Coastal aquaculture in British Columbia: Perspectives on finfish, shellfish, seaweed and Integrated Multi-Trophic Aquaculture (IMTA) from three First Nation communities

by

Kathryn Tebbutt
B.A., University of British Columbia, 2009

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Supervisory Committee

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Abstract

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Most aquaculture tenures in British Columbia (BC) are located in coastal First Nation traditional territories, making the aquaculture industry very important to First Nation communities. Marine aquaculture, in particular salmon farming, has been labeled one of the most controversial industries in BC and various groups with differing opinions have created a wide-spread media debate known as the "aquaculture controversy". Industry, government, and (E)NGO's are often the most visible players; First Nations, especially those without aquaculture operations directly in their territories, are often excluded or underrepresented in the conversation. In particular, remote communities from the central and north coast are significantly underrepresented. Aquaculture is predicted to expand in BC, making it crucial to know the opinions of these communities. By drawing on twelve key informant interviews conducted *in situ* in three central and north coast First Nation communities, as well as other literatures and discourses, this thesis explores the aquaculture controversy and perspectives towards finfish, shellfish, seaweed and Integrated Multi-Trophic Aquaculture (IMTA) systems. The thesis suggests that there is little interest in salmon aquaculture in the communities of Oweekeno, Skidegate and Massett; however there is significant interest in shellfish farming and to a lesser extent seaweed and IMTA. It also sheds light on the major issues and concerns of the current industry and potential interest areas in-line with First Nation values. In doing so, the current research contributes to the knowledge mobilization of First Nation perspectives towards coastal aquaculture in BC.

Table of Contents

List of Figures

Acknowledgments

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Dedication

This thesis is dedicated to the caretakers of this region who continue to fight for the preservation of the land and resources for our future generations, the coastal indigenous peoples of British Columbia and united allies.

Chapter 1:
Introduction

1.1

Aquaculture is one of the fastest growing animal food producing sectors worldwide. In Canada, for instance, aquaculture production has increased four-fold over the past thirty years (United Nations Food and Agriculture Organization [FAO], 2012; Fisheries and Oceans Canada [DFO], 2013). Driving the global rise in aquaculture production is the pressing need to meet the food and nutrition requirements of a growing population with finite natural resources. Contributing significantly to the world's fish supply and total production, aquaculture, combined with capture fisheries, is estimated in the next decade to surpass that of beef, pork, or poultry (FAO, 2012). However, as wild fish stocks are being increasingly overexploited globally, meeting this global food shortage is becoming crucially important. The United Nations Food and Agriculture Organization (2012) assessed that 87% of wild fish stocks are either fully exploited or over exploited, and the target for all fisheries to meet their maximum sustainable yield by 2015 is an unlikely goal. The Pacific Northwest region had the highest global marine catch, contributing 27%, or 20.9 million tonnes (FAO, 2012). Productivity for capture fisheries in other words, especially in the Pacific Northwest, is at its maximum threshold. To prevent fishing wild stocks into extinction, there is a pressing need to find alternative means of producing food. Aquaculture is one of these options, as some believe it presents a way to relieve pressure on wild stocks while providing the world with affordable protein. In British Columbia (BC), however, the aquaculture industry is continuously contested as to whether it is a viable, sustainable industry.

Aquaculture refers to the farming of aquatic organisms including finfish, shellfish, and seaweed. In British Columbia (BC), the practice can be traced back thousands of years to the coastal indigenous peoples, who tended clam gardens and enhanced seaweed production in their territories (Turner & Clifton, 2006). Today, BC produces over half of Canada's farmed seafood and cultivates over one hundred different species, making it BC's largest agricultural export product (BCMOA, 2010). The coast of BC has some of the most suitable conditions for aquaculture: clean, cool, and nutrient rich waters, with good access to local and international markets. Despite these conditions, the industry has stagnated, largely due to a lack of public support for salmon aquaculture. Concerns, for example, have resulted in several Province-wide moratoriums since the commercialization of the industry: occurring in 1986 (2 years), 1995 (7 years) and 2008 (2 years) (Wagner, 2010). Accordingly, the Department of Fisheries and Oceans (DFO), the governing body of the aquaculture industry, has identified addressing the social licence for aquaculture as one of its top priorities (DFO, 2010c).

A social license refers to the perceptions of local stakeholders that a project, a company, or an industry that operates in a given area or region is socially acceptable or legitimate (Springer, 2013). To date, the aquaculture industry's social license, especially for salmon aquaculture, has been exceptionally poor. Concerns pertaining to issues such as environmental sustainability and transparency have fueled the controversy between proponents and opponents. At the center of the controversy is BC's indigenous population. First Nations have been living in coastal BC for thousands of years and have a great stake in what happens to the marine environment, as many individuals and communities depend on the natural resources within it for well-being and survival. It is

understood that all aquaculture operations in BC are currently located in the traditional waterways or lands of a First Nation, despite many believing the industry could pose a risk to their livelihood and territories. Furthermore, First Nations have largely been excluded from the decision-making process of the industry resulting in their voices being underrepresented in management and decision-making. Although some First Nations have engaged in the industry, there remains an evident division.

As aquaculture is projected to expand in BC, there is a need to evaluate the socio-economic impacts of aquaculture on remote coastal communities to understand the social acceptability of the industry. Remote communities, especially those without aquaculture facilities directly in their territories, likely do not have the same opportunities to express their opinions as those in more populated regions involved in the industry. Minimal literature exists on BC First Nation perspectives towards aquaculture, specifically on the major issues and concerns of the industry. There is also a need to investigate whether new production technologies, such as Integrated Multi-Trophic Aquaculture (IMTA) would help to alleviate some of the concerns of current production methods. IMTA is a sustainably designed model for cultivating finfish, shellfish, and seaweeds in a single operating system that is a relatively new method of aquaculture to BC. It specifically aims to increase the social acceptability of the overall industry by potentially addressing and mitigating concerns of current operations (Chopin, 2006). This thesis will explore the perspectives and opinions on aquaculture from three coastal First Nation communities: Oweekeno (on the central coast, BC), Skidegate, and Massett (both in Haida Gwaii, BC).

1.2 Purpose of the Study

The purpose of this thesis is to provide insight into the perspectives of three First Nation communities that will result in a broader understanding of coastal people's perspectives towards aquaculture. It is also to investigate if there is awareness or interest in sustainable aquaculture technologies, such as Integrated Multi-Trophic Aquaculture (IMTA).

The specific research objectives are to:

1. Identify and critically review relevant literature on the major issues and concerns of coastal aquaculture in BC;
2. Investigate the perspectives of coastal First Nations towards finfish, shellfish, and seaweed aquaculture in BC; and
3. Assess coastal First Nations perspectives on sustainable aquaculture methods, specifically Integrated Multi-Trophic Aquaculture (IMTA).

1.3. Organization of Thesis

This thesis has been organized according to the research objectives. Chapter two sets the context for the study by reviewing relevant literature on theoretical and practical applications to the history and management of aquaculture in BC. It also examines the available literature on the perspectives of the public and First Nations regarding coastal aquaculture. Chapter three presents the methodological framework that fuses the report by providing structure. It also describes the methods adopted for addressing the research objectives. Chapter four addresses the second and third research objectives by presenting First Nations perspectives on aquaculture according to themes and presents the study's findings. Chapter five discusses the findings presented in Chapter four in greater detail,

highlighting and integrating key patterns and themes. Chapter six summarizes the contributions of this study, presents the study's conclusions and limitations, and offers recommendations for future research.

Chapter 2:
Context

This thesis attempts to create a greater understanding of First Nation perspectives of coastal aquaculture. Therefore the context of the industry, including its history, patterns of development and management is exceptionally important for understanding the current state of the industry. Conceptualizing how aquaculture fits within its management framework helps to understand how it is applied on the ground. Thus, it is appropriate to discuss the ecosystem approach to aquaculture (EAA) as well as ecosystem based management (EBM), as these frameworks have been instrumental in guiding current aquaculture operations worldwide and in BC. This chapter examines various discourses, beginning with an introduction to EAA and EBM, and how these paradigms have influenced the thinking of BC's resource managers. Next is a description of the coastal aquaculture industry in BC, the various species that are being cultivated, and the managing bodies of the industry. This is followed by a review of the aquaculture controversy that documents the major issues and concerns of the industry, which is currently being played out on the west coast.

2.1 Part 1: The Integration of Aquaculture

Resource management is a complex and multi-themed task. Most often, managing resources is about managing the environment for human uses, or for human incorporation into the environment, while humans, for the most part, have perceived ecosystems as a series of fragments, each system being separate from the next. This thinking has formed the basis for the secular legislative framework seen traditionally in BC. Most natural

resources, however, are too complex to be governed effectively by a single agency or managed exclusive to one another (Berkes, 2009). There has been a global shift away from individualistic, positivistic management systems to perceiving environments in a more holistic, dynamic way and incorporating all aspects, such as the social, political, economic sectors, into a more integrated framework (Berkes et al., 1998). This way of thinking has been recently applied in aquaculture. On the global scale, the United Nation's Food and Agriculture Association (FAO) has developed a framework called the *ecosystem approach to aquaculture* (EAA) that, since 2005, has been in stages of implementation (FAO, 2013). The ecosystem approach accounts for a complete range of stakeholders, spheres of influences and interlinked processes (Soto et al., 2008). Locally, the *ecosystem-based management* (EBM) strategy has already transformed resource management in BC with success in the forestry (Price, Roburn, & MacKinnon, 2009) and other land-use sectors (Parks Canada, 2011) and has been identified as a management objective for BC aquaculture (DFO, 2013d) .

The ecosystem approach to aquaculture (EAA) is defined as "a strategic approach to the development and management of the sector aiming to integrate aquaculture within the wider ecosystem, such that it promotes the sustainability of interlinked social-ecological systems" (Soto et al., 2008). The approach can be understood as being guided by three key principles (Soto et al., 2008). First, aquaculture should be developed in the context of ecosystem functions and services with no degradation of these beyond their resilience capacity; second, aquaculture should improve human well-being and equity for all relevant stakeholders; and third, aquaculture should be developed in the context of (and integrated to) other relevant sectors. Importantly, a main goal of EAA is to optimize

economic efficiency and the sustainable use of available resources particularly by encouraging the integration of various species in polyculture, or IMTA systems, and managing for long term sustainability (FAO, 2013). The association between EAA and IMTA will be influential in a discussion of IMTA in a later section. Soto et al. (2008) refer to EAA as an ecosystem-based approach and describe it as essentially applying ecosystem-based management as proposed by the Convention on Biological Diversity (UNEP/CBD/COP/5/23/ decision V/6, 103-106, taken from Soto et al., 2008), which notes the difference between the two similar concepts.

EBM has been variously defined in different sources and has also been referred to as integrated management, adaptive management, and collaborative stewardship, among other titles (O'Boyle & Jamieson, 2006; Pacific Marine Analysis and Research Association (PacMARA), 2010; Yaffee, 1999). This concept is relatively new and is therefore experiencing rapid growth in terminology and jargon, representing one of the limitations to using this system (O'Boyle & Jamieson, 2006). However, this thesis will exclusively use the term EBM and adopt the definition specifically pertaining to aquaculture from the Department of Fisheries and Oceans (DFO);

> "… [EBM is] *an integrated or holistic approach to making decisions about ocean-based development and conservation activities. It means considering the environmental impact of an activity on the whole ecosystem, not simply the specific resource targeted. It also means taking into account the cumulative impacts of all human activities on the ecosystem within that area"*
>
> (Burrows et al., 2010, p. 12-13).

To compare the similarities of DFO's definition to the world stage, a useful, albeit lengthy definition of EBM signed by 219 scientists in a "Scientific Consensus Statement" reads:

> *"Ecosystem-based management is an integrated approach to management that considers the entire ecosystem, including humans. The goal of ecosystem-based management is to maintain an ecosystem in a healthy, productive and resilient condition so that it can provide the services humans want and need. Ecosystem-based management differs from current approaches that usually focus on a single species, sector, activity or concern; it considers the cumulative impacts of different sectors. Specifically, ecosystem-based management:*
>
> *• emphasizes the protection of ecosystem structure, functioning, and key processes;*
> *• is place-based in focusing on a specific ecosystem and the range of activities affecting it;*
> *• explicitly accounts for the interconnectedness within systems, recognizing the importance of interactions between many target species or key services and other non-target species;*
> *• acknowledges interconnectedness among systems, such as between air, land and sea; and*
> *• integrates ecological, social, economic, and institutional perspectives, recognizing their strong interdependences*
>
> (PacMARA, 2010).

In these definitions, both the DFO and the Scientific Consensus Statement describe EBM as an integrated approach, yet the DFO also describes Integrated Management as a separate, overarching action plan, and EBM is described as its specific action item (DFO, 2010). Similarly, O'Boyle & Jamieson (2006) describe EBM as being a component of the greater complexity of "Integrated Management". The complexity and undefined nature of this strategy provide some of the limitations to using this approach, yet can also serve as a malleable, flexible plan perhaps useful in an unpredictable and ever-changing industry such as aquaculture. The similarities between EAA and EBM are apparent in their goals related to sustainability and integration, yet EBM has been the approach that has been adopted by local resource managers in BC. For this reason I will expand more upon the discussion on EBM.

EBM is a popular discourse within coastal management planning groups in BC, such as the Marine Planning Partnership for the North Pacific Coast (MaPP), Central Coast Indigenous Resource Alliance (CCIRA), Coastal First Nations Great Bear Initiative

(CFN), Pacific North Coast Integrated Management Area (PNCIMA), and others. This thesis will follow with this familiar discourse to employ EBM as a tool to highlight two main themes that will integrate this study. First is the shift DFO is taking towards embracing an integrated approach that encourages greater engagement with First Nations in managing aquaculture in BC. EBM emphasizes the connectedness and inclusion of various knowledge systems and groups to create a more holistic, informed approach. This theme helps to connect the perspectives discussed throughout this thesis to a practical application in the aquaculture sector. The second theme is the emphasis on sustainability that EBM strives for that is perhaps more in line with First Nation values and addresses another component of this study, IMTA. IMTA takes a similar holistic approach as EBM, in that it considers the entire system as a whole, with each species in the system working symbiotically with another. In utilizing EBM I hope to provide a meaningful discussion of these themes, as well as provide a conceptualization of how these themes and discourses can be mobilized at the ground level.

DFO has embraced integrated management under the Ocean's Act, designed to bring together diverse ocean stakeholders, provincial and territorial governments, First Nations and strong governance mechanisms into a single management approach for Canada's oceans estate (PacMARA, 2010). Specific to aquaculture, the DFO has adopted a policy framework committed to supporting aquaculture development in a manner consistent with its commitments to EBM and integrated management. The DFO states:

> *"within the context of ecosystem-based and integrated management, DFO will encourage provincial and territorial governments, the aquaculture industry, communities and other stakeholders to begin working together to identify regional aquaculture growth objectives and to select biophysically and socially suitable areas for aquaculture development"*
>
> (Fisheries and Oceans Canada, 2008).

A challenge of moving towards a new management approach is linking conceptualization to implementation (O'Boyle & Jamieson, 2006). DFO has attempted to implement EBM through its National Aquaculture Strategic Action Plan Initiative (NASAPI) (2011-2015), which outlines DFO's intentions of using a collaborative decision-making process and incorporating sustainability in managing the aquaculture sector, paralleling the characteristics of EBM (DFO, 2010). In NASAPI, DFO has stated as its first development objective for year 1, "principles of ecosystem-based aquaculture management" (DFO, 2010).

The human component in EBM is crucial and differs from current systems that generally do not take anthropogenic changes into account. Perhaps this was once acceptable; however, in today's global state where humans interact with virtually every corner of the earth, this element needs to be addressed. Never before has there been such great dependency on ecosystem services, outputs, and the productivity of environments, including marine ecosystems. At the same time, human alterations to the environment are one of the leading causes of environmental degradation, pollution, and species loss. In terms of aquaculture, many examples exist globally where facilities have caused irreversible destruction to their host ecosystems (Buschmann et al., 2009). In BC, aquaculture is a relatively new industry compared to other countries and is still in a somewhat experimental stage in regards to impacts on the environment and the ecosystem (DFO, 2011; Economist, 2009). The uncertainty surrounding the impacts of aquaculture impacts accentuates the insecurities of the public, especially as the industry is concentrated in what is seen as "pristine", remote parts of the province. Social activism has become commonplace, especially concerning salmon aquaculture, showing that

aquaculture in BC is rooted in not only a sensitive physical environment, but a sensitive social environment as well (McDaniels, Dowlatabadi & Stevens, 2004).

The sustainability of coastal aquaculture, particularly salmon farming has been widely questioned. Several analysts suggest that farm sites pose a risk to surrounding environments, natural resources, human health and wild fish stocks (Burridge et al., 2010; Glavin, 2004; Page, 2007). One of EBM's main objectives is to address the issue of sustainability, and stresses that development must be practiced within the limits of the ecosystem and sustain the human use of ecosystems over generations (Coastal First Nations Turning Point Initiative, 2009; Mamoser, 2011). The approach is mirrored after the concept of sustainable development, commonly defined as *"development that meets the needs of the present without compromising the ability of future generations to meet their own needs"* (Brundtland Commission, WCED, 1987). This highlights the embeddedness of sustainability within EBM and the importance of it in today's state, especially when applied to coastal ecosystems. Sustainability is often stated as being a main factor leading to the lack of support in BC aquaculture and is perhaps one of the areas where EBM can mitigate some of the challenges today's industry faces.

BC's coast has some of the highest marine biodiversity and BC wild salmon is revered as one of the most culturally significant species to coastal First Nations. Today, the health of wild stocks has been under serious inquiry and the disappearance and degrading health of the stocks are, in part blamed on the aquaculture industry. The aquaculture industry is consistently singled out as being responsible for various detriments, often despite little evidence and, for example, regardless of record returns of some salmon runs, such as the Fraser River sockeye in 2010 that travel directly past

salmon farms (CBC, 2008; 2011; Globe and Mail, 2014; Vancouver Sun, 2012; Young & Matthews, 2010, p. 11). Globally, the aquaculture industry is, in part, blamed for the disappearance of smaller tropic level fish, such as herring and mackerel that are used in fishmeal (Naylor et al., 2000). "Fishing down the food web" has major implications for species relying on those smaller fish, such as wild salmon and other larger species (Naylor et al., 2000). McDaniels Dowlatabadi & Stevens (2004) suggest more information is needed on the cumulative impacts of salmon farms, especially impacts on wild salmon stocks, and that decisions have to be made on how local governments and communities might better be incorporated into the regulatory process. They also suggest various sources of knowledge, particularly local or traditional knowledge, may facilitate the understanding of impacts more directly.

2.2 Integrating Knowledge

A multi-perspective approach to managing ecosystems allows the integration of various sources of knowledge from different backgrounds, including traditional, local, and scientific (Coastal First Nations Turning Point Initiative, 2009). An important component of this integrated approach that is pivotal to the following section is the inclusion of First Nation's traditional ecological knowledge (TEK). As with many ancient societies and non-Western cultures, indigenous peoples are known to have a deeply rooted understanding of ecosystem functions and interactions between humans and nature (Berkes et al., 1998). Insights such as the experiences, practices, and adaptations of ancient societies can be applied to current management strategies to add another dimension of understanding of the complexities of earth's ecosystems, which can strengthen practice at the operating level (Berkes et al., 1998; Turner et al., 2000). While

TEK has received increasing attention in academic and scientific literature, EBM offers a way to facilitate its dissemination into a practical application, bridging the gap between indigenous knowledge and western knowledge (Turner et al., 2000). A number of terms are used interchangeably to refer to the concept of TEK, including Indigenous Knowledge (IK), Indigenous Technical Knowledge (ITK), Local Knowledge (LK) and Indigenous Knowledge Systems (IKS); however, this thesis will solely refer to this idea as TEK.

The idea of traditional ecological knowledge (TEK) is that indigenous peoples possess knowledge about systems and environments in which they have lived for a very long period of time. TEK often represents a spiritual connection with the land and resources that many indigenous peoples inherit through ancestral lineage and customary use (Ulluwishewa et al., 2008). The United Nations Environment Programme (UNEP) (2011), for instance, state that, *TEK is based on, and is deeply embedded in, local experience and historic reality, and is therefore unique to that specific culture. It also plays an important role in defining the identity of the community, as it represents all the skills and innovations of a people and embodies the collective wisdom and resourcefulness of the community*. The general characteristics of TEK can be categorized within three broad themes as stated in Turner et al. (2000). The first characteristic is practices and strategies for resource use and sustainability; the second, philosophy or world-view, and third is communication and exchange of knowledge and information. These traits are acknowledged as having "fundamental importance in the management of local resources, the husbanding of the world's biodiversity, and in providing locally valid models for sustainable living" (Turner et al., 2000, p. 1275). TEK is thought to be akin to

adaptive management, often used synonymously with EBM, and is based on detailed observations of the dynamics of the natural environment, feedback learning, social-system-ecological system linkages, and resilience-enhancing mechanisms (Berkes et al., 1998). This particularly, can have benefits to the management of the complex marine environment.

2.2.1 The Importance of TEK in Resource Management

TEK facilitates meaningful indigenous participation that benefits and enhances resource management policy. It provides the linkage between indigenous ethics and values and the scientific principles of resource management strategies, meaning it provides the insights into aboriginal culture and beliefs that help provide a piece of the puzzle that is beyond the scope of science (Coastal First Nations Turning Point Initiative, 2009). Integrating indigenous knowledge into decision-making can potentially fill an enormous void seen in current BC management, as current secular management fails to completely understand the connection and linkages between resources and institutions because it is disconnected from the local level. Utilizing TEK is a way to "strengthen cross-scale linkages and localized knowledge, resulting in more effective and legitimate management with greater capacity for meaningful participation and decision-making" (McDaniels, Dowlatabadi & Stevens, 2005, p. 10). Furthermore, it works in parallel with DFO's goal of achieving a better working relationship with First Nations (Fisheries and Oceans Canada, 2011). TEK is unique to every culture and society and it is embedded in community practices, institutions, relationships and rituals that differ from region to region (UNEP, 2011). The diversity this brings to modern resource management strategies can create resilience and a broader understanding of the complete ecosystem. In

a time of increasing change to environments due to atmospheric and anthropogenic causes, this becomes crucially important as impacts and responses can be unpredictable. As a hereditary Chief from the ‘Namgis Nation says, *“You can’t bring something strange into our place without something strange happening”* (Gerwing & McDaniels, 2006, p. 259).

First Nation’s have a very long history of working with the resources and environments involved in modern aquaculture and hold subsequent knowledge that comes from such experience. Greater incorporation and utilization of this knowledge could increase the social license to operate and create a more socially acceptable industry. The following section provides a look into BC’s finfish, shellfish, and seaweed aquaculture industries.

2.3 Aquaculture in BC

Aquaculture products are BC’s largest agricultural export and contribute immensely to the Province’s Gross Domestic Product (GDP). In 2010, BC produced over 100 different species of fish, shellfish, and marine plants, for a total of 264,400 tonnes and a landed value of $863.8 million (BCMOA, 2010). The finfish and shellfish sectors are the most significant contributors to the industry; while the marine plant sector is growing.

2.3.1 Finfish

BC’s fish farming sector has far surpassed wild capture fisheries in terms of production. Atlantic salmon (*Salmo salar*) is the most prominent salmon species farmed, however Chinook (*Oncorhynchus tshawytscha*) and Coho Salmon (*Oncorhynchus kisutch*) are cultured as well. According to the BC Ministry of Agriculture, in 2010

cultured salmon generated $499.6 million in sales which represented 88 per cent of the total landed value of all BC salmon production. Capture fisheries generated $69.3 million in landed value for a 12 per cent share. Together, the landed value of all salmon harvests was up 36 per cent in 2010 to $568.9 million. BC has approximately 130 sites, primarily in the Campbell River, Port Hardy, and Tofino/Ucluelet areas (Fisheries and Oceans Canada, 2014). Most of BC's products are exported, with Japan being the largest market for fresh and frozen sockeye and USA being the largest market for BC's Atlantic salmon (BCMOA, 2010). As mentioned, the sector has been concentrated to the Southern coast of BC and Vancouver Island with the most productive region being the Broughton Archipelago. Other finfish in BC accounts for less than 2,000 tonnes and includes sablefish (*Anoplopoma fimbria*), tilapia, sturgeon, and freshwater trout (BCMOE, 2011)

2.3.2 Shellfish

BC produces several shellfish species commercially and combined harvests rose to 10,000 tonnes in 2010 with the landed value at $21.7 million (BCMOA, 2010). Cultured oysters (*Crassostrea gigas*) are the main species produced in BC at 7,400 tonnes, while Japanese/weathervane scallops (*Patinopecten caurinus x yessoensis*), Blue Mussels (*Mytilus edulis*) and clams (Manila (*Venerupis philippinarum*), Littleneck (*Protothaca staminea*), and Geoduck (*Panopea abrupta*)) are produced on a smaller scale (BCMOA, 2010). The wild shellfishery still dominates the markets with production at 14,000 tonnes and a substantially higher landed value of $108.9 million (BCMOA, 2010). The USA and Asia provide the largest market for BC shellfish (Fisheries and Oceans Canada, 2013b). There are about 500 sites in BC with a concentration located in Baynes Sound, or the Comox-Strathcona area on Vancouver Island (Fisheries and Oceans

Canada, 2011c). For the purpose of this thesis, shellfish from here on will refer to the variety of species described here unless otherwise specified.

2.3.3 Marine Plants

Several species of marine plants are cultivated in BC. Giant Kelp (*Macrosystis integrifolia*) is the most proficient, used for the roe-on-kelp (spawn-on-kelp) fishery. Other species such as Kombu (*Laminaria saccharina*), Groenlandica (*Laminaria groenlandica*), Giant Kelp (*Macrocystis integrifolia*), Marine Micro-algae (Gen spp), Bull Kelp (*Nereocystis luetkeanna*), and Sea Lettuce (*Ulva lactuca*) are grown for other commercial purposes such as speciality foods for the restaurant market or fertilizer (BCMOA, 2013; BCMOE, 2011b). Several species such as Irish Moss (*Chondrus crispus*) and Dulse (*Palmaria palmata*) are also being used for various research, development, and monitoring projects (Fisheries and Oceans Canada, 2013c; Starosta, 2011). The Oceans and Marine Fisheries Branch of the Ministry of Agriculture is responsible for collecting the production statistics for marine plant culture, however they state that due to the current small scale of the industry, production statistics are confidential and cannot be released (BCMOE, 2011c).

2.3.4 First Nations involvement

According to the Aboriginal Aquaculture Association (AAA), 28 coastal First Nation groups are involved with salmon production, while another 17 First Nations are involved with shellfish aquaculture. There are currently at least 286 indigneous people employed in the BC salmon processing and administrative sectors and many more are employed in the shellfish sector (AAA, 2012). Furthermore, salmon processing operations employ another 178 First Nation people, which represents 36.6 percent of the

workforce (Canadian Aquaculture Systems, 2011). As of 2011, twelve First Nation groups have signed formal agreements with salmon farming companies and four other Nations were close to writing a Letter of Support (AAA, 2011). Other First Nations have started fully-owned companies, such as the K'omoks First Nation Pentlatch Seafoods Ltd. and the 'Namgis First Nation's land-based, closed containment Atlantic salmon project, KUTERRA.

2.3.5 Management

The Department of Fisheries and Oceans (DFO) is responsible for the commercial finfish and shellfish industries in Canada, and works closely with several other federal agencies such as Environment Canada, Canadian Food Inspection Agency (CFIA), Canadian Environmental Assessment Agency (CEAA), Transport Canada, and Health Canada to maintain day to day activities (Fisheries and Oceans Canada, 2013). The Province of British Columbia licenses marine plant cultivation, issues tenures, issues business licences under the *Fisheries Act*, and maintains business aspects of aquaculture such as work place health and safety within the province (BCMOA, 2013). Specifically, the Ministry of Agriculture is responsible for the management of the commercial harvest of marine plants in British Columbia, apart from the spawn on kelp fishery (roe-on-kelp) that is managed by the DFO (BCMOA, 2013b). Other levels of governance include First Nations, industry and various stakeholder agencies that participate through various levels of consultations. Specifically, the Aboriginal Aquaculture Association (AAA) has been supportive of facilitating First Nation participation in aquaculture development, and also seeks to advise and guide the management and regulation of the industry through an indigenous perspective (AAA, 2012).

2.4 Part 2: The Controversy

"The aquaculture controversy is one of the most divisive and intense struggles over industrial development ever to have taken place in Canada"

(Nathan Young and Ralph Matthews, from The Aquaculture Controversy in Canada: Activism, Policy and Contested Science, 2010, p. 3)

In a relatively small time frame, an intense controversy has developed on BC's coast concerning the aquaculture industry. Salmon farming is at the center of the debate that has industry, government, Environmental Non-Government Organizations (ENGO's), First Nations and many BC citizens at odds. The conflict has become the focus of a fully wedged media war that has spilled onto easily accessible public platforms, spurring mass engagement and participation. Salmon farming is arguably the more contentious of the industries; however, shellfish farming has also proved to create discontent at the local level. Residents of high density shellfish farming areas such as in Baynes Sound, BC, have expressed concerns that shellfish activity is having negative impacts to the environment, quality of life, and non-aquaculture resource uses in the area (Hamouda, 2004). Province-wide, however, salmon farming has fueled one of the largest controversies ever seen in BC (Young & Matthews, 2010). The following section will examine the salmon farming controversy, investigating how things got to this point and where this controversy is heading.

One of the earliest instigators of the aquaculture controversy was the release of *Net Loss: The Salmon Netcage Industry in British Columbia* (Ellis, 1996), as published in Young & Matthews, *The Aquaculture Controversy in Canada: Activism, Policy and*

Contested Science (2010). The report was commissioned by The David Suzuki Foundation, a popular ENGO, and presented to the public as aquaculture 'facts'. It was structured as a catalogue of objections to the industry, including chapters on the predominance of multinational firms in salmon farming, pollution issues, the use of pharmaceuticals, and disease transfer to wild fish. Shortly after its release, the BC Salmon Farmer's Association released *Net Gain* (Kenney, 1997), an attack and rebuttal that essentially began a high-profile exchange of critical risk issues (Young & Liston, 2010). This dialogue was most significant in setting the tone of communication between opponents and proponents of the industry that persists today. As well, three important outcomes of the *Net Loss* and *Net Gain* exchange are presented by Young & Liston (2010). First, it is significant that *Net Loss* was produced first. It filled a communications void that enabled critics to take the lead in defining what the "aquaculture problems" are. Second, it allowed *Net Loss* to selectively engage their arguments and choose their points of attack. This meant that industry had to adopt a defensive and reactive stance and were forced to completely engage with the arguments of their opponents. Incidentally, supporters of aquaculture have had much less freedom to choose the terrain over which they are fighting. Third, the two reports take very different values approaches. *Net Loss* is structured in a manner that separates the scientific and moral arguments. Scientific claims are typically presented in long lists that are intended to build a dispassionate weight-of-evidence case. Moral arguments are usually separated from the presentation of facts. *Net Gain* fails to separate these, which makes the industry appear overly defensive and too ready to dismiss concerns and lash out at critics. This suggests the industry is actively rejecting dialogue or 'learning' from the exchange, and disconnects the moral narrative as

it mostly focuses on the bias of *Net Los*s and its unfair treatment of the industry, which is unlikely to resonate with the concerned public (Young & Liston, 2010). From these three outcomes, it is evident that industry stakeholders are at a disadvantage in terms of public perspective, as moral arguments are generally more readily believed. This is especially true when consistent with one's own values, compared with defensive or reactive claims as seen in *Net Gain*. The positions of each side of the debate as presented in *Net Loss* and *Net Gain* are important context for understanding the origins of the controversy and how it has developed over time.

The analogy aquaculture proponents have used is that the fish and shellfish industries are following a path of natural advancement, taking after terrestrial agriculture and the "green" revolution that occurred towards the end of the 20th century, with the industrialization of beef, pork, and poultry production (Economist, 2003). Similarly, the "blue" revolution represents an industrialization of the marine environment by culturing various fish and shellfish, with the benefit of taking pressure off wild species and providing affordable protein world-wide (Economist, 2003). For opponents, however, this "blue" revolution has been severely problematic, especially concerning environmental sustainability, and a particular concern has been expressed by many coastal First Nation peoples. There remains much controversy within and between First Nations about whether salmon farming can enrich modern aboriginal culture by providing another way of producing salmon (Schreiber, 2002). This thesis focuses on the controversy with a particular emphasis on the central and north coast First Nation population because they represent a very important, under represented part of the controversy, with a huge stake in the future of aquaculture. A statement made by the BC

Aboriginal Fisheries Commission to the Salmon Aquaculture Review (1997) indicates the exceptional nature of the issue for First Nations:

> *While the B.C. society at large and the economy in general would most likely survive the collapse or extinction of a run or stock of wild salmon, a First Nation whose distinct culture may depend on that stock, would cease to exist. The society at large may find such a catastrophe an acceptable risk. The First Nations who face extinction as a people and a culture do not. Therefore, the very special nature of the First Nations and their dependence on the natural environment around them requires a very special treatment and recognition of the risks associated with activities such as salmon aquaculture.*
>
> (Environmental Assessment Office [EAO], 1997, taken from Page, 2007)

This statement associates salmon aquaculture with an "extinction" of First Nation people and culture, which is as serious a claim as one could make. Evidently for some, the very existence of salmon aquaculture is a threat to their livelihoods. The following section discusses several discourses surrounding the controversy that highlight some of the perspectives of First Nations in BC. Several studies have examined First Nation perspectives that are particularly beneficial to this examination. Gerwing & McDaniels (2006) take a value-based approach to salmon farming to look at the perspectives of several First Nation communities (Ahousaht, Alert Bay, Bella Bella, and Fort Rupert); Page (2007) illuminates salmon farming as an issue of environmental justice by presenting a series of statements made by coastal First Nations; Young & Liston (2010) analyze industry responses to both organized and local opposition to salmon farming; Schreiber (2006) reports how salmon farms perpetuate the culture of colonialism; and Young & Matthews (2010) present an in-depth account of the aquaculture controversy in Canada. These sources, along with others, provide the foundation for understanding the aquaculture controversy. The following section will explore the controversy in a manner

consistent with a discourse analysis that focuses on the production of themes and patterns that emerged from the review of relevant literatures.

2.4.1 Representation

The aquaculture controversy is largely a political and cultural struggle, and resonates with many dealing with new industries and developments in an age of globalization, environmentalism and the assertion of local rights (Young & Matthews, 2010). The context, history, and relationships between First Nations, industry, and government have created a highly emotionally charged and longstanding conflict that goes far beyond solely environmental concerns. For some First Nations, the industry conflicts with a range of social, economic, and ecological values held by the community. Many say that First Nations have had little voice in governance or decision making (Gerwing & McDaniels, 2006). Chief Bob Chamberlain of the Kwicksutaineuk Ah-kwa-mish First Nation says his band is home to a third of fish farms on the coast of BC, yet they were only consulted for a "whopping 3 hours" (Lavoie, 2010). First Nations in Canada hold the right to participate in planning and resource management decisions based on the recognition of aboriginal rights and title from Delgamuukw v. British Columbia [1997] 3 S.C.R. 1010, as well as section 35 of the Constitution Act, 1982 (Ministry of Aboriginal Relations and Reconciliation, n.d.). As well, the Provincial Government and resource-based industries have a fiduciary obligation to consult with First Nations about land use decisions in their traditional territories, where most, if not all, aquaculture tenures in BC are located (Haida Nation v. British Columbia Minister of Forests and Weyerhaeuser [2002] B.C.C.A. 462). Some believe this consultation has not been sufficient and describe it as being consistent with colonial attitudes of ignoring

aboriginal legal rights to land (Gerwing & McDaniels, 2006, Schreiber, 2006). More specifically, some coastal First Nations believe marine resource development and the lack of consultation in developments and resource extractions, including aquaculture, is characteristic of colonial development (Young & Liston, 2010). One could base an entire thesis topic on colonialism in BC and several have; however for the purpose of this study I wish only to acknowledge that colonialism is still very much felt within BC's aboriginal community and I introduce this idea early so as to provide a reference point for indigenous perspectives. Several other studies acknowledge the role of colonialism in connection with aquaculture and the way in which it provides powerful context for how the aquaculture industry is interpreted by coastal First Nations (Gerwing & McDaniels, 2006; Page, 2007; Schreiber, 2006, Young & Liston, 2010). My intent with this reference is to connect the past with the present and to conceptualize the events that may shape present relationships. I do not seek to downplay the impacts, events, or attitudes towards the colonial past; conversely, my objective is to acknowledge it is still very much alive in today's communities, as a participant of this study illustrates:

> *Respondent: "You know this is a trick, First Nation traditional territory. Why do you think they use the word traditional?"*
> *Interviewer: "I'm not sure".*
> *Respondent: "Because I think they kinda want to give a sense that we don't exist anymore. It's in the past. But it's not traditional territory it's my territory!"*
>
> (Personal Interview, November 2012)

Several communities have been subjected to aquaculture facilities in their territories without their consent. One example of this is in Ocean Falls, BC, which led to one of the most publicized, highly emotional protest involving the Heiltsuk and Nuxalk Nations, environmentalist, and others.

Ocean Falls

> *"We've declared war on the fish farming industry. They might have to throw a lot of us in jail but we don't care. We have to protect our way of life"*
> (Ed Newman, Heiltsuk elder, from Young & Matthews, 2010, p. 1)

First Nations have been some of the most active groups participating in protests and also some of the most passionate. The above quote was heard at a demonstration led by indigenous leaders from the Heiltsuk Nation (Bella Bella/Waglisla) in the central coast community of Ocean Falls, an ancient Heiltsuk village and resource site. Ocean Falls was colonized in 1901 to build a pulp mill and later ensued decades of deforestation, destruction of resources, and chemical pollution. In 2003, without consultation, an Omega Fish Farm hatchery was planned for construction and an allied group of local First Nation protesters were met with a contingent of armed RCMP. Protesters vandalized the site, pulling up the newly poured foundations of the structure. A press release from the event read, "Despite being well informed about the importance of this area to the Heiltsuk, the government's blatant disregard for our title and rights has felt like a slap in the face. It has created a situation where legal action is our only recourse to counter the threat that aquaculture poses to our way of life. We continue to rely heavily upon our marine resources for subsistence as well as for cultural and social uses. The proposed hatchery threatens our way of life and we will use every available legal tool to protect my people and stop this development" Chief Harvey Humchitt. The Marine Harvest-owned hatchery remains today producing 10 million Atlantic salmon smolts annually (Wonders, 2008; Young & Matthews, 2010).

This is an example of how the aquaculture industry had, and continues to have, a direct impact on the Heiltsuk First Nation and territory, and also shows how little say they had in its construction. The discourse used in the quotations shows the depth of emotion behind their protest and how they perceive salmon aquaculture so as to "declare war" and "protect their way of life" against the industry. It also demonstrates negativity towards the government, as it quotes, "The blatant disregard for our title and rights has felt like a slap in the face". The relationship between First Nations and government has not been without challenges and government, including DFO has acknowledged the need for a better relationship (Province of British Columbia, 2008). However, in several opinions, much of the damage has already been done and this has had direct implications for aquaculture. Distrust towards the government and harboured personal resentment

appeared as a reason some BC First Nations disapprove of aquaculture (Gerwing & McDaniels, 2006). It was said by one participant in Gerwing & McDaniels (2006 , p. 268) “First Nations start to trust government and every time they let us down because they pretend to hear what we have to offer but then disrespect us behind our backs”. It is clearly seen that the aquaculture industry is facing issues not only relating to the sustainability of culturing animals, but other historical, political and often racial attachments as well.

The media has also played a dominant role in the framing of the aquaculture industry in BC and there have been frequent accessible articles relaying the negative implications of fish farms (CBC, 2011; Economist, 2009). One of the main features of the controversy is a lack of clear information and transparency. Often, public information is flawed in two very important ways: academic rigour and bias (McCaffrey, 2008; Young & Liston, 2010). There is considerable mention from the public and industry of the need for greater transparency to provide credible information (Chopin 2008; Gerwing & McDaniels, 2006; Mamoser, 2011).Where the public receives their information from is critical when discussing perceptions; and media is the main stream of disseminating aquaculture news to the public. Scientific reports are often unavailable to the civic community, and if they are released they are likely backed by a funding organization with a predisposition. Furthermore, often there are tendencies to assume that science or published work is clear cut science, which results in the forming of perceptions and opinions that are simply not supported or true. ENGO’s are often the most visible activists, with initiatives demoting farmed salmon such as CAAR’s (Coastal Alliance for Aquaculture Reform) “Farmed and Dangerous” campaign and “Salmon Farming Kills”

(CBC, 2013b). There has been widespread viewing and discussion of the film, *Salmon Confidential* by filmmaker Twyla Roscovich and outspoken activist Alexandra Morton that critically denounces the salmon farming industry. This was recently followed up by The Water Brother's, *Farmed and Dangerous* film. As well, the controversy is being played out virtually on several social media sites and at the ground level where protests can draw thousands of supporters (CBC, 2010).

2.4.2 Environment

Environmental concerns have been a main factor in the aquaculturecontroversy, with most of the concerns focusing on salmon farming. Cubitt et al. (2008) describe the main perceived risks of BC salmon farming to include disease outbreaks (viral, bacterial and parasitic), fish quality (contaminants, colour additives, antibiotic use), wild salmon returns (pink salmon in the Broughton Archipelago), fish waste (uneaten feed, faeces, mortalities, anti-fouling agents), predators (killing and harassment devices), farm escapes (exotic species introduction, ecology, disease, genetic dilution) and feeder fish population declines. Furthermore, many scientists, environmentalist, fishers, and locals worry that the ecological impacts of fish farms, such as spread of disease and parasites, escaped farm fish and endemic species, and pollution from farm effluent, outweigh potential benefits of farmed salmon (Naylor et al., 2003). Sustainability is a key topic among researchers, scientists, and environmentalists, however, the sustainability of the industry is a difficult concept to define and measure, making it difficult to understand environmental impacts (Black, 2001). There are many variations in literature, mixed messages, and sporadic or incomplete uses of scientific literature supporting arguments surrounding environmental issues (Cubitt, Butterworth & McKinley, 2008). For example,

there are disagreements of whether or not escapements are a threat to wild salmon stocks. In one article it is said it would be highly unlikely for Atlantic salmon to have the potential to hybridize with Pacific species, and there appears to be little risk of Atlantic salmon establishing viable populations in the Pacific Northwest (Cubitt, Butterworth & McKinley, 2008). Conversely, others argue that escapes are capable of establishing and reproducing in the wild and competing with wild salmon for food and spawning habitat (Glavin, 2004; Volpe et al., 2001; Volpe et al., 2000). Moreover, the east coast may have very recent evidence of this behavior (CTV Atlantic, 2013).

It is also debated how fish farms impact surrounding environments. It is well established that fish farms emit organic and inorganic waste from sites and, in some cases, have significant impacts on the areas around the farm (Goldberg et al., 2001; Obee, 2009). Organic waste from salmon farms can change the physio-chemical properties and the microflora biodiversity of benthic sediments, while inorganic dissolved waste can enhance the growth of algae leading to algal blooms that can produce cascading effects on the trophic web (Buschmann et al., 2009). The main components of waste from salmon aquaculture are carbon, nitrogen, phosphorus and sulphur, resulting mainly from uneaten feed and metabolic fish by-products. To a lesser extent the sewage from human workers, net cleaning operations, mortality disposal, bleeding and offal from product preparation, and garbage contribute to the waste as well (Cubitt et al., 2006). It is common for the public to refer to the "dead zones" underneath salmon farms making it an important issue to address in terms of public acceptance. However, studies suggest it is particularly difficult to calculate the actual biological output from the farms, while others have observed little or no feed underneath fish farms in BC (Allsopp et al., 2008; Cubitt

et al., 2006). All food producing systems have some degree of environmental impact. In comparison, land-based systems such as commercial agriculture and livestock production usually have a much larger environmental footprint than marine aquaculture. However, land-based systems have had the opportunity to evolve over time, whereas aquaculture is a relatively new technology to BC and has conflicted with a number of publicly-held values, mainly those revering "pristine" and wild salmon habitats.

Sea lice is another topic that has been debated widely in the scientific community as well as the media. It is common for the public to name sea lice as one of the top concerns of salmon farming. However, whether or not sea lice from fish farms negatively impact wild salmon is up for debate. Some say it is not possible to establish a direct causal link between the decline of wild salmon stocks and the expansion of the salmon aquaculture industry in British Columbia (Brooks, 2005). Similarly, some say that there is little chance of sea lice impacting wild stocks (Cubitt, Butterworth & McKinley, 2008; Marty, Saksida & Quinn II, 2010) while others strongly believe that sea lice negatively impacts wild stocks (Krkošek et al., 2006; Morton, 2004; Naylor et al., 2010). Arguably, there is some level of connection between sea lice and wild stocks. According to a recent study published by the *Journal of Fish Diseases*, Torrissen et al. (2013) state that intensive salmon farming in the Atlantic and Pacific Oceans has improved the conditions for the growth and transmission of the parasites compared with natural conditions and has impacted wild stocks, although the extent of the impacts show variations that require further study. The study also states that the density of farms in an area has a clear effect on the levels of sea lice at individual farms within that area. Evidently this is an area in

need of further research. Meanwhile, the conflicting reports make it difficult for the public to determine the scope and magnitude of the issue.

2.4.3 Human Health

Health should be considered at two scales: community health as well as individual. First Nations suffer from some of the biggest health challeges, and therefore, many individuals perceive aquaculture through a health lens (Young & Liston, 2010). For some, the very presence of a salmon farm in their territory is viewed as a health risk: "Our people are dying because of a lack of access to our [traditional] food, and that's all it boils down to. I've had so many friends who have passed away in the last seven or eight months because of cancer, diabetes, you name it … The answer is a big, flat no. We don't want fish farms here. We've got one of the most pristine areas in the province right here, and we're being ruined. (Stanley Hunt, member of the 'Namgis First Nation, spoken at Alert Bay, BC; taken from Young & Liston, 2010). Fish diseases such as infectious salmon anemia (ISA), infectious hematopoietic necrosis (IHN) and infectious pancreatic necrosis, (IPN), among others, have all been associated with fish farms in BC waters (CBC, 2011; McVicar, 1997; Naylor & Burke, 2005). There are mixed messages pertaining to the prevalence of diseases in Pacific salmon. The ISA virus was officially reported present in BC by a media document from Simon Fraser University (Rick Routledge and Alexandra Morton) yet the Canadian Food Inspection Agency (CFIA) reported a "thorough and exhaustive research effort" failed to find proof of ISA, IHN, and IPN diseases in wild Pacific salmon (Hume, 2013; Simon Fraser University Public Affairs and Media Relations, 2011). Furthermore, how disease infected fish affects human health is unclear as well. The CFIA has stated that farmed fish infected with ISA

are safe for human consumption and have been supplied to Canadian supermarkets, even though some chains have refused to sell the infected fish based on consumer expectations (CFIA, 2012).

Many First Nations have fears about disease that they associate with colonialism and oppression of indigenous peoples: "When you have foreign salmon coming here and they're bringing foreign disease, it's going to create problems. I can only compare that to what happened to Aboriginal people when the white man came and brought their disease and just about wiped out the Aboriginal people" (Leggatt Inquiry, 2001; taken from Page, 2007, p. 624). Another person says, "[My father] is absolutely opposed to any [salmon] farm on our tribal land or our tribal territories, or our tribal waters. Also, [my father] wants to know why, with all the research done and all the government spending on preventing cancer in Canadians, they would subject the First Nations to the possibility of getting cancer from these fish? They have toxins, they have cancer-causing agents in them. Why would they subject the First Nations to this sort of thing – literally, psychologically, emotionally, physically? … Establishing fish farms in our tribal territories and letting one farmed fish out is equivalent to letting TB [tuberculosis] out in the world. How do you contain it once it's gone?" (Raija Reid, member of the Heiltsuk First Nation, speaking at Bella Bella, BC; taken from Young & Liston, 2010, p. 1056). Similarly, another person says: "Medical science has recognized the importance of heredity to the response of our physiology. Aboriginal people are much more susceptible to particular disease agents than is the general public. First Nations are alarmed at the use of very biologically active chemicals, such as antibiotics and hormones used in salmon aquaculture" (BCAFC submission, EAO, 1997; taken from Page, 2007, p. 619). These

statements are directly relating disease, cancer, and other serious health issues to farmed fish. The perceptions of these people associate a disproportionate amount of health impacts to First Nations in comparison to other citizens. There is a clear need to address health issues in these communities, and all factors should be considered. Farmed salmon may be one factor, but there could be others as well. In terms of diets, there have been many introduced foods to coastal indigenous people, especially processed and foreign goods, as well as a decrease in traditional foods that may play a role. Advocates also believe that farmed salmon can help prevent some diseases and contribute to a healthy lifestyle that conflicts with these individual's statements. The prevalence of salmon in coastal First Nation's diets, however is often much greater than in non- First Nation's diets and may result in a disproportionate amount of impacts, either from eating a high amount farmed salmon or impacts that occur from transmissions to wild salmon. Page suggests that, if this is the case, perhaps this is a larger concern of environmental justice (2007). Environmental justice is "the fair treatment of all races, cultures, incomes, and educational levels with respect to the development, implementation, and enforcement of environmental laws, regulations and policies. Fair treatment implies that no population should be forced to shoulder a disproportionate share of the negative environmental impacts of pollution or environmental hazards due to lack of political or economic strength" (Page 2007, p. 616). This definition specifically draws attention to groups with a lack of political or economic strength, or marginalized groups such as coastal First Nations who have been excluded from the industry's decision-making process. This specifically relates to colonialism, in that Canadian political processes are oppressive towards First Nations and fail to provide an equal playing field for representation. The

aquaculture industry has been described as “cultural genocide” (Young & Liston, 2010, p. 1056), therefore, making it clear that some BC First Nations interpret salmon farming as a threat to their health and cultural survival.

Chemical use in Atlantic salmon aquaculture in British Columbia is far less than in other countries. For example, the following products are registered for use as antibiotics in Canada: Oxytetracycline, trimethoprim80%/sulphadiazine20%, sulfadimethoxine80%/ormetoprim20%, and florfenicol. In 2008, however, while British Columbia administered 5093kg, Chile administered 325, 600kg (Burridge et al., 2010). Canada also uses emamectin benzoate (EB, or SLICE®), to treat sea lice infestations; however all other regions do as well (Burridge et al., 2010). Canada appears to be on par with, or below global standards for chemical usage in salmon aquaculture, yet that does not seem to meet the public’s, or First Nation’s, requirements for approval. Furthermore, the proximity of First Nation’s communities to fish farms, in some cases, is disproportionate to other non-indigenous communities, which emphasizes their concerns.

2.4.4 Accountability

Another major concerns of BC’s aquaculture industry is that it is not being adequately managed (Cohen Commission, 2012; Hume, 2004). A common criticism is the suggested conflict of interest DFO is presented with being the regulating body for the industry but also responsible for the promotion of farmed product. In the recent Cohen Commission Inquiry (2012a), Commissioner Bruce Cohen suggests DFO no longer be responsible for promoting salmon farming as an industry and farmed salmon as a product. He says “As long as DFO has a mandate to promote salmon farming, there is a risk that it will act in a manner that favours the interests of the salmon farming industry over the

health of wild fish stocks". The Honorable Stuart Leggatt recommended this in 2001 in the Clear Choices, Clean Waters: The Leggatt Inquiry into Salmon Farming in BC report (Leggatt Inquiry, 2001; taken from the David Suzuki Foundation, 2004). Similarly, it was echoed again from a participant of this study saying, "I think there should be separation between DFO being responsible for the science end and also for the growth of the industry. I do think there should be an independent science body that can give information that isn't necessarily tied to that structure". Evidently the same concern has been raised time and time again yet the issue remains. Aquaculture management has been accused of being too complex that it has impeded growth, making the industry unable to realize its full potential and be outpaced by competing nations (CAIA, 2011). The industry has traditionally been one of the mostly heavily-regulated industries, being governed by 73 pieces of legislation with often conflicting rules and regulations (CAIA, 2012). It is argued that the industry is also subjected to gaps within the levels of management, and that links among multiple scales of activities, multiple levels of impact, and multiple levels of regulatory decisions have not been extensively explored (McDaniels, Dowlatabadi & Stevens, 2005). McDaniels, Dowlatabadi & Stevens (2005) argue that much of the controversy surrounding salmon aquaculture in BC arises at the local level, potentially due to the centralized, top down management system that is disconnected from the local level. One example of this is the issues over siting and the regulating of individual facilities that are some of the biggest points of contention (McDaniels, Dowlatabadi, & Stevens, 2005). Siting decisions facilitate a wide debate concerning the aesthetics of fish farms, their impact on competing marine industries, and their possible impact on wild stocks and the environment (McDaniels, Dowlatabadi &

Stevens, 2005). The multiple factors, multiple stakeholders, and uncertainties involved in each siting choice, coupled with the preference of being in "pristine", remote, sheltered and highly productive ecological zones tend to generate significant public input and make the siting aspect very controversial (Galland & McDaniels, 2008; McDaniels, Dowlatabadi & Stevens, 2005). Siting is especially a concern for First Nations, as when you site an operation it is essentially cutting off access to that location, representing an unjustified privatization and industrialization of the oceans (Young & Matthews, 2010). Traditional harvesting is still practiced in many regions, and many First Nations, especially elders, feel very strongly about preserving and safeguarding their marine resources and traditional harvesting skills, which an operation could impede (Gerwing & McDaniels, 2006). Another concern of siting is that the site-by-site emphasis of the regulatory permitting process is not well equipped (it lacks appropriate knowledge) to address cumulative impacts of multiple sites (McDaniels, Dowlatabadi, & Stevens, 2005). For example, it is evident that certain areas have much higher densities of aquaculture activity than others and little is known about the carrying capacities of marine environments, or at which point would result in exceeding the ecological threshold of the system, (ie: whether due to stock densities of fish, excess nutrients in the water column, impacts to the benthic layer, etc). Ecological thresholds are the point at which small changes in environmental conditions produce "large and sometimes abrupt responses in ecosystem state or function" (Samhouri et al., 2010, p. 1). This is important to consider when introducing a development into an environment, such as an aquaculture facility, where responses can be unpredictable. It has been suggested to use a precautionary approach when making decisions about ecosystem and aquaculture

interactions, since ecosystems and the various impacts of human activities and their potential reversibility are not completely understood (FAO, 2013b). However, perhaps many would argue precautions have not been taken in regards to salmon aquaculture due to the host of concerns that have been raised.

The common response fish farm proponents give when being the target of activism is that aquaculture has a minimal environmental footprint compared to some other industries and is a major source of employment and stability in economically distressed coastal communities (Bastien, 2004). According to the Canadian Aquaculture Industry Alliance (CAIA) (2011b), the industry employs 8,000 Canadians at an average salary of $30,000, of which 90% are located in rural, coastal aboriginal communities. However, a report by Canadian Aquaculture Systems (2011) for the Aboriginal Aquaculture Association, shows positions held by aboriginals and non-aboriginals employed in the sector is not equal (Appendix A). Aboriginals earn significantly less than non-aboriginals in production and administration positions; however earn more in management positions, although management positions only account for eleven individuals, or 8% of the total positions (Canadian Aquaculture Systems, 2011). Additionally, the response that aquaculture promises employment and wages in rural communities is not being bought from some community members. Edwin Newman, from Bella Bella says, “The fish farm industry has been in Port Hardy for many years, but you don’t see a prosperous community. You see a dying community. We will not allow our territory to become a garbage dump for the fish farm industry” (Hume, 2004, p. 39).

For small communities, however, this employment can make a huge difference to the economy. For example, Kitasoo/Xai’xais First Nation has partnered with an

established salmon farming company, Marine Harvest, that employs 15 full time jobs worth $450,000 annually. Furthermore, a processing plant in the community provides 30 additional full time jobs at full operation contributing approximately $1 million in wages to the village economy (Canadian Aquaculture Systems, 2011). For a community of approximately 460 that makes a big difference (Destination BC Corp., 2013). As aquaculture advocate, Chief Councillor and Band Manager Percy Starr proclaims, “No one should be fooled into thinking that the Kitasoo First Nation had sold out and sacrifices any part of its environmental heritage in order to become part of the salmon-farming industry” (Canadian Aquaculture Systems, 2011).

Chapter 3:
Research Design

This chapter reviews the research design established to guide the sampling, collection and interpretation of field data. The chapter opens by discussing the theories behind how knowledge is generated, from conception to dissemination, throughout the entire research study. Following this is a description of the study area and the methodologies used to guide the study. Next, the chapter provides a description of the methods, or the tools used to collect the data for this study. The final section of the chapter offers a discussion on how validity and rigour were maintained throughout the research.

3.1 Generation of Knowledge – a qualitative approach

The purpose of this study is to gain a greater understanding of First Nations perspectives towards aquaculture. This topic could be investigated from several different vantage points. A qualitative research approach has been adopted for this study as it investigates aspects of the social environment. Human behavior, it is argued, cannot be understood without reference to meanings and purposes and qualitative data is well suited to provide rich insights into human behavior and contextual information (Guba & Lincoln, 1994). How the participants in this study construct their realities is an important point to analyze, as are the ways in which I, the researcher, understand my own reality. In this chapter, I will frequently refer to the first person to provide clarity and accountability on the reasoning behind my motivations that have shaped the study.

Many qualitative researchers operate under epistemological and ontological assumptions about the world that they apply to their research (Winchester & Rofe, 2010). Worldviews are important to understand in social research, because, for the holder, it defines the "nature of the world and the individual's place in it" (Guba & Lincoln, 1994, p. 107). These views of what knowledge is and how it is acquired are fundamental underpinnings in research, and ultimately carry the fingerprints of the researchers as they apply their own worldviews to designing a project and interpreting the resultant data that arise from it. This personalizing effect differentiates qualitative research from quantitative, making it more interpretive, reflective and open to the organization of the researcher; creating the strengths and to some, the weaknesses of qualitative research (Winchester & Rofe, 2010). Conversely, a quantitative view creates a very different foundation for research. This approach seeks the development of universal laws, and actual or real events in the world are explained in a deductive manner that asserts definite and unproblematic relationships (Altheide & Johnson, 1994). Qualitative and quantitative approaches have both been criticized for their shortcomings in being able to produce valid results: qualitative data for its interpretative and "soft" qualities and quantitative data for its mathematical, generalizable qualities which do not take unpredictable human behaviors into account (Altheide & Johnson, 1994, Winchester & Rofe, 2010). Defining this project is a challenge, as characteristics of each paradigm have helped to shape it; qualitative research, most clearly for its grounding in social science and its flexibility in working with human subjects, and quantitative research as an aid to help sort through the mass of data received, and refining and categorizing hundreds of words.

Altheide and Johnson (1994, p. 488), posit that "qualitative research is carried out in ways that are sensitive to the nature of human and cultural social contexts and are commonly guided by the ethic to remain loyal or true to the phenomena under study, rather than to any particular set of methodological techniques or principles". This statement embodies why I believe that a qualitative approach is best for investigating the questions posed and what I connect with as a researcher in carrying out a study. It has also guided the reasoning behind my choice to use Discourse Analysis and Indigenous Methodology as the main methodologies supporting this research, given that remaining true to the voices of participants was the ultimate inspiration for this research.

3.2 Methodologies: Discourse Analysis & Indigenous Methodology

Qualitative methodologies developed in the social sciences allow researchers to study social and cultural phenomena (Skinner, 2010). The research questions and objectives dictate the choice of methodologies, while philosophical and theoretical orientations assist in uncovering the essence of the data, while also providing a functional framework to engage with and structure the data. Methodology is defined by Baxter (2010, p. 82) as "…a theory of what can be researched, how it can be researched, and to what advantage". Investigating the perceptions of coastal indigenous peoples is a complex, sensitive, and multi-themed task. Many different approaches could be used (ie: cultural, political), which makes choosing the proper methodology a complicated process. One methodology that supports the analysis of multiple sources of knowledge and perspectives is Discourse Analysis (DA). Perceptions, ideas, and silent communications that are identified in this research are complex and interpretative in their meanings (Bas

& Buizer, 2009). Therefore, communicating these meanings truthfully and accurately need a reflexive, malleable framework, such as DA.

3.2.1 Discourse Analysis

Through Discourse Analysis (DA), the 'discussion', or interview, becomes the object of analysis. DA attempts to trace particular linguistic regularities that can be found in discussions or debates (Hajer & Versteeg, 2005). This follows from Foucault's (1977) notion that language, knowledge, and power are all interconnected through discourse (Lees, 2004). Foucault is a dominant force in discourse analysis in critical human geography, which has drawn on work in cultural studies and post-colonialism to explore the constitutive nature of discourse that will follow well with the themes of this study (Gregory, 1994; Lees, 2004). DA is a difficult methodology to define because of its versatile abilities and functions in different applications. For this study, it is used as a container to package the multiple avenues of discourses used to inform this research. It enables consistency in the analysis of data and provides a useful and organized framework to present data. Generally, when undertaking DA, researchers seek to highlight two things: first, the interpretative context that is the social setting in which the discourse is located, for example the introduction and context chapters of this thesis; second, the rhetorical organization of the discourse that is the argumentative schema which organize a text and establish its authority, for example, understanding how or why people say things and the reason behind them as discussed in the perspectives and discussion chapters in this thesis (Tonkiss, 1998). Fairclough (1992) offers a three-dimensional framework of analysis that highlights the three avenues explored in this study: text, discursive practice, and social practice. The textual analysis scrutinizes the

vocabulary, grammar and text structure, allowing major themes and key words to come forth. Discursive practice considers the context in which statements are made in addition to their links to other debates and literatures. Social practice explores the more general ideological context within which the discourses have taken place (Lees, 2004). This has been the framework utilized to make sense of the various types of information gathered throughout the length of this study.

Characteristically, the approach of Discourse Analysis takes a critical stance towards 'truth' and puts emphasis on the communications and power through which knowledge is exchanged and understood (Hajer & Versteeg, 2005). The Foucauldian strand of DA emphasizes the construct of the social world, and as such, the analysis of meaning becomes central (Hajer & Versteeg, 2005; Lees, 2004). The ways in which society makes sense of a phenomenon becomes essential to understanding reality, which makes it important in this research to include a range of perspectives from multiple sources, as each individual brings their own assumptions to their statements (Hajer & Versteeg, 2005). Understanding the ways in which coastal indigenous people make sense of their realities, their history, politics, resource developments, and various other elements, is central to understanding how they perceive aquaculture. It is also central to how we, the reader, come to understand their perspectives.

Hajer & Versteeg (2005, p. 176) argue that the social constructionist approach to DA appeals to researchers, because "…it appreciates the messy and complex interactions that make up [various] policy process[es]". Concepts such as sustainability and traditional ecological knowledge that are discussed in this study, are not, and cannot simply be imposed in a top-down way. Rather, they are continuously contested in a struggle about

their meaning, interpretation, and implementation. Hajer and Versteeg argue that DA attempts to make sense of this struggle through its capacity to reveal the role and embeddedness of language in politics and practice.

DA analysis has been carried out in this study by compiling and examining various literatures. These have included academic scholarship, news articles, government documents, and various media sites. DA has shaped two major components of this study; the literature review and the analysis of interviews. The literature review provides a broad textual and discursive analysis that allowed major themes and patterns to emerge. This resulted in sectioning various discussion points according to theme or idea. On a more detailed and perhaps more apparent level, DA is applied to the transcriptions of the collected data in the form of coding, which is discussed in greater detail in the Methods section.

3.2.2 Indigenous Methodology

The second methodology used in this research is Indigenous Methodology (IM). The goal of this study is to gather the perspectives and thoughts of coastal First Nation people pertaining to aquaculture. Asking individuals to share their knowledge, insights, and beliefs, so that I could identify them, interpret them, and share them, is a process that some indigenous people say has "offended their deepest sense of humanity" in the past (L.T. Smith, 1999, p. 1). The challenge of this was great. To misinterpret or miscommunicate this information would add to an extensive record of colonial research, as well as add to the collection of "us" and "them" discourse. As a non-indigenous researcher, I approached this task being aware of this risk, and with a determination to do *good* respectful research. I identify myself again and my positionality here in order to

properly use and describe an Indigenist paradigm, as it is evident I cannot be separated from my writing, worldviews, or myself throughout this process (Wilson, 2007). To describe my positionality, I agree with Guba and Lincoln's (2005, p. 212) statement that social science research "needs emancipation from hearing only the voices of Western Europe and emancipation from seeing the world in one colour". It becomes incredibly clear after reading literature on IM and research done especially on the marginalized and oppressed, that this has traditionally been the case. Research is often a highly politicized process, and in some cases who is represented in research and what information is included or excluded is pre-determined or determined by institutional bodies. The bureaucratic practice of research and policy-making as processes of Western society, from the initial stages, results in an unfair playing field for indigenous peoples unfamiliar with Western standards or status quo (Nadasdy, 2003). Representations can be further distorted by the researcher's own perceptions of reality. What counts as knowledge and values has an impact on the way research questions are conceived, as well as the utilization of research approaches, data-gathering instruments, analysis, interpretation and dissemination of findings (Chilisa, 2011). My ontologies, epistemologies, and axiologies, or ethics and value system, are inherently different from others, and therefore what I determine to be knowledge or important may be relatively significant or insignificant from one person to another (Chilisa, 2011). Developing a cultural partnership "with, between, and among" indigenous researchers and allied "Others" is suggested to create space for working corroboratively on common goals and engaging in multidirectional lending and borrowing, or a mutually beneficial relationship, with the hope to create meaningful research (Chilisa, 2011, p. 24). It is suggested that the choice of methodology

used in research can silence and exclude the views of non-Western, formally colonized societies (Chilisa, 2011). My intent through this research is to do the opposite. By drawing on IM, I have endeavoured to inform my research approach to best represent and take account of indigenous views.

Indigenous methodology offers alternative ways of thinking about the research process in a more holistic means, with the purpose to ensure the research is undertaken in a sympathetic, respectful, and ethically correct fashion from an Indigenous perspective (Louis, 2007). A main component is that the ethics and values that define the relations and responsibility of the researcher to the researched should be addressed before defining the ontological and epistemological questions. They should also drive the research process, from the formulation of the research proposal to the dissemination of findings (Chilisa, 2011). As Chilisa (2011, p. 31) illustrates, postcolonial indigenous research methodologies challenge the ideologies embedded in positivist/postpositivist research methods, and "propose ways of decolonizing and indigenizing research methods so they are inclusive of local and indigenous knowledges, relevant and responsible to the experiences and needs of researched communities". IM are complex to define; nevertheless, there are commonalities found in the literature that relates to their guiding principles (Louis, 2007). Chilisa (2011, p. 7) and Louis (2007, p. 133) illustrate four fundamental principles: relational accountability; respectful representation; reciprocal appropriation; and rights and regulation. Relational accountability describes the concept that Indigenous peoples share about their dependence on everything and everyone around them, referred to as "all our relations, be it air, water, rocks, trees, animals, insects, humans, and so forth" (Steinhauer, 2002, p. 72). It implies that all parts of the research

process are related, from inspiration to expiration, and that the researcher is not just responsible for nurturing and maintaining this relationship but is also accountable to "all your relations" (Louis, 2007, 133). Respectful (re)presentation requires the researcher to "consider how you represent yourself, your research and the people, events, phenomena you are researching" (Absolon & Willett, 2004, p. 15). It is about displaying characteristics of humility, generosity, and patience with the process and accepting decisions of the indigenous people in regard to the treatment of any knowledge shared. Reciprocal appropriation is a metaphor suggested by Scott Momaday (1976, p. 80) that describes the attitudes of Native Americans to the environment. Specifically, it is "appropriations in which man (sic) invests himself in the landscape; and at the same time incorporates the landscape into his own most fundamental experience". It recognizes that 'all research is appropriation' (Rundstrom & Deur, 1999, p. 239) and requires adequate benefits for both the indigenous people and the researcher. Rights and regulation refers to research that is driven by indigenous protocols, contains explicitly outlined goals, and considers the impacts of the proposed research (Smith, 1999). This is meant to ensure that the research process is non-extractive and recognizes indigenous peoples' intellectual property rights to "own" the knowledge they share with the researcher and to maintain control over all publication and reporting of that knowledge (Chilisa, 2011; Louis, 2007). In addition to these principles, other authors provide further guidelines, such as Wilson's (2007) *Indigenist Research Paradigm* and Ermine's (2007) *Ethical Space of Engagement*, maintaining the emphasis on ethics, morals, and good practice.

There are some limitations to incorporating this methodology in my research. I have merged aspects of Western science and IM, creating a hybrid approach that

endeavours to recognize the benefits and appropriateness each paradigm represents. The choice to include IM and "decolonize" the research process is not about a total rejection of Western theory, research, or knowledge, but about a change in focus to indigenous perspectives (Louis, 2007). Each paradigm, I believe, possesses the flexibility to incorporate one another, and will bring a higher level of awareness to the research and to myself as a researcher. The IM framework is largely based on maintaining good morals, responsibility, and accountability in all aspects of the research process, while the western science aspect will frame and carry the project into the larger body of literature and academia. The four principles of IM play a significant role in the process of reflexivity, of relating myself and my positionality to the research. This methodology has allowed the necessary space for the involvement and engagement of First Nation perspectives, opinions, and suggestions and has allowed me as a researcher to broaden my perspectives on how to approach a study of this nature. I gained the confidence to use this methodology through statements like those of Louis' (2007, p. 134) who said that he "would like to see non-indigenous researchers working with indigenous communities to develop these tools". Taking risks is what doing research is about, and I also reflect on Kuhn's (1970, p. 91) statement about the transition period in research: "*the proliferation of competing articulations, the willingness to try anything, the expression of explicit discontent, the recourse to philosophy, and to debate over fundamentals, all these are symptoms of a transition from normal to extraordinary research*".

3.3 The study area: Central and North Coast, BC

The region stretching from the Alaskan border in the north, to Vancouver Island in the south, is the unceded traditional territory of more than one dozen coastal First

Nation groups (Coastal First Nations, 2009). In this region, three communities on BC's Central and North Coast have provided the voices for this study: Oweekeno (Wuikinuxv), Massett (Old Massett), and Skidegate (Figure 3.1).

Figure 3.1 Map of Map of Wuikinuxv (Oweekeno), Skidegate and Old Massett. (Coastal First Nations, n.d. http://www.coastalfirstnations.ca/communities)

3.3.1 Into the field

Prior to conducting fieldwork in the communities, a Certificate of Approval from the University of Victoria Human Research Ethics Board (HREB) was obtained. The

HREB ensures that research involving human participants meets the ethical standards required by Canadian universities and national regulatory bodies (University of Victoria, 2013). Ethical considerations included: respect for human dignity of all research participants; respect for free and informed consent of all research participants; respect for privacy and confidentiality of personal information; respect for justice, fairness and equity in the generation and dissemination and information; and, the minimization of harm and the maximization of benefit of the research for the subjects themselves, for other individuals, and for the advancement of knowledge (HREB 2007, 2009). All participants were informed of these principles prior to interviewing and signed and kept a copy of the participant consent form, in which these principles are described.

After being granted ethics approval, I was ready for "the field". I began devising a list of potential communities and participants. I suspected that gaining access into a community was going to be one of the most challenging aspects of this research. I had no established contacts as a researcher and some of the communities I was targeting were very small, remote and had limited means of communication. Nonetheless, in May 2012, I mailed fourteen *Invitations to Participate* (Appendix B) to community Band Offices inquiring about their willingness to participate in the research. Soon after mailing the letters, I received word of a public meeting taking place in Massett, Haida Gwaii on a shellfish development project that presented an opportunity to meet and establish potential contacts. To take advantage of this opportunity, I travelled to Massett. During that time I received no responses from the communities I had mailed invitations to. Upon returning to the University of Victoria, I followed up by sending twenty emails to specific band members in twelve of the selected communities. One individual I contacted is a

personal acquaintance, who then facilitated contacting other members of their community, which likely increased my response rate. I am affiliated with this personal acquaintance through previous employment, which may pose a potential bias to their participation in this study; however, they were extremely helpful and willing to share their thoughts about this study. Eleven individuals from six communities responded, with three of the responses declining to participate due to timing and logistical issues. Three communities in particular, Oweekeno, Skidegate and Massett, expresse particularly high interest in participating, likely as a result of the acquaintance and having established contacts on my earlier visit to Haida Gwaii. I decided to focus on expanding contacts and communications in these three communities, and my research project began to take shape.

3.3.2 Oweekeno

Figure 3.2 Oweekeno Village [Online Image] (Central Coast Regional District, 2014. Retrieved from http://www.ccrd-bc.ca/communities/oweekeno.php)

The community of Oweekeno (Wuikinuxv) rests between the mouth of River's Inlet and Owikeno Lake, along the north side of the Wannock River. The community is one of the smallest on the coast, with around 35 homes, and a population between 70 and 90, depending on the season and available work (Wuikinuxv Nation, 2012). There is a one-room elementary and middle school, an administration building, accommodations lodge, air strip and a ceremonial big house. There are two freight boats that service the community, as well as frequent Pacific Coastal flights that residents depend on for fresh produce and other services. There is also a grocery store located in the lower level of a resident's home. The Wuikinuxv territory is very rich in natural resources, however extraction has caused a decline in some of the most important resources for the

community such as abalone, eulachon, salmon and monumental cedars (Wuikinuxv Nation, 2012). This is an issue as this community is very resource-dependent being so remote. Most employment opportunities and traditional harvesting depend on the natural resources in this region. Many residents are former commercial fishermen; however, that is no longer an option for most and many residents remain unemployed. There is a Wuikinuxv operated forestry company, as well as a fisheries department and Band Office that are the major employers of the Village. Wuikinuxv is in stage four of the six stage BC Treaty Commission (BCTC) process, and remains an untreatied Nation (Wuikinuxv Nation, 2012).

Haida Gwaii – the People's Islands

Skidegate and Massett are both located on Graham Island, in Haida Gwaii, BC. It is evident from spending time in these communities that, although they share many commonalities and the same land mass (Figure 3.3), they are inherently very different. Thus, it is necessary in this research to consider the communities separately from each other. The communities share infrastructures, amenities, lands, culture and sometimes, people. However, the two communities are distinguishable. For example, they are comprised of descendents from different regions (and clans) of the Island and have created their own social and political systems which they operate under. The Council of the Haida Nation, an elected council representing both the Skidegate Band Council and the Old Massett Village Council, completed Stage two of the BCTC in 2005, making the Haida Nation untreatied as well. Nearly half of Haida Gwaii's land mass lies in protected areas and conservancies (Ministry of Aboriginal Relations and Reconciliation, 2014). The communities will be discussed in greater detail below.

Figure 3.3 Map of Skidegate and Old Massett. (Ministry of Aboriginal Relations and Reconciliation, 2013, http://www.gov.bc.ca/arr/firstnation/haida_nation/default.html)

3.3.3 Massett

Figure 3.4 Village of Massett [Online Image]. (Village of Masset, 2013, http://massetbc.com/)

Massett, in this thesis, refers to both the Haida community of Old Massett, as well as the neighboring incorporated village of Massett (Figure 3.4). The community rests at the northernmost tip of Haida Gwaii, where the Village and surrounding rural population comprises approximately 2,300 people (Village of Massett, 2013). Massett itself is a

modest community with most basic services: schools, groceries, a bank, several restaurants, cafés, B&B's, a hospital, and an administration office. This region is well-known for its sport fishing, with many commercial lodges operating here, as well as its many hiking trails at the entrance to Naikoon Provincial Park (Village of Massett, 2013).

3.3.4 Skidegate

Figure 3.5 Village of Skidegate. [Online Image] (Dewitt Jones/CORBIS, 1985. http://www.corbisimages.com/stock-photo/rightsmanaged/DJ001665/aerial-view-of-skidegate)

Skidegate (Figure 3.5) is also a Haida community facing Skidegate Inlet on the edge of Hecate Strait. Neighboring Queen Charlotte City is to its west and the farming community of Tlell is to the east. The combined population of these communities is approximately 2,000, with approximately 800 persons residing in Skidegate (Skidegate.ca, n.d.). Skidegate has the services of a small community, a convenience

store, gas station, clothing stores, administration office and the Kaay ’llnagaay Heritage Centre. The village of Queen Charlotte also services those living in Skidegate with its amenities. Commercial fishing and logging, once the main sources of employment in Skidegate, are slowly being replaced with ecotourism and cultural-related work (Skidegate.ca, n.d.).

3.4 Methods

A method can be defined simply as “a mechanism to collect data” (Baxter, 2010, p. 82). Purposive sampling, and more specifically, criterion sampling was utilized to achieve a final study group of twelve key informants from the three indigenous communities. Criterion sampling involves selecting participants based on meeting certain criterion (Bradshaw & Stratford, 2010). The criteria for this research was based on the individual being of indigenous descent, being significantly involved in the aquaculture industry, or involved in community decision-making. For example, informants included hereditary chiefs, community board members, community resource managers, planners and previous or current aquaculture employees. Nine of the interviewees were male, three were female and all ranged from approximately twenty years of age to sixty years old. From this sample population, ten respondents were indigenous and two were long time residents of the communities.

3.4.1 Semi-structured interviews

One-on-one interviews were conducted with each participant in a semi-structured format. The semi-structured interview style employs a question guide, facilitating the interview to be content-focused and allowing main themes and concerns to emerge (Dunn, 2010). The questions were based on several themes: personal, community,

environment, politics, and the various types of aquaculture. The conversations in the interviews were ordered, although flexible, to allow participants to engage in conversation while remaining on topic. Many participants would stray off topic; however, this was often very insightful as they would talk about issues important to them. This style of interview encourages the flexibility for the participant to engage in meaningful discussion and provide in-depth details that may be excluded in a more structured interview format. Interviews were carried out in person and took place in workplaces, coffee shops, participant's homes, and other locations as suggested by the participants. Each conversation spanned from twenty minutes to two hours and was audio recorded, except for one participant who wished not to be recorded. Notes were also taken during the interviews for triangulation purposes and the interviews were manually transcribed by myself in preparation for coding.

3.4.2 Coding

During the transcription process, I was able to comb through each interview, word for word, to ensure each statement was clear and that I understood the meaning. While transcribing, I was able to begin visualizing and organizing the information based on the coding technique. Megan Cope (2010, p. 281) describes the coding process as a way to "evaluate, organize, and make sense of data". This follows in line with the DA framework of classifying themes and patterns as they appear. Coding organizes the data in a deductive manner, reducing and categorizing by establishing themes, much like a quantitative approach (Cope, 2010). The purpose of this process is to help the researcher handle large amounts of data by refining key themes, usually based upon similarities or relationships to promote data reduction (Cope, 2010). Coding was applied in two

instances in the examining of the data. First, it was applied in the initial reading of the transcripts. Here, preliminary overarching themes became apparent and specific examples (i.e. quotations) from the interviews were linked to those themes. Second, an Excel spreadsheet was made for each initial theme and further deconstructed into sub themes, with examples linked to those as well. This created an organized, detailed map to visualize connections and patterns within the data (Appendix C). The construct of a thematic analysis is a particularly important tool in this study since themes can be culturally laden and because the study group is culture specific. Further, the themes revealed are then meaningful and important to the study group. Interpreting and detecting these themes, however, requires awareness and sensitivity on the part of myself, the researcher, in deciding what information to include and what not to, while maintaining and ensuring valid and rigorous data.

3.5 Validity and Rigour

In the social sciences, the truth and validity of knowledge arising from research has been the subject of extensive discussion (Mansvelt & Berg, 2010). It has been argued that geographers need to be more explicit about how rigour has been achieved throughout the research process, with calls for greater transparency in their methods (Baxter & Eyles, 1997; Mansvelt & Berg, 2010). This is difficult, however, because there are no standardized evaluation criteria for 'truthworthiness' (Baxter & Eyles, 1997). Considering this, being explicit of the choices I make of what to include or exclude, and the reasons behind these decisions, is crucial in establishing validity. The interpretability of qualitative research has been one of the major criticisms of this approach, especially concerning the validity and authenticity of the data interpretation (Mansvelt & Berg,

2010). Ensuring validity throughout this project has led me to practice critically reflexive research. This has meant I have remained thoughtful about my research practices, my position towards the research topic and study area, and my relationships with the participants in this study (Baxter & Eyles, 1997). The participants were each encouraged to ask questions throughout the interview, as well as received researcher contact information for maintaining contact or follow ups. I have also kept in communication with each participant by mailing a letter in March, 2013 that described the status of the project and encouraged comments. The methodologies I have chosen to guide this research, in particular, Indigenous Methodology, has helped maintain a constant reflexivity to align myself with the guidelines the methodology provides. It has also helped to state my positionality, and any biases I possess that are mentioned in the introduction, throughout the study in order to achieve valid and rigorous objectives.

Chapter 4:
Perceptions

This chapter highlights the results of the qualitative analysis by presenting the perceptions of those interviewed in this research. The chapter begins with a description of the study region and a discussion of some of the challenges and distinctions of coastal life. Next, perceptions on shellfish, finfish, seaweed, and IMTA aquaculture are presented and organized based on themes that emerge from the participant's statements. The chapter concludes with a summary.

4.1 The West Coast Story

The commercial aquaculture industry in Canada began in the 1970's, exploding to over 6,000 operations within thirty years (Fisheries and Oceans Canada, 2011). On the West Coast, salmon farming began in Sechelt with the cultivation of Chinook, Sockeye, and Coho salmon and expanded into the areas of the Georgia Straight and the Broughton Archipelago. Within two years (1986-1988), aquaculture production values rose from $35 million to $433 million (Fisheries and Oceans Canada, 2011). For British Columbia (BC), aquaculture was now a major contributor to the GDP, at a time when the wild fishery and forestry industry, two of BC's mainstay economic sectors, were in steep decline from decades of overharvesting.

The decline of the wild fishery was devastating for coastal communities as BC's fishing fleet was cut in half by the mid 1900s, spurring a range of social and economic problems including a wide-spread wave of unemployment, which remains a major issue today after thirty years (Tollefson, 2006).

"We relied on fishing, that went downhill and so did the opportunity, and that's happened a couple generations ago now. We've had chronic unemployment forever, they only know how to fish"

(Personal Interview, November 2012)

The employment rate for BC First Nations between the ages of 25-53 is significantly less than non-First Nations, at 66.3 percent compared to 81 percent according to Census Canada (2006). However, on many coastal First Nation reserves traditionally reliant on the capture fisheries and forestry industry, the unemployment rate is closer to 90 percent (Tollefson, 2006). Survival in remote locations is challenging and many communities are seeing a decline in population as young people leave the area in search of work, "There are issues of unemployment, there are a lot of people leaving the community because they don't have the resources to stay" (Personal Interview, October 2012). Those who choose to stay in the communities have few employment options. One of the popular choices for young males is forestry; however the work is limited and usually only seasonal. It is also seen by some as the "evil necessity" for its traditionally unsustainable harvesting practices (Personal Interview, October 2012). Seasonal jobs are characteristic of coastal communities, as many jobs are scheduled around resource harvesting periods. This poses a challenge for attracting youth for only a couple months of work, as well as the youth become accustomed to only working certain months of the year and no longer want full time employment (Personal Interview, November 21, 2012).

It is believed that half of First Nation children live below the poverty line in BC, and many of the communities are facing severe challenges, including issues of poor housing, overcrowding, non-potable water, and difficult access to education (CBC, 2013). Indigenous people also have some of the highest rate of physical and mental health issues, suicide, and lower life expectancies (Statistics Canada, 2006) and several

studies have linked health challenges to unemployment directly (Dooley 1996, Orpana 2007). Creating employment opportunities in communities may help with alleviating some of these challenges and several participants in this study mentioned the need for more opportunities, capacity building and education in their communities. There has been an increase in partnerships between First Nations and industry across BC and some have expressed their drive to improve the status of their communities and foster opportunities (Richardson, 2012). One community member describes his attitude towards economic advancement; "We can't rely on logging anymore we got to move to what is feasible at this point in time, like aquaculture, like greenhouses up here, looking to support the community and create job profits", demonstrating the desire to diversify within their local community (Personal Interview, October 2012).

4.2 "Home" – to the Wuikinuxv and Haida People

Most of BC's coast is a rugged, wild and remote landscape. It houses the Great Bear Rainforest, one of the largest remaining intact temperate rain forests featuring thousand year-old Western Red Cedars, the iconic Grizzly and Kermode "Spirit" Bears and countless other species that create a flourishing ecosystem. Here, Pacific salmon have some of the strongest runs in the world and it is the migration route for thousands of birds, whales and other marine mammals. Several small communities are situated along the coast that have been home to the indigenous peoples since time immemorial.

> *"I'm from here, my Dad's from here, my Mom's from here…"*
> (Personal Interview, October 2012)

These coastal communities are some of the most unique in the Province. Each one is different from the next in terms of size, capacity, amenities and often, language. If one

had only been exposed to urban centers and found themselves in one of these communities, it would certainly be an enlightening experience. "*They're barely out of the stone age!*" said one interviewee, describing one of the coastal villages. Despite the differences, many of the communities share commonalities. For most communities, there is no direct road access making accessibility and affordability one of the most challenging barriers these residents face; "It's in isolation, there's challenges to living here; we have to fly in our food. Or by water in and out of here". For the modern city dweller, the notion of challenges may reflect an understatement. The west coast is home to some of the most unforgiving weather, especially in fall and winter months. Flights have sometimes been grounded for weeks at a time, preventing all travel in and out of the community. As a result, food availability is limited and expensive. Fresh produce is often a luxury and food is often preserved and processed, making a consistent healthy diet expensive and unavailable for residents. For many, healthy means unaffordable. Access to things like basic health care, such as doctors or dentists, is also often difficult to achieve, especially in communities where there are no resident physicians or dentists. Transportation is one of the major challenges facing business development. Moving people or products, in or out, is expensive and unreliable. Consequently, there is very little business or economic growth in the communities. Their greatest challenge is "…access. Ease of access. I don't think we're ever going to grow unless the access in here gets easier. It's just too hard and expensive to get in and out. So the cost of living is high which sort of limits the amount of people that move in." (Personal Interview, October 2012).

The isolation and lack of reliable access to outside resources is the greatest uniqueness to living in these areas and is what sets them apart from inlanders or city dwellers. As a result of this remoteness, the residents have to rely on what is around them and are forced to interact very closely with their environments. Evidently, this has helped to maintain the relationship the coastal people have with their territory, as one of the most repeated statements of the interviews was that many still "live off the land". As mentioned earlier, food is expensive, unreliable, and often poor quality in many communities; harvesting from the land is a way to supplement their food source and get nutrients perhaps otherwise not available. Living off the land, apart from being a lifestyle for coastal people, also serves as an identity for many. For example, the mention of being "beach people" and "ocean people" appeared in several conversations. In one example, someone talks about the generations of their family as "beach people"; "My [family], they are all beach people, I spent my life on the beach, ever since I was little I remember being on the beach and now my grandchildren are out there on the beach. We really try to live out of the ocean as much as we can" (Personal Interview, November 2012). A resident of Oweekeno says, "Traditionally we harvest clams, cockles, urchins, everything. Rock scallops, everything. We harvest seaweed in the spring, we also used kelp that we set out and herring would spawn on them and we'd eat the kelp, the kelp and the herring roe. So traditionally, I mean, everything that came from the sea we ate, you know some of our beds, our clam beds were I don't know if you'd call them manicured or farmed or ... they were maintained. Now we just go out and we still use those traditional clam beds, we still go out and dig our clams and cockles and pick our mussels…still a big part of our diet". In another conversation, someone refers to the Haida Nation as being

"marine people for thousands of years". Other people associate their connection to the land as bringing a sense of home; "So I grew up on the land, eating all sorts of interesting things and it stayed important to me. I don't usually go away for that long" and "Basically from 1970 on I've lived off and on away from the village, but come back every year so that I can participate with whatever I have to do culturally, and also just to come home and be home. Cause it's a good place to be" (Personal Interview, October 2012). It was common for participants to mention their family when describing their experiences of living off the land. One participant says "As a younger child I had an opportunity of learning with my Dad about the land and the resources that provide to us, you know we've always lived off our land, especially in the marine"; while another says, "Our family is originally from here, I had the luxury of learning from my Dad from hunting to trapping to fishing". This highlights the idea that these experiences and skills are deeply rooted into the lives of these individuals and are passed down generationally. This is also indicative of these activities being very valued cultural experiences, seen by the number of times this discourse is used in conjunction with each other. Also connecting the idea of culture to living off the land, an individual states, "Strategically as a First Nation it's a very good spot to be in, we didn't have to chase our food all over the place" referring to the geography of their community and the reliance the people have on the nearby resources.

From other conversations, however, I got a sense that life today is not the way it used to be. One participant began to cry during an interview, saying they missed the old way of life and the amount of resources that used to be in their territory. "There's no traditional beds left, the beaches used to be loaded with urchins. Not much life anymore.

Used to see all kinds of things in the sea and land, now nothing" (Personal Interview, October 2012). The same individual later says, "It's hard to be an Indian", emphasizing the changing physical, and social, environment they are living in. Another participant mentions the amount of jealousy and competition in their community, "The jealousy is so rich among our people that when our people start getting ahead we become our own worst enemies, because the ones that aren't doing so well they want part of your action. Because they're sitting at home watching TV". Others suggest changes need to be made to create room for greater success within communities; "The fact is at this point in time we don't have homes or jobs to sustain more people living here and the only way we are going to be able to grow is to venture outside of our comfort zone".

4.3 Aquaculture

As noted earlier, aquaculture has been practiced since time immemorial. As a participant described, indigenous peoples used to maintain shellfish beds in their communities, and noted that they still harvest from their traditional clam beds today. Commercial aquaculture nowadays, however, tells a very different story. The following section sheds light on some of the perspectives First Nations from Oweekeno, Skidegate and Massett have towards shellfish, finfish, and seaweed aquaculture. The discussion is organized according to themes that emerged in the interviews, following the framework of a discourse analysis.

4.3.1 Shellfish Aquaculture

"'There is no better place than Haida Gwaii to farm shellfish"
(Personal Interview, November 2012)

There were mainly positive responses when discussing shellfish aquaculture. Broad themes that surfaced were: positives and negatives about the industry, previous experiences and capacity issues. When speaking of the positives, the main subjects brought up were using local species, not having to issue feed and minimal impacts to the environment. The most prominent negative of shellfish aquaculture was the chance of introducing new species and the impact that this would have on the native ecosystem. These themes are expanded upon below.

4.3.1.1 Previous Experiences

Each of the three communities, Oweekeno Village, Skidegate and Massett have experience with shellfish aquaculture, either through pilot studies or small scale farms.

Oweekeno Village has experimented with scallops and oysters, while mussels were used for Paralytic Shellfish Poisoning (PSP) sampling. The scallop had the greatest growing success and the Oweekeno Nation is very interested in establishing this species as an industry, as well as looking into geoduck aquaculture. One participant mentioned reasons for being interested in geoduck as "It is a local species, they are filter feeders so they won't be introducing anything into the area that wasn't there already, and we'd be looking at beaches that already have geoduck, so it wouldn't be a significant change". In Oweekeno Village, when speaking about past experiences with shellfish aquaculture, several participants spoke about the type of species being cultivated: "We studied both scallops, oysters, and clams. We looked at long lines, we looked at rafts, um the feasibility was more in the rafts than the long line" and "We were trying to grow scallops, mussels and oysters and that program went very well until it ran out of funding". Several also talked about accessing sites: "We had to go to the mouth of the Inlet because

Oweekeno Lake pumps out so much freshwater that we had to go out there to get away from the freshwater" and "Access, I guess it's a long way to go we only had a few areas we study for the opportunity". According to residents, they were told that the ideal growing conditions for shellfish is away from the freshwater source of Owikeno Lake. Therefore, the infrastructure had to be out at the mouth of the Inlet. Funding was also a main reason for the lack of success with shellfish in this community, as several participants state "I think a large part of it [the main issue with previous cultivating] was funding, like I said it went dead in the water" and "[they] grew very well but our program ran out of funds and it just went by the wayside".

In Skidegate, when talking about previous experiences related to shellfish aquaculture, participants talked about what species were being grown. It was said that "Haida have oysters and scallops in the ocean right now, and when they first did the pilot projects up here it was oysters, mussels, and scallops, and they did preliminary growings to find that the scallop was the best species to move forward with, so that's why they went down that road". It was also commonly discussed that Skidegate and Massett are in the process of potentially creating a large shellfish operation on Haida Gwaii with geoduck and potentially sea cucumber and scallops. However, one participant noted that "the greatest challenge facing the industry right now is developing new species in shellfish aquaculture, basically rules and regulations and existing policy". As it exists right now, the policy for geoduck aquaculture has just been released this year and is still being reviewed, which may pose a challenge for that operation as it may take some time to do so. It was said that the Haida have various tenures for shellfish aquaculture, but they are not all activated right now due to a seed failure in Prince Rupert. There was also

mention of locations for shellfish aquaculture, “Back in ‘84 we looked at places like Dawson Inlet, Dawson Harbour, Englefield Bay all up in there, Kano, up by Rennell Sound, and on the west coast we looked at every bay in the Inlet there for shellfish operations”.

Participants from Massett also talked about which species were being cultivated previously. One participant said, “They had scallops, oysters, cockles, if I had to guess it started in 2003 and we probably did it for three years maybe”, and another expands on that saying, “There was a mix of trays, some of them were scallops some of them were oysters, and I believe scallops and oysters for sure. Probably in 2002, 2003. There’s some scallops happening now and some oysters and they sell them locally at the farmers market or you can buy them at the grocery store”.

4.3.1.2 Positives

There was widespread support for shellfish farming from participants in each community. The most common positives that were mentioned for shellfish surround little environmental impact, not requiring feed, and the ability to farm local species.

In Oweekeno, a participant stated they “want to see if the opportunity is there, big or small”. Another said, “I completely agree with shellfish aquaculture and think it is a wonderful way of growing a large crop in a very small area”. One individual spoke of the larger Oweekeno community as “being pretty well unanimous in supporting shellfish, for the opportunity” and another stated “the community was very good about the shellfish, they quite enjoyed the idea of it, I think they would be very on board”. One participant mentioned that they were looking at a beach that already had geoduck, and that it wouldn’t be a significant change to the environment, while another states, “I don’t think

of it as farming". Not requiring feed was a major positive, as one participant says, "You don't have to feed them. It's a no-brainer right? I mean you put those little baby oysters, or mussels in the water and they live off the planktons or whatever, and you don't have to feed them so, so just a win-win situation".

Similarly in Skidegate, there was great support for shellfish aquaculture. "I'm all for it. I would love to see something go on here like hatcheries and grow out areas. I'd take pride working at an area like that". Another stated, "I see an incredible opportunity for our people, absolutely incredible opportunity". Three individuals compared shellfish aquaculture to salmon aquaculture, saying "I'm sold on this industry for the future yeah, not on finfish, on shellfish. Let's do something, let's create opportunities" and the other said, "With salmon farming, there's just so much negativity around it, it's like why bother when shellfish seems so much more accepted". The third stated, "I strongly support shellfish aquaculture in that it's certainly far more sustainable than finfish and has less negative impacts to the environment. And certainly the Haida support a more sustainable approach". Another Skidegate participant recognized limitations to aquaculture production while still being supportive: "I think if it's managed properly and sustainable, if it's a sustainable operation that could bring us into the future. I don't want to see every bay and everything filled with aquaculture, but I think within acceptable parameters it's an acceptable industry". When asked which species they think would be best in Haida Gwaii, one respondent answered, "The mussel is really good, they're natural but a good opportunity and easy to grow clusters. We like scallops – leave the clams and cockles alone. The geoduck is probably something that could be enhanced quite well because they grow in a different environment than clams and cockles down

deep. And abalone, I'd like to see some kind of program put together to produce abalone". They further explained plans looking at developing a geoduck aquaculture program along with scallops, sea cucumbers and oysters, stating, "It's pretty exciting stuff".

For participants in Skidegate, no feed was also a positive. One interviewee mentions, "The thing about those [oysters, mussels, cockles] is you can't feed them phony food, they live off the nutrients in the ocean. And I got no problem with harvesting those, and ensuring they come back". Local harvesting was also important: "It's nice to have them on your front door knowing the water your getting them out of is clean water, versus the Gulf of Georgia or the Salish Sea now".

The community of Massett was also supportive of shellfish aquaculture. One participant was evidently more supportive of the industry saying, "Talk about sustainability and keeping things healthy and you can do that [with shellfish aquaculture]. If you want to do aquaculture on the BC coast than there's no better place than Haida Gwaii". One participant spoke about current aquaculture on the Island; "There is a little scallop operation but its literally just a little family operation, they're doing it on a very small scale which is fantastic, because a big operation would not fight over the same market, there's lots of room here. You could create several shellfish industries on Haida Gwaii, it isn't like there's one or nothing". Other Massett community members were also supportive. One participant said, "I believe they want to develop it a bit more. I don't mind the shellfish, it gives everyone the opportunity to eat things they normally wouldn't get, and makes it sustainable. It wouldn't harm to develop it more, I don't think anyways" and another stated, "I don't oppose the idea of an aquaculture project, especially a

geoduck aquaculture project. I guess they also want to do sea cucumber and I believe scallop too", while another participant also compared shellfish aquaculture with finfish aquaculture by saying, "I eat farmed scallops and oysters, but I would never touch farmed fish". A participant also said "Shellfish is a neat one, scallops you can grow a pile of them and there seems to be no negative side effects. You can hang them in the water or a long line system or a raft or whatever and that seems to fit, we got to be very careful monitoring everything to make sure we're only doing good things out there". "We've seen that you can do scallops at a modest level and not negatively affect anything therefore why wouldn't we do it, and the same with sea cucumbers".

4.3.1.3 Negatives

There were some negatives expressed towards shellfish farming. These mostly concerned capacity issues, impacts to the environment and the chance of introducing invasive species.

When asked what any concerns would be for shellfish farming, a participant from Oweekeno stated that "Oweekeno doesn't like using other species. Anything that has the potential to become an invasive species, they haven't responded well to that idea. And they don't want to do anything that will have a large impact on the environment". Another resident from Oweekeno says more studies have to be done on shellfish in the area as well to determine the risk of invasive species.

In Skidegate, similar concerns were mentioned about introduced species. One resident says, "My single concern out of all that is an introduced species, such as the oyster. We never had oysters up here and then they started culturing and raising oysters here". Similarly, another interviewee says, "We like to pretend that we don't want to

introduce new species here, but the reality is there are introduced species here already. How do you best manage with lessening the impacts? So we have to look at each case upon its own airs to determine whether that's acceptable. And you know we've got to be careful about introducing species, have some knowledge about their potential detrimental or positive affects, but no I don't oppose aquaculture, but it's got to be managed properly".

Massett's concern with introduced species was similar. One participant said, "In the Cumshewa we had our sea pens where we reared the salmon. The floats on those ended up having a ton of mussels on them where they didn't have them before. So I don't think we were careful enough and didn't take into account how it would spread, how it would affect the indigenous species. I kind of think they're spreading. I've also heard third hand reports of there being oysters around; we don't have oysters on the island. So I'm kind of worried about that, about how an introduced could possibly take over. That being said I'm not that strongly against it as much as finfish, or salmon farming".

4.3.1.4 Capacity

One of the biggest issues with shellfish farming in these communities is capacity and what to do with the product after it is harvested. In Oweekeno, the remoteness of their village is their biggest challenge. One interviewee mentions partnering with a nearby community like Port Hardy or the Heiltsuk Nation to help with marketing and processing. "As long as the processing isn't so far away that it's going to cost us too much money. I mean if we can do it all local in a co-op or whatever we do, you know it's got to work for us before it works for anybody else". Similarly, another participant states, "I do believe it's difficult for a lot of areas because of where the processing plants are

located. So for a place like here it would be a little difficult to get to market on time depending on water, just how the seas are, you're not going to make it through 20-30foot swells very well, but I do believe it's feasible out here". Oweekeno has established some infrastructure capacity from their previous trials, saying "We still have all the infrastructure, all the nets and line from the nets, hundreds of thousands of them actually", that would be a benefit to a shellfish operation in the community.

In Skidegate there are also capacity concerns. One participant mentioned the capacity of his community to manage the industry, "I don't oppose aquaculture but it's got to be managed properly and there isn't the capacity here to do that. Experience would change that, putting them in and starting to run them and getting people interested". Another interviewee spoke about their concerns and the size of the operations: "I think there is interest and capacity to expand industries like resource development or aquaculture here but I mean you have to crawl before you can start running here, and that's the thing that scares me about some projects is that they're just so big, there's so much money. It looks good on paper but in reality I know it's not going to work out like the way they say it's going to". Another participant talked about the capacity to get seed: "I think the scallop industry in Prince Rupert have been very lack lustre, they haven't been able to produce what they wanted to. So they've been restricted on getting seed so how can you grow anything if you can't get anything to put in there in the first place?" One interviewee also talked about the financial capacity to begin a geoduck operation, "So Geoduck, unlike oyster and clam aquaculture which require very little capital, is a very expensive proposition. In our experience it costs upwards of $100,000 per hectare to develop a hectare of seeded or enhanced geoduck. So if we are looking at a 10 hectare

site which isn't very large by world standards, you need $1 million, and you need to sit on that million for 8 years before seeing a single return on investment". A resident from Skidegate also talked about the potential capacity in Haida Gwaii for a bigger industry, "I very much see potential for a bigger industry here. I don't see why we can't produce a million tonnes a day up in this country. I mean the opportunity to start a massive major shellfish operation on Haida Gwaii here; the potential is there to create employment for years to come".

Participants from Massett also expressed capacity concerns. Similarly to Oweekeno, one mentioned the concern of proximity to market: "Our biggest problem on Haida Gwaii is we can grow a lot of stuff, we can grow big trees we can grow lots of products but we're a whole step further away from the market than other people, so we tend to start with the high end stuff so we have a nice cushion to deal with that. If we get into mussels, clams and oysters, things like that, the profit margin is all going to be eaten up. We want to create economy here". Another Massett resident mentioned the infrastructure planned for Haida Gwaii, "The Sandspit hatchery proposed in this geoduck venture is like 30 000 square feet or something, so there's going to be capacity there and room to expand", while another mentioned the scientific monitoring available to the community: "We'll be able to do highly sophisticated monitoring so we'll be able to see if there's any change anywhere".

4.3.2 Finfish Aquaculture

"Don't even talk about it, don't even mention it. 'Cause we've been hearing about it on the news and everything, it's kind of the same thing as Enbridge, the same package, and we don't like either one of them"

(Personal Interview, November 2012)

Finfish aquaculture was generally less well perceived by participants. Most were opponents of the industry and many did not want to talk about it during the interviews. The species talked about during the conversations were salmon and sablefish. The major themes developed from these interviews were previous issues and experiences, positives about the industry, negatives about the industry and capacity issues. The major issues mentioned were disease and pathogen introduction, health issues, feed, impacts to surrounding environments, invasive species, scale, and management. Alternative methods of farming and sablefish were also discussed.

4.3.2.1 Previous Issues and Experiences

The communities of Oweekeno, Skidegate, and Massett have never been involved with culturing fish. However, there was a wave of interest during the early stages of the industry to create a farm in Haida Gwaii: “Yeah, they really tried to put some farms in here. They took about 16 or 20 guys from our communities, and came up and promoted the hell out of it, educated them on salmon farming and stuff like that. And god given it worked they had a major fish kill of the seed that they were supposed to put out all died, and the company that was doing all the promotion of it went bankrupt. This was back in the 80's”.

4.3.2.2 Positives

Only two participants spoke positively about salmon farming. When asked about their thoughts on finfish aquaculture, one response was, “I’m kind of fence sitting on there, I don't think I have enough info, I have my reservations. I would love the economic benefits, as far as profit and the generation of more jobs would obviously be a welcomed addition to the island economy. Um, because also the other reason I wouldn't mind seeing

it is we recently bought a processing plant (Seapak) so it just kind of fits, right. Harvest it, process it, package it, ship it out. Value added, less wait, makes for better bottom lines. One of the biggest barriers obviously is the shipping and the freight". The other individual said, "Do I eat it all the time? No, but you know I have eaten it and I don't mind it. I think it's a viable industry. But, you know it's all the public, how politicians get in if the public wants them in, we go with what they want, that's the way I look at it. I was kind of pro salmon and I just got tired of defending it because there is that from the newspaper ads, the media that has manipulated the public opinion right, and that's alive here and well, is that negative public opinion. So for me it's like why even bother, know what I mean? I'd be very open-minded and I'd definitely do my due diligence on the thing I wouldn't go too big or anything but if no one wants it, it's like, what's the point, no point".

4.3.2.3 Negatives

> *"I think it's very unfortunate. I think that I have yet to meet a First Nation person who supports salmon farming"*
>
> (Personal Interview, November 2012)

> *"From what I've seen, it seems to cause a lot more problems than what it's worth"*
>
> (Personal Interview, October 2012)

Participants from each community expressed negative perceptions towards fish farming. The negatives expressed were cumulative, meaning that there is not one aspect of fish farming that is the single concern; there are several. It is also evident that the concerns are connected. When discussing issues and concerns, participants would list several at a time. For example, when talking about impacts to the environment they would include concerns about disease, sea lice, wild salmon, etc. Therefore, although

these concerns are listed separately in this section for clarity and readability, they should not be considered separate from one another. This section begins by describing broad statements that were made towards disproving of salmon farming and follows with specific concerns that were mentioned.

In Oweekeno, participants said, “Nobody likes it. The general consensus here is that nobody likes it. And why would we farm fish I mean, when it comes right by our front door?” and “Salmon farms? Totally against it. Totally opposed. I actually talked with my brother who tried to have some farmed fish that was cooked and when they started to eat it, you can't see it from the outside but when they started to eat it, it was blue. I never see a salmon turned blue after cooking it. I remember BBQing and it just started falling off, it’s not real. To me I just see they created a monster, is all I see”. Another member from the community states, “I don't believe in salmon farming the way we are doing it here”. Similarly, in Haida Gwaii, a participant describes how they declared themselves a “finfish farm free zone”. “We won't go to finfish. Alaska is the same way, so we drew little maps with the international boundary going through Haida Gwaii and up and said ‘were joining these guys’ just to bug people, and that was in recognition that you don't want to mess with your environment”. Another stated, “Finfish, I don't care for it. Talk to anybody, any Haida on the Island, there’s no way they want to see any sort of salmon farming on island. Probably more strongly worded if you talk to some other people”.

4.3.2.4 Impacts to the Environment

One of the most common concerns about fish farming was the negative impacts on the environment. For example, in Oweekeno, participants made statements such as, “I

wouldn't agree with salmon farming out here, our oceans are too precious to be tossing them away" and, "I think it's devastating to our resources on the bottom". One participant believes salmon farms "are a major hazard actually to the waterways that they're involved in". They continued to say, "As much as I didn't like the person that was doing them, in Broughton Archipelago, I can't remember her name.., she's doing studies out there anyways [Alexandra Morton] yes, thank you, that would be her. She'd protest sites that I worked at. Personally at the time I didn't agree with her. After my first dive under the sites, I quit that job, and agreed, extremely, as to what she was saying". The same participant explained, "So our fish that we get in the summer is what might feed a poor family for two weeks while we wait for fresh fruit, veggies and meat to come in. That's a big deal. So to think putting a fish farm out there and to have our fish stocks decline due to sea lice and breeding grounds taken away by pollutants and loss of culture up here essentially…no, I could never agree to that".

Similarly in Skidegate, a participant said; "I do know that salmon farming in closed pens, as its being done, is just not a sustainable or healthy approach. All you have to do is put on dive gear and dive underneath a fish pen. It is not pretty, the scary part is they end up taking the morts out and if they die, there's a reason they're dying, they're not dying from a seal taking a bite out of them, they're dying because they're sick". Another participant was concerned for the surrounding wildlife, saying, "I heard the salmon guys have to double net and bring in nets and shot guns, stuff were not supposed to hear about. You know, there's pros and cons for sure".

Participants from Massett echoed the statements of other participants concern for the environment. One individual says, "I don't think they do any good for the

environment. Fish in general I don't think they should be farmed anywhere near wild stocks. From what I've heard about fish farms is they're dead zones underneath, from all the waste from the fish and all the feed that's going down". Another participant agrees, "I think with salmon farms the trouble is, the reasons salmon farms go ahead is for all the wrong reasons. To keep saying it's alright and yet, all you got to do is swim below one and look at the videos, you create deserts under there, and they're pouring in terrible chemicals". Another voices concern over the wild salmon stocks, "You have thousands of fish, one net pen breaks and if it's close to a salmon bearing river it could easily wipe out over time. I don't think the benefit out wins the risk. That's because I place a higher value on the indigenous stocks that we depend on so much". The concern for chemical impacts was voiced by another participant, saying, "So you have health issues, environmental issues, and the only way to keep ahead of that is to pour chemicals all over them to kill whatever the latest bug is. So that stuff doesn't just disappear it goes into the environment and so eventually you're going to pay for that".

4.3.2.5 Disease

Another main concern of the participants was the possibility of disease occurring in salmon net pens, as well as the transferability to wild stocks. One individual from Oweekeno says, "Just the potential for disease transfers and lice transfer, and just the amount of say pesticides, the antibiotics or whatever it is that gets rid of the lice and those kinds of things that end up in the environment outside. The problem with having so many things together is the possibility of disease transmission; lice transmission is so much higher when they are in that density and can't go anywhere. And if they get it then they are passing it on".

Perceptions were similar in Skidegate, as a participant says, “My opinion is that fish farming being done in BC today in closed containment net style, pen style, fish aquaculture is something that I do not view or consider sustainable, it creates potential for disease”, and, “The problem with intensive closed aquaculture is that you tend to increase the densities so that its commercial viable and when you increase densities your faced with problems of disease, over-crowding, and lack of food. If you’re increasing densities beyond the natural densities then you’re just asking for trouble, and that’s been demonstrated in finfish aquaculture time and time again. You've got disease, sea lice, and you got you know all the nastiness that…it’s the same with agriculture. You let chickens free roam they're going to be a healthier and a better product. You put them in these enclosed little coops you get max bucks for your investment dollar and you get disease and you get sick animals and ultimately humans pay the price”. Another Skidegate resident states, “You know there are pluses and negatives and even the Cohen Commission that just came out references areas of concerns from disease transfer and what not”.

Perceptions in Massett were similar. When asked what are some of the reasons for not wanting finfish on the island, one respondent answered, “Disease, the threatening of the local stocks. Um and as far as the sea lice and the disease it just breeds more conditions where things like that are more likely to happen. So never mind all the chemicals and the waste and all that horrible stuff and the sea lice and you know, there’s a big war going on about the whole thing”. Another participant stated, “I think they just spread diseases and stuff to the natural stock, which are depleting anyways”.

4.3.2.6 Health

"I mean, we're taking the natural products of the ocean, and turning them into McDonalds"

(Personal Interview, November 2012)

As well as raising concerns about the health of the environment and diseases, participants also raised concerns about human and fish health. One Oweekeno participant explains their concerns; "Talking to individuals that worked on salmon farms, industry, and the stories that you hear from them and what they do, makes you wonder why they do that. I mean, like, how could they do that, to cut off double fins, double heads, double tails, they cut off and still send to the processing plant, imagine that going to the public. There's got to be a reason why they have double head, double fin, double tail and imagine them eating it. My concern is when the women eat it. To me woman have the gift of life, you know, is that salmon gonna affect, you know? How much they complain about obesity nowadays, it's because all the mass producing of cows and chickens and, big time, it's crazy. For First Nations we look at we should go back to what we traditionally used cause there was less health issues then there is nowadays, 'cause you got cancer and so forth". A participant from Massett simply states, "I mean, the chemicals jammed into those farmed fish, I don't think they would be healthy for anybody long term". Another participant questions the health of the fish, saying, "Well I wonder about salmon farms because the fish don't have as much exercise, all they're doing is swimming in this water, then is it lower quality? Because they aren't going to have all the muscles that ocean going fish have". One participant from Skidegate tells the story of how he resists eating farmed fish, "We went to this high end restaurant and one of my cousin's sons was with me and he ordered salmon and as soon as he stuck his fork into it there was mush all over it. I said 'that's farmed fish your eating buddy'. I said give

it back to them and I said have a lobster something you can ID, so we changed his plate right away". Simply put, another respondent from Massett says, "It's a feed lot, you stick any kind of animals in those close quarters you are going to have issues".

4.3.2.7 Feed

A major concern mentioned by participants has to do with feed, specifically the feed ratio and the ingredients of the feed. For example, one participant from Oweekeno says, "One thing I don't like about salmon fish farming, is, um, it takes so much bait fish to produce. I think its 5 pounds of bait fish to produce 1 pound of salmon flesh, so um, and obviously that fish food got to come from somewhere so your robbing Peter to save Paul, so um, you know whether it's our herring, or our piltchers, or our sardines that they're grounding up for fish food, you know I think that it's something we really should look at because it's counter-productive". Another resident similarly says, "My opinion is that I do not view or consider it sustainable, in that it requires adding feed which is, um you know, unnatural I guess, for lack of a better word. But what's really scary, is they take these morts out, grind them up and they actually make more salmon food, they feed them pellets. I don't know to what extent but it's how they produce their feed that really, really concerns me". A participant from Skidegate explains a conversation they had with a friend working in the industry, "I asked how can you feed this fish to people? It's not even fish, it's pale and flakey. It's not even flakey it's mushy and the colour of the meat isn't even natural. And he said that's from what they feed it. 'The wild salmon they eat shrimp, they eat krill they get that rich red colour', he said 'we don't get this because we feed them', bionic food is basically what he said to me, and I said 'how are people taking to it' and he said 'if you don't know what fish, real fish taste like, fish is fish. That's the

way we look at it, it's a business'". One participant in Massett says candidly, "The feed that they give them that determines the colour of their flesh, like all that just grosses me out". Another individual voices their concern, "I don't know, I really don't believe in the farming itself because your expending and using more energy then you get out of it meaning you need more food than you get fish out of it, right. I can't remember the ratio but it's something crazy like seven pounds of feed for every pound of fish or something like that. Quite high, and to me that just doesn't make sense". Along the same lines, another Massett participant says, "The sort of the quiet problem with salmon farming that nobody really wants to talk about is they're still using about 3 pounds of seafood product to grow one pound of salmon, at the end of the day if you're trying to feed people that's not a good formula. And they're trying to get away from that, they're trying things like vegetable protein and they grew salmon all right but they lost all the health benefits, because it's the wrong kind of protein and wrong kind of oils. So all the heart, circulatory benefits that you normally get form wild sockeye disappear when you feed them vegetable pellets, so what's the point. They explain further, "The food thing, you're not gaining anything. If your spending one pound of protein to gain three pounds then I'll get it, but it's the other way around so eventually that's gonna get' em. Therefore, why even go there so if you can avoid those kinds of things then that's great, and I think there's a lot of potential".

4.3.2.8 Management

"The fact that salmon farms are out there I think that they're being mismanaged"
(Personal Interview, October 2012)

"We want to create a working relationship with benefits that benefit everybody. And to start with equality is good enough"
(Personal Interview, November 2012)

The management of finfish aquaculture farms was a major concern for some participants and several aspects of the industry were mentioned. The Department of Fisheries and Ocean (DFO) was criticized for their lack of management by several participants. One participant from Oweekeno said, I think DFO and the Ministry, the whole Ministry of Fisheries dropped the ball on River's Inlet after 1968 when the decline of the sockeye drastically started declining you know. Um, I think they just kind of walked away and um left us on our own with it. So, um. It's a part of gross mismanagement and other things, I think that things could be better, I mean they could come to the table and look at restoring what's happened within our traditional territory as far as logging our Oweekeno Lake watershed. So as far as I'm concerned the government has dropped the ball on us all here, not only as Oweekeno but as a citizen of BC I mean, we used to have, like I said, the third largest sockeye producing system in all of BC and now that they're gone they don't seem to want to bring it back or help bring the population back". Another Oweekeno participant says, "The government should be encouraging my First Nation to get into this (shellfish aquaculture). You know they always talk the talk about, you know, economic opportunity for First Nations within their traditional territory, and I truly believe this is one of the industries that is good for our community and the outside world. I mean we could produce a world class product and make some money at it, so I think the government should be on board with all this and helping it become a reality rather than a handcuff". Similarly, another resident shares how the government is acting as a barrier, "There's one area which is a provincial park, and we were trying to see if there's ways that we can do a shellfish operation in it. But when they turned it into a park it kinda took that opportunity away. And there is an area

there that is the heart of the shellfish that they used as an anchorage and that contaminated it, and that really is an area we used to go camp and spend a night and do harvesting or like for the season or for the winter, and they contaminated it. That was about five or ten years ago now that we've been trying to address it, and just lack of funding to support it too". The same participant was asked how they thought the finfish industry was being managed and they responded, "I don't think so. Like I'll give an example, when we were doing our marine use TEK, there's areas that are especially halibut spawning grounds and seeing that logging industry put a heli-drop, like, almost right on it. Like, we just said no, like right now. Like to me, the department, the DFO should have been aware of the spawning ground for halibut and said no you can't put a heli-drop there. Like to me, that's not proper. To me that's kind of strange they don't have the knowledge of spawning grounds, like our elders did. You figure science should have been at the forefront, especially for spawning grounds for halibut, ground fish". Another participant states, "The fact that salmon farms are out there I think that they're being mismanaged. I mean it wrecks food fishing for First Nations, it can wreck culturally significant traditional areas, I mean salmon farming that's gone on already".

Regulation was also mentioned as a concern in Skidegate, as a participant says, "DFO hasn't managed well in anything they've done. The management practices, high predation on the resources, not only by humans by other predators, so were sitting on a critical time where, um if we don't start managing things real quick ... in the wild harvest of stuff like sea urchins. I think that's gotta have more regulation". Another resident expressed concerns with regulation by saying, "I strongly believe that if your selling farmed fish to people you should allow them to make a choice, farmed Atlantic salmon

from the Pacific coast, or farmed Atlantic salmon from Norway, I don't care it should be labeled, and that's something that the government has been unwilling to enforce", while another states, "I've worked on salmon farms, I don't believe in their practices, I think we need stricter regulations on them".

An individual from Massett stated, "I guess what I'm saying is I don't trust the finfish aquaculture industry. I simply don't. They've introduced the foreign species. All they care about is their shareholders and they are engaging with First Nations but only as token partners so they can push through their political agenda". One participant tells of the foreign companies having interest in Haida Gwaii salmon farming, "And we had an Asian group here that wanted us to take them to our site and said give us everything you got, and they wanted to move us from a quarter of a million animals to 500 million in one hump, and we backed off form that really fast. Because that kind of mentality will get you into trouble and their concern with the environment is, well, if your screw it up than you either do something to fix it, or you pump out that pond and pump in a bunch of freshwater and keep going, and we didn't like that mentality at all".

Several participants mentioned the abalone fishery as an example of mismanagement. For example, one participant from Oweekeno says, "you can take for example the abalone, the species at risk, to me there's a lot of poaching going on. I don't think there's really been management in the area. The abalone being under um, protected. Even that wasn't done properly, there's still lot of poaching, eh, there's still an ongoing fishery that's happening illegally". Another participant in Skidegate says, "In 1978-1980 we tried hard to shut down the abalone fishery and DFO wouldn't even listen to us, so in

1992 they shut it down on us. So that created a real hard time for our people because we're 20 years down the road and they still got it as a forbidden fruit to the sea".

Geoduck aquaculture was commonly talked about during the interviews because of the big proposal of a commercial geoduck operation for Haida Gwaii; however development has been slow seemingly because of political reasons. A participant from Skidegate explains the current political situation with the proposal: "Basically we are prevented from doing geoduck aquaculture because of a lack of policy. We asked or nicely demanded that the policy be reviewed so we were told that they would undertake this process, but as with almost anything its taking far more time than it should. So that's our challenge right now. And the second challenge is about accessing feral stocks located on a tenure, so as an oyster farmer, or as a clam farmer, if you take out a tenure, you're allowed to harvest the existing oysters or clams on that tenure, as a by-catch of your harvesting activities. Once you harvest the cultured stocks there's no big issues because there's not a lot of money in the oyster or clam game. However, geoduck aquaculture has been identified as the highest value fishery in Canada; the challenge facing aquaculturists is when they take out a tenure, and when they're granted a tenure, who has access to the feral stocks or wild stocks on the tenure? And up until now the wild fishery has had access to those stocks. And the reason they've had access to those stocks is because they claim that every time a tenure is granted they're displaced and can no longer fish in that particular area. And since they are displaced they should be compensated, which involves money. So DFO, in order to make sure they don't end up with lawsuits or situations that doesn't end up costing them a lot of money have allowed wild fishermen to go in and 'rape' the existing wild stocks. So many First Nations that have claims on what they

consider their territory or traditional territory don't agree with that concept because they believe the resources on their territories are theirs as well. So First Nations have been excluded from the very lucrative geoduck fishery". Another respondent on Haida Gwaii talks about the geoduck project, "Really we're ready to go, the only thing were waiting for is the red tape with the government and its just like, we've got seven applications in for tenure sites and each one they sort of wiggling around it, so it's like, come on. I don't know what they're doing. I don't know whether they're playing games or, they've just never been presented with anything like this. It is a little different, but we've also done everything we can to comply with their rules. So meeting this resistance, I guess is sort of a long history of this stuff, but you now, it's like come on, when are we gonna start working together to make things happen, you know. There aren't many things being proposed around here, there's lots of opportunity but this is going to create a lot of economy in a sustainable manner, but were running into nothing but this red tape".

4.3.2.9 Rights and Representation

It is also clear from some statements that there is a history of aboriginal rights not being respected in management decisions that has become a major concern for aquaculture management. It was common for participants to say they did not feel their voices were being heard or that they were being represented adequately. It was also frequently mentioned that consultations with industry and government were insufficient. For example, one participant from Oweekeno states, "We weren't allowed to do this kind of work [shellfish aquaculture] within this marine park that they designed without our consent. So they totally handcuffed us with it. We are always looking for more input you know in what's happening in our traditional territories, whether its aquaculture or fish

farms, or even you know. I mean the huge picture in this whole thing is oil tankers going up and down our coast. You know, sure Enbridge has said their having community consultations, but really in those consultations they met with the Heiltsuk and the Wuikinuxv, and they sat with Coastal First Nations in Bella Bella and Enbridge dictated to them where everyone was gonna sit and who could speak and who couldn't. So I mean with the big companies, well especially Enbridge they're just trying to bull their way over and it's not consultation at all, its dictation". Another participant from Oweekeno says, "Well when they rolled over from being managed from federal to provincial there was no consultation on the issuing of new licences. I don't think there was a lot of consultation before, from what I understand from other Nations who do have the fish farms in their areas, is that there wasn't a lot of consultation with the Nations before the fish farms came in. And now that they're already established, consultation isn't about whether or not they are going to be there it becomes about what practices are. So if you missed out on the window of being consulted in the beginning then there's really not a lot that you can do. And from what I've seen at least through other DFO processes, just because they've come in and asked you the questions doesn't mean it's going to translate in what decisions they make. They can come in and talk to you all you want but they aren't necessarily going to change their decisions. It's one of the biggest things I've seen with the eulachon, is that, consulted yes, but when it comes down to actually making the decision they didn't really take into account, most of that TEK and most of that is because they say in order to be considered for that process it has to be citable, and TEK isn't citable. So I'm not sure if that'll come down to the same thing with this research as well". The same individual continues, "I know one of the biggest shortfalls of the way consultation works now is that

there is not enough money to fund the consultations. Because most band offices run off program funding, you get the money to run your program and there is no program money for referrals. Without that ability to go out and do that research and referrals, then you're basically taking a shot in the dark. So what Coastal First Nations have been doing is starting the Guardian Watchman Program. But there's no money for the Guardian Watchman funding either and a lot of us have been using our Guardian Watchman for doing some of the checkups and other stuff for referrals. But without any source of funding we've been using our own money. But there's not a lot of our own money around. What most of the coastal First Nations have been using is the money we've received for putting our land in conservancies, because the more conservancies you got made, the more money you get out of the pot". Another Oweekeno resident said simply, "I don't think there's really been much of a role [for First Nations in management]. I would say we've seen no results for our resources". When asked whether First Nations have been represented in management decisions, a resident of Oweekeno said, "No, no I don't believe so. Most just the protesting that has been done in some traditional areas, whereas they haven't been considered traditional areas by the government".

In Haida Gwaii, perceptions of consultations are similar. One resident of Skidegate describes the situation, "So we basically, we have to realize that the Haida operate with a big giant court case and the Province and Canada are scared shitless of us cause it's so powerful, we use that to our advantage you know, I mean, if you got a tool use it. Yeah so, so when you talk to us, you always gotta understand that it's, the court cases play a huge role in getting us to where we are. We've taken Canada to court to say you don't own these lands, nor does BC, the Haida own these lands. Well, now that

Canada has to do the tripartite, Canada and the Haida in a tripartite, but Canada doesn't really participate ... they just come to the meeting but they don't really say anything. So are you going to come and start dealing with us openly and respectfully and honorably, and if not then see you in court". When asked what do you want out of Canada, the same respondent answered, "What do we want out of Canada? Well we live under this, were in a situation right now, not of our own choice, not of our own making. We'd like to create a relationship in a working agreement with Canada where we can live together here, we can share the resources. The Haida are willing to give up some of the plenty, but not, and we also want to share were not trying to get rid of non-Haidas, that's not our intent. We just don't want to be beggars in our homeland like we are now. So we want to create a working relationship with benefits that benefit everybody. And to start with equality is good enough. Like the Haida are 50 or 60% of the population here, so yeah we need to create a formula that works. I don't think we're being unreasonable, I think were being really reasonable".

4.3.2.10 Alternatives

When talking about salmon farming, participants commonly mentioned alternative methods of farming to open ocean net pens. One participant from Oweekeno says "I hope to never see a salmon farm in our traditional territory. And as one of the hereditary leaders its one of the things I will always object to. Um not that's there's nothing wrong with farming fish, but if they were in closed containments, on land, I'd embrace it. But these open net pens, um are just a disaster waiting to happen. That is happening". Another Oweekeno member says, "It's been thought about because Kitasoo does have a farm, fish farm, and there has been discussion. If there was any fish farms,

they'd have to be closed containment, preferably land based with the water being filtered really well so the diseases wouldn't be carried out to the waters as well. But it's been something the Nation has been definitely opposed to, the idea of the current mode of operations for fish farms". Another states, "The salmon farms. I know they even talk about salmon ranching too. I don't believe in that either because when you have fish confined like that for a couple life cycles that's a long time to be confined. But you know, if there's an opportunity, who knows. But that's why I was asking about on land, if it could be on land where it doesn't take water, I think it's a main concern". Similarly another participant notes the potential of land based farms, "I don't believe in salmon farming the way we are doing it here. I believe in other places like Sweden, where they have land locked ones or even on the east coast further down land. Definitely a sustainable way of doing it. I believe we have the water here to produce land locked sites, and I think as soon as the technology comes around for that we could move in that way. But for right now, I wouldn't agree with salmon farming out here".

In Skidegate, participants voiced their opinions of alternative methods of fish farming as well. One participant says, "I don't like the idea of closed containment pen culture. I just don't, you can apply it to anything you want, I just don't. I believe in open water enhancement. Even the agri-marine guys that are building these huge fiber glass tanks, which basically prevent escapement, eliminate the bio-fouling, and reduce the food because the food is more used – because whatever falls to the bottom is re-used, and there's no issue of cross contamination of species and no sea lice issues. And those are the main issues that really piss Canadians off. And I don't support them either, I don't support the closed-containment of salmon farming because even though its better it's not

the solution ‘cause you still need to feed them. Even though it’s not high on the radar it is a huge problem, huge problem”.

In Massett, alternative methods were discussed as well. One participant expresses their thoughts, “So if you start looking at aquaculture as a whole, we looked at finfish and we won't go there. It doesn't matter how they wrap it, you know salmon farming is bad news. Unless there’s ways to do it so it’s much better, like totally contained systems”. Like land based, there’s even these motion ones that they're talking about that they say are totally self contained. There’s some interesting things going on, they were looking at wolf eels and black cod and other things like that. They're doing it all land based so that’s what caught my attention. I haven't actually gone to see it yet I'm kind of interested, but you know that’s of a little interest it isn't really anything to do with us yet, and we might see down the road if people want with the same philosophy, but at the end of the day ...”

4.3.2.11 Sablefish

“I don't know, it’s getting fairly near the finfish stuff”
(Personal Interview, November 2012)

The participants were asked about sablefish because it is the main species used in an existing west coast IMTA system, and to differentiate concerns between fish farming and salmon fish farming. When asked if they see any major issues with farming sablefish, one participant from Oweekeno responded, “I'm not sure, I know it’s one of the things we had thought about before. I think that there’s just not enough information on trying to farm it. Because it depends on the amount of waste it produces, it depends on just the volume of fish that are in there so if anything is, the problem with having so many things together is the possibility of disease transmission, lice transmission is so much higher when they are in that density and can't go anywhere. And if they get it then they are

passing it on and I don't know what the possibilities would be with black fish or black cod". Another resident wasn't aware of the practice of farming sablefish: "Um no, that's farming, I'm not really interested. I wouldn't be interested in it either. No, no you play with nature you get burned is all I have to say". Some Oweekeno residents were interested in learning more about sablefish; "I more or less agree. Depends on the way it's being done. I don't know enough about just straight sablefish sites to say yay or nay. I would like to learn more about that". While another stated. "Um, I don't really know a lot about sablefish, but I know that they're an expensive fish to buy. I don't know enough about it to comment on it, just that they're not trying to cram those pens too full you know. As long as it's done sustainable and that these wouldn't be plugged solid with sablefish, they'd have room to have a healthy life".

Discussions about sablefish were had with participants from Haida Gwaii as well. In Skidegate, one participant answered, "I have no idea what our Haida … we are open to opportunity, we are open to opportunity that is not going to detrimentally affect the environment, it's sustainable. So that's a good question that you've asked me. Is it all finfish I am opposed to? Well, really I was more specifically speaking of salmon. No one's ever, the dialogues never happened around black cod". Another participant wanted more information as well. They said, "Well I don't know a lot about sablefish farming, I like the end result the product I think it's well suited. I haven't heard of any of the issues that is plaguing the salmon farming industry, I haven't heard of sea lice, but possibly that's because it's done on a much smaller scale. I don't know enough about sablefish aquaculture that sablefish don't do well in closed pens, perhaps they do. But I don't know what is needed in raising sablefish, are antibiotics used? Is anti-fouling material used on

the net to prevent biological fouling like fish pens, which copper sulfate and all sorts of toxins are used. So that's an important factor. And, um, along those lines I mean are there any diseases of intensive culture of sablefish, is it a species that does better in a small closed area? And the biggest question is what do you feed them? Commercially made feeds? I think we would be better off investing our money, our efforts in building hatcheries to create sablefish smolts, fry whatever they call them and putting them back in the ocean and using the broodstock from those area. The deciding factor of how we do things in aquaculture should be lets mimic Mother Nature. So let take sablefish females and males, lets spawn them out, help them that way and protect them in their initial stages in their growth from predation and then throw them back into the ocean and let the wild fishermen catch them". Other individuals from Skidegate was familiar with sablefish farming, saying, "Yeah I don't know how active they are doing it now, but umm, we were just talking about it actually a couple weeks ago. A guy said it's an incredible opportunity and I don't know what a black cod diet is. I don't know much about it. If we can do something to raise black cod in a more natural environment it would be great. I would be interested in the sablefish, the black cod that would be pretty awesome" and "From what I understand there's a lot of challenges with the larval rearing, getting survival rates up. I think they're kind of sensitive to light because when we walked through some of the larval tanks we had to just wear a light up top. They're a deep water species right, they get limited light down there probably. I'd be more into that than the salmon farming. With sablefish you probably won't get as much as a backlash right, in terms of if you try to push that idea in the north. So I think that's a great approach too because obviously there's not as much controversy, I don't hear sablefish being mentioned much. I don't

know enough about sablefish and culturing them, other than the larvae they need a lot of dark, you are putting them at a level of water they aren't naturally adapted to, so you will probably have a higher mortality rate than naturally, perhaps I don't know that though. Um, then you know the fish would obviously attract sea lions and seals".

In Massett, participants were also asked about their thoughts on sablefish. One response was, "I think it would be a tough sell, I think even though it's more of a holistic, is the right word, more encompassing, more of a broader … I think people might be more willing to listen to this more than salmon. Yeah you know, people might not be opposed to the black cod, black cod is a delicately right". Another participant mentioned the high value of wild sablefish, saying, "I don't know about farmed but wild on hook and line it's about $5 to $7 a pound, like consistently". Another expressed interest in farming the species; "I know that there's people looking at it, actually they have for quite a while. I think there's a couple of spots they're actually doing it. So that's the kind of thing that I, there's some fairly high tier, I don't know how to describe it, kind of academic institutions that are looking at it doing the sort of ground work on it. But we'll definitely keep our eye on things like that, like that's, that'll be something to get into those. If we can do that kind of things it's not hurting things, it'll add more depth to your organization. But then again, I don't know, it's getting fairly near the finfish stuff".

4.3.3 Seaweed Aquaculture

Most people had never heard of or considered farming seaweeds commercially, however they were supportive of the industry or did not see any major problems with it. There was mention of spawn-on-kelp operations in Oweekeno and Haida Gwaii that were mainly for local use. As a result, there was less conversation about this type of

aquaculture. Some questioned the commercial viability of the species and whether the capacity exists in the communities to benefit from this type of aquaculture.

In Oweekeno Village, a participant commented, “I wouldn't see a problem with seaweeds. It’s something that we use pretty consistently”. Another was more optimistic, saying, “Oh I think that’s wonderful. They do roe on kelp up here so I think seaweed is a great thing to grow anywhere because it’s something that actually helps the oceans. The community were very pro the seaweed”. Other Oweekeno residents were less familiar with farming seaweeds but still optimistic, saying, “Um, I don't really know a lot about farming seaweeds, but I mean if it’s done the same way as, as aquaculture, you know, mussels and stuff like that, if they're just planting this stuff on the rocks and letting it grow natural than why not? But when they start to have to fertilize or, putting in antibiotics or whatever, you know I don't know. I think if they let it grow natural I’m all for it, but if they've got to fertilize or anything like that than what does that do. Organic is, I think the key to the whole thing, in my mind” and “Seaweeds? Farming? I've heard of doing it, just, I don't know. I've never tried seaweed that had been harvested, wild I guess ... just go pick it ourselves. All natural I guess. Natural resource I guess. I know when I lived in Vancouver a few years back I wanted seaweed and I looked in the stores and saw little seaweed patties about this big, bought about ten of them”.

In Skidegate, participants were generally positive about farming seaweeds, but indicated that they needed more information about it. One participant talked about their seaweed and kelp fishery, “You know that big old ugly building with that big round tank in Massett? That’s a kelp plant. That thing was built, I don't know if it was ever opened, they built it and got all the money, they were going to go out and harvest all the kelp and

I don't know if it ever ran. But there it sits, it's a kelp plant". They explained "I know seaweeds are really depleting on Haida Gwaii. I don't know what it is but we used to have these massive, massive kelp beds and now there's not that many. We also have a roe-on-kelp fishery. Well, we don't have a roe-on-kelp fishery but those mainland license holders come to Haida Gwaii to pick their kelp and we don't want them coming here to pick kelp. It's great for urchins, Haida's love eating it. I know that when, that radioactive fallout happened in Japan, kelp played some sort of role, I know that they were measuring the kelp right away to see if there were any radioactive things". The participant also wanted to know if there were any financial benefits to growing kelp. Another Skidegate resident was optimistic about seaweed culturing, saying, "I think that kelp production here holds tremendous potential and you know more and more people are aware of the economic benefits of kelp in our diets, so, and at the current growth we cannot believe that were going to satisfy that with cattle, chicken, and pork and salmon as we have, we are going to overwhelm the planets ability to produce protein. So we're going to have to look at different sources, you know we are going to be eating more and more plants, there's no doubt about that, and the planet I think is tapped out with plant making capacity. I think we're going to be looking at the ocean, and Asians have been doing so for millennia". Another Skidegate resident echoes this, saying, "I've never cultured [seaweeds] so I have limited experience there. But you know from what I read there's potential. Um but it's just research level, so. I know in Asia, China, and Japan they're, like, *the* leaders in the world with seaweed culture". Another Haida Gwaii resident from Skidegate also tells of the decline in kelp and their previous experience with the spawn-on-kelp; "I always see these guys talk about the kelp forest, we gotta do this for the kelp forest, go kill off the

sea urchins, well they know nothing! You know, here's a guy who spent 30 years in and out of the water, travelled up and down the whole BC coast, did a whole pile of things in my life and I see these donuts come up with these hair brain idea thinking they're going to cure the problem with the kelp. Well kelp, like everything else has a cycle. We have seen some really hard years with the sawn on kelp operation where we couldn't get the kelp that we needed, and were dealing with the *macrocystis* kelp at the time and we had a really hard time with the kelp because young kelp it peels, and that's not part of the market.".

In Massett, a participant tells of how seaweed has been thought about as an industry; "Seaweed, it's an interesting one, it has come up. We haven't really talked seriously about it yet but it is, we're aware that people do grow seaweed and we've certainly got the area to grow it and nutrient wise. It won't grow as fast as in California or anything, I hear the pacific kelp will grow a foot a day down there but they've got a bit more warmth than us". They continue to tell about the seaweed processing plant, Seapak, located in Massett, however cautions that "it's sort of very tempting for processors to locate on Haida Gwaii because we're right in the middle of the fishing grounds, but you always run into freight problems". Another Massett resident also shares about Seapak, saying the species harvesting are *lamenaria* and *macrosystis* and used for various products. They also say, "There's a lot of kelp around. I don't know enough about it. Bad part about the kelp is that it provides cover for juvenile rock fish. I don't know enough about it to say whether I like it or not. I could see issues with it, that been said I don't think they are insurmountable". When asked what kind of issues, the participant answered, "Just because it provides habitat, they all grow at different rates and some are

able to regenerate quite quickly. I've been told bull kelp has been known to grow two to three feet a day or something like that, some crazy amount. And I know there's some other kelps where my biologist has told me the *lamenaria* are a lot slower growing right, so. It would depend. Problem being the main issue I have is that there is so much sea urchin around that it has to affect the amount of kelp around here, in turn affecting the amount of rock fish around". I asked the individual would those issues still be there if you have it in a closed system? They responded, "There's an interesting concept, yeah I know what you mean. Like a smaller kind of, yeah. It probably, yeah, you probably could find areas where it is closed, or it wouldn't be that much of an issue. I've done diving also so I've done a lot of swimming amongst kelp and what not so even if they're just a little bit…there's a ton of life around there, so I don't know". Another participant simply said, "Um I've heard of it but haven't heard really much about it". When asked if they would see any issues with it? They responded, "I don't know...I'd like some literature on it; see what it entails and everything".

4.3.4 Integrated Multi-Trophic Aquaculture

"So we're going to rape and pillage the coast and now we're going to call it Integrated-Multi-Trophic Aquaculture? And next week we'll call it a new name, and then another name"

(Personal Interview, November 2012)

When directing the conversation to Integrated Multi-Trophic Aquaculture (IMTA), I first showed a diagram of the Kyuquot Seafoods SEAfarm model (Appendix D). The SEAfood System uses ecological design, system innovation, and best organic practices to meet the challenges of attaining environmental and socio-economic sustainability. Technically, the SEAfood System considers three major aspects in its design: (i) nutrient, or waste removal and use; (ii) reduction of the operational

carbon foot-print; and (iii) integration of certified organic management practices (SEAVision Group, 2011). I then asked if the participants had any initial reaction or response to the system. Many responses were positive; however there were also noted concerns as well as respondents requesting more information. Three participants had heard of IMTA previously, for the other nine participants this was their first time hearing of the system.

4.3.4.1 Positives

Many respondents spoke positively about IMTA or mentioned positives about the model. Some of the positives that were mentioned surrounded the ecosystem-based approach nature of the model including the nutrient absorbing, or "cleaning" by the species, the organic, local, and sustainable approach, and the diversification of species. This section will discuss the three community's views on IMTA.

The IMTA system was very well received in Oweekeno Village. After initially reviewing the handout explaining the model, participant's responded: "I mean it speaks everything it should speak, I mean as First Nation people always say, we're stewards of our land and our sea, um, to me this is good stewardship. I don't see anything wrong with it or any negatives with it, as far as I can see". Similarly, one participant previously familiar with the IMTA model, says, "Well I absolutely love this system. I think this is the way that we're going to have to go to be able to make it safe and stable for communities especially First Nations communities, just amazing". The same participant discusses further, "Something like this you can agree to, anyone can see the benefits to something like this. And if you look at the studies I don't see an impact it will have on the areas. It's worth the cost. Not to mention when you finally get everything to

production the sablefish are going to be worth twice as much as the salmon stocks are. So you can have half the size of farm but still produce quite a bit of money. I believe this is the way to go. I think it's feasible for any Nation to do it and I think the Government should assist the First Nations with things like this because it's going to protect culturally sensitive areas; it's going to protect food fisheries, especially in a place like here where we sometimes cannot have a plane for two weeks. And not to mention partnerships, I mean to see a lot of First Nations get together. So looking at something like this we can have the central coast all the way up to the Charlottes working on something like this, which we've done with scallop farming before, which would have been feasible if the Government had continued the project and the funding been possible up to first production. We would have been able to harvest and we would have been on our own, and it would have been quite good actually".

When inquiring deeper about what participant's liked about the system, several responses considered the nutrient recycling or the "cleaning" factor, "I do like the idea of using all of the excess from one to feed the other and it looks like it will do a lot of cleaning up of itself just with filtering in all of the waste from all around. That I really like, that you're using the leftover of this to feed these, and using these to filter out what comes out through there. I really like that idea" and "Well it's the fact that you're not actually causing any real pollutants. I mean your filtering out anything that gets done, there's no chemicals added, no antibiotics, no, you know, reduced carbon footprint is always nice. I mean you're going to end up with some fecal column coming down, but a lot of it is filtered out" while another notes, "I like the idea of using all of the different kinds of fish. Or not necessarily just fish all the different kinds of farming to use up the

excess nutrients that are in the water and everything else like that". Economic diversification was mentioned by Oweekeno participants as a positive of IMTA, as one interviewee says, "I quite love that [multiple species] not to mention you get different years of growth rates, so I mean whereas your Japanese scallops might be ready in 4-5 years, cockles 2-3 years, so you've got different years where you can be harvesting and replanting and that's quite nice too".

Another major positive for Oweekeno people was the sustainability of the IMTA system and using local and organic practices. For example, one resident says, "I mean it speaks to everything that it should speak to, sustainability, ecology, organic, um you know, I mean I think organic to me means no fertilizers and all that kind of stuff. So I mean this all speaks the right language to me. I know if you crowd anything too much, whether its human beings or chickens they're going to get sick. You know, that they're not trying to cram those pens too full. As long as it's done, and I think if the word sustainable is there, these wouldn't be plugged solid with sablefish, they'd have room to have a healthy life". Along the same lines, another participant responded, "I like that idea, of not using any of the chemicals and antibiotics and being able to reduce the waste load, that I really like". Culturing local species was also a positive that several people mentioned. One participant says, "You know, that this is all local, local produce if you want to call it that, shellfish, or sablefish, you know that's wonderful. Because there's no sense in, we've got enough foreign species in our world today that we don't need to be adding more". Another says, "I mean with fish farming you're looking at Atlantic farming in the Pacific Ocean, I mean aside from using Japanese scallops you're looking at pretty much all local species, you're not looking at any cross contaminations or any

issues of sea lice you get with other farms, fish farms, this is a huge step forward". Lastly, a participant says, "It's something that's definitely worth looking in to, especially because they are local species. If there is an escape it's not going to lead to an invasive species".

Skidegate participants also had quite positive responses to the system. One participant who was previously educated on the system says, "I've liked it since I first heard about it. It makes sense, like why grow one when you can grow lots and utilize every hectare of your tenure. It would be nice to see it fully functioning. I'd say this is the future for sure, I can definitely see this being utilized more". Other Skidegate participants respond positively towards the system, however, with concern for the finfish component: "It'd be exciting to see this all work but one thing I'd be concerned about is the environment around the finfish, it doesn't matter what kind of fish" and another participant's initial response: "Oh, cockles, there's urchins, these are the new species of scallops that they're growing here now, and Pacific oyster, huh neat. Well the rest of my Haida people would probably be more than willing to listen to anything except for salmon finfish. Don't even talk about it, don't even mention it". While another responded, "This is, I don't know, a very sound approach to developing sustainable aquaculture there's no doubt about that. It exploits the symbiotic relationship between the species. The approach is a lot healthier ecologically or environmentally than how they're farming finfish right now, or salmon farms. There's no doubt in my mind that this is a better solution".

The relationship between the species was mentioned several times by Skidegate participants, and seemed to be a big positive for the system with the nutrient recycling

and ecosystem based approach. One participant, while looking at the IMTA diagram, responds, “Ohh, like an entire ecosystem”, and goes on to say, “You know, and I get how the waste, the ammonia or whatever, the nitrogen gets sucked up by the plants, and they grow fast as a result”, while another participant says, “You should have a diverse, what do you call it, because I think you know, they could feed off each other’s discharge, it’s a natural thing eh”. One respondent explores the interaction of the system, “It exploits the symbiotic relationship between the species. If you’re going to conduct aquaculture you’re doing in this approach you’re producing food for the various species and the various species are producing food for the original start of the chain which is the seaweed so there’s no doubt in my mind that this makes sense, I mean you’re basically mimicking what happens in Mother Nature”. They further say, “I see it working in areas where possibly, naturally there are no sablefish to be caught wild, there are no sea cucumbers to be harvested wild, in other words in areas for one reason or another Mother Nature hasn’t been able to establish these species on her own, to make this a remedial approach to waters that aren’t as healthy cause it all works together in this wonderful symbiotic relationship”. They suggest another area where they see IMTA being successful, “And certainly in remote areas, um where having a system like this set up will enable them to not go out on a boat and fish 100 miles away and not harvest cucumber 100 miles away. You do this in their front yard”.

Participants in Massett also had positive responses towards the IMTA system. “This is interesting, this is very interesting. This to me makes more sense than just doing one thing in an area, especially having the sea cucumber below. They’re foragers right, so it just kind of makes sense. It’s a great idea actually; it’s good that they are doing pre-

commercial R&D". Another respondent replies, "I think that's an awesome way to look at it. I mean the philosophy's great; it'll be really interesting to see. I think they're on to something for sure, and I think that's awesome". In one conversation an interviewee suggests this approach will be more agreeable to the public, "The fed component, sablefish, organic extractive component, filter feeders … this is a very interesting concept. I think people would buy into something like this". Another Massett resident shows interest along with precaution and hesitation, "We'll be keeping an eye on this to see how that works out cause if that works out that'll be great. You're kind of taking care of your own problems and also some of your problems turn it some of your benefits, but it's got to work".

Massett participants also noted specific positives they liked about IMTA systems. The ecosystem approach was referred to several times, with statements such as "I like this idea of, you know, getting one species to help with the aspects of the other species, yeah, I mean this is invaluable research because it's the way we have to go. Good stuff" and "I think even though it's more of a holistic, is the right word, more encompassing, more of a broader. I think people might be more willing to listen to this than salmon farms by itself, or even, you know people might not be opposed to the black cod, black cod is a delicacy right". As well, economic diversification was mentioned as a positive, with the ability to culture and harvest multiple species. One participant says, "On the early investment side, it's the diversity that will probably ensure it to be successful, less likely to fail". Further using local finfish species was mentioned as a positive as an individual states, "The fact that even if the black cod got out they wouldn't be competing

with the indigenous stocks because they are already local, I'm thinking people would probably buy into it".

4.3.4.2 Negatives

> *"As you've witnessed the storms on Haida Gwaii aren't you're ordinary types of storms, so when I'm in hurricane force winds and I see my neighbor's garage move from its foundation, I can tell you right now that it will not work in possibly 95% or a very high percentage of the waters in Haida Gwaii"*
>
> (Personal Interview, November 2012).

The negatives surrounding IMTA were mainly directly towards infrastructure issues and the capacity to undertake such a system. Oweekeno and Massett participants did not mention any direct negatives about IMTA, these were only discussed by Skidegate participants.

Concerns about the system as discussed from participants in Skidegate raised the question of how IMTA infrastructure will work within the environment of Haida Gwaii. Referring to the storm mentioned in the quote above, one participant says, "There's quite a bit of infrastructure involved. The challenge I see with this is that exposure to the elements has always been my biggest concern with rafts or any infrastructure that's required to pursue aquaculture. I've yet to see a raft system that is not vulnerable to the surge, to the wind, to the tidal action, or to the waves and until I do I'm not going to put a lot of faith in it". Another participant comments on disease, "You know what the first thing I see let me give you quick feedback. If this one gets disease it's going to go through all of them. That's the first thing I notice when I look at that".

Participants in Skidegate were most concerned with capacity, as several interviewees spoke about their concerns of mainly, human, expertise, and infrastructure capabilities. Human capacity in this community appeared to be a concern for several

individuals, as a participant explains, “The capacity is here. The capacity’s anywhere you want to work. It’s finding the people that want to do it, that’s where there’s no capacity and you have to develop that. And it comes down to developing trust”. Another participant refers to the need for more expertise in the community, “You’re going to have to do a lot of training not just on one species but many, and they each have totally different life cycles. It’s not like if you know one you know them all, you pretty much need a biology degree just to thoroughly understand each species, you’d need to definitely educate them quite thoroughly before doing any commercial level”. They further relate the capacity challenge to being in isolation, “Going for them all at once that’s just going to complicate matters in my opinion. We are such a remote location and getting expertise here is going to be a limiting factor right away and then the lack of experience here for people doing these jobs. If you were to try and do it at a commercial level it’s about having the expertise and then we’d be so isolated it’d be tough to get it to the market that would be a huge thing”. Commercial viability was also mentioned by another participant, “Well it sounds great in theory you know, but the whole thing is the feasibility of doing it commercially at the level you can make a profit and sustain yourself right. Well there would be challenges for sure doing it commercially you would have to start at a pilot level here just so you work out the kinks as you go, it’s not like oh were going to be making money get rich fast scheme”. Another response mentions commercial viability as well, “At what scale does this become commercially viable? I would say a very large scale, scale of economy right, so that’s the challenge that you have”. Marketing and processing capacities were mentioned by another individual as a concern as well, “Again you run in processing issues. It’s a whole other ball of wax to

sell it, and it ain't worth a penny if you can't sell it. So that's another aspect that needs to be addressed. If you're going to do this you have to create the marketing capacity as well, and that's a very interesting part of the aquaculture page". Building capacity was addressed positively in this individual's response: "Well I think there's interest and capacity to expand these kinds of industries, but I mean you got to crawl before you can start running here. And I'd say you got to start with something like [IMTA], smaller scale and then you know, get some money flowing where you are kind of sustaining yourself and then start to branch out. Start hanging some kelp off your lines too".

4.3.4.3 More Information

Many participants indicated that they needed more information on the IMTA system. Many questions were raised during the conversations, with most of the questions revolving around impacts to the environment including the scale of the farm and disease transferability, feed issues, and the economics and science behind the system.

A participant in Oweekeno wanted to know what kinds of impacts IMTA would have on its environment, and where it would be situated specifically in the area, "Is it sustainable within the environment? Is it suitable with all of these species? And then what is going to be running past it? Because I know around here a lot of the best areas for something like this would be where there are a lot of little islands and they're narrow channels so they would be exposed to whatever problems they may have". There were also many inquiries from Oweekeno people about disease transfer and the scale of the farms. One individual inquires, "And volume wise, is it a large volume? Like is there going to be the same problems that you end up with in fish because of the volume of cucumbers that are down below? Are they going to be more likely to get diseases, are

they going to be more stressed than wild species? Is this large scale, small scale, is it sustainable within the environment? Is it suitable with all of these species? I would just want to know about the volumes". Another participant raised questions about disease and scale, "I think I still would like to know what the increases in disease transferability are in say something like black cod, and the same thing with the amount of sea cucumbers? Is there going to be any, when you've got that much down there? Do you plant them or are they wild? 'Cause I know one thing that diseases do have a tendency to become more prevalent when they are more concentrated, because then they get more stresses on them". Other inquiries that were raised questioned the science behind IMTA, the current state of the model and the economic factors, "I think it depends on the volume and the science behind what happens to the fish. It alleviates some of the current problems but I'd have to know the science behind some of these other farms" and "So is this used anywhere else or is it just something they're looking at? And so what did they do with this product. Like do they sell it or does it go to a local market? I guess what I'm asking then is, so how is it working today?"

Questions raised in Skidegate were very similar to those in Oweekeno. Environmental concerns were raised by one participant who asked, "One thing I'd be concerned about is the environment around the finfish, it doesn't matter what kind of fish". Also, one of the major issues for Skidegate interviewees was concerning feed, and questions were raised on this topic: "The one thing I like about that is that I don't think you have to feed it. So how do you feed sablefish? [They use pellets]. Okay that's where the Haida would really struggle", and similarly, "Food availability in the waters of Haida Gwaii is not an issue, I mean it's amazing. Now you know the sablefish component and if

I'm saying correctly it's the feces of the sablefish that will end up feeding the cucumber. And that's another thing what will the feed be? I mean this is another man made intervention in the cycle right. If you did this in waters that don't have the adverse or the food/nutrient load that Haida Gwaii does than you would have to rely on this system because it is self sustaining in a sense". One of the participants familiar with IMTA poses, "As far as I understand [IMTA is] only at research level in BC. They're not doing it at commercial level right now, it's more on the east coast I've seen guys doing the mussels, the kelp, the salmon in the same spot kind of thing. Do the urchins and sea cucumbers eat the salmon waste? I know they eat the shellfish waste but do they eat the salmon waste? It'd be nice to see it fully functioning, like those ones in the Atlantic; don't they do them commercially there? Lastly, a participant says, "It would be interesting to know if the cucumbers, what percentage what they're eating. I know it's not 100% it can't be, there's got to be something going somewhere". Furthermore in Skidegate, one respondent felt they didn't have enough information to comment after I asked about the pros and cons of the system, "About this? Well I have no idea it's unproven".

Conversations in Massett also saw that participants would like more information on IMTA. Whether the system "works" was questioned by several individuals: "As far as environment, I think that the concept is probably a good concept. Whether it works or not will be, we'll find out I guess", and "Well if it actually works, from what I've heard and read on finfish farms is they're dead zones underneath". Questions surfaced about the system functioning properly as a participant said, "Also around here downstreams are, like, that's a bit problematic. We have roaring tides, like crazy tides, so what happens

when the tide turns? I'm not saying it wouldn't work I'm just saying it would have to be built differently". A participant also questioned feed usage, "The only thing I would be worried, not worried but uh, is what kind of feed, right. And how much of that feed actually gets to the bellies of the sablefish?". As well the economics of the system were questioned: "I don't know what stage this is at, like, if it's viable. Like is this a little operation? Is it making money or is it experimental level?" In Massett the science of the system was also questioned and perhaps doubted as participants said, "We'll definitely have to explore it and make sure that it does work and it's sort of looking after itself" and "It may work but I mean this is all just an experiment. They don't have really anything to back it up. For the people on the Island in general to even look at it they'd have to see something that has proven worked and had a non-impact on the environment. I mean we're trying to keep Haida Gwaii as pristine as it still is".

4.4 Summary and Key Concerns

The communities of Oweekeno, Skidegate and Massett, as with most central and north coastal communities, are unique to the rest of the Province. Their remote locations pose certain challenges for the communities, such as transportation in and out. However, it also creates the sense of "home" for these residents with a strong connection to their lands. As a result of the isolation, developing economic opportunities is difficult, and aquaculture has been considered by each of the communities as a potential viable investment. The interest has been mainly in shellfish and this industry has been attempted in the three communities, with scallops being the most successful in all three locations, although oysters and mussels also grew well. The main reason the operations have not reached a commercial level or successful level is mainly due to a lack of funding. The

concerns around shellfish were similar in the three communities, with most participants mentioning the lack of available and suitable sites, the risk of invasive species, access to markets, scale of the farm, and the fear of mismanagement.

Finfish (salmon) aquaculture told a different story as participants were generally very unsupportive of this industry. The concerns were again similar between the three communities. The main concern participants had towards this industry were environmental impacts (creation of "dead zones", impacts to wild salmon habitat, impacts to surrounding wildlife, escapements, chemical impacts), diseases and parasites (sea lice transferability, chemical usage, high net pen densities), health (unsafe for human consumption, fish health), feed (ratio, ingredients, use of smaller trophic-level fish), and management (lack of government support, lack of representation in consultations). Some participants mentioned support for land based, closed-containment systems, with the greatest level of support in Oweekeno. Most participants, however, were not supportive of any type of fish farming. Sablefish farming was not familiar to most participants and many wanted to know more about this species and what the major differences are between farming this species and salmon.

Seaweed aquaculture was not well known to participants; however there was some initial interest. Most participants wanted more information on farming seaweeds and had concerns about the commercial viability of the species.

IMTA was generally well perceived by participants. After being shown a model of the Kyuquot farm site on BC's west coast, most participants stated positives about the system and wanted more information about it. The major concerns of IMTA were similar to those of conventional farming methods, such as environmental impacts, feed, the

science behind the system, capacity, and if it actually mitigates current issues of salmon aquaculture farms. Most concerns surrounded the farming of the sablefish, as this species was often compared with salmon farming.

Chapter 5:
Discussion

This chapter analyzes the qualitative data presented in Chapter Four. The perceptions participants had towards shellfish, finfish, and seaweed aquaculture are discussed, followed by a section on implications for IMTA. The chapter is organized into sections based on the major themes and sub-themes that emerged through the discourse analysis and parallels with the format of the previous chapter.

5.1. Shellfish

Every participant in this study supports shellfish aquaculture to some degree, and each community (Oweekeno, Skidegate, and Masset) has attempted commercial shellfish aquaculture with scallops, oysters, and mussels. The species grew successfully in each location, but the scallop seemed to grow the fastest and largest in all communities. The communities are most interested in pursuing the culturing of higher value species, seen by their lack of interest in lower value options such as clams. The lower-value species were not as economically viable because of the distance from markets and processing locations that would reduce the profit margin.

A lack of funding seemed to be the main reason why Oweekeno's shellfish venture was not successful. There was not enough funding for the community to continue studying the viability of the industry and they were unable to maintain their operation. However, they are very interested in establishing scallop farming as a local industry, and are looking into the potential of geoduck aquaculture.

5.1.1 Positives

Oweekeno was very encouraging of future aquaculture development, indicated by several mentions of the word “opportunity” by participants. The major positives of the industry were the small environmental footprint, by not having to use feed, and having little impact on surrounding ecosystems. Some participants also mentioned the greater community being supportive of the industry, which suggests broader support and community buy-in. Shellfish aquaculture also has very strong support in the Haida Gwaii communities. Currently, the Haida have scallops and oysters growing and the communities are also involved with a geoduck aquaculture project, which many conversations mentioned. Skidegate residents indicated that the Haida have been interested in shellfish for a long time, and currently have several Haida-owned tenures for shellfish. Interviewees in Skidegate and Massett discussed shellfish farming in relation to finfish, with a far more positive view of shellfish in comparison. The support ranged from one participant saying the industry is “acceptable with acceptable parameters” to others saying it is “wonderful”. The word “opportunity”, and “creating opportunities” were also mentioned by several Skidegate residents and the industry was described as sustainable and that it wouldn’t be a major impact to surrounding environments.

5.1.2 Negatives

The major negative of shellfish farming that was mentioned by participants from each communities is the possibility of introducing invasive species. In Haida Gwaii, they have already experienced introduced oysters and the weathervane scallop (Lee, 2004), which was mentioned by several participants as a major concern. Mussels were also reported to be in areas where they were not previously, which were noted as a concern by

other participants. Participant's associated this with mismanagement, and several mentioned this as a serious concern. "It's got to be managed properly", a participant said. This was echoed in the other communities as well, as many of the resource-based industries have a history of being managed not in the best interest of the local communities. As Gerwing and McDaniel (2006) describe, many First Nations are weary of government involvement and multinational corporations having interest in their traditional territories based on failed past ventures in their communities. Participants mentioned the past mismanagement of particularly the forestry and fisheries sectors that many viewed as unsustainable, and are wary of a similar future. For example, a participant from Skidegate said, "That's the thing that scares me about some projects is that they're just so big, there's so much money. It looks good on paper but in reality I know it's not going to work out like the way they say it's going to". Many interviewees mentioned the history of companies harvesting resources in their communities unsustainably, without proper compensation or care for the environment. Management within communities was also noted as a concern, as some participants mentioned doubts over the shellfish aquaculture venture proposed for Haida Gwaii and the controversial iron fertilization experiment that occurred in July 2012, which sparked some distrust within the Haida Gwaii communities (Vancouver Sun, 2012).

5.1.3 Capacity

Capacity is lacking in several areas for these communities, which is one of the major challenges to creating successful industries. Remoteness and isolation are the main barrier to growth and development, which pose the issues of accessing markets and processing that was mentioned by respondents in each of the three communities. The

capacity to get in and out of the locations depends on unpredictable factors such as weather, ferry or plane schedules that can be unreliable and inconsistent. Another capacity issue that was mentioned is that the central and north coast of BC has a very rugged coastline, making it difficult to find available sites to host shellfish aquaculture operations. This is experienced in Oweekeno Village, where culturists have to travel a distance away from Owikeno Lake, a freshwater source, for suitable conditions. This presents additional challenges such as increased time, fuel costs and limited travel during good weather to sites. It is also a challenge for Haida Gwaii, as one Skidegate participant described a highly protected area that is unable to shelter a raft system, "The rafts are very much beaten up. They are on the beach, and yet it's one of the most protective areas in all of Haida Gwaii, in Kaygen Bay". Other capacity concerns were contingent on outside factors, such as access to seed and funding that, by these statements, appear to be lacking for remote locations. Greater capacity has to be developed in these communities in order to have a viable shellfish operation, especially in Oweekeno where the community is more isolated and without necessary infrastructure or amenities to host a commercial operation. One way of increasing capacity, as mentioned by a resident of Oweekeno, may be to partner with a neighbouring community.

5.2 Finfish

Finfish was perceived very negatively by most participants from each community. Most participants did not want to even discuss salmon farming and some were observationally uncomfortable doing so. Salmon (Atlantic) was the species most discussed, however participants were also questioned about their thoughts on sablefish.

5.2.1 Negatives

Participants raised several concerns about fish farming that are fairly consistent with literature reviewed earlier. Cubitt et al. (2008) describe the main perceived risks of BC salmon farming to include disease outbreaks, fish quality, wild salmon returns, fish waste, predators, farm escapes, and feeder fish population declines that are closely matched with concerns raised here. Similarly, a report titled Community Dialogue: Reflections of the Sea Around Haida Gwaii (Lee, 2004) states how the Haida community has positioned themselves and what their major concerns are:

"No salmon farming in Haida Gwaii waters – that is the overwhelming message in discussions about salmon farming. Like offshore oil and gas, most Islanders feel that the many risks associated with salmon farming – disease from overcrowding, sea lice, impacts of wastes, use of antibiotics, impacts of bright lights and scaring devices, escaped and surviving Atlantic salmon, uncertain impacts on wild salmon – are too great to allow open net cage salmon farming. The Council of the Haida Nation has kept salmon farms out of these waters to date and Islanders want to keep it that way. Islanders want to focus on wild salmon and ensuring that wild salmon populations and fisheries co-exist in perpetuity".

From reviewing this statement, it was not a surprise to find similar perceptions in this research. The main themes that emerged from this study regarding finfish aquaculture were environmental impacts, disease, heath (human and fish), feed, management, alternative methods of farming, and a discussion about sablefish. These are discussed in detail in the following section.

5.2.2 Environmental Impacts

Environmental impacts were a unanimous concern by participants. From the interviews, it was apparent there was great concern for the environment and the destruction of areas and habitats surrounding fish farms. It was stated from several participants that fish farms caused “dead zones” underneath farm sites, from fish wastes and other contaminants. As well, two participants have said they have seen this first hand. This was also a common public perception noted in previous studies; however, there is mixed evidence of this “desertification” happening in the scientific literature (Cubitt et al., 2006; Allsopp et al., 2008).Cubitt, Butterworth & McKinley (2008) explain that there is a degree of impact to the benthic environment and that little information exists of the recovery from these affects. Fallowing, or the removal of all fish and nets from sea cage sites, can reduce the accumulation of sediment beneath the cages, which is typically the process used to mitigate this issue. In BC, fallowing is achieved either by repositioning the cages or by alternately farming at two separate sites, usually for 12–24 months (one growing cycle), although it is known to have taken up to seven years to remediate a particular site (Cubitt, Butterworth & McKinley, 2008). Impacts to surrounding wildlife, including wild salmon, seals and sea lions was also commonly mentioned. Wild salmon in particular was of greatest concern for several reasons; mainly because of the risk of sea lice transferability and chemical pollution that were most commonly mentioned, which will be discussed further in the following sections. Impacts to wild salmon stocks were also discussed in association to escaped farmed fish impacting their spawning grounds, although this was debated in scientific literature. One participant connected salmon farms and the destruction of wild fish stocks to a loss of culture that makes for a powerful statement. This relates to the earlier discussion of the aquaculture industry being

described as a “cultural genocide” and the connection First Nations have with the land and resources they depend on for cultural survival (Young & Liston, 2010, p. 1056). Similarly, another participant emphasized the greater value they placed on wild salmon over farmed fish, and their community’s dependence on indigenous stocks. As Lee (2004) states, several Islanders from Haida Gwaii have related salmon farming to the oil and gas industry, comparing the risks each industry poses. Likewise, three participants from two of the communities also related commercial aquaculture to oil and gas, in particular the Enbridge pipeline saying, “It’s kind of the same thing as Enbridge, the same package. And we don't like either one of them”.

5.2.3 Disease

Many respondents mentioned disease as one of the main concerns of fish farming; however the concern was mainly over parasitic issues, with those terms being used interchangeably. Several associations were made between the transferability of disease and sea lice to wild salmon stocks. Evidently, this is a common perception among the public, as it is also discussed in depth in the reviewed literature. However, this interaction is also debated in scientific circles, especially as to whether farmed salmon actually transmit sea lice and whether the extent is great enough as to have an impact on the wild stock (Brooks, 2005; Cubitt, Butterworth & McKinley, 2008; Krkošek et al., 2006; Morton, 2004; Naylor et al., 2010; Torrissen et al., 2013). Nonetheless, the perception gathered through these conversations is that any impacts to the wild stocks were unacceptable to the location population.

Associated with the concern of disease transferability was the density of salmon being cultivated in net pens, as well as using Atlantic salmon that was thought to create

conditions to increase or breed disease because it is not natural to the Pacific. This thought was related to agricultural practices and the idea of "free range" animals, which create a healthier product, versus high concentrations of animals that produce "nasty", unhealthy, and diseased outputs, also paralleling the idea of the Blue Revolution versus the Green Revolution (Economist, 2003). Participants also said the high densities in pens lead to excess usage of chemicals, which ultimately end up in and impact the environment and are harmful for human consumption, although chemical use is highly regulated in BC and was shown to be used much less than in other countries.

The language used by the participants to describe their thoughts on disease is also important to note. Words and statements such as "nastiness", "asking for trouble" "horrible" and strong statements such as "the Nation does not approve of the amount of risks", "there is a war going on" and referencing the Cohen Commission to support their thought describes and emphasizes the seriousness of the attitudes towards the topic.

5.2.4 Health

There were several concerns from participants about the health of the fish and the safety of the fish for human consumption. One individual told his experiences of hearing about fish having double heads and tails, and wondered if that would affect humans, especially child-bearing women, after consuming. The same individual also associated the mass production of animals with high levels of obesity and cancer, and the need for First Nations to go back to a traditional diet to combat these issues. This echoes many statements made in this research and previous studies; for example Stanley Hunt ('Namgis First Nation) stated: "Our people are dying because of a lack of access to our [traditional] food, and that's all it boils down to. I've had so many friends who have

passed away in the last seven or eight months because of cancer, diabetes, you name it (Spoken at Alert Bay, BC; taken from Young & Liston, 2010). Another participant was concerned about the amount of chemicals in the farmed fish and believes it wouldn't be healthy for humans to consume, despite the CFIA certifying each fish farm and product safe for consumption. A participant in this research sent back their meal after being served at a restaurant because it was "mushy" farmed salmon. Another wondered about the health and quality of the fish, particularly not being able to swim freely or exercise properly. Evidently, although farmed fish is sold in most major grocery stores, it is a common concern that farmed salmon is unsafe for human consumption or may cause serious health problems, as over half the respondents mentioned these concerns. Health in remote communities and to First Nations in general is a serious issue and widely discussed, which may be one of the reasons fish farms are being viewed through this lens. However, farmed fish and health can evidently be debated as one study concludes: "[Salmon] diets optimised only for growth or produced at lowest cost may not necessarily result in optimal fish quality most beneficial for human consumption" (Hunter & Roberts, 2000, p. 1051). The statements being made by some of these participants are speaking of critical illnesses, such as cancer and diabetes, and associating them to farmed fish. Whether there is evidence of this linkage or not, as it has been previously mentioned these communities are intricately connected to their environments and, thus, if the health of their ecosystems is impacted, consequently they will be too.

Participants also talked about maintaining a traditional diet and fish farming appeared to be a barrier to achieving this. Individuals stated numerous times they would not want to eat affected or diseased wild salmon and individuals who choose to eat

farmed fish rather than the natural wild fish were seen to be straying from the traditional foods. Most of the concern was on the fish farms impacting the wild stocks, and by not having access or availability to that food source, it is perceived as a threat to maintaining indigenous health and culture, which some participants of this study believe is the case.

5.2.5 Feed

Feed issues were a major concern for many participants. There were several points discussed, a main one being the conversion ratio of the amount of feed it takes to produce a farmed product. Some participants had unrealistic or out-dated ideas about the amount of wild fish it takes to produce a pound of farmed fish, stating 3:1, 5:1 and 7:1 ratios. Today, the actual amount has fallen below a 1:0 ratio (Klinger & Naylor, 2012). Small pelagic fish are highly valued in coastal First Nation communities, such as the Pacific herring and Eulachon that are traditional foods (First Nations Health Council, n.d.). In fish meal and fish oil, these lower trophic-level fish are reduced for use in aquaculture feeds, factoring around one-third to one-quarter of the global fish catch, while simultaneously facing major declines in wild populations (Klinger & Naylor, 2012). Many participants saw this as unsustainable and a counter-productive model, calling it a “robbing Peter to save Paul” situation (Personal Interview, November 2012). Another participant was concerned about substituting vegetable proteins in the fish feeds and losing some of the health benefits one receives form a natural diet. There has been advancements towards fostering alternative feeds to create new lipid and protein sources for use in aquaculture. The range of plant-based protein concentrates suitable for aquafeeds includes products from barley, canola, corn, cottonseed, peas/lupines, soybeans, and wheat. Of these, soy-protein concentrates dominate the commercial

market. Burr, Wolters, Barrows, & Hardy (2012) produced a study showing that recent feeding trials revealed that after the early juvenile stage, Atlantic salmon can grow just as well on all-plant protein diets as on combination plant-animal protein diets. They report that during the past decade there has been a rise in the use of plant proteins, as well as a rise in the use of plant oils (e.g., canola, soy, flax, and palm oils) and other animal by-product meals and oils being used in aquafeeds (Klinger & Naylor, 2012). Relating to some of the concerns expressed by participants, Klinger and Naylor (2012, p. 257) state that:

"*plant-based oils are an attractive fish oil substitute because they can be produced in large quantities to meet current and future demands by the aquafeed industry. On the down side, however, vegetable oils do not contain LC omega-3 fatty acids; instead, they generally have high concentrations of the short-chain oleic, linoleic, and in some instances α-linolenic acids. The shift from LC omega-3 oils to oils containing short-chain fatty acids in fish diets has negative implications for both fish health and consumer health. As a result, terrestrial plant oil and fish oil blends are commonly used in commercial aquaculture diets, with the blending ratio determined by price, stage of production, and desired consumer outcomes*".

They continue to say, "Genetic and metabolic engineering techniques can also be used to achieve the benefits of LC omega-3 fatty acids with various other plant-based feeds" (2012, p. 259).

"Scary" was the word a participant used to describe their concerns of how salmon feed is produced. They described how they thought salmon morts, or dead farmed salmon, were being fed to live farmed salmon, although they did not know the extent of

how much that was happening. There are no studies to prove this; however, similarly "a growing volume of aquaculture processing wastes are now being used in aquafeeds in many locations. Although data on the global production of fish meal and fish oil from farmed and wild fish and shellfish by-products are not readily available, it is estimated that ~6 mmt of trimmings from food fish are used for this purpose and that roughly one-quarter of commercial fish meal is now made from fish processing wastes" (Klinger & Naylor, 2012, p. 260).

5.2.6 Management

Management was a major point of contention for most participants. Concerns ranged from a participant stating they would like to see stricter regulations for the entire industry to having concerns with individual business partners. The discontent seen in the interviews supports McDaniels, Dowlatabadi & Stevens (2005) claim that much of the controversy in BC arises at the local level. Discontent was mentioned over the neglect DFO had in these territories and not having or relaying the necessary information to properly manage wild salmon stocks. Another major concern that was mentioned was that DFO had a conflict of interest in managing the wild fisheries as well as having a stake in the productivity of the aquaculture industry. Several participants from the various communities said that the DFO was acting as a barrier to economic development rather than being helpful. Especially concerning the shellfish aquaculture industry, several mentioned that DFO is not engaging or helping their Nations in establishing ventures. Consequently, they describe the DFO as acting as "red tape" and a "handcuff".

Others mentioned the need for better regulation regarding wildlife and the protection from the harvesting of wild species, namely abalone, urchins, and salmon. The

need was also mentioned to label farmed fish on products that they describe the government being “unwilling to support”. Another specifically says from their first-hand experience that salmon farms need stricter regulations. Interestingly, the aquaculture industry is one of the most regulated industries in Canada, which then draws the question of what, or who, is the industry being managed for? Economic or social benefits? From literature and research on the social aspects of the industry, there is little effort being done to placate the negative resistance to the industry. Conversely, the government has recently relieved the moratorium on the industry, meaning it will likely to expand despite strong social resistance and unresolved issues. For these reasons, one could assume the industry is being managed primarily for economic purposes. As a participant says, “All they care about is their shareholders and they are engaging with First Nations but only as token partners so they can push through their political agenda”. Evidently, mismanagement is a key theme that First Nations feel needs to be addressed.

Consultations were mentioned by the majority of participants as being insufficient and that First Nations were not being represented in management decisions. “They can come in and talk to you all you want but they aren't necessarily going to change their decisions”, is what one participant from Oweekeno said, while another said the nature of consultation with big companies is “it’s not consultation at all, its dictation”. This is similar to other literatures that agree First Nations have not been represented and that government actions allude to colonial attitudes by “dictating” instead of consulting. A participant expressed doubt in the process as they said TEK was not citable, and therefore was not taken into account during decision-making with the eulachon fishery. A participant in Massett said “there is a long history of this stuff”, describing the red tape

with the government, but they also said it's time to work together to make things happen. One issue that was brought forth from the interviews was the lack of funding for the consultation process. A participant described how First Nations tend to fund consultations from money gained from putting their land into conservancies; however, this means that the land is no longer eligible for any economic development which then limits the Nation's opportunities. Perceptions were very similar in Haida Gwaii, in both Skidegate and Massett, where most participants said they did not feel represented in management decisions. A participant from Skidegate described their working relationship with Canada and how they feel they don't participate in meetings, which is evidently frustrating. Others believe that this type of relationship is intentional, saying, "Every time we start to make headway with the minister, there's a change and it's just to keep the status-quo because they really don't want to hear what the people say". This perception of poor government relations is felt elsewhere on the coast, for example, as described in the Ocean's Falls protest in Chapter 2. Similarly, it is stated in Lee's (2004) report that "Islanders want more say and accountability of salmon fisheries management around Haida Gwaii". The government, as well, has admitted the need for a better relationship with First Nations and have stated they are adopting a more holistic, integrated approach to management with emphasis on greater inclusion of communities in decision making and working together (DFO, 2008; Province of British Columbia, 2008). From these interviews, however, this has not been seen in practice. The majority of participants in this study are not satisfied with DFO's management regime or effort or consult with their communities, with concerns mentioned in regards to aquaculture, as well as other resource-based industries.

5.2.7 Alternatives

When discussing aquaculture with participants, alternative farming methods were often mentioned. Land-based, closed containment systems were the most popular method mentioned, with participants saying they would support this method over open net pens. Four out of five participants in Oweekeno mentioned some level of support for land-based closed containment, however also mentioned the need for smaller sized operations, value-added, and sustainable practices. In Haida Gwaii there was far less interest in any form of alternatives. One participant from Massett mentioned an interest in land-based closed containment, while another participant from Skidegate mentioned that they didn't approve of close-containment because "even though it's better, it's not the solution because you still need to feed them" and noted their preference for open-water ranching with sablefish. The major issue with land based systems, however, is the amount of energy it consumes. For remote communities that only run on diesel or gas generators, such as Oweekeno, this is an issue. Not only would is this power source inefficient and unreliable for a large project, it also becomes exponentially expensive, which poses some challenges for this alternative. Some participants were interested in the 'Namgis land-based project and wanted to see how successful that system is.

5.2.8 Sablefish

The participants were asked their thoughts on sablefish as it is the species being used in the west coast IMTA farm. Many participants were not familiar with the farming of this species and, in some cases, were hesitant to respond due to this unfamiliarity. Most participants, naturally associated sablefish farming with salmon farming. For participants in Oweekeno, concerns were similar to salmon farming as they mentioned it would depend on the amount of waste it produces, disease and parasite transmission, high

pen densities, and the sustainability of the operations. Three participants said they didn't have enough information on farming this species to say if they approved or not, while one participant said they were not interested, saying, "you play with nature you get burned is all I have to say".

A participant from Skidegate who originally said they were very opposed to finfish farming, said they had never heard of farming sablefish. After being asked their thoughts on sablefish, they began asking a series of questions and said they would be open to opportunities for sustainable ventures, which perhaps shows a change in attitude towards being against farming *all* finfish. Similarly, another resident said they would be interested in sablefish if it could be raised in a more natural environment. Concerns were similar to Oweekeno's, as one individual compares sablefish farming with salmon farming, mentioning concerns of sea lice and scale. Another individual asked several questions related to sablefish farming in the IMTA system concerning antibiotics, anti-fouling material used on the net to prevent biological fouling, such as copper sulfate, diseases, and feed. The same participant also mentioned the range of the sablefish, alluding to a concern of the natural range of a wild sablefish compared to the fish being contained. Another individual said they would be more interested in salmon farming over sablefish; however, because of the controversy and poor public opinion on salmon farming they think sablefish would be a better approach. Several participants also mentioned the price of wild sablefish, noting their higher value, which may suggest support as well.

Participants from Massett had mixed perceptions on sablefish farming. One was opposed to any type of fish farming, while another was more interested, saying they will

"keep our eye on things like that". When another resident was asked if people would be interested in sablefish they responded that their community would probably be more willing to listen to this more than salmon, but it would still be a tough sell.

5.3 Seaweed Aquaculture

Many participants wanted more information on seaweed farming before commenting on this topic, however, most seemed supportive of the idea. Most participants were not aware that seaweed was farmed commercially although sounded optimistic about potential opportunities and benefits. Perhaps seaweeds have not been thoroughly considered as a commercial commodity in these communities due to the species holding lower economic values compared to shellfish or finfish that participants mentioned being a crucial component for success in remote locations.

In Oweekeno, where they harvest seaweed annually for roe-on-kelp, each participant mentioned positives. Three out of the four participants were not aware of farming seaweed commercially, however after thinking about it one said they wouldn't see a problem with it, another said they would be for it if it was done naturally and organically, and the other said they can just go pick it themselves, but they like the product. Another resident from Oweekeno said they thought it was "wonderful" because it can grow anywhere and "actually helps the oceans". The same individual also thought the community would be very pro-seaweed farming.

Perceptions were similar in Skidegate as most participants were optimistic but were not aware of the commercial industry. Two participants in Skidegate talked about the decline in wild kelp stocks in Haida Gwaii, while one said they thought the industry holds potential. Positives of seaweed that were mentioned was that it can play a role in

radiation monitoring, the Haida love eating it and it provides health benefits. Two individuals mentioned outside influences, such as people coming to the Islands to pick kelp, perhaps alluding to wanting more influence over the management of the resource and protection over it that reflects the concern in the decline in the species as well.

In Massett, participants talked about the kelp processing plant, Seapak, however warn that despite the temptation for business to locate on the Island due to the close proximity to fishing grounds, freight problems frequently become an issue. Another participant expressed a concern of a seaweed farm attracting life around it and wasn't sure if that would be an issue or not, while another wanted to learn more about it before making any other comments.

5.4 IMTA Aquaculture

IMTA was not well known to participants. Skidegate had two participants with previous knowledge of IMTA, the other communities of Oweekeno and Massett each had one participant with previous knowledge, which may have influenced the individual's opinions on the system.

5.4.1 Positives

There were many positives mentioned by participants from each of the communities when discussing IMTA, with eight out of twelve participants stating positives about the system. One of the major patterns that emerged from conversations was IMTA's emphasis on sustainability that was a major positive of the system. The symbiotic relationship between the various species in the system was frequently mentioned, as was the "cleaning" aspect of the system. The words organic and local were often said and repeated, which is how the model is described in the handout that was

provided to participants, which may have had an impact on how the participants viewed and interpreted the model. Some of the positives that were mentioned paralleled the Ecosystem Approach to Aquaculture (EAA) strategy that the FAO is supporting. The emphasis on interlinking socio-ecological components and EAA's three guiding principles focusing on sustainability, well-being and equality, and integrating other sectors are closely related to goals and elements of IMTA. This puts IMTA in a position well-suited to increasing the social acceptance and global support of aquaculture.

5.4.2 Negatives

The negatives of IMTA that participants mentioned were strongly aimed towards capacity and the infrastructure of the system holding up to the rugged coastal conditions of Haida Gwaii. At the beginning of one interview a participant from Skidegate said, "So we're going to rape and pillage the coast and now we're going to call it ITMA? And next week we'll call it a new name, and then another name". Although laughing, there was obvious intent to this participant's statement and initial resistance to discussing this topic. Skidegate was the only location where participants specifically mentioned challenges or negatives of the IMTA system.

5.4.3 More Information

Due to IMTA being such a recent development on the west coast, the participants in this research didn't have very much information or awareness about the IMTA system. I had the sense that most of the participants wanted or needed more information to make a confident statement about their feelings toward the system. Four out of twelve participants had heard of IMTA previously, therefore, this was most of the interviewees first time hearing about the system. Each participant was provided a handout (Appendix

D), created from Dr. Stephen Cross's slides that were presented at the National Aboriginal Economic Forum II held in October, 2012. The information provided was presumably critical to the forming of the participant's opinion and how they perceived IMTA.

Many respondents related IMTA to conventional finfish farming and compared the two systems in their questioning. For example, they raised questions relating to impacts to the environment and if IMTA mitigated any of the associated issues, such as feed and scale. Feed was a major point that was questioned, respondents wanted to know how the sablefish were fed, and what happens with the feed, if it gets absorbed by the other species in the system. The science of the feed being recycled as nutrients was questioned, participants wanted to know how much does the system actually absorb, what the impacts are, and how much is still released into the environment.

CHAPTER 6:
Summary and Conclusions

6.1 Summary

The first objective of this research was to identify and analyze relevant literature on the major issues and concerns associated with coastal aquaculture in BC. The second objective was to investigate the issues and concerns of coastal First Nations on finfish, shellfish, and seaweed aquaculture in BC, specifically their perspectives regarding the sustainability and acceptability of the industry. The third objective was to assess coastal First Nations perspectives on sustainable aquaculture methods, specifically Integrated Multi-Trophic Aquaculture (IMTA).

A qualitative research design was conducive to gathering in-depth interview data, emphasizing the perspectives and thoughts of the study's participants and allowing the research to be supported by methodologies rooted in the social sciences. Indigenous Methodology and Discourse Analysis equipped this research design with the tools necessary to gather and organize data in the most useful manners. Indigenous Methodology supported obtaining answers to the research questions and the approach of the study, while Discourse Analysis was most useful in the organization of data and interpretation of themes.

The methods used to collect data were semi-structured interviews and coding. Semi-structured interviews allowed for structured, yet flexible, one-on-one conversations that encouraged the participants to discuss topics important to them, yet remain on topic. Interviews were conducted with twelve key informants who were selected based on their knowledge of aquaculture and position within their communities. The participant group included fisheries managers, marine-use planners, economic development officers,

hereditary chiefs, aquaculture industry workers, and similar positions. Ten members of the sample group were of indigenous descent and the group consisted of nine males and three females of varying ages between approximately twenty to sixty years old. The interviews were recorded, transcribed and coded according to themes that emerged during the conversations.

The qualitative data analysis undertaken for the research provides valuable insights into the perspectives of First Nations towards aquaculture, especially surrounding the major issues and concerns of the industry. Based on similar research, it would seem that some of the findings are transferable and compatible with other coastal communities. The research findings can be used to make informed decisions on how to address and approach marine use, resource management and community development by industry, First Nations and other stakeholders. These research findings can also be used as a guideline to determine what is acceptable to coastal communities and what is not in terms of various aquaculture components. Furthermore, to determine what aspects need to be mitigated in order to improve the social license amongst coastal communities. I would hope and expect this research to help inform and guide others to the thoughts of the three coastal communities investigated in this research, Oweekeno, Skidegate and Massett regarding the direction of future aquaculture development in BC.

6.2 Conclusions

This research contributes to the understanding of indigenous perspectives on the aquaculture industry at a critical time for aquaculture development in coastal BC. In the wake of the recent lift of the salmon aquaculture moratorium, issues around local aquaculture have continued to be contentious, indicating that this will continue to be an

important topic for the coastal First Nation population. Very little support for finfish aquaculture, especially salmon aquaculture, was found in this study. Despite the need for greater economic opportunities in their communities, this industry is not being considered. The major concerns of finfish farming surround environmental impacts, impacts to wildlife, disease/parasites, feed, health, mismanagement and a lack of representation in decision-making. None of the participants in this study were entirely supportive of pursuing salmon aquaculture in their communities. There was more interest in sablefish farming and many questions were raised about the sustainability and economic viability of the species. Most participants were not aware of the farming of this species and needed more information in order to state whether they were supportive or not. There was great interest in shellfish farming in each of these communities, as they have all engaged previously with the industry. The major concerns participants have with shellfish regard invasive species, the mismanagement of the operations, and the capacity and support necessary to maintain a commercial operation. There was also interest in seaweed farming; however similarly, there was a lack of knowledge about the commercial farming of these species as well as a mention of capacity and economical viability issues. As a result of these research findings, it can be suggested that the west coast IMTA model would be a challenge to implement in these communities specifically due to a lack of knowledge about the species used in ITMA and the science behind their interactions, a resistance to finfish farming, and capacity issues in the remote locations. In addition, there was also a strong emphasis on the need for greater economic opportunities in these communities, especially with regards to sustainable activities that are in line with

IMTA values. Over half of the participants in this study mentioned positives of the system, which provides a good starting point for future discussions of opportunities.

I encountered limitations during this study that are of significance. The first is in regards to accessing participants to take part in this research. During the field work portion of this research, I had limited time and budget to travel and work within. As such, during my visits there were possible participants who may have been away from the community or busy that otherwise would have been a valued voice for this study. The weeks spent on Haida Gwaii happened to be exceptionally exciting, with the occurrence of a 7.7 earthquake, an election, and several large storms that had the communities on edge and perhaps not as social. Conceivably a visit during another more settled time would have implications on study group as well as the study's results. Nevertheless, in general, perspectives on aquaculture appeared mostly consistent among coastal people represented by twelve key informants from a population of 80 residents in Oweekeno and 1,500 each in Skidegate and Massett. The second limitation was finding appropriate literature on aquaculture facts, as there are extreme biases in support of, and in opposition to aquaculture and especially salmon aquaculture. I found a critical lack of credible aquaculture information that has great implications to this study as it centers around perceptions. How people construct their perceptions and opinions is of great importance. In particular, the most noteworthy gap is the lack of accessibility to scientific literature for the general public, who mainly have access to media, ENGO, government, and industry sources. In an attempt to limit biases in this thesis, a variety of sources were used (technical papers, websites, government sources and media) to triangulate and provide a

wide range of perspectives. This limitation highlights the need for transparent, baseline data for the aquaculture industry.

6.2.1 Recommendations

Many First Nations coast-wide oppose the fish farming industry. Due to this, attempts to expand to these areas would face strong resistance and challenges that may impede the success of the operation. Conversely, shellfish aquaculture, and seaweed aquaculture to a lesser extent, are strongly supported in the central and north coast. The communities involved in this research have experimented and seen successes with shellfish and seaweed culture; however, need more government and industry support to create long-term, thriving commercial operations. Particular support is emphasized for funding, processing and market access, policy creation and general community capacity building. The IMTA system is an interest to these communities; however there are concerns with several aspects of the system that would have to be addressed before it is accepted by the communities. The concerns most reported were from participants associating the finfish component of the system to salmon aquaculture. Perhaps modifications would have to be made to the model and species in order to meet the communities social license and be successful in these areas.

6.2.2 Future Research

During the course of this research, at least two gaps were realized that could be areas for future research. First, there is room to expand on this research to conduct a coast-wide study that would include the many other coastal indigenous and non-indigenous communities that were not involved in this study. This would paint a more complete picture of the perspectives coastal BC has towards the aquaculture industry and

major concerns or impacts that are perceived. The second area of study is on IMTA. Since this is a new aquaculture system on the west coast, comparing perspectives to east coast IMTA would provide a nation-wide comparison that would be informative and beneficial to industry stakeholders.

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Appendix A:

Number of management, production and administration employment positions held by aboriginals and non-aboriginals within leading salmon farming companies in BC. (Canadian Aquaculture Systems, 2011)

Management			**Production**			**Administration**		
Aboriginal	Non-aboriginal	Percent aboriginal	Aboriginal	Non-aboriginal	Percent aboriginal	Aboriginal	Non-aboriginal	Percent aboriginal
11	130	8%	94	417	18%	3	109	3%

Appendix B:
Invitation to Participate

[First Nation Band Name],

Thank you for taking the time to read this message. My name is Kathryn Tebbutt and I am a Master's student in Geography at the University of Victoria. I am conducting research for a project titled Coastal Aquaculture in British Columbia: Perspectives on finfish, shellfish, seaweed, and Integrated Multi-Trophic Aquaculture (IMTA) from three First Nation communities, and I would be very grateful to be invited to your community to speak to some members about their thoughts of aquaculture. The purpose of this project is to achieve a greater understanding of opinions on the finfish, shellfish, and seaweed farming industries, especially around the sustainability of these industries. I would also like to learn what the opinions are of farming multiple species (finfish, shellfish, and seaweed) in a single system, and if this method is seen to alleviate any issues or concerns of current farming techniques.

I am requesting that this message be directed to individuals, departments or organizations associated with your First Nation who would be interested in participating in this research. Ideally this would include people within your First Nation who are have encountered the aquaculture industry in some capacity (i.e., an employee or former employee).

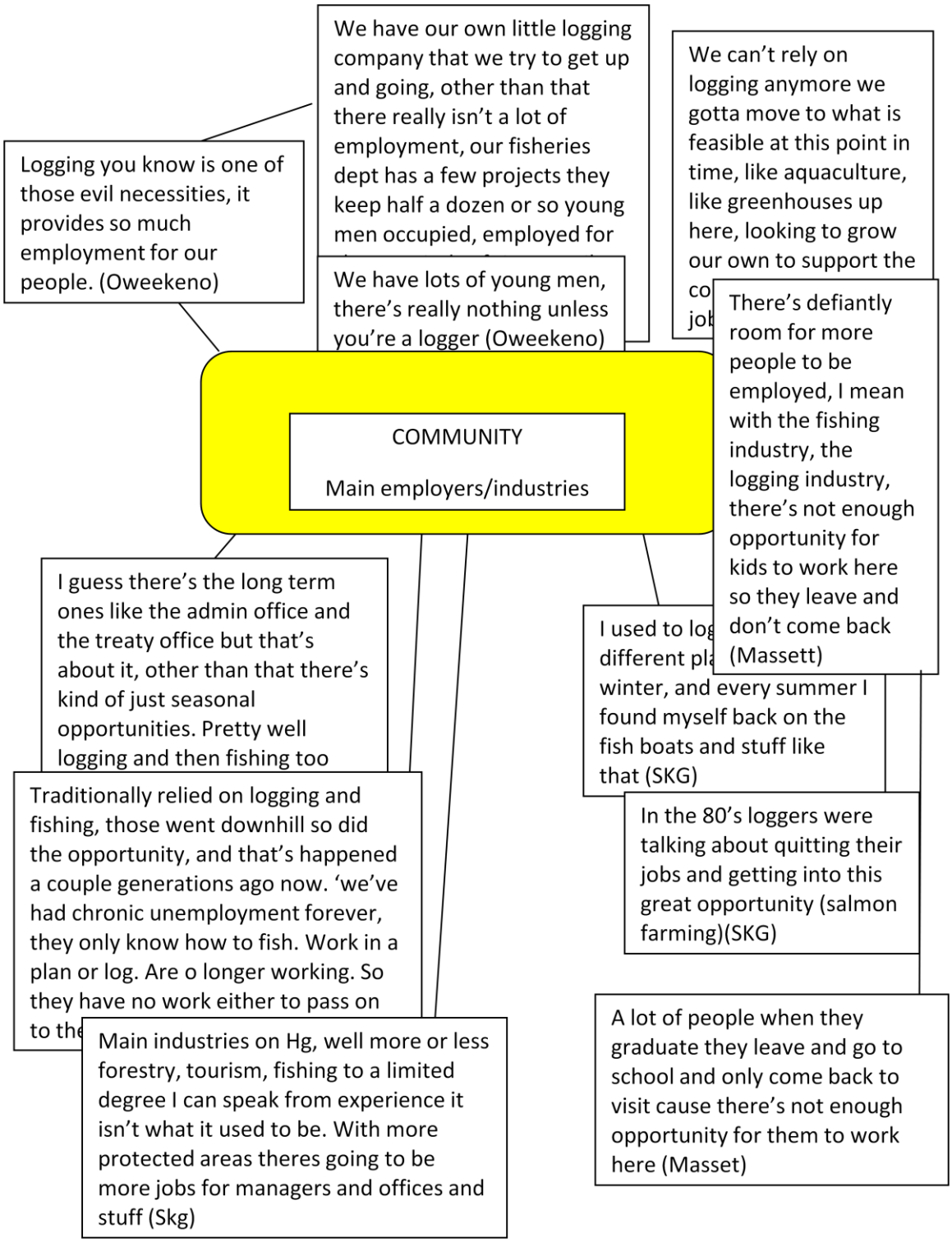
I would also hope to be instructed on how this project can be most useful and beneficial to your community. I hope to gain a range of perspectives from various coastal communities in BC and would ultimately hope it provides a meaningful platform to voice the opinions of First Nations to scientific and academic circles. This research is ultimately to assess ways to make aquaculture operate in the most sustainable and socially acceptable way possible for First Nations, as well as assess whether or not new methods of farming will address any concerns identified through this research. The project is funded by the Natural Science and Engineering Research Council of Canada, HOWEVER, PLEASE NOTE THAT I DO NOT HAVE THE MEANS TO PROVIDE FINANCIAL COMPENSATION FOR YOUR PARTICIPATION. If you would like further information on this project, please feel free to contact me at any time. I will follow up this letter by telephone within the following three weeks. I thank you in advance.

Regards,

Researcher: Kathryn Tebbutt, M.A. Student, Department of Geography, University of Victoria

Supervisor: Dr. Mark Flaherty, Department of Geography, University of Victoria

Appendix C:
Coding Map



Appendix D:

Handout used to inform participants of west coast Integrated Multi-Trophic Aquaculture (IMTA)