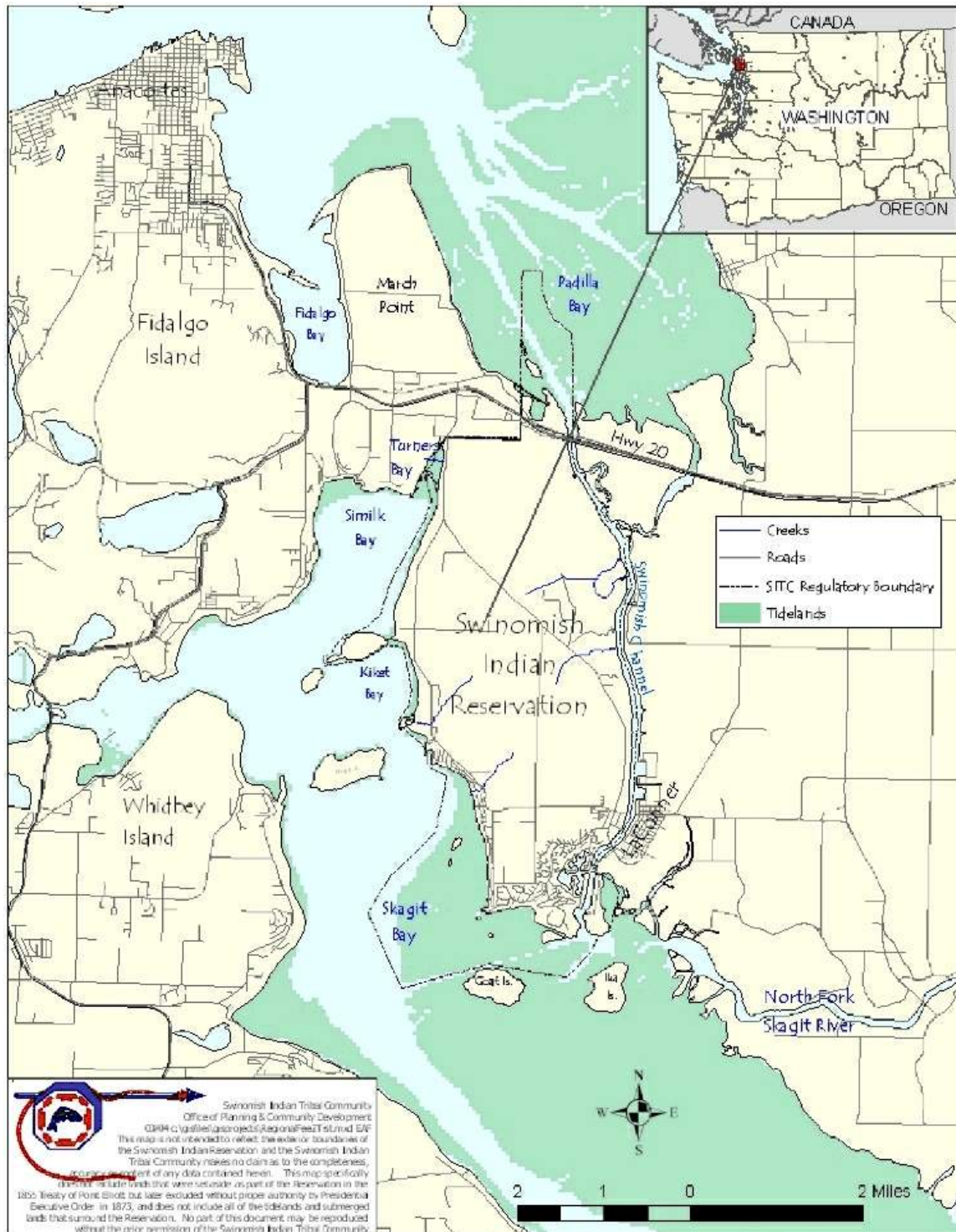
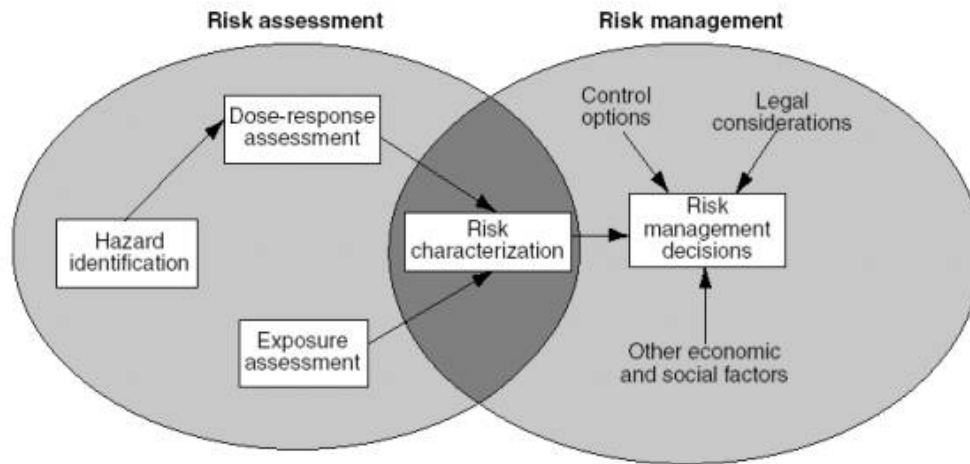


Figure 1.2 Diagram of NAS risk assessment/risk management paradigm ⁶



Source: EPA Office of Research and Development.

⁶ The figure is published online at <http://www.epa.gov/ttn/atw/toxsource/paradigm.html>; accessed June 26, 2008. Reprinted with permission from Risk Assessment in the Federal Government: Managing the Process © 1983 by the National Academy of Sciences, Courtesy of the National Academies Press, Washington, D.C

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2 Issues in Evaluating Fish Consumption Rates for Native American Tribes¹

Introduction

Human health risk assessments are performed to determine the degree to which people may have an increased likelihood of illness or death due to exposure to chemical toxicants in media (air, water, soil, sediment) and/or other exposure pathways such as using materials for food, clothing, shelter or other items. Regulatory applications of risk information include remediating contamination, setting water and air quality standards, registering pesticides, and many other actions. Risk assessment methods were developed to estimate the mean exposure, or other percentile-based exposure, such as the 90 percentile, of the general American population to one or more toxicants (NRC 1983). More recently, vulnerable populations, such as children or subsistence populations, are sometimes considered and explicitly protected.

Disproportionate exposures to Native American² populations may thus occur as a result of inaccurate base rate or national average data used in risk assessments. These data are the products of a number of methodological shortfalls, including: unclear statement of

¹ A version of this chapter has been accepted for publication. Donatuto, J. and B.L. Harper. In press. Issues in Evaluating Fish Consumption Rates for Native American Tribes. *Risk Analysis*.

² The terms Native American, tribal community, tribe, tribal member and Native are used interchangeably in this paper to refer to the many and diverse American Indian and Native Alaskan peoples residing in the United States.

intention for the use of the data collected so that data are then used inappropriately; data collection methods that are incongruent with community norms and protocols; and, data analysis methods that omit or obscure the highest consumer or exposed subset of the population. Even when some of these shortfalls are addressed, current regulatory standards and policies do not have the flexibility to include data demonstrative of Native traditional knowledge³ and values. Traditional knowledge involves more than numbers of species harvested or the frequency of eating certain species. It provides also the context needed to situate and interpret data in the entire process of obtaining nutritive and spiritually satisfying foods.

This paper focuses on one specific dietary exposure pathway within a vulnerable population: fish consumption (including freshwater, estuarine and marine fish and shellfish) in Native communities. Across the United States and beyond, consumption of contaminated fish raises serious concerns for all peoples, as demonstrated by the number of fish consumption advisories that exist in every state and in most major water bodies. Yet because these advisories are based on assumptions about the fish consumption rates of the general population, tribal members from fishing communities who eat more fish than the general population are less protected. In addition, determining appropriate and

³ Traditional knowledge is defined here as “the information that people in a given community, based on experience and adaptation to a local culture and environment, have developed over time. Their traditional education processes were carefully constructed around observing natural processes, adapting modes of survival, obtaining sustenance from the plant and animal world, and using natural materials to make their tools and implements. All of this was made understandable through demonstration and observation accompanied by thoughtful stories in which the lessons were imbedded” (Barnhardt 2005).

representative fish consumption rates is critical because of their key role in numerous regulations and decision-making procedures such as determining water quality standards or setting cleanup thresholds. This paper discusses problems with conventional fish consumption survey methods often used for Native American populations, and describes how to study tribal fish consumption rates in a more culturally appropriate and therefore more accurate manner. An alternative survey approach is presented, one created and enacted by the Swinomish Indian Tribal Community, a federally recognized tribe with homelands in the Puget Sound region of Washington State.

Fish Consumption Default Values

The US Environmental Protection Agency (USEPA) has prepared several guidance documents specifically for conducting fish consumption surveys (USEPA 2000a, 1998a) and evaluating general health risks at Superfund sites and other situations (USEPA 1992, 1997). These documents make various recommendations about default intake rates for water, fish, and other exposure pathways. For example, Chapter 10 of the USEPA Exposure Factors Handbook (1997) includes recommendations for default fish ingestion rates for the general population, recreational marine anglers, recreational freshwater anglers, and Native Americans. For the general population, USEPA recommends using a mean per capita ingestion rate for all ages combined of: 6.5 grams per day (gpd) for fresh water and estuarine finfish and shellfish, 14.1 gpd for marine fish, and 20.1 gpd for all

fish.⁴ For Native Americans, the fish consumption rate recommendations differ depending on the guidance document and the particular group being considered. USEPA and Oregon State have proposed using rates from the Columbia River Inter-Tribal Fish Commission survey (CRITFC 1994) which cites a mean ingestion rate of 63.2 gpd and a 95th percentile of 175 gpd. The 2005 USEPA Combustion (2005) guidance suggests using a general intake rate of 5.4 four-ounce meals per week (3.1 oz/d, or 87.4 gpd). Chapter 6 of this guidance (pages 6-16) notes that “populations such as Indian Tribes, Asian and Pacific Islanders, and some immigrant groups are known to have high local fish consumption rates,” but does not make numerical recommendations.

For developing ambient water quality standards, an USEPA technical support document (2000b) makes reference to an “ideal” scenario of using fish consumption rates derived from the local populations who eat fish from the water body in question, and that those who eat the most fish are given “priority.” When the situation is not ideal, and it rarely is, USEPA goes on to recommend consumption rates for the general population and sport anglers of 17.5 gpd, and for subsistence fishers a rate of 142.4 gpd. The earlier final draft technical support document (USEPA 1998b) recommended 86.3 gpd (the 99th percentile of national consumption by the general population) of freshwater and estuarine fish and shellfish for subsistence fishers, and the alternative default subsistence rate was 39 gpd (the 95th percentile of national consumption). None of these rates include marine

⁴ Although these estimates have been revised in the USEPA report Estimated Per Capita Fish Consumption in the United States (2002) the numbers presented here are germane due to their continued widespread use in regulatory standards in most States, as described in more detail in the data presented here.

species.⁵ To provide additional protection from adverse effects when pregnant women are of particular concern, a default intake rate of 165.5 gpd specific to women of childbearing age is suggested for setting ambient water quality standards to protect against developmental effects (USEPA 2000b). The earlier technical support document recommended using 148.8 gpd (USEPA 1998b).

Even in light of the range of recommended fish consumption rates and associated guidance documents, many states still use the older 6.5 gpd rate in their water quality standards and have not promulgated higher consumption rates for waters used by women, children, or tribal members or other subsistence fishers.⁶ When those groups are considered, the typical response is to recommend that those groups eat less fish, rather than imposing stricter standards on the waterway.

To add to the array of fish consumption rates, most States also have their own regulations and guidance documents containing a range of rates. Currently, the Washington State Department of Ecology is proposing changes to the Model Toxics Control Act (MTCA)

⁵ Note that the approach to considering marine versus freshwater and anadromous versus resident fish species, as well as freshwater or marine shellfish (and other aquatic species) is often unclear and confusing in regulatory standards. Similarly, the use of measured or modeled data is quite variable; for example, using modeled data to fill in the gaps in the existing data, or using existing data for anadromous species as a relative source contribution when setting standards for resident fish in water bodies where both are present.

⁶ For example, Washington State's Water Quality Standards, Chapter 173-201A WAC, refers to the National Toxics Rule (<http://www.epa.gov/waterscience/standards/rules/ntr.html#sectionF3>) for protecting human health, which cites 6.5 grams per day.

Cleanup Regulation (Chapter 173-340 WAC),⁷ which governs contaminant cleanups.

The current guidance uses 54 gpd with a fish diet fraction of 0.5 obtained locally, for a total of 27 gpd, applied to all populations and all locations. The Department is proposing to replace this with a fish consumption rate of 57 gpd (derived using the 95th percentile of the Sechena et al. study of Asian and Pacific Islanders living around Puget Sound (Sechena et al. 2003), and a fish diet fraction of 1.0). The recommendation recognizes that “these values may not protect tribal fishers that consume fish” but does not provide numerical recommendations or describe situations where higher subsistence rates would apply.

Brief Overview of Tribal Context

According to fish consumption surveys of several tribes in Washington State, tribal people currently eat more than 20 times the amount of fish compared to the average American (CRITFC 1994, Suquamish 2000, Toy et al. 1996). Nevertheless, although the current tribal fish consumption rates are much higher than those of the average American, the average contemporary tribal rates are well below the traditional subsistence levels that are still followed by a subset of tribal members. Moreover, traditional subsistence levels are most often less than the subsistence heritage rates that inherent aboriginal and treaty rights protect.⁸ Using an average tribal fish consumption rate instead of a rate reflective

⁷ http://www.ecy.wa.gov/programs/tcp/regs/reg_main.html; proposal to change rate is posted at

http://www.ecy.wa.gov/programs/tcp/SAB/SAB_mtg_info/mtg_060915/02%20RecapAPIFishConsumptionRateDiscussions.pdf

⁸ Harris and Harper (2008) refer to low (including the average), moderate (100 gpd to 1 pound per day) and high (heritage) consumption rates in Native American fishing communities. “Low” refers to the average,

of the subset of current traditional subsistence consumers, or even higher heritage rates, will result in lower estimates of health risks and in lesser degrees of health protection. Therefore, it is important to clarify the context in which the consumption rate will be used in order to ensure that the chosen rate is appropriate (e.g., use of current traditional subsistence rates to reflect current risks of fish consumption in assessments; use of heritage rates in water quality standards to protect natural resources as stipulated by treaty trust and responsibility obligations).

Compounding this problem is the fact that protecting tribal health is not simply a matter of managing exposures to contaminants. The biophysical, mental, spiritual, social, and economic well-being of the individual, the community, and the environment are all equally important parts of tribal health (Arquette et al. 2002, Harris and Harper 1997, 2000, 2001, Wolfley 1998). For some tribes, to whom fish are more than simply a food source, contaminated fish adversely impact all of these facets of health. In these tribes, fish represent a cultural keystone species—species that have significant meaning and identity in tribal values and practices and as such are used in family and place names, educational stories, and ceremonies (Garibaldi and Turner 2004). Impacts to cultural keystone species degrade overall cultural morale (Harris 2000, Kuhnlein and Receveur 1996). Therefore, degradation of traditional foods, for example from contamination,

currently suppressed rates. “Moderate” may reflect the current traditional subsistence consumer rates or a subcategory of heritage/ Treaty rates. Heritage is the preferred term for the subsistence rates once consumed by all tribal members because these rates continue to be modern and relevant, as protected by inherent aboriginal and Treaty rights.

directly impacts the physical health of those consuming the food and is regarded, equally, as an attack on beliefs and values through the “acknowledged relationship of the people with the land, air, water and all forms of life found within the natural system” (Suquamish 2000 as quoted in O’Neill 2003: 46). None of these values tied to traditional knowledge are acknowledged or included in the current decision-making and regulatory settings.

Evaluating Contemporary Tribal Fish Consumption Rates

Approach to studying fish consumption rates

National risk evaluations for toxics in fish use data representative of the general population, yet the fish consumption rates used are not protective of Native American populations. Table 2.1 illustrates the range in fish consumption rates from: the general population, several Pacific Northwest Native American fish consumption surveys, and data of heritage rates (i.e., original subsistence rates that every member formerly consumed). All of the tribal consumption rates are well above the rates used to derive environmental standards.

Fish ingestion rates also vary among tribes. All of the tribal groups listed in Table 2.1 are from the Pacific Northwest, yet each tribe is unique; even neighboring tribes do not necessarily eat the same quantities or types of fish and shellfish. Thus, it is important to recognize that one tribe’s fish consumption rate may not accurately represent any other tribe and that grouping tribes together may create a downward bias in the rates.

Within each tribe, additional fish consumption rate variation exists that may or may not be evident in conventional consumption survey reports. For example, the average CRITFC (1994) contemporary consumption rate is 63.2 gpd and the 95th percentile is 175 gpd, as measured using conventional survey methods. However, within the Confederated Umatilla Tribes, one of the CRITFC member tribes, a subset of traditional consumers who adhere more closely to traditional subsistence practices such as harvesting and preparing their own food currently consume an average of approximately 540 gpd, illustrating that the reality of contemporary consumption is not captured by conventional survey methods (Harris and Harper 1997).

Contemporary consumption rates

Even though average contemporary tribal fish consumption rates are much higher than those of the average American, current average tribal rates are nevertheless lower than all three of the following: (a) heritage rates, (b) subsistence rates eaten by a subset of tribal members even now, and (c) goals for recovering traditional healthy diets. Many Native people have been forced to reduce their intake below original subsistence levels, in essence *suppressing* their fish consumption rate (Harper and Harris 2008). A ‘suppression effect’ occurs when a fish consumption rate for a given population, group, or tribe reflects a current level of consumption that is artificially diminished from an appropriate baseline level of consumption for that population, group, or tribe. The more robust baseline level of consumption is suppressed, inasmuch as it does not get captured by the fish consumption rate (NEJAC 2002: 43-45). There are several reasons for this suppression:

1. Treaty and aboriginal rights to access and harvest traditional foods are still hotly contested, with battles being fought across the country for recognition and protection of those rights. Many federal, state, local, and commercial entities still aggressively seek to diminish or extinguish tribal rights and culture.
2. People have less access to general and specifically inherited harvest sites due to loss of ownership, theft of land, and poorly scripted federal policies.
3. Fewer people have enough time to catch fully subsistent levels of seafood because they have been forced to assimilate into the dominant society's workforce and to share its economic beliefs. In many cases this assimilation is the unhappy result of decades of federal policies that deliberately tried to eradicate traditional tribal lifestyles, using such agents as missionaries and boarding schools, to obliterate native languages, religion, cultural practices, and connections to the land.
4. Tribal people are still harassed while participating in the harvest of traditional foods via verbal, physical, and legal threats by private citizens and public law enforcement authorities, and their gear is still being vandalized, stolen, or seized.
5. Aquatic species populations have been decimated or destroyed by dams and other development projects, commercial over-fishing, invasive species, habitat fragmentation and loss, and many other causes.
6. Knowledge of contamination in areas traditionally harvested - learned through anecdotal, first-hand or visual data, and fish advisories - have influenced some native people to eat less subsistence seafood.

Despite these obstacles, many tribal people continue to rely on subsistence foods with seafood being a primary source, although they may not always mirror levels of historic consumption. Furthermore, some tribal people continue to harvest and eat fish and shellfish in areas where fish advisories have been issued. In many cases, people continue to eat fish they know are contaminated because upholding the traditional ways is paramount to cultural survival (Harris 2000, O'Neill 2003). As a Board member from the Confederated Tribes of the Umatilla Indian Reservation has stated, "It's our food whether it's contaminated or not." Warnings about contaminants may also raise suspicions that the federal government is trying to scare or force tribes out of practicing their culture (Harris 2000). Over time, failure of state and federal agencies to protect tribal people tends to be interpreted as lack of caring at best, and deliberate poisoning at worst.

Specific critiques of the tribal consumption study methods

As a result of the methodology typically used in consumption surveys, the majority of consumption rate data available for Native American communities are not representative of the true range of tribal consumption rates. Tribal fish consumption surveys from Washington State illustrate six common flaws in the survey and assessment process that have led to inaccurate data:

1. Widely cited reports do not clearly state what they intend to do with the data supporting these same reports. A clear purpose stating why the data is being collected guides the type of data collected. Consumption rate data differs dependent on whether the goal is to evaluate current risk levels, to use in a regulatory context with data usability criteria, to develop cleanup levels, or to

develop water quality standards. If the study questions and data quality objectives are not clear, the results may be used in statistically inappropriate ways to address questions different from the ones that the authors intended.

2. Outlier data are often eliminated or recoded based on the assumption that the respondents are unaware of or mistaken about how much they eat. Yet, traditional subsistence consumers, who represent the highest reported rates, are acutely aware of how much subsistence food they eat, and conversely how much they are currently prevented from eating. In the Tulalip and Squaxin Island fish consumption survey (Toy et al. 1996), the highest reported rates were recoded to lower amounts because the reported rates were considered too high to be “realistic.” In the CRITFC survey (1994), the highest data points were simply eliminated.⁹ The Suquamish study (2000) assumed that the responses were all likely accurate and therefore were included in the analyses, although they were not evaluated as representing a separate subset of people.

⁹ There is considerable confusion about how the CRITFC outliers were determined or what their values were, nor is there any explanation of which of these outliers were eliminated and which were included in the analyses. The report states that 4 outliers were excluded. However, the 4th highest datum point represents four respondents reporting equal values (486 gpd), thus either 3 outliers of the highest 4 data points (648, 778, and 972 gpd) were excluded, or a total of 7 outliers were excluded if the 4 people reporting 486 gpd were also excluded. Confounding the confusion, other tables in the report state that up to 13 outliers were excluded. Yet another possibility is that there were 4 additional people who reported higher than 972 gpd rates and were excluded.

3. A random sampling technique is employed in most of the surveys to capture a statistical mean. This is appropriate for answering some study questions; however, random sampling through the use of enrollment records may produce flawed results because many people, and especially traditional consumers and elders, are transient even within a reservation. They may live with relatives or friends and have no permanent address or phone number, or simply wish to remain invisible (Harris and Harper 1997). This may result in an effective over-sampling of the low consumers, creating a downward bias.
4. Many fish consumption rates in government guidance documents include data from non-consumers. Again, this may be appropriate for some study questions, but produces lower consumption rate averages and percentiles. For example, the USEPA estimated daily fish consumption, converted to uncooked weight, based on the USDA's combined 1994-1996 and 1998 CSFII (Table 2.2) (USEPA 2002). Data were presented for consumers and non-consumers, referring to people who did or did not consume fish during the 2-day survey period. USEPA (1998a) recommends that "States and Tribes need to ensure that the distribution is based on survey respondents who reported consuming fish because surveys based on both consumers and non-consumers typically result in median values of zero" if the survey is a dietary recall of only the previous one, two or three days.
5. Dietary recall questionnaires for 24 or 48 hours are employed in fish consumption surveys (e.g., see endnote #10). This means that the data likely reflect a single

meal, which may not be appropriate for developing annual totals. Some parts of the American population eat fish on Fridays – what if a 2-day dietary recall survey is administered on Thursday? Further, many native people follow seasonal consumption patterns. For example, the initial results from the Swinomish seafood diet interviews demonstrate that shrimp was one of several species that are primarily a seasonal food (Figure 2.1 illustrates the annual Swinomish seafood cycle). Additionally, many tribal members reported eating several pounds of shrimp in one sitting because it was a treat to eat shrimp when it is in season. This also raises the matter of potential acute exposures.

6. Questionnaires may not collect accurate information from tribal members for a number of reasons. It has been confirmed that many non-respondents from traditional fishing families said they declined to participate or may have given false information during the CRITFC study (Harris and Harper 1997). Respondents may be reluctant to provide honest answers because they do not want to be prosecuted if they say how much they eat or where they go to harvest (due to memories of personal or family arrests from historical ‘sting’ operations). Tribal members may not respond well to demands for questionnaire data even if it is in their native language, particularly from outside entities and unfamiliar faces; decades of data appropriation and misuse have created a strong distrust of “western” scientific research and government agencies (Campbell 2000, Smith-Morris 2007).

An Alternative to Fish Consumption Surveys

The Swinomish approach to investigating contemporary consumption rates

Conventional survey techniques are often not applicable in native communities. For example, oral interviews are recommended in lieu of written surveys because traditional knowledge transfer pathways are primarily oral. Yet simply converting the written questions to oral ones does not solve the problem; there is more to the process than making a few tribal-specific modifications to a conventional survey instrument or translating it into another language. When researchers try to include traditional knowledge in regulatory science, such as for use in a standardized risk assessment framework, they encounter difficulties because words, definitions, or ideas differ or do not exist in one or the other knowledge system (Cruikshank 1998, Nadasdy 1999). These issues can be addressed, in part, by fostering a strong, communicative relationship, based on the principles of meaningful consultation, in which all players come to the table and have equal parts in the decision-making process (Harris and Harper 1997). Valid, repeatable and defensible research methods can be created and agreed upon by all parties (Menzies and Butler 2006) and the tribe(s) must be able to retain control over the data (Cruikshank 1998). Scientifically sound “Rules of Evidence” must be followed: that data and conclusions can be crosschecked via multiple sources; that the methods are reliable and repeatable; and that each assumption is validated and uncertainty is addressed. Equally important, those asking the questions must establish cultural credibility by receiving true informed consent and being familiar with the community in

order to understand the local knowledge system. More often than not, the most appropriate entities to carry out such work are the tribes themselves.

In 2002, the Swinomish Indian Tribal Community (Swinomish) initiated a study of bioaccumulative toxics in locally harvested species of clams and Dungeness crabs. For the risk assessments, Swinomish initially intended to use a combination of fish consumption rates from neighboring tribes: the Tulalip and Squaxin Island survey (Toy et al. 1996) and the Suquamish survey (2000). Once the project was underway, analyses of these tribal fish consumption surveys found that species eaten, preparation methods, and even harvesting seasons represented a few of the many differences between Swinomish and the other tribes. Coupled with the desire to rectify some of the shortcomings of conventional surveys as described in this paper, Swinomish decided to develop an alternative methodology, called “seafood diet interviews.” The purpose of the seafood diet interviews is to develop a “fish basket” with amounts of various species of fish and shellfish that reflects traditional subsistence and average consumer rate data. These data are then coupled with consumption data of pre-suppression heritage rates, such as during the time when local Treaties were signed (see Section 5.2). The results are designed to evaluate risks for each diet: an average current diet, a current traditional subsistence diet, and a pre-suppression heritage diet, so that three questions could be answered: (1) what are the risks to people today with current, suppressed fish consumption rates, (2) what are the risks to people today who eat traditional subsistence diets with higher consumption rates, and (3) how do today’s traditional subsistence rates compare to the heritage rates.

These estimates may overlap, with some contemporary people eating at heritage rates.

The Swinomish seafood diet interview methods are summarized below.

Swinomish established an advisory board of university and tribal experts to help guide the seafood diet interview process. A professional ethnographer trained Swinomish community members to conduct the interviews. The open-ended, oral interview questions (Table 2.3) allowed for data collection in a manner much more amenable to determining fish consumption rates for a range of consumers, the traditional subsistence subset—the posited highest consumers. Conventional survey questionnaires ask numerically-based, closed questions about portion size and number of servings within a specific timeframe, yet leave no room for other information. Important data and dialogue are lost, such as how seafood is obtained, preserved and eaten, how portion size or number of servings has changed over time, whether the current quantity and frequency of fish consumption is at a desirable level, if not, why the current rates are not desirable, what a desirable rate is, and why. Data elucidating the reasons driving current fish consumption levels and changes over time, as well as gauging the desired fish consumption levels, are key to accurately interpreting tribal fish consumption rates for use in decision-making.

Multidisciplinary reconstruction of heritage rates

The original subsistence heritage rates that Native people formerly consumed are much higher than current fish consumption rates (Walker 1992, Walker and Pritchard 1999).

The heritage rates are part of Native culture and aboriginal rights, and often represent the

rates that tribes desire. Heritage rates reflect the goals for recovering traditional healthy diets. It is important to think of heritage rates not only as past, but also as future, desired rates for tribes, particularly in regulatory decision-making media. More to the point, when contemporary, suppressed rates are used in regulatory actions such as remediating contamination or setting water quality standards, the result is a maximum consumption value that may be safe to harvest and consume in perpetuity, effectively restricting tribes from ever achieving their desired traditional subsistence consumption rates in the future.

In order to determine the risks to people who may consume traditional subsistence diets with higher consumption rates, an approach different from the fish consumption survey is needed. Over the past decade, an approach has been developed that combines ethno-historical, nutritional, ecological, and biomedical information, and that follows scientific rules of evidence and rules of informed cultural consent and participation. These methods allow for reconstruction of original diets and lifestyles specific to ecological regions.¹⁰ Calorically-complete diets specific to individual eco-regions have been developed for several tribes, including fish consumption rates for fishing tribes. Advisory boards of tribal and university experts in the regional ecological and anthropological literature are established for each case. Reconstruction of heritage rates is a literature exercise, with tribal advice on which experts and literature reflect indigenous knowledge most accurately. This process provides accurate information on

¹⁰ The project, Regional Tribal Exposure Scenarios Based on Major Ecological Zones and Traditional Subsistence Lifestyles, provide more information (Grant Number 2000-STAR-J1-R831046).

<http://www.hhs.oregonstate.edu/ph/tribal-grant/index.html>

traditional subsistence intakes that complements the ethnographic and meaningful consultation methods for accurate contemporary intakes.

Tying It All Together: The Bigger Picture of Risk Assessment

The issue of fish consumption rates has been used here as one example where some of the current shortfalls in risk assessment can be recognized and amended. Many of the issues raised here are germane to more than determining fish consumption rates; in many cases Native American exposures and risks are distinct from those of the “average American” (Cirone 2005). Yet when tribes are considered as a single homogeneous vulnerable sub-population outside of the normal distribution, then the traditional consumers within the tribal population are considered outliers and are under-assessed or not included at all.

The people who are not protected are the most likely to be at the highest risk. Although improvements to data collection and analyses methods have been recommended here, most of the current regulatory standards are not equipped to accommodate these changes. New policies and standards are needed to ensure the protection of vulnerable populations without imposing the burden of risk avoidance on those populations. It is unacceptable to protect the average person and expect the vulnerable groups to provide the additional needed protection themselves.

While the creation and use of more appropriate evaluation tools begin to address the many shortcomings in the current risk assessment framework for Native Americans, they do not resolve all the issues regarding the determination and protection of tribal health. Rather, a public health promotion approach that includes all facets of health - physical,

mental, environmental, cultural - comes closer to truly meeting the needs of native communities. Until such a paradigm shift occurs away from risk assessment and toward health promotion, the recommendations regarding risk assessment made in this paper are useful for determining more accurately contemporary, albeit suppressed, tribal fish consumption rates.

Table 2.1 Examples of the range of fish consumption rates in the United States

Amount Eaten (grams per day)	Rationale
6.5	Official USEPA Office of Water rate based on 1980 USEPA dietary survey based on the general US population (roughly equivalent to one 8oz fish meal per month)
17.5	USEPA Office of Water Quality proposed rate for the general population based on CSFII ¹¹ national 90 th percentile; recommended for ambient water quality standards (USEPA 2000b)
48.6	USEPA and FDA recommendation to eat 12 oz fish per week
63.2	CRITFC (1994) mean consumption rate (~1lb/ week)
142.4	USEPA (2000b) recommendation for subsistence fishers for developing water quality standards
165.5	USEPA (2000b) recommendation for women of childbearing age to protect against developmental defects.
389	CRITFC (1994) 99 th percentile minus 4 to 13 “outliers”
454	1 pound per day, a commonly cited “traditional” rate
540	Harris & Harper (1997) average rate for current traditional Confederated Tribes of the Umatilla Indian Reservation member subsistence use
620	Boldt ¹² decision cited 500 lbs per capita on the Columbia River as the Treaty rate
1000	Walker, Walker and Pritchard (1992, 1999) estimates of pre-dam rates for Columbia Plateau Tribes

¹¹ 1994-1996 and 1998 U.S. Department of Agriculture’s Continuing Survey of Food Intakes by Individuals (CSFII) Table 4 from Section 5.1.1.1, “Uncooked Fish Consumption Estimates (Finfish and Shellfish) for Individuals Age 18 and Older;” fish consumption rates include data from non-consumers and marine species were not included. Estimates are based on 2-day averages. Amount of consumed fish was converted to uncooked weights.

¹² United States v. Washington, 384 F. Supp. 312, 380 (W.D. Wash. February 12, 1974); aff’d 520 F.2d 676 (9th Cir. 1976), cert. denied, 423 U.S. 1086 (1976), at note 151.

Table 2.2 National per-capita fish consumption summary¹¹

Habitat	Statistic	Estimate (grams/person/day)
Freshwater/Estuarine	Mean	7.50
	50 th	0.00
	90 th	17.37
	95 th	49.59
	99 th	143.35
Marine	Mean	12.41
	50 th	0.00
	90 th	48.92
	95 th	80.68
	99 th	150.77
All Fish	Mean	19.91
	50 th	0.00
	90 th	74.79
	95 th	111.35
	99 th	215.70

Table 2.3 Swinomish seafood diet interview template

➤ Species consumed currently and historically, changes, if any, and if so, why
➤ Perceptions of historic vs. current consumption rates, changes, if any, and if so, why
➤ Seasonal patterns of consumption
➤ Harvest, preparation and preservation procedures used currently and historically, changes, if any, and if so, why (baked, smoked, canned, fried, etc.)
➤ Use of seafood currently and historically, changes, if any, and if so, why (e.g. ceremonial use, community gatherings, teething, educational purposes)
➤ Location and mode of acquiring food (e.g. gifted from relations and/or friends including the tribal distribution, purchased from docks, purchased at grocery store, restaurants)
➤ Specific changes in consumption over time (e.g., lost access to gathering sites due to property rights issues; lost access to/have refrained from gathering at sites due to contamination and resulting beach closures/bans; depletion of resources and/or resources habitat)
➤ Desire to eat more seafood/ increase consumption if could?
➤ Questions to determine whether the interviewee might be considered a “traditional use” consumer, including but not limited to: vessel owner/ manager, holder of commercial license(s), cultural practices, religious affiliation, average number of community/ social events attended over the year, number of meals eaten at community gatherings over the year, time spent fishing or clamming, etc.; asking other community members for who might be “traditional use” consumers also important for multiple lines of evidence
➤ Impressions of the health of seafood in Puget Sound in general and where obtained information, if have any (e.g. news reports, from friends, first-hand accounts, etc.). Pollution perceptions. Has the perceived health of the seafood affected the decision to harvest and/or consume seafood?

Figure 2.1 Swinomish seafood wheel



The Swinomish Seafood Spiral by Swinomish Tribal member Kevin Paul. Mr. Paul, an accomplished carver and painter, painted the seasonal cycle of Swinomish seafood harvest depicting the importance of seafood in Swinomish cultural beliefs and practices. He pointed out that as the seasons flow from one to the next--interconnected and building on each other--the harvest practice spirals outward, collecting more wisdom.

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3 Flawed Assumptions, Flawed Conclusions: Using Interviews to Improve Our Understanding of the Impacts of Shellfish Contamination in a Native American Community¹

This paper examines why findings from conventional fish consumption surveys, which are used to measure the impact of contaminant exposure, have failed members of Native American communities and how the errors in these findings can be mitigated through carefully constructed interview techniques. I begin by describing the problem of contamination of seafood, the assumptions underpinning surveys, and the approach taken here to better understand the social and cultural implications of contaminated seafood, including how interview approaches might be used to improve both the accuracy and the representation of Native American practices and concerns more broadly. Specifically, I find that conventional surveys misrepresent consumption, do not contain information necessary for interpreting consumption rate findings, and ignore the enduring social and cultural relevance of the Swinomish seafood diet. The particular case I have chosen to elaborate these concerns is drawn from the Swinomish Indian Tribal Community.

The Swinomish are a federally-recognized Native American tribe, with a reservation on Fidalgo Island in Puget Sound, Washington State. There are approximately 840 Swinomish tribal members, of which roughly half live on or near the Reservation. Like

¹ A version of this chapter has been submitted for publication. Donatuto, J. and T.A. Satterfield. Flawed Assumptions, Flawed Conclusions: Using Interviews to Improve Our Understanding of the Impacts of Shellfish Contamination in a Native American Community.

other Coast Salish communities, the Swinomish are a fishing tribe who depend on the local natural resources for subsistence, economic, and cultural purposes. In this case, as with other Native American communities, salmon and shellfish are species that hold deeply rooted meanings for tribal values and practices (Gunther and Haeberlin 1930, Roberts 1975, Suttles and Lane 1990).

Contamination, Consumption, and Critique

In tribal contexts and for all peoples, the consumption of any number of species of fish and shellfish is one pathway through which a person may be exposed to persistent toxics such as dioxins, heavy metals, polychlorinated biphenyls (PCBs), and chlorinated pesticides that have accumulated in the species. A quick search in the *New York Times* article archive using the key words “fish health risk” reveals 1,119 citations, many of which highlight the considerable concern generated since the early 1980s regarding contamination of edible aquatic natural resources. Concurrent with an increasing awareness of this source of contamination is a focus on performing fish consumption surveys in order to determine exactly how much fish and shellfish people are eating, and thus to what extent are they are subject to related health risks. In addition to providing the data for determining human health risks from eating fish (wherein “fish” refers to freshwater, estuarine and marine fish and shellfish in this paper), consumption surveys are required in several regulatory standards, such as water quality and clean-up standards. Performing risk assessments and enacting and upholding exposure standards are part of government agencies’ charge to protect the health of U.S. citizens.

According to federal guidance about the use of fish consumption surveys, their purpose is to determine current fish ingestion rates that are representative of individuals who eat fish from a given water body (USEPA 1997, 1998, 2000). The types of surveys the guidelines describe, which I will refer to here as conventional surveys, are an important first step in examining the risks people face when eating contaminated fish. Yet the conventional survey approach of aggregating populations to determine mean consumption rates is based on simplified assumptions that do not allow insight into the subtle and complex patterns of consumption, and thereby forego addressing the larger social context of why people eat what they eat. For example, high-use consumers within a single population are not assessed separately, thus missing key information needed in determining how best to protect those who may face the highest exposures. Additionally, the regulatory content leaves no room to compare and prioritize the physiological risks and impacts found with other potential risks and impacts, especially those of a more social or cultural nature, including the beliefs and values of the group in question (Beehler, McGuinness, and Vena 2001, Donatuto and Harper in press, Ranco 2001).

Many scholars have criticized the surveys, assessments and other tools used to analyze potential hazards. Among the more salient concerns mentioned are: poor reconstructions of dose or assumptions about the dose of the risk object, assertions of objectivity when the risk assessment process cannot escape making value-laden choices, and endemic uncertainties such as extrapolating from animal studies to human effects and separating risk-derived outcomes from those caused by other influences (e.g., Hattis and Kennedy

1995). Key contextual considerations are also often omitted, such as the physiological, social, institutional and cultural facets that equally shape risk, and which are needed in order to situate, interpret, or modify the numerical data that determine adverse effects (Harthorn and Oaks 2003). Hazards cannot be identified, and risks cannot be evaluated, without an understanding that there is no definition of risk that fits all situations, that “risk” is a mediated term (Fischhoff, Watson, and Hope 1995, Kasperson 1992, Slovic 2000). The mediation occurs, or ought to occur, between the risk assessors and the local populations who are affected by the hazard; each has its own knowledge that is just as valid, and value-laden, as the other (Satterfield 2000, Slovic 2003, Wynne 1992).

Fish-dependent Native American communities present a germane example of how the confining focus of assessment tools such as fish consumption surveys excludes the larger social context that situates, even constitutes, the nature of evidence recorded, rendering the more conventionally collected data inaccurate and ineffective for any decision-making purposes. For many Native American peoples, fish are a key component of the diet and culture and have been for countless generations. This is particularly so for the Northwest Coast Salish peoples, the Native Alaskans and Canadian Inuit peoples, the Algonquian speaking peoples of the North Atlantic coast, and the aboriginal peoples of the Great Lakes region. Because of the longstanding and ongoing dependency on local natural resources, and the contamination of those natural resources, attention has been directed to conducting fish consumption surveys in tribal communities. Examples of extensive investigations involving native communities and fish consumption surveys span North American, including: the Great Lakes region (e.g., Dellinger 2004), Alaska

(e.g., Wolfe and Utermohle 2000), the North Atlantic coast (e.g., Fitzgerald et al 2001), the Canadian Arctic (e.g., van Oostdam et al 2005), and the Pacific Northwest (e.g., USEPA 2002).

For Native Americans in particular, the U.S. government is bound via treaty trust and responsibility obligations to protect the health of tribal people and the natural resources on which they depend (O'Neill 2007). Yet tribal representatives have repeatedly made the case that, because fish consumption data do not accurately or completely represent consumption patterns and concerns as they exist, these treaty obligations are not being upheld (e.g., Harris and Harper 2000, 2001, NEJAC 2002, O'Neill 2000). Much of the contestation introduced by Native Americans also mirrors scholarly critiques, including discontent with the misrepresentation of diverse users within a community, as well as the calculation of consumption rates in such a way as to decouple them from events and practices that drive the rates in the first place such as past events that may have dramatically, and involuntarily, changed consumption rates. This leads, equally, to the assumption that current rates calculated via conventional surveys are assumed to be equivalent to desired consumption rates, when in fact current rates may be involuntarily suppressed due to lost access and availability in the first place (NEJAC 2002). Others report resisting participation or providing inaccurate information because of discomfort with survey data collection itself, namely the closed-style question format instead of oral story-telling as preferred by some (Harris and Harper 1997).

Ultimately, these assumptions alongside those noted above miss the diversity and complexity of consumption rates, and, more broadly, the diversity e.g., (traditional high-use consumers) and complexity (e.g., the particularities of practices, resistance to conventionally research practices or the reasons for changes in use over time) of the people in question. It is thus more reasonable to recognize that there is a range of fish consumption rates between and within Native communities, and to ask how and why changes over time occur, and why they are integral components for risk characterization and risk management decision-making processes (Harris and Harper 2004, NEJAC 2002).

Using Interviews to Improve the Accuracy and Interpretation of Fish Consumption Information

In the remaining portions of this paper, an interview-based method is employed to allow for stories and discussion not otherwise captured, thereby providing an opportunity for people living traditional lifestyles to articulate their critiques of conventional consumption surveys. In particular, focusing on the specific contexts of native fish-dependent communities in lieu of employing a generalized, non-specific survey method can be used to identify the most vulnerable people within a group and provide the depth and detail needed to interpret and employ the information and contextualize the quantitative data if and when ‘evidence’ of this kind are paramount for regulatory officials. The concept of coupling interview and survey methods is not new; researchers from a diverse array of fields such as health, education, psychology, sociology and anthropology commonly employ mixed method approaches including hybrid

combinations of qualitative and statistical methods (e.g., Miller 1997, Pearce 2002, Riley, Newby, and Leal-Almeraz 2006).²

In this case study, open-ended interviewing is, alternately, the primary basis of the “seafood diet interviews.”³ The interview instrument itself was created in collaboration with the Swinomish Indian Tribal Community (hereafter, the Swinomish). Recent research on the toxicity levels of the central Puget Sound’s natural resources (Johnson 1999, 2000a, 2000b, Johnson, Serdar, and Davis 1997, Long et al. 1999), coupled with the central importance of fish to Native fishers, prompted the Swinomish to enact a study of toxics in their local shellfish, and the health risks, if any, associated with harvesting and consuming the local shellfish. For the Swinomish, salmon and shellfish are cultural keystone species—species that hold deeply rooted meaning for tribal values and practices. The integral connection between the cultural keystone species of salmon and shellfish may be evidenced in family and place names, educational stories, and ceremonies (Garibaldi and Turner 2004).

² We do not mean to suggest that all studies involving indigenous communities and fish consumption rates fail to augment their survey tools using qualitative techniques (e.g., see van Oostdam et al 2005, and Wolfe and Utermohle 2000 for notable exceptions), yet the majority of fish consumption surveys that are performed in the United States continue to follow conventional survey methods.

³ Recognizing the necessity of quantitative consumption data for use in characterizing current consumption trends, we collected this information at the end of the interviews. Interviewers asked about the types of fish eaten, seasonal diet patterns, the amount eaten in a serving, frequency, and preparation and cooking methods. The information is currently being analyzed and will be published as a separate report.

The purpose of the seafood diet interviews was to demonstrate the consumption rate range of locally harvested foods—from traditional subsistence through to ‘average’ consumer practice -- in a Native community. Questions on changes over time, drivers of those changes, and resulting effects were included in order to provide context for and details on the logic of the rate results in place and as they’ve changed. Swinomish interviewers coined the name, “seafood diet interviews,” the first of many steps taken to tailor conventional methods to fit Swinomish practices. The name itself signaled important sensibilities and methodological improvements to community members. The term “seafood” is used in place of “fish” because for the Swinomish, “seafood” represents all fish and shellfish eaten, while “fish” solely refers to the species with fins, and often is used for salmon. The term seafood will be used for the remainder of this paper to refer to all fish and shellfish eaten by the Swinomish. “Diet” is preferred over “consumption” because consumption is not a word commonly used by the Swinomish and because “diet” signals a much broader set of practices and meanings than the quantitative inferences associated with “consumption” (rate). “Interviews” over “survey” connotes an oral versus written style of investigations preferred by most of the Swinomish, and particularly for those practicing the traditional lifestyle. By changing the name, interviewees gained a clearer understanding of the purpose and intention of the interviews and provided more accurate and specific answers.

The methods used follow the community-based participatory research approach (e.g., Harris and Harper 1997). First, the interview question themes were crafted in

collaboration with Swinomish community members, elected representatives, staff and researchers. After the interviews, interviewees were given the opportunity to edit the transcribed interview for accuracy. Once the initial data analysis was completed, the results were presented to the Swinomish government committees and the Swinomish Senate for approval. This multi-tiered approach to consent in a tribal community is considered the most respectful and ethical method of collecting data about local knowledge (Menzies 2004).

Interviews were conducted with 76 Swinomish Tribal members who live on or near the Reservation. Names were selected using the Swinomish Tribal enrollment database. These names were then sorted, in random order, into age groups in order to distinguish more vulnerable members of the population such as children and women of childbearing age.⁴ Of the adult interviews, age and gender representation generally mirrors the overall demographic statistics of the Tribe, with the exception of the female to male ratio in the 38-54 year old age group, in which the Swinomish demographic is a roughly equal ratio of males to females (Table 3.1). Names of potential traditional use consumers from each age group were highlighted. Project personnel consulted with several Swinomish community members to verify the potential of the highlighted names to be high seafood consumers. Personnel also inquired about who else in the community is ‘living a traditional lifestyle,’ and added these names to the list of potential interviewees. Project

⁴ Children are considered more vulnerable because consume more food and liquids and breathe more air per unit of body weight, thus they potentially ingest and absorb higher levels of toxic chemicals than adults in relation to their body size. Women of child-bearing age are targeted for additional protection against exposure to toxics while pregnant or breast feeding that can cause developmental defects.

personnel refined the order of names by age group so that interviewers first contacted the potential traditional use consumers for interviews, and then contacted people not highlighted as potential traditional use consumers in the same age group in the random order originally generated before any names were highlighted. This procedure continued until a representative sample of the age distribution of the community was reached. Questions about vessel ownership, registration as a vessel crewmember or operator, and number of times a month a person fishes or digs clams were asked in order to provide additional lines of evidence as to whether the respondents might be high consumers. In this way, high consumers were over-sampled in order to increase the probability of capturing their true consumption rates.

All seafood interviews consisted of a series of open-ended, qualitative questions (themes are listed in Table 3.2) followed by quantitative questions about the type, amount, and frequency of specific seafood eaten (e.g., using a model of serving sizes, how much of each type of seafood is eaten and how many times in a week or a month, whether each seafood is eaten seasonally or year-round, etc). Interview questions were crafted and tested by the project personnel with aid from several Swinomish community members. Flexibility was upheld in all cases so as to preclude any insistence that the interviewee answer scripted questions in a particular sequence. For example, one series of questions asked about foods and preparation methods that may have been common in the past but are no longer prevalent. In answer to these questions, many respondents told stories of childhood memories such as “beach bakes”—summertime multi-family events in which shellfish are steamed in sand pits. Beach bakes are no longer a common occurrence.

These accounts could then be used to provide multiple layers of information; in addition to changes in food use and preparation methods, information about food sharing networks, family roles, seasonal consumption patterns, and harvest locations are present.

Interviewers were Swinomish community members who received training from professional ethnographers using methods from Hora (1992) and Meyer and Booker (1991). The interviewer made appointments at the convenience of the interviewees, usually in their homes, and the interviews were recorded on tape. Interviews were then transcribed into a Word document and returned to the interviewee to allow for revisions and clarifications.

Interview content generated from the question themes (Table 3.2) was coded and grouped using Atlas.ti 5.2, a software package developed for qualitative analysis. This was particularly helpful for revealing links across question sets such as those that addressed the prevalence and content of stories about species no longer commonly eaten, to discussions about species that were harvested historically, to loss of access due to contamination, government restrictions and private property. In this way, reasons for changes over time, historic consumption practices, and desired consumption rates were drawn from the interviews. Because of the semi-structured nature of the interviews, not all questions were touched on by the interviewers nor did the interviewees choose to answer all the questions; therefore, the number of respondents is provided for each answer discussed below as (n= # respondents).

The Enduring Meanings of Seafood for Swinomish

Across all interviews, it proved to be a given that the seafood diet is an integral part of Swinomish life. All of the 76 interviewees eat seafood; first and importantly: *there are no non-consumers*. Although the majority of interviewees believe that the amount and types of seafood eaten are declining over time, these declines are not looked upon with ambivalence. A strong desire to eat more seafood than people currently feel able to was evident across interviews, even though most people are aware of and so act against (albeit uncomfortably) the knowledge that the local waters are contaminated. Among the salient findings was frequent reference to the belief that the health benefits (broadly stated) of eating seafood, both physically and culturally, outweighed the risks of the known contamination. The interview content emphasized three dominant areas of concern or observation: (1) findings regarding the current state of the Swinomish seafood harvest and consumption, highlighting in particular the observations of traditional use consumers; (2) changes over time noted by community members and the forces driving those changes; and, (3) the impacts and implications of contamination. The interview results are presented in these three groupings to provide the reader insight into harvest, diet and use practices not otherwise seen in conventional fish consumption surveys. While conventional surveys would have generated results assuming that the amount of seafood currently eaten reflects voluntary decisions, the interviews illustrate how the current diet patterns can only be understood as a function of a larger set of community practices, which in turn are impacted by involuntary changes over time, such that current seafood diets are less than the desired diets of the majority of the community.

Swinomish catches: current seafood harvest and dietary patterns

The number of people who harvest seafood is a telling sign of the importance of seafood in the community. Dungeness crabs are the most popular harvest—54 percent of the interviewees own or work on a crab boat (n=76). Salmon fishing is the second most popular harvest--49 percent reported owning or working on a salmon fishing boat (n=76). Often but not always Swinomish boats are geared for crabbing or salmon fishing, but not both, because of the requirements of specialized gear like crab davets or fishing nets.⁵ Clam digging is also popular: 46 percent of the interviewees dig for clams “at least occasionally” (i.e., more than once a year; n=76). Among top harvest activities, clam digging, which occurs on the tidelands year-round, is unique in not requiring a boat. Harvesting benthic species (i.e., diving for them) such as geoducks, sea urchins and sea cucumbers also occurs by a much smaller percentage of people—5 percent said that they own or work on a dive boat (n=76). These results are summarized in Figure 3.1. The small number of divers and dive boat operators is most likely due to the need for diving certifications and expensive, specialized dive gear for harvesting the benthic species. The number of people who harvest seafood and the types of seafood harvested are closely related to the economics of the fisheries: when there is an established market for certain seafood, more people participate in that harvest, and those seafood are sold in much higher quantities than seafood for which there is no market, or a poor market.

⁵ Although shrimping was not included as a species-specific harvest question, many crabbers use the same boats and similar gear for the shrimp harvest in the spring before crabbing begins.

Of the interviewees who manage harvests, the majority (73 percent) sell most of their harvest. Fifteen percent stated that they harvest purely for subsistence purposes and do not sell any of their catch. Nine percent of the interviewees said that they sell only some of the harvest, as opposed to the 3 percent of interviewees who sell their entire catch (Figure 3.2). Interviewees explained that the portions of seafood that are not sold are shared within the community with friends and family, saved for ceremonial purposes, or kept for household consumption. Yet, most harvesters sell some or a majority of their catch as their primary source of income to support their families. An excellent identifier of traditional use consumers is the interviewees who retain some or all of their harvest, because they have access to seafood and are not harvesting solely for the cash economy. As one Swinomish elder explains, the current proportions of seafood sold versus kept for personal or community use are not considered acceptable by, or respectful of, everyone in the community, particularly as seafood plays a central role in the community's identity and well-being.

I rarely sell them [seafood], especially the clams, when I get clams. What we don't eat here [in the household], I just pass out to a lot of our elders or friends...whatever I go get, it's always passed out for whatever we don't eat.... I get my permits from the fisheries so I can get more than one bucket that I can pass out, especially for ceremonial use and stuff so usually I get more than one bucket; we'll probably eat about a fifth of what I get and the rest is donated out. There're a few people who aren't doing what they should do as far as that, they

sell a lot instead of bringing it home for their own use. That should be taken care of.

When comparing what is harvested by the Swinomish to what is eaten, four of the top five types of seafood eaten are also the most commonly harvested: salmon (1), crab (2), shrimp (3), and clams (5). Salmon refers to all five species that are present in the local waters (commonly called king, sockeye, coho, pink and chum). The fourth most common type of seafood eaten is canned tuna, a commodity food staple.⁶ Although specific questions on the proportion of each type of seafood that is store-bought versus obtained through a Swinomish fisher were not asked in the interviews, it is reasonable to assume that most of the top five seafood types consumed were not purchased in a grocery store. This assumption is supported by unsolicited comments from several interviewees regarding their distrust, avoidance, and concern about the safety of seafood caught by fishers they did not know. In addition, interviewees noted that cost was one of the primary inhibitors in regard to why people are not eating as much seafood as they would like, supporting the premise of local acquisition of the majority of seafood eaten by the Swinomish. Several people mentioned that seafood in grocery stores is too expensive; if people are not in a household or extended family unit that includes fishers, they must purchase seafood or meats in the grocery store, and which types are selected are dependent on cost.

⁶ Canned tuna is one of the 7 meats available in the USDA's Food Distribution Program on Indian Reservations; it is the only seafood available. URL: <http://www.fns.usda.gov/fdd/foods/fy07-fdpirfoods.pdf> (March 10, 2008).

Changes over time: the declining amounts of seafood on Swinomish tables

The interviewees reported major changes over their lifetimes in regard to the types and amounts of seafood harvested and eaten by the Swinomish. Harvest and use of seafood is lower today than it has been in the past. Yet interviewees are not satisfied with the current conditions; many believe that restoring lost access to seafood would reinstate a healthy food source integral to community well-being.

Of the interviewees who discussed changes in seafood harvest over time (n=55 or 72 percent of the total number of interviewees), 84 percent said that more seafood was available and harvested in the past compared to today, while 7 percent stated that the amount harvested has remained the same over time. Nine percent said that less seafood was harvested in the past than today because of mechanically advanced fishing equipment and the drive to catch more fish for commercial interests.

For the changes in seafood diet over time, interviewers asked two temporally-based dietary change questions: changes, if any, in the diet between today and when the interviewee was a child, and estimates of changes, if any, in the diet between childhood and 50 years before their time. Answers to the latter question relied on memory-recall of the extensive Swinomish oral history in which most tribal members have been educated. The answers demonstrating lower consumption rates over both time periods are not surprising and have been echoed in Native fishing communities across the country: the majority of people are harvesting and eating less seafood now than they did in the past

(e.g., NEJAC 2002, Suquamish Tribe 2000). What is unique about the Swinomish information is how “the past” is defined. Often when changes in harvest and diet are discussed for Native American communities, “the past” refers to an undefined and seemingly distant historic time. To better define “the past”, the interviews had two sets of the aforementioned temporally-based dietary change questions. The answers provide insight into a range of historic times, depending on the age of the interviewee. Of particular interest were the answers from the interviewees who were younger than 38 years old; more than 70 percent of these interviewees said that they eat less seafood now than they did as children. Considering that these interviewees were children in the late 1960s to the 1980s, today’s lower seafood consumption rates cannot be relegated solely to occurrences in the distant past, long lost subsistence practices, or complete lifestyle changes. Declining seafood use is a trend that continues to this day. Figures 3.3 and 3.4 detail the changes over time in both temporal ranges per age group.

According to interviewees, the following foods are no longer eaten with regularity: sea urchins (sea eggs), slippers/ stick shoes (limpids and barnacles), sea cucumbers, flounder, cod, elk, deer, geoduck, octopus (devil’s fish), mussels, oysters, seaweed, smelt, sturgeon, berries, roots (e.g., camas), rock fish, ducks, and other water fowl. Fish consumption studies from other regional native communities report comparable findings (Mos et al 2004, Suquamish Tribe 2000). These foods may have disappeared from the dinner table, but are certainly not forgotten.

All interviewees provided opinions on why Swinomish community members are eating less seafood today than they did in the past, and many cited more than one reason (n=76). The most frequently cited reasons for why Swinomish community members are eating less seafood today than they did in the past are described here. 1) Fifty-four comments were given regarding restricted access to seafood. Less access to available seafood stocks can be due to: shoreline development, privatized beaches, pollution-based beach closures, inability to compete with commercial fishers with advanced harvesting equipment, restrictive stock management regulations, and deteriorating food sharing networks within the community. 2) Forty-four comments were given regarding the constraints imposed by the wage economy. Survival in today's cash-based economy forces fishers to sell more of their catch, leaving less to bring home and share with the community. The cash economy also imposes time and resource constraints, particularly for fishers who are not commercial because money is required for maintaining boats and equipment, so fishers have to work in the cash economy to obtain funds, but time spent working restricts the time available to go harvesting. 3) Forty-three comments concerned how children's food preferences have shifted toward fast foods during the past 40 years. It was also noted that the change in food preference is connected with lower access and availability of traditional foods, the increase in commodity foods, and in part a result of generations of forced assimilation practices (e.g., decades of persecution, abuse, and arrest when harvesting traditional foods). 4) Forty-two comments denoted that the declining seafood stock numbers severely limit availability. 5) Fourteen comments were given about the health constraints of the harvesters or consumers, either that they are too ill or too elderly to harvest anymore, or that they have sensitivities to sodium-rich foods

such as crab and clams.⁷ 6) Eight comments mentioned fear of the health risks from consuming contaminated seafood. 7) Six comments mentioned that the cost of purchasing seafood when it cannot be obtained through community networks is prohibitive.

Table 3.3 illustrates the reasons for eating less seafood with quotations from the interviews. It is important to recognize that the decreases in the seafood diets do not mean that community members are satisfied with their current diets. On the contrary, 78 percent recommended that the Swinomish community return to a more traditional diet high in local seafood because it is healthier than available alternate foods and because it is an integral part of the Swinomish community and culture (n=63). Many interviews echoed the following sentiment about the importance of seafood to the community:

The salmon and the shellfish and everything that came from the water was basically our diet and the old saying is, “when the tide is out, the table is set.” It’s very, very important to our culture, to our society, we use it on a [regular] basis for our ceremonies, for our funerals, for our gatherings. It’s a very important part of our culture.

⁷ Several interviewees mentioned that they could not recall stories of ancestors who had sensitivities to sodium-rich foods. Two interviewees cited the hurried nature of current harvest practices as the reason why the sensitivity has developed—that if crabs are collected in a net or bucket and left in the salt water for the day, they do not cause reactions when eaten that otherwise occur when the shellfish are immediately killed after harvest. To our knowledge, this technique has not been tested in a laboratory.

When asked about the desire to eat more seafood: 73 percent said that they would like to eat more seafood than they do now, 26 percent said that they have access to seafood and consume large amounts now; 1 percent were unsure; no one said that they would like to eat less seafood than they do now (n=74). The interviews illustrate that current diet and use practices by the Swinomish are not voluntary preferences. In essence, the current seafood diets are *suppressed*, meaning that the current rates are forcibly lower than what the community desires to eat and what they are entitled to under treaty trust and responsibility obligations of sustaining health (Harper and Harris 2008, NEJAC 2002, O'Neill 2007).

Impacts of contamination

In the above section, interviewees consistently indicated that the most commonly consumed seafood are those caught by local fishers and distributed through community food-sharing networks. In the second section, paramount attention is granted reasons for and discontent with widely reported suppressed consumption including the deterioration of food sharing networks due to loss of access, time, and the cash economy.

Interestingly, knowledge of contaminants (or, more colloquially, 'pollution') is not the primary deterrent of seafood consumption, though people are aware of the presence of contamination. Sixty-three percent of the interviewees think about or hear about pollution in the local waters (n=76), and 61 percent said that they worry whether or not it's safe to eat seafood (n=67). Yet only 8 interviewees cited pollution as the main reason why people are eating less seafood. As stated in the "changes over time" section, people

desire to eat local seafood because it is healthier than the alternative food choices, and it is an important part of the community culture.

To explore the connection between seafood and cultural practices, interviewees were asked about the importance of seafood at community gatherings and ceremonies. Eighty-four percent of the interviewees stated that gatherings would change or be impossible without seafood (n=76).⁸ Many people mentioned a “hunger” for seafood that transcends a physiological longing. Of principal importance was the idea that seafood feeds the spirit.

Indians have to have it [seafood]. They've got to feed their spirit, it's just good health for them, as a Native people they just got to have it. I can't go too long and I have a longing and I have to have something. Like I said, this week, I'm going to cook a steelhead because I can just feel I need it.

⁸ Interestingly, none of the interviewees discussed loss of ceremonies as one of the reasons why seafood consumption has decreased. Other studies have noted that loss of ceremonies is a prominent factor in loss of access to seafood and other culturally important items and activities (Turner et al 2008). At Swinomish, gatherings and ceremonies are one of the main access points to seafood for community members who do not fish themselves; these gatherings are still a prominent part of the Swinomish lifestyle and seafood is always part of the menu, even though current seafood resources are limited and continue to decrease.

Discussion

While the interest in and need for performing fish consumption surveys in fish-dependent Native communities are increasing, it is curious that the use of conventional methods persists. The “seafood diet interviews” provide an alternative, with on-the-ground verifications of the current conditions of seafood harvest and use across a range of consumers in the community. The data collection methods presented here aid in attaining more accurate diet and use information, particularly for traditional use consumers who are often missed in conventional surveys. By using interviews, traditional use consumers were able to convey their information and demonstrate that their harvest and use of seafood is and will continue to be a vital part of the Swinomish community.

The interview answers provide the context needed to situate current conditions in the broader milieu of why the present situation exists and what can be done to effectively reduce risk for the Swinomish. Without such information, it would be impossible to determine that, for example, limitation of access to harvesting areas is the biggest impediment for community members to obtaining desired amounts of seafood. In the Swinomish interviews, people mentioned the importance of sharing food 96 times, and provided information demonstrating that people are no longer sharing food as much as they did in the past, in part because of lost access. If these questions were not asked, one might erroneously conclude that pollution is the biggest concern and driving force behind the lower consumption rates, completely overlooking the vital cultural relevance of seafood for the community, and thus recommending inappropriate risk management

recommendations and policy decisions. Table 3.4 summarizes the differences between conventional surveys and the seafood diet interviews.

Seafood continues to be an integral part of the Swinomish community for physiological, cultural, spiritual, social, and economic reasons. The fact that all interviewees consume seafood is a telling sign that, amidst the many social and ecological changes, the community connection to seafood is still strong and will continue to be so.

Looking more closely at what changes have occurred over time, and the forces behind those changes, details critical to deciphering how current seafood diet patterns fit into trends from the past to the future can be found. The interview results demonstrate that current seafood diet rates are lower than diet preferences and desires--that current seafood diet rates are suppressed. If the conventional survey approach had been used, the assumption of current rates as suitable for use in regulatory decision making would persist because the diets would not be understood as suppressed. This assumption could lead to employing the suppressed rates in hazardous waste remediation or water quality standards, essentially freezing seafood diet rates in perpetuity so that tribes would never be able to reach the higher, desired rates that are considered part of the treaty trust and responsibility obligations to protect the health of Native Americans and their natural resources (Donatuto and Harper in press, NEJAC 2002, O'Neill 2007).

It is imperative to note that the traditional use consumers are among the majority of interviewees who stated that they eat lower seafood diets today compared to in the past,

and that they desire to eat more seafood. These points demonstrate that the forces compelling community members to eat less seafood affect everyone. This is important for interpreting the quantitative results to ensure that when identifying and separating the unique subset of high-use traditional consumers, the higher traditional use consumer rates are not used as a proxy for determining a desired seafood diet rate for the community as a whole. A future, desired target rate may be higher than the current consumption rate of even the highest-use traditional consumers, so such decisions cannot be made based on current consumption information alone.

Elucidating changes in seafood diets over time also provides a basis for determining how rapidly the seafood diet rate is changing, over what time period, and why. For the Swinomish, the rates were higher historically and the decline has continued within the past 25 years. That seafood diet rates are trending downward even in the youngest adult members of the community, coupled with the desire to eat more seafood because it is healthy and culturally important, demonstrates that actions must be taken to *reduce* additional risks from eating seafood. Yet current policy relies primarily on risk *avoidance*, i.e., eat less fish, rather than risk *reduction*, i.e., clean up contamination (O'Neill 2003). Inherent in risk avoidance strategies is that people would avoid certain foods if those foods are shown to contain hazardous levels of contamination. Had the seafood diet interviews not been conducted, it could be assumed that Swinomish people would follow this line of thought. However, the interviewees emphasized that pollution is not the driving force behind why they eat less seafood, even though they are aware of the pollution present. In fact, contrary to risk avoidance assumptions, interviewees declared

that they would like to increase the amount of seafood they eat. As such, risk avoidance policy imposes disproportionately greater burdens on the Swinomish people because they eat more fish now than the average American, and they will not voluntarily eat less seafood, nor should they be forced to. This is an issue of environmental justice. As Catherine O'Neill explains, "...the values and cultural understandings reflected in the dominant society's evaluation of risk avoidance measures are not the values and understandings of those who must undertake avoidance" (2003: 3). As many interviewees explained, eating seafood "feeds the spirit" and when seafood is not available, the spirit grows hungry and restless, prompting many negative health consequences. Thus policies meant to protect people by enforcing avoidance measures actually impose additional harm.

Although the results presented in this paper are specific to the Swinomish tribe, it is likely that suppression of rates of consumption (desired and actual) will be found elsewhere. The interview methods and the importance of the question themes are also pertinent to other Native American fish-dependent peoples. Without recognizing the myriad roles that seafood plays for Native American fish-dependent peoples, the agencies charged with protecting the health of these peoples and their natural resources will not be able to fulfill the treaty trust and responsibility obligations of protecting and maintaining the health of the natural resources and the people utilizing those natural resources.

Table 3.1 Number of interviews conducted by age group

		Age groups		
		16-37	38-54	55+
Interview #		47	18	11
Female		25 (53%)	6 (33%)	5 (45%)
Male		22 (47%)	12 (67%)	6 (55%)

Table 3.2 Swinomish seafood diet interview template

➤ Species consumed currently and historically, changes, if any, and if so, why
➤ Perceptions of historic vs. current consumption rates, changes, if any, and if so, why
➤ Seasonal patterns of consumption
➤ Harvest, preparation and preservation procedures used currently and historically, changes, if any, and if so, why (baked, smoked, canned, fried, etc.)
➤ Use of seafood currently and historically, changes, if any, and if so, why (e.g. ceremonial use, community gatherings, teething, educational purposes)
➤ Location and mode of acquiring food (e.g. gifted from relations and/or friends including the tribal distribution, purchased from docks, purchased at grocery store, restaurants)
➤ Specific changes in consumption over time (e.g., lost access to gathering sites due to property rights issues; lost access to/have refrained from gathering at sites due to contamination and resulting beach closures/bans; depletion of resources and/or resources habitat)
➤ Desire to eat more seafood/ increase consumption if could?
➤ Questions to determine whether the interviewee might be considered a “traditional use” consumer, including but not limited to: vessel owner/ manager, holder of commercial license(s), cultural practices, religious affiliation, average number of community/ social events attended over the year, number of meals eaten at community gatherings over the year, time spent fishing or clamming, etc.; asking other community members for who might be “traditional use” consumers also important for multiple lines of evidence
➤ Impressions of the health of the seafood in Puget Sound in general and where obtained information, if have any (e.g. news reports, from friends, first-hand accounts, etc.). Pollution perceptions. Has the perceived health of the seafood affected the decision of harvest and/or consume seafood?

Table 3.3 Top reasons stated by interviewees why people eat less seafood today

Top reasons for eating less seafood	Exemplar quotes from interviews
1. Less access	<i>“Because it’s harder to get for a lot of people. That is a big hassle because that was all tide lands that we should be able to go and dig [clams] on any time we want. You get out other places that we’re supposed to be allowed to dig too and they’ve got [closed beach] signs all over out there... And the fish, we don’t get to fish as much as we used to... Never had the regulations we have today.”</i>
2. Cash economy	<i>“I just got a part-time job, I’ll be working today, but I’m still going to find time to clam dig and work my fishing in... Gotta, actually, work to crab and fish to live the way I want to live.”</i>
3. Food preference	<i>“A lot of fast food joints out there and plus our resources have been cut back so the younger generation doesn’t follow the stuff [teachings] that the elders provided for us years ago.”</i>
4. Lower availability	<i>“Because there’s less [seafood] to get, less to catch... and the numbers just keep shrinking year by year by year...”</i>
5. Health constraints	<i>“My grandfather, he can’t have a lot of salty stuff since he’s diabetic, and since we’ve lived here with him, our diets have changed and everything so we have to eat what he eats.”</i>
6. Pollution	<i>“Our beaches are contaminated, that’s what one of the main reasons that I was concerned because you go out there and dig and they’re [clams] no good... Even the crabs too, they get that black stuff all over...”</i>
7. Cost	<i>“I don’t want to buy it [seafood] in the store because it’s too expensive, but if my dad brings it home I eat it.”</i>

Table 3.4 Comparison of methodologies and outcomes: conventional surveys vs. seafood diet interviews

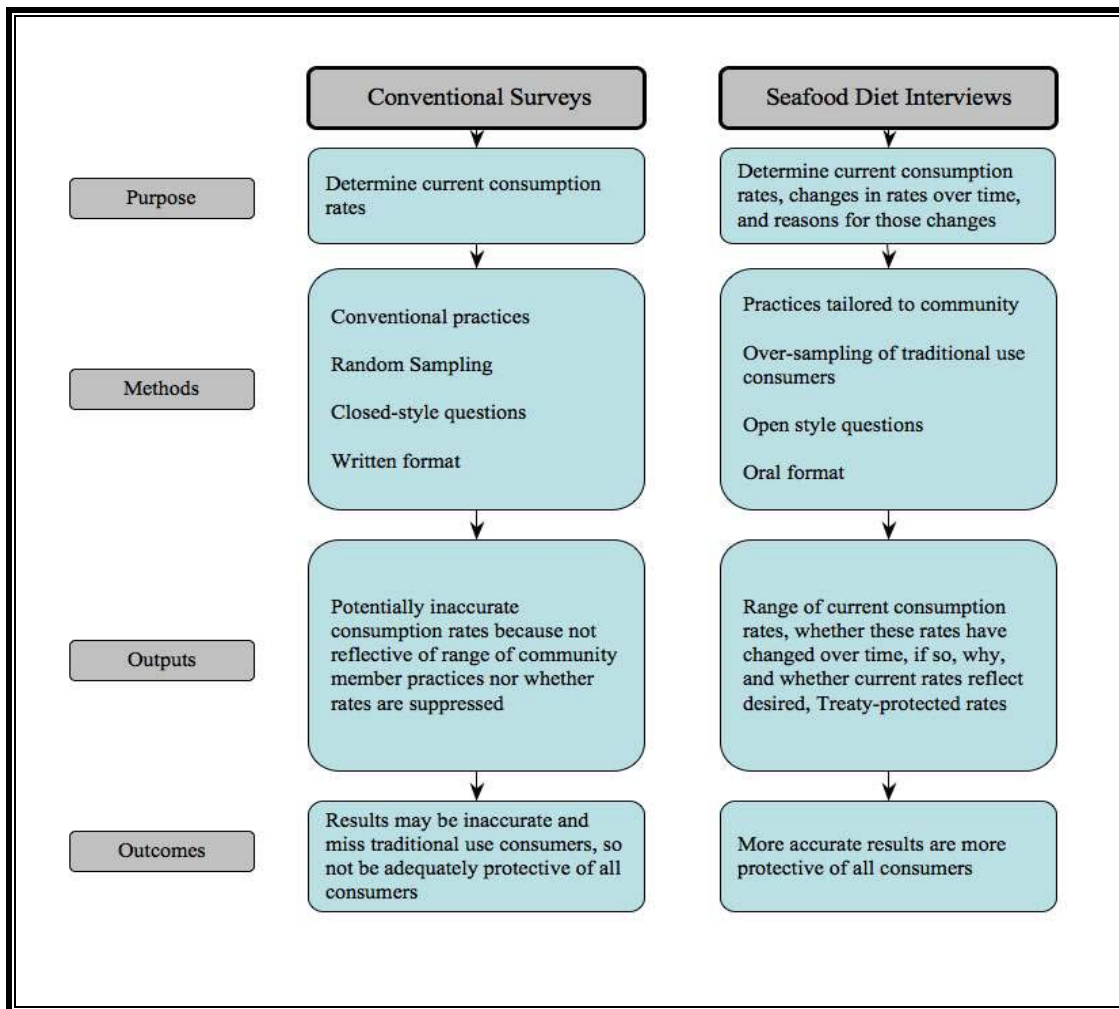


Figure 3.1 Percentage of harvesters by harvest type; some individuals harvest more than one type of seafood (n=76)

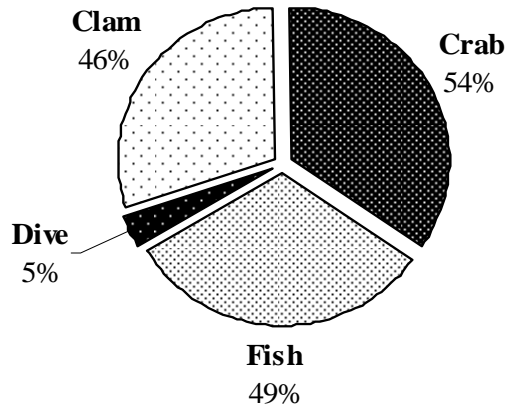


Figure 3.2 Percentage of seafood sold

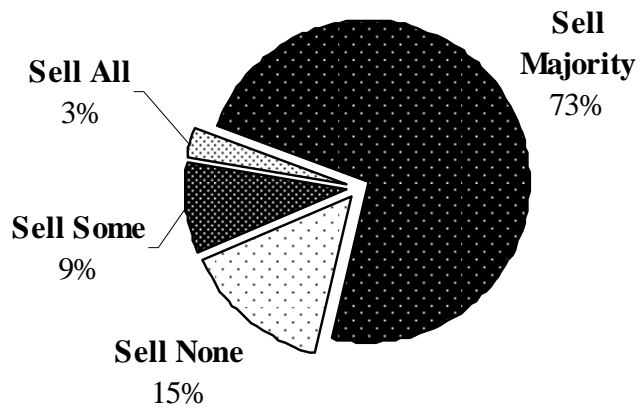


Figure 3.3 Change in amount of seafood eaten over time: amount of seafood eaten as a child compared to today (n=62)

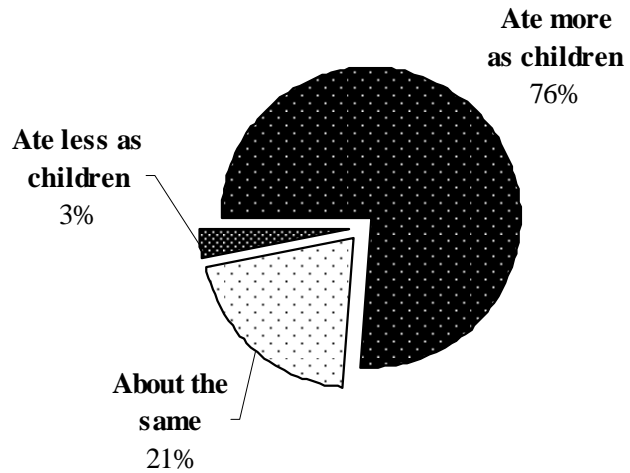
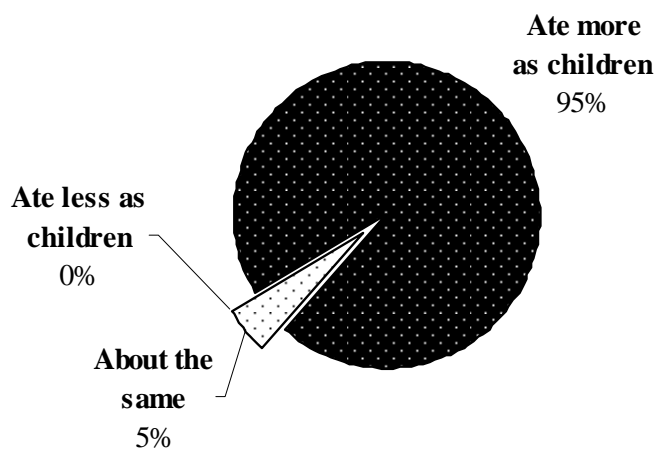


Figure 3.4 Change in amount of seafood eaten over time: amount of seafood eaten 50 years before his/ her birth compared to as a child (n=63)



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4 Experts and Ironies: On Traditional Knowledge, Food, and Feeding the Spirit in a Native American Fishing Community¹

The long rows of plastic tables and folding chairs set up for lunch resemble many of the Swinomish Indian Tribal Community's (Swinomish) gatherings that take place throughout the year. Some servers prepare last minute touches for the tables, while others hurriedly fill sink-sized tubs with piles of steamed clams, crab and shrimp in preparation for the expected crowds. Out back, the fish-cooks surround the large, raised barbeque pit, swapping jokes while keeping an experienced eye on dozens of salmon fillets in neat rows on the grill above the alder wood fire. Today the tables are set to hold more than 250 guests for the Blessing of the Fleet ceremony, but the Swinomish aren't worried, they routinely host gatherings of this size and larger.

Also called the First Salmon ceremony, this community gathering occurs in mid-May, marking the return of salmon and the fishing season. As with all Swinomish gatherings, food is an integral component,² and a major draw. Although most Swinomish gatherings and ceremonies occur within the Smokehouse and are thus restricted to Native people participating in the traditional religion, the Blessing of the Fleet is one of the half-dozen celebrations open to everyone. And considering the generous hospitality and endless

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² Some ceremonies require fasting; the traditional foods are served afterwards.

plates of food that the Swinomish are known for, it is a yearly event much anticipated by Natives and non-Natives alike.

The event starts with lunch at midday. Attendance far exceeds capacity, yet all are respectful to the many elders who are present, allowing elders first servings and seating. Inevitably, visitors comment on the large number of elders present. If the comment is overheard, a community member may explain that gatherings and ceremonies are particularly important to elders because they provide opportunities to eat seafood. Elders who no longer participate in seafood harvests, nor have household members who do, often do not have access to as much seafood as is desirable or necessary for health. At Swinomish, seafood is more than a high protein, low fat, nutrient rich local food source, it plays an integral role in the Swinomish belief system and so contributes to health and well-being in the broadest sense of both words. Consuming seafood honors the ancestors and sustains and nourishes the connections between community members and the local environment, which is part of the Swinomish view of health. As it is expressed at Swinomish, “seafood feeds the body and the spirit.”

The mood at this gathering is jovial. Everyone eats more than his or her fill of the plentiful local seafood. After lunch, the ceremony occurs, culminating in four Swinomish fishermen each carefully carrying an offering of a salmon carcass on a cedar bough to their boats. The fishers leave the dock, each heading in a different cardinal direction to present their offering and give thanks to the spirit of the salmon and to the natural resources that have sustained their people. The blessed offering also asks for the

fishermen's protection during the fishing season and for plentiful fish (see Figure 4.1). Although the timing and expression of the ceremony varies from group to group within the Coast Salish peoples of the Pacific Northwest and British Columbia, of which the Swinomish are a part, the overall meaning and importance of the ceremony as reverence to salmon is the same (Gunther 1926).

I bring up the Blessing of the Fleet ceremony because it evokes the complex and myriad connections that exist between the Swinomish people and seafood. The importance of these natural resources is reflected in Swinomish's belief system and worldview (Onat 1993; Roberts 1975; Suttles 1960), called the "teachings" at Swinomish, and "traditional knowledge" by academia, consultants, government agencies and the countless other parties interested in the specialized knowledge associated with indigenous communities. Traditional knowledge³ encompasses knowledge of and beliefs in the web of life that includes both humans and the environment (Berkes 1999), and is cumulative, yet dynamic, based on moral and spiritual values embedded in local contexts, information and practices that are passed down through multiple generations (Menzies and Bulter 2006). Traditional knowledge is broader and deeper than artifacts and information, it is a manifestation of the complex social structure that creates, maintains and guides it (Nadasdy 1999).

³ I refer to Swinomish's knowledge system as "traditional knowledge" in this paper. I stress, however, the dynamic nature of traditional knowledge, in part to avoid the pitfall of giving the terms "tradition" and "traditional" antiquated, outmoded meanings. As Cruikshank (1998) points out, "tradition" cannot be distorted into a "litmus test" that determines whether Native peoples are authentic (also see Nadasdy 1999). As is commonly said at Swinomish, "the teachings are not just about stones and bones."

Similarly, social science work on traditional knowledge ties together both knowledge and practice and sometimes skill (Ingold 2000). Practice-based models, based on seminal works from Bourdieu (1977, 1990), Sahlins (1981) and other influential thinkers, analyze behavior, cultural forms and the people who enact and create them within the broader social and material conditions (see also Wolf 1999)⁴. Regardless, within the definition of traditional knowledge is the implicit understanding that whatever term is used, it encompasses both “a way of life” and “a way of knowing” that guides most aspects of life. Nadasdy (2003) quotes a Kluane First Nation member who succinctly answers the question posed by a wildlife biologist: “What exactly is ‘traditional knowledge?’” by replying, “Well, it’s not really ‘knowledge’ at all; it’s more a way of life” (2003: 63; see also Cruikshank 2005).

In recent years, traditional knowledge has been a popular research topic, particularly for research related to natural resource decision-making. Much has been published on the definition of traditional knowledge, similarities and differences between traditional knowledge and other knowledge systems, and the pros and cons of employing traditional knowledge with other systems (e.g., Cruikshank 1998, Ellen and Harris 2000, Menzies and Butler 2006, Nadasdy 2003). Researchers interested in this epistemological domain

⁴ Wolf, building on Marvin Harris’s works, characterizes cultural forms as rooted in material conditions and so driven by practices of “production and reproduction,” not by “mentalist” beliefs and held values (Wolf 1999: 58). At some level, the argument is circular in that both play roles in shaping and maintaining a ‘culture.’ And while some Swinomish practices have changed over the years, they have maintained several material practices that are important, such as the annual Blessing of the Fleet described here, just as they have maintained particular value positions such as the importance of feeding the spirit as well as the body.

are generally assumed to be prudent in ensuring that traditional knowledge information comes from reputable and knowledgeable sources, as deemed so both within and outside the speaker's own community. Yet comparatively little has been said about how these knowledge experts are chosen, or how "expert" is defined.⁵ How does one ensure that the person providing information about the history, for instance, regarding the Blessing of the Fleet ceremony and its significance in Swinomish teachings, is an expert knowledge holder?

One of the many research projects conducted by Swinomish staff offers a pertinent example of what is meant by asking, "who are the experts and how do you find them?" The project sought to reveal more fully how seafood influences Swinomish community health, and in particular, risks and impacts to community health when the seafood is contaminated by anthropogenic sources, which in the Swinomish case include oil refineries and pulp and paper mills. At the onset of the project, it was assumed that Swinomish expert knowledge holders are those most closely tied to both the knowledge and practice of the Swinomish teachings and are therefore best suited to identify and describe how contaminated seafood impacts the non-physiological aspects of community health—the health indicators most often associated with traditional knowledge and values (e.g., ceremonial use, knowledge transmission). Unexpectedly, I found that many people identified within the community as expert knowledge holders do not have adequate access to traditional foods because they themselves are not harvesters. The traditional food sharing networks that ensure food security are stressed by wage labor economies—both by the imposition of commercial fisheries and by other wage-earning employment. I

⁵ For a notable exception, see Davis and Wagner (2003), which is discussed in further detail below.

also find and recount here my increasing recognition and understanding of what it means to be an expert (in the context of knowledge and practice), as well as the often devastating implications of restricted access to seafood more broadly. Although the findings call attention to additional infractions against an already struggling community, the resiliency and contemporary applicability of the knowledge system is nonetheless evident in the knowledge holders' abilities to assess, mitigate and find alternatives to how these risks and impacts can be defined, represented and evaluated in ways that are both locally meaningful and ontologically accurate.

On the Search for Experts

Davis and Wagner (2003), two of the few researchers exploring strategies for identifying expert knowledge holders, found that the overwhelming majority of published research on the topic fails to recount the methods used to verify expertise of knowledge holders, or even whether a systematic method was used in the identification process in the first place. They strongly recommend that researchers employ a transparent and organized identification method, and ensure that the chosen method is detailed in the research manuscript. They rely on "peer recommendations" in their research with local fishers in Nova Scotia, Canada. Peer recommendations entail asking fishers to identify other fishers who are the most knowledgeable in their peer-group. Names are then ranked in order of the number of people who mentioned that person as an expert; those with the highest rankings are considered the expert knowledge holders and asked to participate in an interview. Davis and Wagner (2003) also require a minimum of three experts to

remark on each piece of knowledge claim in order to validate it. In this way, they work toward ensuring that the statements provided by the experts are indeed reflective of the local knowledge system.

Following Davis and Wagner's recommendations, a multi-step expert-seeking process was enacted in the contaminated shellfish and health project. I worked with other Swinomish staff and community members to identify and verify individuals who are considered expert knowledge holders. Adhering to the definition of traditional knowledge as both a way of knowing and a way of living, we sought out people who are well versed in the Swinomish teachings, participate in the community gatherings and ceremonies, and harvest and prepare seafood in the community.

The study centered on toxics in seafood as opposed to other food or related pathways of exposure because of the special meanings and importance that the Coast Salish peoples place on seafood. The extensive knowledge related to the harvest, preparation, and use of these foods is complex—from the migration pattern and frequency of pink salmon to construction of fish traps to clam preservation techniques to use in particular ceremonies. This traditional knowledge resonates throughout the cultural practices of the Coast Salish people (Turner et al. 2000, Brown 2006). Termed “traditional foods” by scholars, and more often referred to as “our Indian foods” by Swinomish community members, the Swinomish people have cultivated a relationship with the salmon and shellfish offered by the rich and diverse local environment over countless generations.

Traditional foods are unique because they are deeply imbued with social and cultural significance (Kuhnlein and Receveur 1996, Turner et al. 2000), and because they form the foundation of both their historic and contemporary subsistence economies. Subsistence is more than a single food collection and distribution system, based on hunting and harvesting local foods. Unlike other economic systems, subsistence combines economic, political, social, cultural and spiritual activities (Langdon 1986, Raibmon 2005). In subsistence economies, a thriving economy is not measured in profit or wealth but in security (Lonner 1986: 19). Subsistence relies on functioning kinship and community relationships, the knowledge system and associated beliefs to support the practices and be supported by them (Freeman 1997: 8, Usher et al. 2003). In subsistence-based economies, food security is sustained through internal support and sharing networks that are honored and strengthened through ceremonies and gatherings (Langdon 1986, Usher et al. 2003) such as the Blessing of the Fleet ceremony.

As Swinomish staff, our positions necessitate on-going conversations with community members about the philosophy and practice of maintaining and preserving the local natural resources. The discussions, and subsequent work we perform, are most often focused on the conservation and management of the aquatic systems in order to sustain subsistence harvest and use. The topics are of utmost importance to community members because natural resources such as salmon and shellfish hold significant meaning in Coast Salish beliefs and values--they are considered cultural keystone species. The deeply imbued meanings of cultural keystone species for the Coast Salish are reflected in the knowledge system, including cosmology, place names, educational stories, ceremonies

and community roles (Garibaldi and Turner 2004, Onat 1993). Freeman (1997) pointed out that the traditional knowledge pertaining to subsistence [sea]food encompasses a philosophy of practice that prescribes how particular acts such as harvesting, preparing, sharing, and consuming seafood uphold particular outcomes or relationships, and vice versa. As such, the possibility of contaminated seafood is more than a threat to a food supply, it is a threat to the Swinomish knowledge system.

‘Invisible’ Acts and ‘Intangible’ Benefits: On the Proper Ways of Obtaining Strength

On the basis of interviews with Swinomish expert knowledge holders, I sought to more fully understand the beliefs, values and practices associated with seafood, how health is defined and connected to the knowledge and practices, and the impact of contaminated seafood. It was assumed that interviewing experts would provide detailed information on both knowledge and practices. During one interview an expert was asked for an explanation of the importance of seafood and ceremonies to community health. The expert paused and collected his thoughts, then answered, imparting an eloquent response to both the direct question and to meaning of traditional knowledge as both knowledge *and* practice in relation to seafood, ceremonies and the community food sharing network.

...wherever you go to procure food, there's a proper way to doing it, of gathering that, being respectful to nature, thanking the spirit of, say, the animal or the fish that we caught to bring home, to provide for us... at the same time, there is a proper way to fix it when you get home... all these little things that need to be done to make sure that when it was prepared that it was prepared in a good way,

in a healthful way. The old people say that if you do a lot of this with good thoughts and with prayers, that it adds to the strength of the food that you're sharing with your family or your guests and your visitors, whatever it may be, or yourself. So, when you pray when you gathered it, when you pray when you prepare the food, this all adds to the strength that we receive when we partake in this.

The expert's quotation adds a new layer of detail to the Blessing of the Fleet ceremony description; the ceremony is more than an event to thank the local natural resources for providing sustenance, bless the fishing fleet, pray for plentiful returns, and feast on local seafood; it is a ceremony that provides strength to community members through the proper process of preparing, sharing and consuming the food, strength to ensure community health. The concept of "obtaining strength" from traditional foods is reflected in other indigenous communities throughout North America (e.g., see Nadasdy 2003:75). Within the expert's answer is the nuance that the teachings instruct the "proper ways" of how to harvest, prepare and share the food.

Teachings about the "proper ways" and "obtaining strength" that the expert discusses are excellent examples of situated knowledge, gained from perpetual engagement in and tacit understandings of the Swinomish world view. The skills needed to properly harvest, prepare and use the seafood (e.g., in ceremonies) are knowledge that is not learned via simply replicating experts' activities, nor memorization of the Swinomish world view. Pálsson (2000) reasons that gaining knowledge and skill require active participation

within a specific social context to be successful; in the Swinomish case success might entail understanding the methods and reasons for deriving strength from food. Pálsson refers to this learning process as “finding one’s sea legs”—a phrase garnered from work with Icelandic fishers who gain fishing knowledge through practice within a community-based belief system of how to fish (2000: 26).

At Swinomish, it was assumed that the relationship of knowledge transmission between experts and the novice practitioners “finding their sea legs” ensured that the experts retained solid positioning within the traditional food network, be it via harvest, preparation, consumption or use. The questions were structured around the supposition that expert knowledge holders would spend more time and resources on harvesting, preparing and consuming seafood than non-expert knowledge holders because of a closer dedication to the traditional ways compared to other community members who are less devoted. I crafted interview questions that would provide a more detailed picture of the time and resources experts employ in harvest, preparation and use-related activities because I wanted to establish what could be or is being affected by the presence of contaminated seafood.

The first series of questions touched on the types and frequency of harvest; for example, whether the interviewee participated in activities such as beach seining, crabbing, and clam digging, and how often. Has the type or frequency of harvest changed over time, and if it has, why? These questions inadvertently tested whether expert knowledge holders have access to the subsistence foods closely associated with traditional

knowledge, as is assumed in the widespread linking of experts and traditional foods in the scholarly literature. What I found is that experts' access to traditional seafood is not as I had expected. The broad brush issue is access, yet the causes driving restricted access are visible only after careful consideration of responses given during the interviews.

In answer to the first set of questions, all of the experts interviewed said that they participated in seafood harvests in the past if not today. More than half of the interviewees explained that they currently participate in one or more seafood harvests; those that harvest most frequently do so for commercial as well as subsistence purposes. Those that no longer harvest, or harvest infrequently, lamented that the less they themselves harvested, the less seafood was available in their household. Access to seafood was a common narrative in all of the interviews, with accounts such as the following frequently recounted with remorse: "I've had an elder tell me that she was really wishing for sea eggs [urchins] and she didn't know how to get them, didn't know anyone to get them for her."

It is only natural to assume that the eldest experts would not be the primary harvesters, yet what of the other experts who focus their work on non-harvesting activities (e.g., spiritual leaders or healers in the traditional religion)? What is the status of their access to traditional foods? The second set of questions focused on the amounts of seafood people are currently eating, and the adequacy of current consumption rates. This set of questions followed the same line of reasoning as the former set--that expert knowledge holders would consume greater quantities of seafood because of a stronger commitment

to the traditional ways. Yet I found that those who actively participate in fishing eat more fish than those that do not currently participate in harvests. Of the top ten percent of fish consumers, nine of them are fishers. While pronouncing that fishers eat more fish seems obvious, it also points to the fact that experts who are not active in harvest activities consume less seafood than the experts who harvest.

That less seafood is available and consumed when experts did not go out to harvest it themselves coincides with a stronger desire to eat more seafood. One of the interview questions specifically asked whether interviewees would like to eat more seafood than they do now. The answers received from non-harvester experts knowledge holders all echoed a similar sentiment—that they are not eating as much seafood as they would like because they no longer have the access to it that they once did. When asked to elaborate on what is meant by access, the majority of the replies included stories of community food sharing networks that when intact, feed the entire community even though not everyone is a harvester.

It takes a village to raise a child type thinking. When you're doing this, you're thinking of everybody, not just yourself. "Oh I'm hungry." Well, that's not the point. It's, "who else is going to eat?"

The flip side to access is of course restricted access. Stories of how the food sharing network has rapidly deteriorated with the past 40 years from the pressures of a wage-based economy were common in the interviews. As one expert harvester explained,

...a fisherman goes out, yeah, he may give a few fish away but he's not feeding the whole community. All of the community doesn't reap the benefits of the fishermen

anymore because it's all being sold... it's sell the salmon, sell the clams, sell the geoducks, sell whatever has any value...

It was becoming clear to us that the non-fishing experts are not otherwise sustained by the food sharing networks that are considered a main function of subsistence activities. Usher, Duhaime, and Searles (2003: 180) explain that a community's traditional food needs and internal support networks are dependent on each other, emphasizing that:

Both subsistence activities and subsistence outputs are essential for maintenance of the social system. Through both production and distribution, norms and virtues such as patience, sharing, and mutual aid are reinforced and reproduced. Subsistence must therefore be understood as a system of human relations involving the organization of production, distribution, and consumption in which the reproduction of social relations is as much a concern as the production of material goods.

Repeatedly mentioned by the interviewees, the teachings say that each member of the community has a specific role, that not all community members are fishers or hunters, and it is the responsibility of the harvesters to ensure that the other community members receive sufficient amounts of traditional foods, especially the elders and other expert knowledge holders as a way to honor them. Put another way, following the teachings of traditional knowledge safeguards its continuity and the health of the community. As Swinomish elder and Tribal Historical Preservation Officer Larry Campbell, Sr. describes,

...whether we're speakers [spiritual leader] or we're warriors or we're fishers or cooks...All of these things that make up community, and that we need all of those for us to have a good cultural health. We're one part of the whole, so as we remember that, then, again, it goes back to our families to say, okay, if our families are the core, the gifts are spread out with all the families. That means that your family is whole.

Although ceremonies and gatherings such as the Blessing of the Fleet ceremony continue to provide access to seafood for the entire community, perhaps they are such anticipated events because the food sharing networks historically in place are currently stressed or ruptured. Mr. Campbell, Sr. explicates,

I don't have the boat [anymore] to go fish or crab and then you deal with the clams only on the [low] tides...Primarily what I do since I'm very active in our traditional scene is I just go to all the gatherings because it [seafood] always seems to be provided there... Sometimes if you're not a hunter, gatherer, you don't hunt or fish or you don't do it as much as maybe some of your relatives, that you don't have the availability to do it. So, for me, I found that, well, where was the natural outlet to get the spiritual food? And, that was every time we have a gathering we try to have these traditional foods that feed our spirit there.

It is important to keep in mind that impeded access to seafood and the desire to eat more seafood are not merely about personal preferences. Eating seafood is not prioritized at Swinomish for the caloric benefits, but for the “hunger” to “feed the spirit” with

traditional foods. As one expert knowledge holder summarized, “it’s like medicine to us... It nourishes the body more, seafood does.”

Considering that more than half of the interviewees actively harvest seafood, where is it going if not into the food sharing networks? Many of the fishers are forced to sell the majority of their harvests in order to survive in today’s cash-based economy. Expert knowledge holders repeatedly cited the cash economy as one of the biggest reasons why access to seafood through sharing networks has considerably diminished. Even if the fishers are committed to the beliefs and practices of a traditional lifestyle, it is impossible to completely escape the pressures of today’s dominant economic forces. Considering that the majority of interviewees desire to eat more seafood than they do now, the repercussions of the relative scarcity of shared traditional foods within the community are poignantly felt and expressed.

Experts and Self-righting Boats

At the outset of the project, it was presupposed that Swinomish expert knowledge holders are the most closely tied to the knowledge and practices of the Swinomish teachings.

Although Davis and Wagner’s (2003) recommendations for determining expert knowledge holders were explicitly followed, I failed to examine assumptions of what defines an expert knowledge holder. That failure was compounded by a naivety about the current, fractured condition of the internal support and sharing networks that have historically sustained the Swinomish community. The findings themselves portray a troubling picture, yet had I not recognized the schism between knowledge and access to

traditional foods, conclusions drawn about Swinomish community health in relation to seafood knowledge and practice, including consumption, would have missed the current state of access to seafood and its repercussions in the community. Without an understanding of the importance of seafood and its current status in the community, recommendations and remediation options⁶ may miss the key issues, or worse, exacerbate the problems.

The loss of access to traditional foods such as seafood is an “invisible loss”—an unrecognized consequence from acts that may not be directly attributable to the results, yet that produce intense, enduring negative effects. For Coast Salish people, loss of access to seafood is an excellent example: while media have highlighted plummeting salmon stocks and polluted shellfish beds, little to no consideration has been given to the substantial impacts Native communities have sustained. Equally unrecognized are the damaging policies in place that enable the deterioration of subsistence economies, which legal systems ignore (NEJAC 2002, O’Neill 2003, Turner et al. in press). With recognition by the dominant governance system of the invisible losses exemplified here, communities would have more leverage in decision-making regarding the natural resources that are an integral part of their knowledge system. Only with an understanding of these invisible losses, can changes in policies and procedures occur that would hinder or prevent additional threats to the community (Turner et al. in press). I underscore the key role of expert knowledge holders in shedding light on the invisible losses, their teachings and understandings are key to the process.

⁶ I use the term “remediation” to refer to the correction of something bad or defective.

With the increasing imposition of wage labor, combining subsistence activities, cultural gatherings and wage labor are necessary for the cultural survival of a community that depends on subsistence (Raibmon 2005). Akin to Elias' (1997: 1248-1249) example from the Canadian north that a hunter can successfully feed his family with moose only if the hunter has sufficient cash resources to purchase bullets, at Swinomish fishers area able to fish only if they have the funds available to purchase and maintain a boat, crab pots, and other equipment. Those unfamiliar with indigenous subsistence communities often conclude that the increasing presence of wage labor coupled with lower subsistence food consumption signals an end to the traditional ways and an embrace of industrialism and the western governance system, yet this is not the case (Usher et al. 2003). Even as the knowledge that sustains these communities is marginalized and threatened by dominating Western-based governance systems and industrialization (Elias 1997, Freeman 1997, Langdon 1986, O'Neill 2003), the resiliency of the knowledge system is evident. To situate the forces of wage labor and traditional knowledge-based activities at Swinomish for example, if a certain traditional food is needed for an important gathering or ceremony, community members will donate the supplies required to the harvesters to procure that natural resource.

The teachings of expert knowledge holders are vital to maintaining the resilience of their communities in the face of the devastating yet invisible losses they face today. Despite the dramatic changes occurring in the Swinomish community, the Swinomish people continue to structure their lives largely around harvesting; it is not a "thing of the past." Demonstrated in indigenous communities across North America and beyond, the beliefs,

values and acts surrounding the harvest, preparation and use of traditional foods are fundamental to identity and do not change, even if the equipment associated with the activities does (e.g., the use of high-powered rifles and motorized boats) (e.g., Elias 1997, Nadasdy 2003, Norgaard 2004, Usher et al. 2003). Again, to give context at Swinomish: at a recent funeral of an esteemed elder who headed a large family, fishers donated enough king salmon to feed the more than 600 people who attended. Funerals are one of the gatherings at which it is important to have traditional foods. What is focal in this story is that king (Chinook) salmon can only be fished in small numbers because of their status on the endangered species list, and commercially they net a decent profit per pound. The amount of the donation demonstrates the community's ability to pull together in times of need and donate economically lucrative natural resources to cultural gatherings instead of selling them. The seafood sharing network is impaired, but not destroyed.

As Swinomish elder Mr. Campbell, Sr. has explained to others before, change is inevitable, yet the teachings and ceremonies remain because they are helpful to people in contemporary times when employed in creative yet common sense ways. To paraphrase Mr. Campbell, Sr. who put his point about traditional knowledge systems in analogous fishing terms using the metaphor of a self-righting boat—'it may be thrashed and tossed in an onslaught of storms, and perhaps even inverted, yet it retains sufficient positive righting moment to true itself and carry on.'

Ceremonies like the Blessing of the Fleet demonstrate both the self-righting nature of traditional knowledge and how recognizing and mitigating invisible losses can prevent further community distress. At other Coast Salish communities, the ceremony marking the return of the salmon in the spring is called the First Salmon ceremony (Gunther 1926). The reason for the name change at Swinomish is not known, yet it is reasonable to posit that the name change occurred around the time of the Boldt⁷ decision. The Boldt decision refers to a Washington State court decision in the mid 1970s that effectively reinstated harvest rights to Washington State Tribes. Prior to the Boldt decision, Washington State Coast Salish people suffered decades of abuse and persecution when practicing their treaty-designated rights to harvest and use the natural resources. With harvest rights restored, it was no longer illegal to participate in subsistence activities, and the traditional foods were once again plentiful. Ceremonies and gatherings that had ceased to occur were reestablished. Mr. Campbell, Sr. explains,

Then we were reminded by the elders or the spirits that we needed to re-continue these teachings. Non-Indians say we need to record our ways of life before we lose them. We say, when we are ready the teacher will appear. That belief is what makes us a resilient community that has relevance for the long run.

The ability to ‘right a boat’ has kept and continues to keep communities such as Swinomish afloat and on course in their struggles for recognition of rights and sovereignty. Perhaps, in the aftermath of the Boldt decision, the recognition given to the importance of access to harvesting natural resources may also extend to the importance of

⁷ United States v. Washington, 384 F. Supp. 312, 380 (W.D. Wash. February 12, 1974); aff’d 520 F.2d 676 (9th Cir. 1976), cert. denied, 423 U.S. 1086 (1976).

access to the harvests within the communities, without commercial economic pressures.

A broader understanding of what is meant by access, and the consequences suffered when experts have knowledge about but not access to natural resources, gives added perspective to the enduring need for seafood availability, not as an anachronism of the past but as central to contemporary identity and well-being across all generations.

Figure 4.1 Blessing of the Fleet offering



©Jim Gibson Photography, 2006

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5 Poisoning the Body to Nourish the Soul: Prioritizing Health Risks and Impacts in a Native American Fishing Community¹

“Like we say, it’s our spiritual food so it feeds our soul; so it might poison our body, but then we’d rather nourish our soul.” --Swinomish elder

Introduction

This paper works toward developing a framework to better reflect the meaning of and impacts to health for Native American communities, many of whom face considerable risks from the contamination of their territories and natural resources. Conventionally, health risk assessments have been devised to quantify the probability of negative physiological impacts from environmental and other hazards, particularly chemical hazards. Yet the risk assessment framework focuses solely on physiological impacts, excluding mental, social and cultural aspects of health that many indigenous groups consider to be equally important and inter-linked such that they must be assessed together (Arquette et al. 2002, Garrett 1999, Harris and Harper 1997).

What follows is a first effort to consider how to identify, measure and evaluate dimensions of health that are inclusive of, yet different from, conventional physiological

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ones in the context of the Swinomish Indian Tribal Community (hereafter, Swinomish).

Swinomish is a Native American community facing adverse health impacts from the harvest and consumption of culturally important traditional foods that have been contaminated by anthropogenic sources in the adjacent area.

Decades of controversy over expert definitions of risk have revealed that any risk assessment that fails to address the issues deemed most important by the affected group is doomed to fail, as elucidated in the National Research Council's (NRC) *Understanding Risk* (1996). One of the fundamental requirements in an effective risk assessment is a clear understanding of the risks and impacts prioritized by the group in question, along with incorporation of the group's knowledge base from which these priorities originate. Only then can the risk assessment suitably address the issues at hand (NRC 1996). For human health risk assessments, a clear understanding of the affected group's health priorities, and the definition of health from which the priorities stem, is required. It is a group's moral and cultural system that drives how health is defined and prioritized (Airhihenbuwa 1995, Garrett 1999, Harris and Harper 1999). In the same vein, it is the social and cultural constructs that shape how risk is characterized, classified, and prioritized, more so than any universally truthful hazard ranking (Douglas 1992, Lupton 1999, Nelkin 2003). Thus I begin by recognizing that health and risk are culturally defined, and hereafter set out guidelines to recognize and assess health indicator criteria based on context-specific definitions and prioritizations of health. I determine the health priorities and impacts by, first, reviewing the context of the Swinomish case. Next follows the construction of a Swinomish health framework that depicts the connection

between health and traditional foods. I then evaluate the current status of health due to contaminated traditional foods using simple scaling techniques derived from the decision sciences. The paper closes with a discussion of the next steps needed for further improvement of the framework and its application in the broader milieu of health and risk policies for indigenous peoples, for whom social and cultural self-determination is critical.

The Swinomish context

Swinomish is a federally recognized sovereign nation, located on Fidalgo Island in Washington State's Puget Sound. The Swinomish Reservation sits on 7,000 acres of the southeastern portion of the Island, and is almost entirely surrounded by water and 3,000 acres of Swinomish-owned tidelands. Official enrollment is approximately 850 members, with about half living on the Reservation. Established in 1855 by the Treaty of Point Elliott, the Swinomish Reservation brought together several politically independent Coast Salish groups who shared a common language, a culture centered on fishing, and a ceremonial calendar revolving around cedar longhouses.

Before the influence of European settlers, Coast Salish cultures were renowned for their wealth derived from abundant natural resources and extensive inter-clan and lineage trade relationships that stretched well beyond the Puget Sound region. Although best known for salmon fishing, Coast Salish people harvested a wide selection of flora and fauna from the land, sea and rivers, including a rich selection of shellfish species. Permanent villages consisted of longhouses that sheltered large extended families when family

members were not visiting other villages or away at seasonal harvesting camps during the warmer months. The village provided a social support network during times of crisis or mourning. Equally important, the village was the setting for many celebrations and ceremonies for significant rites of passage such as marriage, or key ritual events such as the initiation of a new spirit dancer. Celebrations were not considered elective leisure activities, but an integral part of culture, health, governance and the maintenance of kinship allegiances and exchange relationships, all of which provided strong motivations for the intensive harvesting required to accumulate the necessary foods and goods exchanged during celebrations (Gunther and Haeberlin 1930, Roberts 1975, Suttles and Lane 1990).

With the formation of the Reservation and accompanying colonial restrictions on traditional cultural practices such as fishing and celebrations, the Swinomish people faced many decades of declining health, education and community assets, and increasing poverty, illness, drug abuse and racism (Roberts 1975). Although the past 20 years have shown some positive changes in the economic and social conditions for the Swinomish people, many problems remain: low rates for graduation, high rates for violence, drug abuse and suicide. Of the employed workforce at Swinomish, more than 26 percent still live below the poverty line. The Indian Health Service estimates that Swinomish rates are reflective of nation-wide average poverty rates for Native Americans, which is twice the rate of the general US population.² The average health of members of Native

² Nationally the poverty rate for US population is 12.3 percent (DeNavas-Walt et al. 2007), while the Native American poverty rate is 26.6 percent (Webster, Jr. et al. 2007).

communities is considerably worse than the US population as a whole (e.g., Indian Health Service 2000, US Commission on Civil Rights 2003), with morbidity and mortality rates often hundreds of times higher than those of the average American.³ These multiple health problems continue to impact tribes throughout the United States.

Part of the improving social condition can be attributed to court recognition of fishing rights in 1975, reasserting the rights of the Swinomish people to harvest the local waters and tidelands that provide culturally important food staples, one of which is shellfish (e.g., clams, crabs, oysters, shrimp, mussels). Shellfish can be harvested year-round, providing a stable, high protein food source. Shellfish parts are used in healing and medicinal practices and the shells are used as containers and for decoration; while individual beaches are treasured for their shellfish populations, and maintained to avoid over-harvest. Shellfish also play an important role in Swinomish cosmology wherein, as a food source and tool to hold fire (in the shell), they sustain a lonely young boy so that he grows into the man who helps create the modern world (Onat 1993). Shellfish can be understood to be a culturally keystone species—not solely a food resource, but also a vital ‘cultural object’ in the Swinomish moral and cultural belief system linked with an extensive network of practices (Garibaldi and Turner 2004). Swinomish and other indigenous peoples often refer to “cultural object” foods as traditional foods--foods

³ According to the Indian Health Service’s *Facts on Indian Health Disparities* (2007), “American Indians and Alaska Natives die at higher rates than other Americans from tuberculosis (500 percent higher), alcoholism (550 percent higher), diabetes (200 percent higher), unintentional injuries (150 percent higher), homicide (100 percent higher) and suicide (60 percent higher).”

within a particular culture available from local natural resources and imbued with both social and cultural meanings. Both the material presence and the symbolic representations of shellfish are critical to ceremonial, educational, economic, and spiritual forms in Swinomish life. Traditional foods that are also cultural keystones are revered through particular harvest and preparation techniques, uses, and spiritual relationships for the people using the food. Indeed, enduring beliefs about the qualities received by consuming a particular food and the reasons for adopting a particular diet structure are often central to cultural expression, identity and well being (Arquette et al. 2002, Harris and Harper 2000, Kuhnlein and Receveur 1996).

Many studies have demonstrated significant physiological risks from chemical exposures for indigenous people who consume large quantities of traditional foods (e.g., Harris and Harper 2001, US Environmental Protection Agency [USEPA] 2002, van Oostdam et al. 2005). Some of these same studies also emphasize that contamination and loss of traditional foods have a much broader, yet unmeasured spectrum of impacts to social and cultural aspects of health. Indeed, loss of the use of a traditional food is directly related to loss of morale, and cultural health and well-being (Arquette et al. 2002; Kuhnlein and Receveur 1996). However, a framework to evaluate the specifics of how and to what extent contamination and loss of traditional foods affect various aspects of health (other than physiological) has not been agreed upon by regulatory agencies and tribes alike. I present here my efforts to create and test the beginnings of such a framework.

The efforts to evaluate the impacts of contamination in shellfish started at Swinomish via a research project to determine the health risks, if any, Swinomish people face when harvesting and consuming local shellfish. Studies conducted prior to the Swinomish project had detected chemical contamination in the local waters, sediments, and shellfish (Johnson 1999, 2000a, 2000b, Johnson et al. 1997, Long et al. 1999, Yake et al. 1998). The Swinomish project used the conventional risk framework, formalized by the U.S. National Research Council as a method to determine the probability of harm (i.e., risk) from eating, breathing and/or absorbing through the skin hazardous substances. The framework calculates risk as the toxicity of a substance multiplied by the amount (i.e., dose) of that substance (NRC 1983). The outcome is expressed numerically as the probability of acute or chronic illness. The Swinomish project modified some of the calculations to be more reflective of Swinomish practices, such as higher consumption rates and larger exposure durations. Results revealed that Swinomish people are indeed considered physiologically “at-risk” (i.e., probable increased chronic morbidity and mortality outcomes) from harvesting and consuming local shellfish (Swinomish 2006).

The conventional risk assessment framework used in the Swinomish evaluation did not allow for use of Swinomish definitions of health nor Swinomish health risk priorities to be accounted for or assessed. Without inclusion of the difficult to quantify, less tangible health risks and impacts related to contaminated shellfish, the assessment did not reflect many of the prominent risks Swinomish faces. Just as the World Health Organization (WHO) defines health as “a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity” (WHO 1946), so too do many indigenous

groups such as the Swinomish. Further refining the WHO definition, many indigenous communities view health in the following way:

Health can be defined as the status of 'being'; how we feel inside ourselves, and how we are seen from the outside, at a cosmic level and in comparison to others. 'Being' encompasses the totality of our relationships with ourselves and with all else. Therefore the health of human beings is contained in the nature and relationships to whatever surrounds them; the environment as totality—all there is (Honari 1999).

Considering that government regulatory agencies are charged with the responsibility of protecting the health of humans and their environment, the current risk assessment framework does not fulfill this responsibility. Particularly for federally-recognized Native American communities, their treaty status entitles a right to health for themselves and their natural resources. Inherent in this right is the ability to define, prioritize, and assess health; these rights must be acknowledged and upheld by the governments who signed the treaties (National Congress of American Indians 2004, USEPA 2006).

Status of the conventional risk assessment framework

Critiques of the conventional risk assessment framework are neither new nor isolated. Numerous critics cite uncertainty and human inter-individual variability as prime faults (e.g., Finkel 1989, Russell and Gruber 1987, Upton 1994). Social scientists have critiqued the framework for its failure to address social and psychological determinants of

risk, as well as locally experienced social consequences of harm (e.g., Flynn et al 1994, Satterfield 2000, Slovic 1992). In response to these criticisms, most efforts to improve the conventional framework have focused on risk characterization and cumulative risk assessment. Calls for changes in risk characterization center on employing an “analytic-deliberative” manner in which risk is characterized based on the priorities and decision-making requirements of the groups involved (NRC 1996). Changes in risk characterization have thus been used to more accurately detail exposure scenarios in communities with unique hazard exposure pathways. In the case of Native Americans, examples of unique exposure pathways include participation in subsistence harvests of traditional foods such as shellfish or wild rice, sweat lodges, and basket weaving, (e.g., Harris and Harper 2004, Schell et al. 2005, USEPA 2006). These practices and the associated increased doses so implied can then be incorporated in a cumulative risk assessment, wherein analysts reconstruct a more accurate characterization of dose by integrating all aspects of a person’s lifestyle or practices that contribute to exposure and thus risk (USEPA 2003). Although much talked about, widespread use of cumulative risk assessments has yet to occur.

Despite efforts to revise and improve the conventional risk assessment framework, the framework remains rooted in a physiological, quantitative view of health, failing to attend to the broader definition of health. A handful of risk assessors have posited methods for including social and cultural risks into conventional risk assessments by converting identified risks into numeric scales that can then be incorporated into a conventional risk assessment (e.g., Harris and Harper 1999, 2000). Yet thus far, this work has not been

widely accepted or put into practice by risk regulators or tribes. Although the causes behind why the posited methods have not been accepted are not clear, potential reasons could be: the methods are considered too complicated by risk assessors or by tribes; regulatory agencies were not yet prepared to acknowledge or incorporate additional methods into their risk assessments; protest from tribes at converting cultural values into quantitative metrics; or, tribal consensus on the best way to evaluate non-physiological risks has yet to be reached. In 2002, the USEPA Tribal Science Council, comprising representatives from the USEPA regions and tribes from each region, deemed addressing the inadequacies of conventional risk assessment the highest priority; to date, no alternatives have been given serious consideration. The Tribal Science Council continues to call for alternatives to be brought to the table (Cirone 2005, USEPA 2006).

The call to alter the conventional risk assessment framework, or create a new one, so that health in the broader definition of the term is recognized and evaluated, is not a new appeal and is echoed by numerous other groups in addition to the USEPA Tribal Science Council. In 1996, National Research Council's *Understanding Risk* expounded on the necessity to incorporate the values of those affected into risk assessment. Likewise those in academia reaffirm that it is essential to legitimize the risks affecting people's lives, even if they are not apparent to others, because impacts can result in severe and irreversible losses that in turn lead to further, more damaging repercussions (Turner et al. in press).

I initiate the work presented here knowing that, in order to assess health in the broad meaning of the term, other equally important aspects of health must also be evaluated. In so doing, the point is not to diminish the importance of physiological health; rather, the point is to demonstrate the logic that values define health as more than its physiological aspects, and thus defining health must include social and cultural health aspects as well. While the conventional risk assessment framework addresses physiological health, here the focus is on how to identify, measure and evaluate dimensions of health heretofore outside the conventional risk assessment domain.

Methods: Toward Constructing a Broader Health Framework

The aim is to design a health evaluation tool in the Swinomish context using this broader definition of health by paying precise attention to the importance and use of shellfish, the way in which shellfish are conceptualized with regard to health, and the evaluations of health that could then be derived from this data using subjective scaling techniques (described below). Each of these stages are further informed by the ethnographic record for Swinomish and neighboring groups, as well as locally developed documents including the Swinomish Comprehensive Plan, Swinomish Annual Reports, and Swinomish Senate Goals.

Identifying the importance and use of shellfish--Swinomish interviews in 2004-2006

Ideas about the links between health and shellfish first became apparent when conducting interviews designed to examine the harvesting, consumption, use, exchange, and sharing of seafood as part of the USEPA funded risk assessment project (see chapter 3 of this thesis). Interview questions were based on: written documentation of harvesting practices (e.g., Onat 1993; Roberts 1975); a working knowledge of the community via the first author's role as tribal staff; and, groundwork data on the types, concentrations, and toxicology of chemical contamination in the local area (see references in Section 1.1). In particular, I explored the status of seafood in contemporary diets and practices as compared to those of the past. The past was defined in two ways: childhood, and 50 years before the birth of the interviewee. Data would provide a temporal range for diet and use change, as well as information establishing a baseline reflective of what it means when connections between the community, health, and seafood as cultural objects are strong.

In 2004-2006, we (an interview team and myself) interviewed 76 adults, spread across 3 age groups (16-37, 38-54, and 55+) to reflect a range of vulnerability from the young and childbearing through to the elderly (Table 5.1).⁴ The project aimed to oversample Swinomish members who were considered traditional use consumers, that is, the subset of people in the community who participated most fully in activities related to traditional

⁴ Children's fish consumption were also collected, but these data are not reported here. Elders are 55 years old or older.

foods. Often seafood consumption surveys of indigenous, fish-dependent people cannot or do not sample this subset of people, yet traditional use consumers are more likely to be at risk from increased exposure to chemical contamination because of their activities and consumption patterns (Donatuto and Harper in press, Harris and Harper 1997).

Sampling was conducted in the following manner: Swinomish names were first screened to reflect only those living in the local area. Next, the names of Swinomish locals were randomized, then the randomized names were sorted into the age groups. We highlighted the names of people known in the community to be traditional users in each age group and interviewed them first in the order their names appeared in the randomized list.

People known in the community to be traditional users include fishing and crabbing boat owners/ managers, people obtaining permits to dig clams, and those involved in the traditional religion. The remaining interviewees were contacted in the order of the randomized list per age group. Overall, the interviewees closely mirror the Tribe's demographics for each age group (with the exception of the female to male ratio in the 38-54 year old age group, which does not reflect the roughly equal ratio of the Swinomish demographic; see Table 5.1).

Community members and tribal staff conducted the interviews; the choice of interviewers was based on their knowledge of the community and their acceptance in it. Past experience indicated that interviewees provide more accurate responses when asked questions by a familiar person rather than a stranger or even a stranger from another tribe

(Harris and Harper 1997). The project team provided basic ethnographic interview methods training for the interviewers.

Semi-structured, open-ended interview questions were crafted using methods from Meyer and Booker (1991) and Hora (1992) for constructing a clear statement of the issue, identifying potential biases, and establishing levels of detail in the subject matter for ease of understanding. The question style of the interviews allowed the interviewer to guide the topic of the conversation while allowing free-flowing discussion and stories. The general topics covered included: harvest, use, and consumption of seafood now and in the past; reasons for changes over time (both short-term/ primary recollection, i.e., childhood, and long-term/ multi-generational, i.e., 50 years before birth); impacts from contamination; and, desire to recover decreased or lost harvest, use and consumption of seafood (see chapter 2 in this thesis for the list of interview question themes).

The interview questions were presented to the Swinomish Cultural Resources Committee, the Swinomish Health, Education and Social Services Committee, the Swinomish Indian Senate, and Tribal elders for feedback, edits and approval. Because communities are not homogenous entities, the project sought and received approval from all of these groups, who represent multiple levels of the community, to perform the research (Butler 2004, McDonald 2004, Menzies 2004).

The transcribed interviews were uploaded in the Atlas.ti 5.2 qualitative data analytical software program. Atlas.ti allows users to create codes and assign those codes to data in

the interviews. The codes can also be grouped for multiple levels of data analysis. For example, simple data analysis generates the number of interviewees who mentioned a particular fish species, or ceremony. More complex data analysis can generate visual representations of how different codes are grouped and their density in each group in order to reveal connections in the data not readily apparent and draw influence diagrams based on the data. The data were coded and grouped on the basis of the question topics stated above (results are detailed in chapter 3 of this thesis).

Using findings from the first set of interviews to construct the second interview schedule

Findings from the first set of interviews in part guided and informed construction of the second interview schedule. Because of this connection, I find it easier to situate and explain the methods for the second interview schedule by first briefly summarizing how the findings from the first set of interviews guided construction of the second set of interviews.

Mental models were constructed using the coded data from the first set of interviews. Mental models are knowledge schemas that are generally defined as the structured explanations people have about the way the world works, for instance about their belief in the relationship between health and contaminated shellfish. Such models can also be thought of as lay theories of cause and action in that they consist of representations of the

world that in turn permit one to interpret observations, infer cause, and/or make judgments or predictions about the multiple impacts and consequences of particular actions (Medin 1989; Morgan et al. 2001). Mental models provide a comprehensible depiction of how risk is shaped and viewed by the group in question that is useful in communicating and managing the risk for both the group and decision makers alike (Morgan et al. 2001). There are many different examples of mental models, ranging from broadly constructed to finely detailed. An example of a mental model relevant to the work here is called “Tribal Traditional Lifeways,” which lists nine aspects of tribal health and well-being, such as morale, responsibility, and the environment, that are all encapsulated in one circle to illustrate the inter-connectedness of the aspects. The Tribal Traditional Lifeways mental model was constructed by the USEPA Tribal Science Council as a way to depict important health aspects for Native Americans (not specific to one tribe) that are not currently included when assessing risk or health (Cirone 2005).

For the Swinomish project, the intended outcome of creating mental models from the coded Atlas.ti data was to document how the information from the first set of interviews revealed explanations or relationships between one facet and another that in turn comprise a mental model. Key to this were connections made by the Swinomish between ‘food’ and ‘health.’ In this context, it became apparent that shellfish are seen not just as food per se but as “cultural objects of importance” linked to meanings of health and connected to such things as seafood in the past, changes over time, and why and whether the presence of contamination has played a role in shellfish related consumption and practices. Construction of the mental models also illustrated where there was

insufficient information to demonstrate the Swinomish theory of the connections between health and shellfish, thus helping me to determine question topics for the second set of interviews might address those data gaps.

Based on the Swinomish mental model of shellfish use and contamination, I developed a flow chart depicting general beliefs about how the contamination affects health at Swinomish (Figure 5.1). The flow chart demonstrates that health is not considered to be solely in the physiological realm, that indicators such as knowledge transmission and spiritual health play integral roles as they are repeatedly mentioned in interviews when people are asked about impacts of contaminated shellfish. In short, the introduction of contamination into local waters precipitates a cascading series of impacts starting with seafood that is less available and of poorer quality, which in turn affects who fishes, how much they fish, who has access to fish and on whose plate the fish ends. All these components subsequently impact how the seafood is used, such as the ability to “feed the spirit” with seafood at gatherings and ceremonies. The flow chart also provides a road map of sorts that guided my interpretation, prioritization, and grouping of data for the second set of interviews in terms of defining specific Swinomish health indicators in relation to contaminated seafood in general and shellfish in particular.

Connections between health, shellfish and contamination--Swinomish interviews 2006-2008

The goal was to construct and employ an evaluation tool based on the Swinomish definition of health, the current health status, and the degree to which contaminated shellfish impacted health. I constructed a second interview schedule using the following data: findings from the first set of interviews regarding how contaminated seafood impacted Swinomish health; published research on the historical health of the Swinomish; published research on Native American definitions of health; and, previous efforts to develop and implement health indicators for indigenous peoples.

In 2006 to 2008, we (the interview team and myself) interviewed a smaller, nonrandom subset of adults (n=14) who were considered to be the most knowledgeable about Swinomish traditional foods, health, and changes over time; this smaller group was labeled Swinomish experts. Not everyone in a community is considered an “expert”—the extent and accuracy of knowledge is heterogeneous even within one community. When multiple and independent sources name particular individuals as experts, it is reasonable to assume that the label is accurate (Davis and Wagner 2003; Hora 1992; Menzies and Butler 2006). I coordinated with multiple authority levels in the community to identify the expert knowledge holders, including the Cultural Resources Committee, political leaders, and Swinomish historians. The majority of the recognized knowledge holders in the community were elders (Table 5.2).

Community members and tribal staff conducted the interviews; again, the interviewers were chosen based on their knowledge of and status in the community. Semi-structured, open-ended interview themes sought to elucidate the Swinomish definition of health, current health status, connections between shellfish and health, and how contaminated shellfish impact health. The second set of interview questions is listed in Table 5.3.

The second set of interviews was coded using Atlas.ti 5.2. The codes were key words, phrases or meanings representing aspects of health that were repeatedly used in answer to the questions; for example, “feeding the spirit” or “food sharing.” To ensure that the codes accurately reflected pertinent Native American health issues and also fit definitions of health specifically for Swinomish, they were cross referenced with the following: published literature on the key aspects of Native American health as stated by tribes and experts across the country (e.g., Arquette et al. 2002, Harris and Harper 1997, 2000, 2001, Wolfley 1998), Swinomish health (e.g., Swinomish 1996, 2002), research on the historical health of the Swinomish (e.g., Onat 1993, Roberts 1975), and efforts by public health researchers to develop and implement health indicators for indigenous peoples (Anderson et al. 2006a, 2006b, USEPA 2006).

The codes were then compared to the mental model and flow chart created from the first set of interviews. The mental model data provided an overview of key health dimensions and influences, allowing the coded data to be used to flesh out their connections. The point was to see if the coded data supported what was found in the mental models and if so, what additional detail the coded data provided. In this way, the codes could be

considered sub-points of the key aspects of health. I employ the term “indicator” to refer to each of the key aspects of health, and the term “component” to refer to the sub-points of the health indicators.

Using the coded health components and indicators to rank impacts from contaminated shellfish

Knowing that the conventional risk equation severely limits the ability to incorporate less tangible and difficult to quantify aspects of health, I opted to work with a descriptive scale ranking technique in developing an evaluation tool that demonstrates how contaminated shellfish impact Swinomish health. Descriptive scale ranking is an ad hoc yet apt approximation that is meant to reflect the health priorities as expressed by interview participants. Development of the tool is an iterative process; as such, my initial evaluation may miss some of the nuance that later iterations may incorporate, yet the overall effectiveness of the tool is tested by presenting results in a comprehensible manner and eliciting feedback. While participants often protest the notion of ranking or assigning numeric values to intangible values (Baron and Spranca 1997), using descriptive scales offers an alternative method that allows for participants’ critical concerns to be prioritized and addressed in an acceptable manner (Keeney and Gregory 2005). And although the complex calculations and numeric outcomes of conventional risk assessments are baffling to many, and the subjectivity of risk management decision-making procedures is even more confusing (Russell and Gruber 1987), descriptive scales are intuitively appealing because they offer a simple method that is easy to understand

and employ for most people. Descriptive scales are widely utilized in our society for assessing a broad variety of objectives from economics to health; commonly known examples include the Gross National Product, the Dow Jones, and the APGAR scales.

Using descriptive ranking techniques in evaluating impacts to fundamental values is not a novel concept. McDaniels and Trousdale (2005) created measures and scales for a multi-attribute value assessment of non-market losses in Metis' communities in Canada. The result is a more accurate and representative impact damage assessment based on values such as respect for the land, traditional knowledge, and traditional sites. Using a swing weighting method, the relative importance of each of the held values was ranked. The authors point out that determining and assessing the held values is paramount in demonstrating the range and severity of impacts Aboriginal communities face, yet elucidating these impacts is usually neglected when economic-based resource damage assessments are conducted (McDaniels and Trousdale 2005).

I followed a similar approach to McDaniels and Trousdale by prioritizing the need to explicitly determine the Swinomish priority health indicators and their components, and whether the current status of each of the health components was linked to contaminated shellfish. My method involved grouping each piece of coded interview datum according to its coded health component. Next, each datum was assigned a rank according to the participant's knowledge of its status using a simple a descriptive scale; the interviewees did not use the scale themselves. A four-part ranking was devised of: "a lot," "somewhat," "a little," and "not at all." For instance, all data coded with "ceremonies

and gatherings” were grouped together, then each datum was assigned a ranking according to what the interviewee expressed. A datum from one interviewee coded as “ceremonies and gatherings” stated, “If there wasn’t seafood to be eaten, we really couldn’t have that ceremony.” This datum was given a ranking of “a lot,” because the interviewee is stating that specific ceremonies are severely impacted by the loss of shellfish from contamination. Conversely, if the interviewee states that the current status of a health component is not related to contaminated shellfish, then it was ranked “not at all.” After assigning descriptive rankings to the coded health components, the first author met with several of the interviewees, showed them the coded health components and associated rankings, and verified that the components and rankings were appropriate and accurate.

All the assigned descriptive rankings for each coded component were then averaged to determine the overall ranking for that coded component by converting the rankings to the numbers one through four: “not at all” is “1”... “a lot” is “4” (Table 5.4). The numbers can then be averaged and rounded to the closest whole integer. For example, if a coded component had three interviewees state that contaminated shellfish impacted that component “a little,” “a lot,” and “a lot,” the number equivalents would be two (2), four (4), and four (4), which averages to 3.3, or 3. Therefore, that health component would have a ranking of “somewhat” impacted. Inherent in averaging the rankings is that the intervals between the rankings are equal; although this may not be the case, both the researchers and the interviewees agreed that such an assumption was acceptable in the initial development and testing of the evaluation tool.

After each of the health components is ranked using the descriptive scale, then they can be averaged together with the other two health components that similarly reflect one of the key health indicators. In this way, each of the primary health indicators receives a ranking composed of the average of the ranking of its health components. The rankings are useful for decision making purposes: they may allow for the establishment of thresholds indicating when negative impacts would occur (e.g., to use a common USEPA term—when the risk is “unacceptable”), and for determining which variables predominantly influence the current status of health (e.g., Kreitler and Kreitler 2006; Nieboer et al. 2005). In order to contemplate thresholds and subsequent action, it is imperative to have a mutually agreed upon policy established at the outset of the project stating at what threshold action will be taken.⁵ In the Swinomish case, it was decided that action is warranted if one or more of the health indicators were affected “a lot,” or if, when all health indicator rankings are averaged, the outcome is that contaminated shellfish “somewhat” impact the four indicators as a group.

Findings

Twelve coded health components were repeatedly mentioned in the interviews as key to Swinomish health. All of the health components emphasize community health and well-

⁵ In order for the federal government to enact policy that affects Treaty status Native Americans groups, government-to-government consultations must occur with the Native American group(s) potentially affected as outlined in the 2001 Executive Order #13175 and The National Congress of American Indians 2006 Resolution #SAC-06-026.

being, they are: participation and cooperation, roles, familiarity, availability, access, sharing, ceremonies and gatherings, give thanks, feed the spirit, the teachings, elders and youth. The 12 health components fit into four key descriptive categories of health indicators based on how interviewees described the components, their relation to each other and to overall health as illustrated in influence diagrams generated using Atlas.ti. The four indicators are generally depicted in the flow chart derived from the mental models data in the first set of interviews (Figure 5.1). The indicators are: community cohesion, food security, ceremonial use, and knowledge transmission (Table 5.5); these names are as much the terminology of the researcher as of the community.

Each of the coded health components was impacted to a different degree by contaminated shellfish. In the sections below, with heading names that match the four key health indicators, I will discuss the status of each of the health components, their rankings indicating how much that status results from contaminated shellfish, and the ranking of each health indicator as a result of averaging the three component rankings connected to that indicator (summarized in Table 5.6). Where applicable, statistical data from the first set of interviews are presented here as an additional data source.⁶ The four health indicators received the rankings of: “a little” for community cohesion, “a lot” for food security, “somewhat” for ceremonial use, and “somewhat” for knowledge transmission.

⁶ Although 76 adults participated in the first set of interviews, not all interviewees answered all of the questions; therefore, the number of interviewees reflected in each of the statistics varies depending on how many answered the question.

Compared across the four key health indicators, contaminated seafood “somewhat” impacts Swinomish health; therefore, action is warranted.

Community cohesion

Community cohesion is considered to be active participation and cooperation in community work. One of the many duties in regards to shellfish is the process of harvesting and preparing shellfish, and it is imbued with thoughtful significance and intention. Particular methods have been honed over countless generations that are specific to the natural resources available, landscape, and climate, but also to the community. Community members each have a role in the process and each role carries with it an identity and the pride of being a needed part of the entire process. For example, the cooks’ role is looked upon with reverence equal to that of the harvesters’ role. These roles are often learned and passed down through the generations such that some may be known as the best clam fritter cooks while others may be known as expert clam diggers. Community members know each other’s roles, and who taught them the roles. That familiarity instills trust that the food handlers have performed their jobs accordingly and the food is “healthy” and “safe” to consume. As one interviewee put it, “...there is an importance that you know where it [seafood] is caught and you know that it is part of our community and it’s been part of our history for that long period of time if it’s caught by local community members.”

Community cohesion has deteriorated during the lifetimes of Swinomish elders.

Interviewees recounted a variety of reasons for the decrease, not the least of which is

pressure to assimilate into a capitalist workforce that does not honor community roles. As more community members work wage jobs, time for community participation, cooperation and specialized roles decreases. In the first set of interviews, interviewees stated that lack of access (25 percent) and the time and resource constraints imposed by the cash economy (21 percent) were the two primary factors for why people eat less seafood today than they did in the past (n=76). The importance of providing for one's immediate family overshadows the importance of playing a specific role in the community network that once sustained entire extended families. Although the Tribe still has fishers and clam diggers, the harvesters no longer participate in their roles as providers for the larger community. As one commercial fisher and crabber summed it up:

...a fisherman goes out, yeah, he may give a few fish away but he's not feeding the whole community. All of the community doesn't reap the benefits of the fishermen anymore because it's all being sold... it's sell the salmon, sell the clams, sell the geoducks, sell whatever has any value and then go to McDonalds.

Yet seafood continues to be considered a top priority in most Swinomish households (all interviewees stated that they eat seafood, n=76). Contaminated shellfish are not the cause of the deterioration of the community participation and roles health components (both are ranked "not at all"); however, the contamination does heavily impact the familiarity health component. Of the community harvesters who still provide seafood for the community, at times they are restricted from harvest sites because of pollution-based harvest closures and are thereby forced to purchase substitute foods. The sources of

purchased seafood are not familiar—the origin, harvester, harvest method, and preparation method are all unknown—so they are not trusted to be safe. Therefore, the familiarity health component is ranked as impacted “a lot” by contamination. Another Swinomish harvester, who fishes, clam-digs and crabs both commercially and for subsistence purposes, echoed the overall sentiment in the community about the perils of pollution in relation to familiarity:

Because if it's purchased it doesn't come from anywhere we're familiar with. I don't know where that shellfish came from. I don't know where those clams came from in that store... At least with our foods I know where they came from and that's familiar to me.

Averaging the numeric conversions of the three health components' rankings-- community participation is 1 (“not at all”), roles is 1 (“not at all”), and familiarity is 4 (“a lot”), an averaged ranking for the community cohesion health indicator of 2 is obtained (“a little”), meaning that this health indicator is impacted “a little” by contaminated shellfish.

Food security

Because there are specific worker roles that are established and known throughout the community, knowing those roles and who holds them helps ensure that each family will have adequate amounts of healthy food. Particularly for elders, who have passed on their food harvest and preparation knowledge but can no longer harvest or cook for

themselves, they rely heavily on the food sharing networks. Food security is defined by the United States Department of Agriculture (2007) as “...access by all members at all times to enough food for an active, healthy life. Food security includes at a minimum (1) the ready availability of nutritionally adequate and safe foods, and (2) assured ability to acquire acceptable foods in socially acceptable ways.” Shellfish are a high protein, low fat, nutrient rich food source (Dong 2001) that comprise a large portion of the Swinomish traditional diet. Three types of shellfish—crab, shrimp and clams— are in the top five types of seafood eaten at Swinomish, preceded only by salmon. Since clams are sedentary, they provide a stable food source, more reliable than hunting or fishing. A common Swinomish saying is, “when the tide is out, the table is set.”

Shellfish are also a significant part of the subsistence economy—part of a long history of Native peoples supplementing economic income with subsistence foods to ensure food security. Subsistence is unique in that unlike all other economic systems, subsistence alone relies on functioning kinship or community relationships. In subsistence-based economies, the food security health indicator is sustained through internal support networks that are honored and reinforced through ceremonies and gatherings (Usher et al. 2003). Often repeated in the interviews, this young Swinomish fisherman stated, “Yes, I always believe in sharing my catch because it’s always been taught to me to do this and I always try and give mostly to elders, the ones that can’t get out on the water and get their own.” Yet with the current, compromised state of community cohesion, the internal support networks through which food is shared are strained or broken.

Food security at Swinomish depends on three primary health components: availability of seafood (i.e., that there are sufficient stocks to be harvested), access (i.e., that harvesters are allowed access to those stocks) and sharing (i.e., that the food sharing network provides shellfish to those that are not themselves harvesters or preparers of seafood). As with all of the Swinomish health indicators, there are other influences at play that affect the status of food security, yet contamination compounds the severity of the problem. First and foremost, pollution has closed many of the beaches that were once prime shellfishing areas in the Puget Sound. In 2005, of the remaining beaches capable of sustaining shellfish habitat, one third were closed because of pollution and many of the remaining beaches were classified as “threatened” with future restrictions (Puget Sound Action Team 2007). Beaches that were once abundant with clams no longer support shellfish populations. Therefore, both availability and access are impacted “a lot” by pollution. One young harvester provided a first-hand report about the impacts of the contamination:

Yeah, I think most of the fishermen are concerned about that...mainly the clams... is this beach going to be safe... yeah, everybody kind of wonders...especially mainly around Reservation stuff... I've tanked [caught] crab in the [Swinomish] channel before, down by boater's discount...there's a big irrigation sewer that comes off the fields and all the cans of crab that I had tanked up...whatever came out of that irrigation channel...if you just opened up the top of the can...just a really strong smell, it killed more than half the crab that was in there so I don't

really know what's in the water that comes off the fields but some kind of strong chemicals though.

With fewer areas open for harvest, the number of healthy stocks declining and community cohesion deteriorating, the amount of shellfish introduced into the sharing network is dwindling. Community members, particularly elders, are no longer able to obtain the types and amounts of shellfish that they desire. In the first set of interviews, 76 percent of interviewees said that they ate more seafood as a child than they do now (n=62). Seventy-three percent of interviewees (n=74) stated that they wished that they could eat more seafood than they do now, but are not able to obtain it. Although the food sharing network is also impacted by the same outside forces as community cohesion, lower availability and access also directly influence this component, so its status is “somewhat” impacted by pollution. Moreover, those that still harvest for the community are wary of giving contaminated food to elders because they worry that elders may be particularly vulnerable to any potential negative effects. Overall, the food security health indicator is impacted “a lot” by pollution (i.e., averaging the three health components’ rankings: availability is “a lot,” access is “a lot,” and sharing is “somewhat”).

In a culture where food security is preserved and reinforced through held values about the importance of sharing food, yet the food sharing network is breaking down, the additional insult of contamination is a heavy burden to bear when struggling to ensure that everyone is able to partake of culturally important foods. Alternatives are few since buying seafood that can be locally harvested from grocery stores is not considered a “safe”

alternative because it is not a familiar source, nor one that some community members can afford financially. Yet the entire community continues to rely on those who still harvest shellfish in order to supply the food that feeds both the body and the spirit.

Ceremonial use

According to the interviews, three of the fundamental health components that comprise ceremonial use are the ceremonies and gatherings themselves (ceremonies), the importance of giving thanks to the spirits of the food when harvesting and preparing it (giving thanks), and the necessity to feed the spirit of oneself by consuming traditional foods or feeding the spirit of a relative who has passed away by offering traditional foods.

Ceremonies, also referred to as gatherings, involve traditional foods such as clams, oysters and crab and are viewed as an important part of the food-sharing network.

Ceremonies provide the environment in which healing can take place (as health is both a physical and spiritual state (Garrett 1999)). Community members look forward to ceremonies for the food and the company as well as the spiritual significance.

Ceremonies are the best way to maintain and reinforce ties with other community members and members of other tribal communities, and have access to traditional foods such as shellfish. Ceremonies are especially important to elders, many of whom obtain much of their shellfish and other traditional foods at these events throughout the year.

When asked about the importance of having shellfish at gatherings and ceremonies, the majority of interviewees said that the events would be changed or impossible without shellfish (84 percent, n=76). For example, the Blessing of the Fleet ceremony occurs at

the beginning of the commercial crabbing season every year, usually in mid-May. The ceremony thanks the marine natural resources for returning and allowing the people to harvest fish and shellfish and also asks for protection and guidance for the fishers to safely obtain plentiful catches.

Giving thanks to the seafood while harvesting and preparing it is another health component of ceremonial use. The proper way to harvest and prepare the seafood is to pray and give thanks to the Spirit for offering food for the community. In this way, the seafood is empowered with the prayers, which in turn nourishes the people who consume it. Ceremonies provide a venue where people have the opportunity to feed the spirit—to eat the traditional seafood that nourishes both the body and the soul.

When shellfish are contaminated to a degree that they are not available or accessible, other foods are substituted, usually processed foods. These foods are not imbued with the same spiritual strength and connection to the community as traditional foods and thus giving thanks for these foods does not pass on blessings to the consumer or honor the deceased to the same degree. As one elder said, “...it’s like we lack the prayers for gathering this food.” Other matters more strongly inhibit the process of giving thanks because traditional foods are not being harvested and prepared as much as in the past or in the proper way by many people (i.e., economic and time constraints cause fewer harvesters and much of the harvest is sold instead of kept for the community).

Contamination is mentioned by only 4 percent of the interviewees as the reason why

people are no longer harvesting and preparing shellfish (n=62). Therefore, contaminated shellfish affects giving thanks “a little.”

As noted above, ceremonies would change or be impossible without the presence of these cultural keystone foods:

“I think that they would lose the power and the success and the spirit of the ceremonies and of the gatherings without the traditional foods, because that’s all central. It’s like when people come... and you feed their spirit with the stuff up there. Their soul...the spirit is hungry for that....”

This belief was echoed by the majority of interviewees, thus ceremonies are given a ranking of “a lot.” Moreover, contaminated shellfish do not nourish the spirit in the same way since the shellfish themselves are not healthy. The majority of the interviewees stated that they worry about the contamination and its potential health effects—that their food is no longer safe to eat (61 percent, n=67). Although most of the interviewees did not stop harvesting or consuming shellfish because of contamination, mental and public health professionals have widely documented negative impacts to health from worry and stress (e.g., Bokak et al. 2000, Marmot et al 1997, Santiago-Rivera et al. 2007), in this case, the stress originating from knowingly exposing oneself to contamination. A Swinomish elder expressed it best when he said, “Like we say, it’s our spiritual food so it feeds our soul; so it might poison our body, but then we’d rather nourish our soul.” Therefore, feeding the spirit is impacted “a lot” by contaminated shellfish.

Averaging the three health components of the ceremonial use health indicator together results in a ranking that demonstrates that ceremonial use is “somewhat” impacted by contaminated shellfish.

Knowledge transmission

The teachings embody the knowledge of how to gather, prepare, preserve, distribute, and employ shellfish in gatherings and ceremonies. This knowledge is passed down through generations within the community, from the elders to the youth. It is through the teachings themselves, transferred from those that hold the knowledge (elders) to those that learn and carry on the knowledge (youth), that the held values of the community are preserved and upheld. Over and over in the interviews, people talked about the experiences of learning from their elder family members where the best clam beds are, how to crab, and how to prepare the foods. All spoke of the components of knowledge transmission to be of the utmost value to sustaining their community, their culture. One example of knowledge transmission that also ties in all of the aforementioned key health indicators of community cohesion, ceremonies, and food security is the role of food preparation as recounted by an interviewee:

I fostered two teenagers... They were getting into a little bit of trouble. They wore the backwards hats and they got the Native pride, you know, “I’m Indian, I’m Indian.” I said, “Well, you really want to show your people how to be Indian, here I’ll show you.” I just happened to be filleting fish, I had a lot of fish. And we

filleted them and I made them help me...I said, "...this is how you want to be Indian is you provide food for your people. It's not standing on the corner with a Native pride hat acting tough. That's not Indian." The effect on them was just passing that on...the importance, and emphasizes that we have to gather these foods, we have to provide these foods in the wintertime when we're putting food on the table for the smokehouse.

When availability of and access to shellfish is impaired by contamination, the shellfish teachings reflected in all the health components and indicators, and in the quote above, cannot be passed on. Simply stated, without shellfish, there are no teachings about shellfish. When asked about the impacts of contaminated shellfish on the community, one elder replied:

"Our children are not learning the importance of the spiritual teachings that we got as children. I think that has to be a core teaching that keeps us as a community.... Yes, I think it's accessibility and I think that there has been a loss in that consistency from generation to generation that it hasn't been passed from one generation to the next."

Therefore, contaminated shellfish impact the teachings about shellfish "a lot."

The second health component is the elders themselves-- the knowledge holders of the community and their ability to pass on the teachings. Many factors influence the current status of the elders' knowledge, predominately the effects of decades of forced

assimilation. Boarding schools and government laws outlawing Native people from practicing their traditional ways have negatively impacted the knowledge base people hold today (c.f., Adams 1995, Collins 1997, Hoxie 1984). According to the interviewees, contaminated shellfish is “not at all” responsible for the current status of elders’ knowledge about shellfish.

The third health component, youth, represents the willingness of and ability for youth to learn the teachings that are available to them. According to the Swinomish Comprehensive Plan and other plans, education and preservation of the culture are top priorities for Swinomish (Swinomish 1996). Numerous interviewees recounted how today’s youth don’t understand the ways and knowledge of the elders, that the youth don’t know how to harvest or prepare traditional foods. Although there are other, more resounding issues that influence the knowledge transmission health indicator, tidelands closures from contamination and changes related to the other three health indicators affect knowledge about shellfish practices “somewhat.” As one interviewee succinctly put it:

Whenever there’s the low tide and you can go out and get the clams, it’s kind of a ritual that you would expect and that you would expect to have for your children. Again, it would be another piece of the culture lost if that couldn’t be done.

Averaging the three health indicators for knowledge transmission, it is found to be “somewhat” impacted by contaminated shellfish.

In review, the four health indicators received the rankings of: “a little” for community cohesion, “a lot” for food security, “somewhat” for ceremonial use, and “somewhat” for knowledge transmission” (Table 5). It was determined at the onset of the project that the threshold for action is reached at “somewhat” when the rankings are averaged or at “a lot” when one or more indicators are ranked as “a lot.” Since the indicators assessed here have reached the action threshold, it is reasonable to conclude that Swinomish health is affected by contaminated shellfish to a degree that warrants action.

For myself, and I think maybe for a lot of other people in our community where our traditional foods are very important to us, we try not to think about it [the contamination]. We consume, we kind of sense or we kind of know that there's a danger there. But, because these foods are so important to us, we're going to consume them anyway, regardless of what the consequences are. I guess when it becomes an important part of your life, you can't walk away from it. You just can't walk away from it.

Discussion

More than 10 years have passed since the National Research Council published *Understanding Risk* (1996), and the federal government has yet to step up to the plate and heed its own call for evaluating risks based on the priorities, values, and decision-making requirements of affected groups. A group's values must be respected and upheld in order to accomplish any health-based work. It is not an issue that more science can fix, it is an

issue of framing—changing the framework to incorporate the social and conceptual networks that created it. As Sheila Jasanoff (2002) eloquently argues:

Acknowledging the contingency [of what we think we know of the world at any given time] should go hand in hand with a respect for plurality, for if no single way of understanding complex phenomena is ever adequate, then it is foolish indeed to rule out inputs from diverse sources of knowledge. Science, in particular, should not repudiate other socially sanctioned forms of knowing, such as tacit knowledge of traditional communities whose skilled environmental management had not been certified through canonical processes of scientific fact-making.

When undertaking health-based research, it is imperative to have a solid understanding of the exposure group's held values and how and why these values define and prioritize health and health risks and impacts (Carter 1991; Garrett 1999; Lupton 1999). This necessitates working with the group in identifying health indicators, risks, and potential impacts to be assessed as well as acquiring working knowledge of the group's history and major changes over time (Carter 1991, Donatuto and Harper in press). It also requires keeping in mind what external forces may be linked to the identified risks. As Mary Douglas has articulated, the context (or cultural values) drives what is identified as a risk, and risk issues are inextricably connected to issues of power and empowerment, illuminating who is in charge and who is liable. "Risk becomes politicized not simply because it is a threat to life but because it is a threat to ways of life" (Tansey 2008).

Teasing out how much risks are prioritized due to insult to held values or to infringement of power is much like looking at two sides of the same coin. Yet the fact remains that power, loss of power, and empowerment are central in the discourse between any exposure group and those in charge of potential cleanup. The social and conceptual networks that form how any evaluation tool is viewed are closely connected to issues of power (Latour 1987, Nadasdy 1999). Particularly for Native Americans and other minority groups who have faced countless decades of prejudice, discrimination and inequity, empowerment is a necessary part of the matter.

The issue is larger than acknowledging that groups see risk differently and that risk is political, it is recognizing that culture itself is at risk. Introduction of exotic species, forced removal from homelands, and illegalization of traditional harvesting practices are just a few of the many insults many Native people have confronted and continue to confront to this day. Reflective of the stories of many other Native American tribes, the fundamental values of the Swinomish people have provided cultural continuity through the many decades of insults they have faced and continue to face, yet resiliency is not interminable. It behooves all parties involved to address the issues and work together to save what remains. Moreover, it must be ensured that the effort to continue this line of work is not delegated solely to the native communities because capacity and time constraints are already burdening many of the communities far too heavily. The additional burden of risk proof must not be placed on the same communities who also bear the brunt of impacts.

Returning to the poignant quote from a Swinomish elder that started this paper, it is imperative that an assessment be brought into practice that reflects the intangible values native communities like Swinomish hold, and evaluates how those values are impacted when natural resources are damaged. “Like we say, it’s our spiritual food so it feeds our soul; so it might poison our body, but then we’d rather nourish our soul.” As I have stated, it is the responsibility of the federal government to protect its citizens’ health and welfare. Yet this charge is not currently upheld because conventional risk assessments cannot capture the importance placed on feeding the spirit, even above that of avoiding poisoning the body. Likewise, it is equally imperative that policy actions enforce risk reduction measures (i.e., clean-up the contamination) rather than risk avoidance measures (i.e., don’t eat the seafood). As the Swinomish elder implies, risk avoidance measures do not take into account the fundamental value of seafood to Swinomish and thus increase the negative impacts by withholding that which feeds the spirit (O’Neill 2003).

The use of descriptive scales in health assessments illuminates health indicators otherwise difficult to measure. Identifying the four main health indicators and their respective components and assessing them is but the first trial run of an alternative framework to the conventional risk assessment. In this first analysis, it was assumed that each of the four health indicators is weighed equally in relation to community health. It may be the case that the health indicators do not equally contribute to the overall definition of health. One of the next steps in furthering this work is to continue collaborations with Swinomish experts and elders, to weight the importance of each of the components and indicators. Perhaps a swing weighting method such as the one

depicted by McDaniels and Trousdale (2005) will be employed. Another possible technique to be considered is examining the indicators separately for different recommended actions that reflect the specific indicator. Defining what actions to take also requires diligent attention. Perhaps different action levels will be set that correspond with different rankings; for example, if the ranking is “somewhat,” the triggered response would be to clean up X amount of contamination, whereas if the ranking is “a lot,” clean up would encompass X + Y amount of contamination.

Additionally, setting standards for evaluating the alternative framework results is another important next step. Evaluation standards that meet the approval of practitioners, the exposure group in question, and the professional decision-makers are required in order for the results to be useful. Choosing standards is no easy matter, as there is no panacea standard, yet scholars have posited commendable recommendations from which to build (e.g., Judd et al. 2001).

The scale used in ranking the components and indicators, and the components and indicators themselves, follow a discernable and set process of construction and assessment that is easier to interpret by all--the exposure group, law makers and regulatory agencies. It is my hope that the evaluation tool presented here will be tested and amended in other communities as a parallel assessment to the conventional risk framework. Because the health dimensions assessed with the evaluation tool cannot and do not fit into the conventional risk framework, employing the evaluation tool for social and cultural health indicators in parallel with the conventional framework for

physiological ones allows for a more comprehensive assessment of health. While cultural practices are unique to each group, there are universal processes that can be utilized to enable communities and the federal government to make decisions that are protective of all peoples.

Table 5.1 Number of interviews conducted in 2004-2006 by age group

Age groups			
	16-37	38-54	55+
Interview #	47	18	11
Female	25 (53%)	6 (33%)	5 (45%)
Male	22 (47%)	12 (67%)	6 (55%)

Table 5.2 Number of interviews conducted in 2006-2008 by age group

Age groups			
	16-37	38-54	55+
Interview #	1	1	12
Female	0	0	4
Male	1	1	8

Table 5.3 Interview questions for Swinomish experts and elders

<p>1. General health</p> <p>a) What does being healthy as an individual and a community mean to you? (<i>definition for both individual and community health</i>)</p> <p>b) What does cultural and spiritual health mean to you? (<i>how does it fit into overall definition of health?</i>)</p>
<p>2. Historical health</p> <p>a) How do you think the health of the Swinomish community today compares to when you were a child?</p> <p>b) What are the main differences?</p> <p>c) In what area do you think the biggest differences have taken place -- physical, mental, social, spiritual, cultural? Why is this? (<i>possible prompts—changes to fishing and clam digging, local government, education/schooling, economy, gatherings and ceremonies, housing</i>)</p>
<p>3. Connection of food to community health</p> <p>a) Please describe the importance, uses, handling and preparation methods of shellfish (such as clams and crabs) to the Swinomish community.</p> <p>b) Some people told us in the first set of interviews that some foods feed the spirit as well as the body. Can you explain this more? How is this true for different types of shellfish?</p> <p>c) (<i>ask this question if not answered in 2c</i>) How much seafood do you eat now as compared to when you were a child? If it has changed, why? Is it different for the children? If so, how? (<i>Possible reasons? Access? Availability? Contamination? Kids' connection to seafood?</i>)</p> <p>d) Is seafood or shellfish bought from the store different from seafood that comes from Swinomish community fishermen? How so?</p>
<p>4. Shellfish contamination</p> <p>Studies show that many natural resources in Puget Sound carry human-produced toxic chemicals, including shellfish. What do you think about this? Do you think that this contamination affects the Swinomish community? If so, how?</p> <p>(<i>Taking the respondent's answers about how shellfish are part of the Swinomish community into account, form the following question</i>). How do you think this contamination affects shellfish specifically? And considering the connection the community has to shellfish, how do you think it affects the community? Does contamination change the way shellfish are used? (<i>If they say that it doesn't, ask if they think that it could at some point and if they say yes, ask what that point would be...</i>)</p>
<p>5. Optional question: What would you like to see happen from this project?</p>

Table 5.4 Descriptive ranking of the level of impact contaminated shellfish has on the current Swinomish health status

Descriptor ranking	Numeric conversion
A lot	4
Somewhat	3
A little	2
Not at all	1

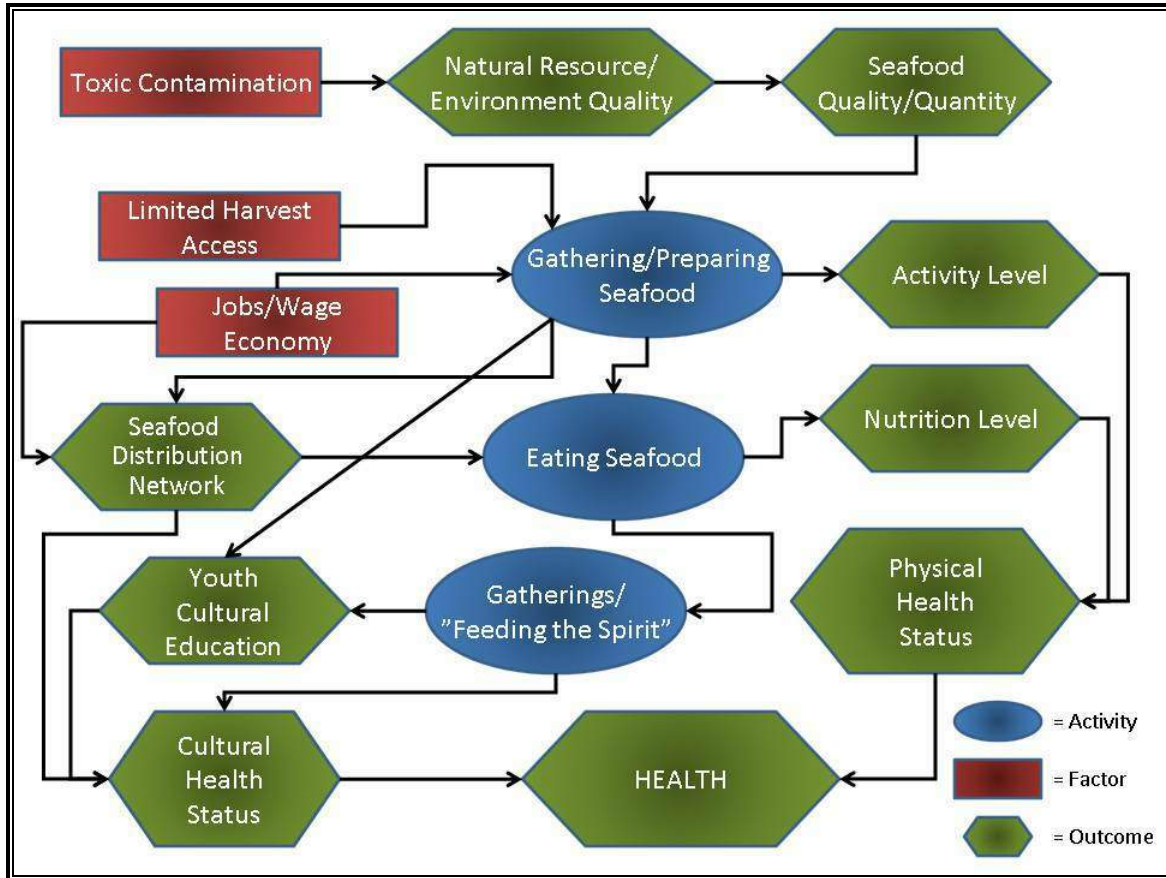
Table 5.5 Definitions of the 12 health components and their grouping within the key four health indicators

Fours Health Indicators	Twelve Health Components with Definitions for each
Community Cohesion	Participation & cooperation – the community depends on each other
	Roles (harvest, prepare, preserve food) – each member has a role that is respected
	Familiarity – food roles are known and trusted; therefore, it is assumed that the food is “safe”
Food Security	Availability – seafood is abundant and the stocks are healthy
	Access – all resource use areas (also called Usual and Accustomed areas) are allowed to be harvested
	Sharing – ensuring that everyone in the community receives traditional foods, esp. Elders
Ceremonial Use	Gatherings & ceremonies – particular community assemblies that require seafood
	Give thanks – thanking Nature/ the Spirit for providing the food when harvesting and preparing it; done with prayers and thoughtful intentions
	Feed the Spirit – consuming seafood to satisfy a spiritual “hunger”
Knowledge Transmission	The Teachings – knowledge, values and beliefs about seafood, its importance, and connections to it
	Elders – the knowledge keepers
	Youth – the future

Table 5.6 The four main non-physical aspects of Swinomish health, key components of the aspects, and impacts, if any, from contaminated shellfish

Health factor	Health indicator, definition & ranked impact from contaminated shellfish	Averaged ranking of impacts of contaminated shellfish on health factor
Community Cohesion	Participation & cooperation – the community depends on each other; strong support network. Not at all.	A little. At times, contaminated shellfish restrict/ close harvest sites to members that still harvest, forcing people to purchase seafood, which is not considered a “safe” alternative. Overall, other factors affect this factor much more than contaminated shellfish.
	Roles (harvest, prepare, preserve food) – each member has a role that is respected. Not at all.	
	Familiarity – food roles are known and trusted; therefore, it is assumed that the food is “safe.” A lot.	
Food Security	Availability -- seafood is abundant and the stocks are healthy. A lot.	A lot. Pollution depletes shellfish populations and closes beaches. With shellfish more difficult to acquire, there is less to distribute in the community.
	Access –all traditional areas allowed to be harvested. A lot.	
	Sharing – ensuring that everyone in the community receives traditional foods, esp. Elders. Somewhat.	
Ceremonial Use	Gatherings & ceremonies – particular community assemblies that require seafood A lot.	Somewhat. Contaminated shellfish impact all categories of ceremonial use due to lower availability and access; yet people continue to eat seafood, even if it’s contaminated, because it “feeds the spirit.”
	Give thanks – thanking the Spirit for providing the food when harvesting and preparing it; done with prayers and thoughtful intentions. A little.	
	Feed the Spirit – consuming seafood to satisfy a spiritual “hunger.” A lot.	
Knowledge Transmission	The Teachings – knowledge, values and beliefs about seafood and its importance for the community. A lot.	Somewhat. Lower shellfish populations and restricted access exacerbates intergenerational knowledge transfer loss, as youth do not have the opportunity to learn about the importance of shellfish, harvest practices, etc. Overall, other factors more strongly affect loss of cultural education.
	Elders – the knowledge keepers who pass on the knowledge. Not at all.	
	Youth – the future; they receive and respect the knowledge. Somewhat.	

Figure 5.1 Flow chart depicting mental models information



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6 Knowledge, Health, and Shellfish Contamination: Risk Assessment in Native American Communities

It has been long said in our community that they know if a fisherman really has the gift if an elder wishes for something in the morning and he finds it on his doorstep that afternoon or in a couple of days. This means that the fisherman was listening to the spirit and the prayer of the elder. The elder will include the fisherman in their prayers, hoping that they do not lose their gift.

I believe that when you quit doing this [a cultural practice] for awhile you don't get the whole ceremony back, but what the people can remember. They then meet to discuss what needs to be done and included. ... Also in the course of reintroducing ceremonies after a period of time of not doing them, you have your spiritual people who can determine if the way it is done is accepted by the other side [the spirit world]. The spirits need to be satisfied in order for it to be a successful ceremony. It is a scary time if the spirits do not accept what we offer.

Tradition and teachings are used to slow or stop changes in the way we do things. The most often spoken teachings about this are: We do not add or subtract anything to our ceremonies or teachings. In other words, the teachings and ceremonies have been given to us in a pure way and if we change them, we dilute the effectiveness and the purpose of the teaching and ceremony. ... I would venture to say that change is inevitable and there is not much we can do to stop it.

I also believe that our ancient teachings and ceremonies are needed to help us in a contemporary life and times. ...it is not changing the teaching, but using it in a creative and common sense way to benefit the people.

Mr. Campbell, Sr., a Swinomish elder and the above speaker, is the Tribal Historical Preservation Officer for the Swinomish. Through his current position, and former position as the Swinomish Intergovernmental Liaison, he has gained the experience and understanding of how to interact in the realm of the Swinomish and that of the wider American context in which the Swinomish live. Gleaned from years of this interaction, his speeches are rightly recognized locally as the conduit through which his knowledge is passed onto others or is the basis of ‘sense’ making in shared worlds.

I was fortunate to meet Mr. Campbell in the first week of employment with the Swinomish Tribe in June of 2000. He relishes his role as mentor and orientation guide, providing tours for new employees and answering questions about Tribal life. Often amused by the preconceived notions that newcomers generally harbor, he patiently explains contemporary life in the Swinomish community with answers such as, “No, people don’t walk around in ceremonial regalia on a daily basis,” and, “Yes, people use guns to hunt these days more often than bows and arrows.” One of the first jokes he told me, and one of my favorites, is “the more formal schooling someone has, the longer it takes to teach them about the ways at Swinomish.” Of course, there is some truth in his teasing; and if understood by the listener, Mr. Campbell is willing to impart a more

thorough understanding of the complexities of Swinomish practices, beliefs, knowledge, and histories.

I recount the above quotations from Mr. Campbell, Sr. for three reasons. First, Mr. Campbell, Sr. has been a key player in the work presented in this thesis by helping me to broaden my understanding of both why seafood ‘matter,’ and how risk, harm, and health might be conceptualized in this context. He has done so in reference to the larger project as well as its derivative pieces including the meanings and nuances attached to the information I was collecting in the interviews. Though the results presented in the preceding chapters were vetted by a host of Swinomish experts, Mr. Campbell, Sr. was particularly instructive in these regards. Second, the quotations illustrate how the telling of stories, which are central to the data collection in all of the chapters, relay essential truths as understood by the Swinomish and within the context of their particular epistemological world. The messages of the stories are no less significant than if recounted in any other fashion or converted to some other evidentiary form. My point in including them here is that it will allow me to revisit their purpose and meaning to provide context and interpretive insight for both my main thesis findings, and the common threads that tie each of the chapters together.

The dependence of this thesis on interview-based methods is evident throughout the chapters. The narrative ‘vignettes’ that such approaches tend to produce have been successfully utilized by researchers for “eliciting and integrating non-quantitative values in debates about risks” (Finucane and Holup 2006: 157, also Finucane and Satterfield

2005, Satterfield et al. 2000). Equally important, a narrative-interview approach also allowed me to construct comparatively dense combinations of ideas (e.g., the relationships between seafood and health), which could then be used to help elucidate how interviewees think about and react to risks and impacts, both as individuals and within the larger social and cultural community context (Douglas 1985, Medin 1989, Morgan et al. 2001).

The interview results underpin the main exposition presented here: that the Swinomish knowledge system, in which the beliefs and values drive how health, risks and impacts are defined and prioritized, is incompatible with and therefore omitted from the federal regulatory definitions, assessment processes and prioritizations of health, risks and impacts. As such, the regulatory agencies charged with the responsibility of protecting health and welfare are not fulfilling their responsibility as defined by the Swinomish. Using the case of contaminated shellfish in the Swinomish community, this thesis illustrates the shortcomings of the current risk framework and proposes recommendations for amending some of these shortcomings by evaluating and prioritizing health risks and impacts based on a definition of health specific to the Swinomish.

What is found in so doing is that the Swinomish relationship to seafood follows more closely an understanding that is akin to seafood as a keystone species (Garibaldi and Turner 2004) and not just a source of protein. Seafood, in this understanding, is a deeply meaningful, symbolically and culturally loaded food that is linked in all senses of the word to a multi-dimensional concept of health. Further, the Swinomish relationship to

seafood has been sustained (though not optimally) across time, passed down through generations, and through many decades of colonialism. This includes knowledge transmission about many aspects of a seafood ‘economy,’ including that about specific harvest, preparation and use practices, its significance in the past when access to seafood was restricted and even banned against the will of the Swinomish people, through to current suppressed consumption rates, and a ‘rightful’ hoped-for future wherein community members have access to as much seafood as is desirable and necessary for health.

Although most Swinomish community members know that contamination exists, they continue to eat seafood because it is an integral part of sustaining health; it nourishes the spirit as well as the body. As such, Swinomish health is as much concerned with social and cultural risks and impacts as it is with physical ones. Community cohesion, food security, ceremonial use and knowledge transmission all play primary roles in health, and thus it is not surprising that these dimensions are regarded as equivalent in importance to physical indications of health. Any resolution to the now long-standing tensions between Native American definitions of health and welfare and current government risk regulations and policies should be built upon this [Swinomish] definitional premise. If this were so, measures of ‘health’ would be received by Swinomish as not only feasible, but as having appropriately prioritized a much broader and more representative ‘classification’ of risks and impacts, which would in turn improve decision-making and policy actions. The intellectual journey that led to these conclusions is best understood in reference to the individual chapters or papers.

Chapter one, for instance, begins with an account of the research process as it unfolded, including available conceptualizations of key works across several literatures, which provided thoughtful sustenance along the way. In particular, I clarify what is meant when I refer to culture, and how it relates to risk. I draw from extensive scholarly work that acknowledges culture as a contested topic, yet makes a case for culture as rooted in a fundamental belief system that is not a static, idealized totality (Clifford 1988, 1997, Geertz 1973, Kirsch 2001, Ortner 1984). ‘Cultures’ vary by specifiable sets of beliefs and values, though I do not mean to suggest anything approaching a ‘one people/one culture’ reductionist definition. Rather, I mean only to suggest that some beliefs and values are *not* held universally, but exist in limited locations and populations, and may be best used therefore to describe said societies, as this is a reasonable proxy and is best stated in the words of how they too describe themselves. Following Atran et al. (2002), for instance, the point is that such beliefs are characteristic of and often as against more dominant forms; moreover, they shape but in no way determine the underpinnings and reasoning behind activities and interactions. Culture also expresses itself through knowledge systems, institutional practices, ceremonies, place names, sacred sites, and so on (e.g., Basso 1997, McDaniels and Trousdale 2005, Turner et al. in press). Mr. Campbell Sr.’s quotations illustrate, by way of example, the concepts and expressions of Swinomish culture as manifest in some of their traditions, teachings, and ceremonies. His story about the fisher and the elder exemplifies specific beliefs and values within a knowledge system that is not widely held, but is, instead, foundational to Swinomish and some aspects of the Coast Salish world more broadly.

In the same vein, it is also our social and cultural constructs that shape how risk is characterized, classified, and prioritized (Douglas 1992, Lupton 1999, Nelkin 2003). This theory of risk, as advanced by Mary Douglas and her students (now senior scholars in their own right), views risk as “inevitably mediated through social and cultural processes and can never be known in isolation from these processes” (Lupton 1999: 35). Thus, returning again to Mr. Campbell, Sr.’s quote, if the teachings are forgotten or enacted improperly and a ceremony is not successful, a serious risk is posed because the spirits are not satisfied. That risk cannot be decoupled from the cultural construct that shapes it.

I think it worthy to revisit the discussion regarding the different epistemological positions on risk found in chapters one and two. Specifically, the conventional framework and the government agencies that produced it espouse a narrow realist position of risk as an objective measure of a predictable outcome that does not otherwise denote key social or cultural beliefs and values (Lupton 1999). The current government risk regulations and policies reflect this technocratic view by assigning this meaning of risk to all populations without consideration of its own intrinsic assumptions as well as to those definitions of risk so clearly evident in other public worlds and, too, cultural groups. The shortfalls of this view of risk assessment are explicated in chapter two: conventional realist assumptions about risk miss the diversity and complexity of consumption rates and practices, and, more broadly, the diversity and complexity of the people in question. This inadequacy is reflected in the case of the Swinomish and contaminated shellfish, wherein

past events may have dramatically and involuntarily changed consumption rates, yet such events and their effects are unacknowledged when conventional survey techniques are used. Furthermore, the information generated by conventional surveys is not tied to the realities of the people the surveys intend to quantify. For example, some tribal members continue to practice traditional lifestyles that include high fish consumption, and are thus at higher risk compared to members of the same community who consume less fish.

Augmenting the list of problems, government agencies are charged with the protection of Native American health and welfare as US citizens *and* as sovereign nations to which the federal government has treaty trust and responsibility obligations. The described shortcomings illustrate the federal government's failure to uphold its charge on both accounts. Chapter two closes with recommendations for amending some of the shortfalls, including an interview-based methodology as an alternative to conventional fish consumption survey methods in order to elucidate the explanatory narratives needed to situate and augment any representative telling of fish consumption and practices.

The interviews are meant to provide a means by which to define the risks and impacts to the Swinomish health in relation to contaminated seafood. Just as risk (be it a technocratic definition or another one) is defined and prioritized via social and cultural constructs, so too is health defined and prioritized by the same constructs (Airhihenbuwa 1995, Garrett 1999, Harris and Harper 1999). For many Native American tribes, health encompasses social, mental, cultural, spiritual, and environmental indicators, in addition to physiological health; they are *all* inter-connected and therefore must be assessed together (Arquette et al 2002, Harris and Harper 1997, 2000, 2001, Wolfley 1998). For

some tribes, to whom seafood is more than simply a food source, contamination adversely impacts all aforementioned facets of health. In such tribes, some seafood species are cultural keystone species—species that have significant meaning and identity in tribal values and practices (Garibaldi and Turner 2004). Therefore, degradation of these foods, for example via contamination, directly impacts the physical health of those consuming the food and is regarded, equally, as an attack on beliefs and values (O’Neill 2003). None of these fundamental values are acknowledged or included in the current decision-making and regulatory settings.

The impacts indigenous peoples suffer because of contaminated subsistence foods can also be considered an “invisible loss.” Invisible losses are inconspicuous and generally unacknowledged, yet produce strong and lasting negative impacts (Turner et al. in press).

The authors describe invisible losses in the following manner:

A decline or removal of key food sources can introduce a cascading effect wherein important associated cultural practices and institutions are also lost (e.g., cessation of “First Salmon” ceremonies following prohibition of associated fishing technologies and declining salmon populations). As well, such losses may impose changes to an individual’s or community’s future options. Invisible losses, by their very nature of being unrecognized or unacknowledged, are seldom considered, awarded compensation or mitigated by decision-makers and resource managers. Yet, in terms of risk to peoples’ overall health and capacity for resilience, such losses may have even more profound impacts on individuals and communities than those that are more visible and widely acknowledged (Turner et al. in press).

In the case of contaminated subsistence foods, although the contamination is generally acknowledged, indirect losses associated with the contamination often are not linked as such and therefore go unnoticed. Damaging regulatory policies that enforce and further the breakdown of the indirect losses directly impact subsistence food networks, which are likewise impacted negatively, yet go unrecognized (Turner et al. in press). Although not explicitly identified until chapter four, these invisible losses are a pervasive part of the subtext in all of the chapters. The above-mentioned article by Turner et al. (in press) on invisible losses in First Nations communities identifies six steps that can be taken to halt or reverse such impacts. These steps can be used as a litmus test to estimate the success of the interview-based methods depicted in chapters three, four and five. The six steps are:

1. Focus on what matters to the affected people.
2. Describe the important issues in meaningful ways, using narratives, stories and visuals.
3. Make a place for these issues and concerns in decision-making, using a multi-dimensional framework and incorporating hard-to-quantify impacts.
4. Acknowledge historical losses by evaluating activities from a historical baseline rather than just from the present.
5. Recognize culturally-derived values as relevant and significant, and include them as legitimate inputs to decisions.
6. Create better alternatives to decision-making, so that invisible losses will be diminished or eliminated in the future.

With these six recommendations in mind, a summary of the next three papers (chapters three through five), falls more readily into place.

Chapter three reveals the findings from enacting an interview-based method as an alternative to conventional fish consumption surveys. The name, “seafood diet interviews,” so entitled instead of “fish consumption surveys,” itself illustrates some of the steps taken to alter methodological practices in order to better represent and reflect knowledge about health as it is understood by Swinomish. By focusing on obtaining information from traditional high-use consumers (who are often left out of the survey process), and by guiding the focus away from single-metric closed-ended survey items, we (the survey team and myself) allowed interviewees to ‘tell stories’ wherein the information provided produced a much more detailed picture of why people eat what they eat in the Swinomish community.

Among the more salient points that emerged from this alternate method was that drastic changes in access, harvest and consumption have occurred over time, changes that continue to this day. People are harvesting and eating less seafood (“seafood” will be used in lieu of “fish and shellfish” because it is a more common term used in the Swinomish community), primarily due to loss of access and an increased dependency upon a cash economy. Further, it became apparent that access to seafood stocks was hampered in numerous ways including: development and privatized beaches, pollution-based beach closures, outmoded harvesting equipment in comparison to commercial fishers, restrictive stock management regulations, and deteriorating food sharing networks within the community. Survival in today’s cash-based economy also forces

fishers to sell more of their catch, leaving less for the local community. Furthermore, when money is required for vessel maintenance and equipment, fishers, particularly non-commercial, must seek employment in the cash-economy. In such instances, time spent working wage jobs restricts the time available for harvesting.

Although declines in harvest access to seafood are generally recognized, indirect losses associated with loss of access are considered invisible losses. For example, heretofore current consumption rates in communities such as Swinomish were assumed to reasonably reflect desired consumption rates due to lifestyle preferences. Yet the Swinomish findings demonstrate that this is not the case—the majority of the interviewees expressed a strong desire to increase their current seafood consumption, yet did not have sufficient access to seafood within the community to do so. Coupled with the above stated reasons as to why community members are eating less seafood today than even twenty years ago, and the decline of access to harvesting areas, the current seafood diets should be regarded as *suppressed*, to wit, the current rates are forcibly lower than what the community desires to eat and what they are entitled to eat based on treaty trust and responsibility obligations to protecting health (Harper and Harris 2008; NEJAC 2002).

Investigating the impact of contamination itself revealed that many ceremonies would be changed or deemed impossible if seafood was no longer available. And while the majority of community members are aware of the presence of pollution, honoring, maintaining and even strengthening (e.g., higher seafood consumption) the relationship

of seafood in the community often outweighs any concerns about the potential for physiological impacts on ones' health. This information is key to analysis and decision-making as it alters quite profoundly that which is being 'assessed' and that which is 'said to matter' with regard to the 'risk' of eating seafood in Native American fish-dependent communities such as the Swinomish. An altered definition of risk or impact in this case goes to the heart of the default tactics of current policy. Most policy actions and recommendations involve programs of risk *avoidance* (i.e., eat less fish), but if and when such recommendations eliminate the use of something so completely fundamental to cultural and social life, then risk *reduction*, (i.e., clean up contamination) is really the only solution. In the absence of legitimate *risk reduction* actions, the Swinomish case points quite directly to both the failures of current policies and of treaty obligations ostensibly extended to Swinomish and like communities (O'Neill 2003).

Finding high-use consumers was critical to this work, yet so too were finding the expert knowledge holders in the community, who may not be individuals of the same group. Chapter four works with the same set of interview findings discussed in chapter three, yet explores some incorrect assumptions made about what it means to be a knowledge holder in the Swinomish community. Working from definitions of traditional knowledge as both a "way of knowing" and a "way of living" (Nadasdy 2003), that is, both knowledge and practice, we assumed that traditional knowledge holders would be most active in the traditional lifestyle as both experts in the Swinomish teachings and as practitioners. What we found, quite unexpectedly, is that many people identified within the community as expert knowledge holders do not have adequate access to traditional foods because they

themselves are not harvesters. In this case the term access to seafood refers to the ability to obtain seafood through the sharing networks in the community, more so than accessibility to harvests, which is part of the definition of access in chapter two. Yet the cash economy, cited as the second most common reason people are eating less seafood today than in the past, is integrally tied to the breakdown of the food sharing network. With increasing pressures to assimilate into the wage-based economy, more seafood is sold while less is shared within the community. Thus those who are expert knowledge holders but do not actively fish, no longer have access to the seafood resources that feed the spirit as well as the body. Although the community continues to exhibit resiliency and perseveres through such losses, this deprivation to those most likely to appreciate its spiritual significance presents yet another example of an indirect, invisible loss that is neither recognized nor addressed by government agencies.

Larry Campbell, Sr.'s opening oration elegantly illustrates the finer details of some of these losses. In the first quotation, the elder, an expert, instructs the fishermen through spiritual guidance to maintain the food-sharing network. The fisherman understands the importance of the acts and is open to the guidance the elder provides. In the story is the subtle yet key teaching of listening to and respecting not only elders but the larger social network, of which food sharing is part. In the second quotation, Mr. Campbell, Sr. illustrates both the losses communities have faced when ceremonies were banned (as was done in many parts of the United States and beyond in forced assimilation efforts), and of community resiliency in bringing them back when they are able to. He implies how it must be an intentional and careful process so as to ensure that the spirits are satisfied,

because misconduct in the ceremonial context is plainly dangerous, particularly if the spirits do not accept what is offered. Yet, there exists no single example of a decision-making process or instrument of policy outside of the community that recognizes the ramifications of the loss faced when practices such as ceremonies are taken away or lost.

Richmond et al. (2005) present a parallel example of how the increasing imposition of the wage economy has engendered deterioration of intricate yet vital subsistence food sharing practices. Potlatch gatherings were traditionally enacted in Coast Salish communities to reaffirm social status and authority, and they “maintained an effective management of human and natural resources, acting as a fully integrated monitoring and public accountability system” (Weinstein 2000 in Richmond et al 2005: 354). With the advent of governance through election and band councils, one aspect of forced assimilation, authority over and management of resources was wrested from indigenous communities and lost. Most often the authority was replaced, quite intentionally, with entry into commercial fishing and capitalist projects of development more broadly. In conjunction with the upheaval came the collapse of systems that sustained communities (Richmond et al 2005), including aspects such as food sharing networks. The authors surmise that although strength and power in the communities have been compromised, the communities continue to endure with their burden of invisible losses, reduced assets, reduced access, marginal participation in the wage based economy and declining community health and welfare. These findings revert the focus back to a primary part of my work with the Swinomish that I have yet to discuss—that of the connections between the losses detailed thus far and human health risk assessments.

At the outset of this project, the idea was to devise approaches to more accurately and comprehensively document the Swinomish community's connection to seafood and somehow incorporate these approaches into the conventional risk assessment framework. The hypothetical product as I imagined it then would offer additional methods within the current framework for expressing the risks of and impacts to lost or contaminated resources to Native American health. The proposition, or rather, hope is not a new one. Others have called for a tailoring of the assessment process for over a decade, from the National Research Council (NRC 1996) underscoring that risk assessments will inevitably fail if they do not suitably and adequately address the issues deemed most important by the group in question, to tribal representatives and advocates demanding that the broader definition of health believed in by many Native Americans be an equally important indicator in risk assessment (Arquette et al 2002, Harris and Harper 1997, 2000, 2001, Wolfley 1998). Others suggest, more pointedly, that government agencies should acknowledge their current shortcomings and seek the help necessary for correcting them (e.g., USEPA 2006).

Since the chapters more or less reflect the chronological progression of my work, it might not be sufficiently apparent that in chapter four I realized that creating and infusing health indicators specific to Native Americans within the conventional risk assessment framework would prove unsuccessful. The reasons are several: first, difficult to quantify, at times intangible health indicators (e.g., social, mental, cultural) do not conform to the criteria-based measures in a conventional risk assessment. Thus, any new indicators of

health that might be devised would be obscured because the risk assessment framework itself is geared toward physiological endpoints (estimates of increased mortality and morbidity). Second, there are no established risk assessment procedures that would honor and act on findings based on the additional health indicators. Many of the incongruities stem from an understanding that the conventional risk framework was created in a knowledge system that is separate from the traditional knowledge system studied here and that produced the additional health indicators. The additional indicators lose their meaning and significance when taken out of context of the knowledge system that fashioned them (Nadasdy 2003). Thus chapter five describes the creation and enactment of a separate yet equal evaluation tool for difficult to quantify, often intangible health indicators, which is to be employed in parallel with conventional risk assessments.

Chapter five can be thought of as the culmination of acknowledging, understanding and detailing the many invisible losses surrounding community health with regard to seafood, and specifically shellfish. The four indicators expressed and prioritized by the Swinomish experts and elders (community cohesion, food security, ceremonial use and knowledge transfer) and their corresponding components demonstrate the presence and significance of a range of risks and impacts that are impossible to depict within the confines of the current risk framework, and therefore have gone unanswered to date. Yet I show that using an evaluation tool based on simply descriptive scale rankings provides an alternative approach that, although not precise, is able to clearly demonstrate that the risks and impacts are there and to what extent, visible to both the Swinomish people and decision-makers alike.

The findings indicate that of the four health indicators, food security was affected the most by the presence of contaminated shellfish, followed by ceremonial use and knowledge transmission. Community cohesion was said to be affected less than these other indicators. In comparison, the original risk assessment project conducted at Swinomish from 2002-2006, which sparked my investigation into finding a more appropriate alternative, deemed that the physiological risk of eating seafood was indeed pervasive.¹ As a result of this latter assessment, food advisories were issued for subsistence consumers. The warnings cautioned Swinomish women of childbearing age and children to a limit of no more than two seafood meals a week; adult men and women past childbearing years to a limit of no more than three seafood meals a week (Swinomish 2006). The advisories were voluntary and considered temporary until a risk reduction strategy could be determined and implemented (see earlier argument on risk avoidance versus risk reduction (O'Neill 2003)). Yet no risk reduction strategy has been established to date. And for the most part, Tribal members continue to harvest and consume seafood without change in large part because that which is seen to be 'at risk' is poorly understood and poorly addressed by this 'advisory' strategy. To reiterate this crucial point, the introductory quotation from a Swinomish elder at the beginning of chapter five sums up how most Swinomish people feel about and behaviorally respond to the first set of findings: "Like we say, it's our spiritual food so it feeds our soul; so it might poison our body, but then we'd rather nourish our soul."

¹ Lifetime non-cancer risks for adults and children are above a hazard quotient of 1 (ranging from 3 to 20) and lifetime cancer risks are in the range of 1 in a 1000 (Swinomish 2006).

How then, given this, do the findings from this newer evaluation tool figure into the current situation and what might be the next action, if action is taken at all? As I worked at designing the evaluation tool, I was aware that any risk assessment work in Native American communities seeking to employ a broader and more comprehensive definition of health might produce higher risk estimates. I was equally aware of the challenges in policy implementation that high estimates from a non-conventional risk evaluation tool would face. Thinking back to the risk assessment/ risk management paradigm established in 1983 by the National Research council (see Figure 1.2), risk management and policy implementation is located in a sphere separate from the sphere of the assessment itself. Much of this thesis argues for establishing a discrete yet equal evaluation tool in the assessment sphere that addresses the social and cultural risks to be used in parallel with the conventional assessment. Yet strategically, changing the risk management/ policy sphere may have a greater impact on changing how health and risk are defined and attended to. Currently, there are no established thresholds for action from the evaluation tool findings, nor policies in place that spell out decision-making procedures for those actions, and creating these policies and regulations will take extensive time and effort. In addition, any anticipated reluctance on behalf of government to produce new policies and procedures will be intensified because high risk estimates mean more extensive and stringent cleanups or standards, which means yet more work for government agencies. Yet formation of these policies and procedures are crucial steps because they afford communities some autonomy over decision-making in regards to their health and welfare, including the health and welfare of their natural resources.

I am not so naïve as to be unaware of the fact that the assertion of power expressed as the superiority of one knowledge system over another is a driving issue in any risk discourse. Although I have only touched on the political and legal dimensions of this thesis, these dimensions are many and sensitive. Particularly when two groups with differing knowledge systems are on opposing sides of political and bureaucratic issues, unequal power relations are bound to arise. These inequities strongly influence the groups' relations with each other as well as what inputs to decision-making are seen as legitimate (e.g., Nadasdy 2003, Oaks and Harthorn 2003). That said, I leave the dialogue regarding political and legal implications to those more experienced in the subjects than I, in particular, the Swinomish Senate, the elected decision-making body representative of the community.

In my position, what I can and will do is continue working on testing and refining the evaluation tool. As briefly touched on in Chapter 5, the evaluation tool presented is the first iteration and requires more testing and refining. This includes recognizing that uncertainties may exist in traditional knowledge, which was not otherwise touched on in the thesis. Continued work on whether the equal weighting of each of the health indicators ought to remain the same or change to reflect prioritizations is also warranted. The equal weighting between each of the measures in the descriptive scale ranking also requires further scrutiny. In terms of conducting the interviews themselves, incorporation of the descriptive scale ranking into the interview question themes instead of assigning

them after the interviews may provide a clearer additional line of evidence of the participants' knowledge of health prioritizations.

Other work to be done after the evaluation tool has been sufficiently tested and modified includes presenting the tool as an option in other Native American communities, working with regulatory agencies to incorporate the tool in their decision-making processes and forwarding similar recommendations to the Swinomish Senate. It behooves all parties involved to address the issues and work together in refining and promulgating a more comprehensive and accurate risk assessment framework. In addition, the federal government must step up to the plate and relieve the Native communities of the burden of proof of that which should by now be perfectly obvious: that risks are inextricably tied to social and cultural processes. To use an analogy based on Larry Campbell, Sr.'s third quotation, in combination with step five in the invisible losses work (Turner et al. in press) and the theory of risk as "inevitably mediated through social and cultural processes" (Lupton 1999: 35), "...it is not changing the teaching [of risk as an objective hazard, threat or danger], but using it in a creative and common sense way to benefit the people [by honoring culturally-derived values as relevant and significant]."

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Appendices

Appendix A: UBC Research Ethics Board's Certificates of Approval

The following UBC Research Ethics Board's Certificates of Approval and renewal forms cover a Social Sciences and Humanities Research Council (SSHRC) funded project for which my supervisor, Dr. Terre Satterfield, is the Principal Investigator. My research with the Swinomish is one of three projects under the SSHRC grant.



The University of British Columbia
Office of Research Services
Behavioural Research Ethics Board
Suite 102, 6190 Agronomy Road, Vancouver, B.C. V6T 1Z3

CERTIFICATE OF APPROVAL- MINIMAL RISK RENEWAL

PRINCIPAL INVESTIGATOR: Theresa Satterfield	DEPARTMENT: UBC/College for Interdisciplinary Studies/Resources, Environment & Sustainability	UBC BREB NUMBER: H06-80653
INSTITUTION(S) WHERE RESEARCH WILL BE CARRIED OUT:		
Institution UBC Other locations where the research will be conducted: N/A		Site Vancouver (excludes UBC Hospital)
CO-INVESTIGATOR(S): N/A		
SPONSORING AGENCIES: Social Sciences and Humanities Research Council of Canada (SSHRC) - "Representing the Cultural Concerns of Three Aboriginal Communities in Risk-based Policy Contexts"		
PROJECT TITLE: Representing the Cultural Concerns of Three Aboriginal Communities in Risk-based Policy Contexts		

EXPIRY DATE OF THIS APPROVAL: July 31, 2009

APPROVAL DATE: July 31, 2008

The Annual Renewal for Study have been reviewed and the procedures were found to be acceptable on ethical grounds for research involving human subjects.

Approval is issued on behalf of the Behavioural Research Ethics Board

Dr. M. Judith Lynam, Chair
Dr. Ken Craig, Chair
Dr. Jim Rupert, Associate Chair
Dr. Laurie Ford, Associate Chair
Dr. Daniel Salhani, Associate Chair
Dr. Anita Ho, Associate Chair

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