MORE THAN FISH: POLITICAL KNOWLEDGE IN THE COMMERCIAL FISHERIES OF BRITISH COLUMBIA

by

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Abstract

Through ethnographic research based primarily in Prince Rupert, British Columbia, this dissertation explores the ecological and social significance of commercial fishers’ political knowledge. Moving beyond the ecological thrust of local knowledge research, this ethnography emphasizes the material and political basis of fishers’ perceptions and understandings. The study focuses on the politicized experience of commercial fishers in resource management contexts and the way in which their knowledge is constructed and positioned by power relations, resource competition, and economics.

Analyzing a series of local knowledge encounters in the fishing industry of British Columbia - moments of conflict between competing knowledges over issues of conservation, co-management, and research - this dissertation reveals the significance of fishers’ political knowledge in determining their fishing behaviour and their reactions to fisheries policy and to fisheries research. Fisheries regulation is explored as the defining force impacting livelihoods of fishers and shaping their knowledge, by structuring fishers’ interaction with the environment, and with each other.

This dissertation historicizes, problematizes, and differentiates local knowledge, emphasizing the entanglement of ecological and political knowledge as forms of knowledge that are implicated in the construction of each other. This dissertation argues for a more holistic approach to fisheries knowledge research, which does not focus only upon the ecological knowledge of resource users. Rather than only asking fishers what they know about fish, researchers must ask them about fisheries in order to explore and resolve the structural problems of human resource use.
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<th>Description</th>
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<tbody>
<tr>
<td>AFS</td>
<td>Aboriginal Fisheries Strategy</td>
</tr>
<tr>
<td>ATK</td>
<td>Aboriginal Traditional Knowledge</td>
</tr>
<tr>
<td>BttF</td>
<td>Back to the Future project</td>
</tr>
<tr>
<td>COSEWIC</td>
<td>Committee on the Status of Endangered Wildlife in Canada</td>
</tr>
<tr>
<td>CPUE</td>
<td>Catch Per Unit Effort</td>
</tr>
<tr>
<td>DFO</td>
<td>Department of Fisheries and Oceans (Canadian Federal Ministry)</td>
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<tr>
<td>EI</td>
<td>Employment Insurance</td>
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<tr>
<td>FEK</td>
<td>Fisher’s Ecological Knowledge</td>
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<tr>
<td>HBC</td>
<td>Hudson Bay Company</td>
</tr>
<tr>
<td>HRDC</td>
<td>Human Resources Department of Canada</td>
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<tr>
<td>FSC</td>
<td>Fisheries Survival Coalition</td>
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<tr>
<td>IFMP</td>
<td>Integrated Fisheries Management Plan</td>
</tr>
<tr>
<td>IK</td>
<td>Indigenous Knowledge</td>
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<tr>
<td>ITQ</td>
<td>Individual Transferable Quota</td>
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<tr>
<td>IVQ</td>
<td>Individual Vessel Quota</td>
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<tr>
<td>LEK</td>
<td>Local Ecological Knowledge</td>
</tr>
<tr>
<td>NB</td>
<td>Native Brotherhood of British Columbia</td>
</tr>
<tr>
<td>PK</td>
<td>Practical Knowledge</td>
</tr>
<tr>
<td>PHMA</td>
<td>Pacific Halibut Management Association</td>
</tr>
<tr>
<td>PRFCA</td>
<td>Prince Rupert Fishermen’s Cooperative Association</td>
</tr>
<tr>
<td>PSC</td>
<td>Pacific Salmon Commission</td>
</tr>
<tr>
<td>QCI</td>
<td>Queen Charlotte Islands</td>
</tr>
<tr>
<td>RPA</td>
<td>Rockfish Protection Area</td>
</tr>
<tr>
<td>SARA</td>
<td>Species At Risk Act</td>
</tr>
<tr>
<td>SEK</td>
<td>Social Ecological Knowledge</td>
</tr>
<tr>
<td>TAC</td>
<td>Total Allowable Catch – approved harvest for a fishery</td>
</tr>
<tr>
<td>TED</td>
<td>Turtle Excluder Device</td>
</tr>
<tr>
<td>TEK</td>
<td>Traditional Ecological Knowledge</td>
</tr>
<tr>
<td>UFAWU</td>
<td>United Fishermen and Allied Worker’s Union</td>
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List of Terms

By-catch  Non-target species caught incidentally during a fishery.

Discards  Fish discarded overboard during a fishery.

Escapement  Salmon which are allowed to escape harvest in order to spawn.

Groundfish  Fisheries category indicating bottom-feeding fish, including halibut, rockfish, and blackcod. Caught by hook and line, trap (blackcod), or trawl.

By-catch mortality  Estimates of by-catch which die after discard. Used to determine impacts of fisheries on non-target species.

Rockfish  Commonly called snappers, canaries, greenies, rock salmon or rockcod. In the waters of British Columbia there are 36 known species of rockfish belonging to the family Scorpanenidae. They are bottom-feeding fish and are distinguished by a stout, heavy build, large broad heads, usually bearing spines and strong ridges, and heavily-spined fins.

Soak-time  Length of time a gillnet or halibut longline is set in the water during fishing.

For descriptions of fishing gear, please see appendix.
Timeline of Key Events

1876  First cannery on the Skeena River.
1888  Commercial Halibut fishery begins in British Columbia.
1908  Prince Rupert is incorporated.
1923  International Pacific Halibut Commission established.
1931  Prince Rupert Fishermen’s Co-operative Association established.
1969  Davis Plan: license limitation in salmon fisheries.
1979  License limitation in halibut fishery.
1991  Individual quotas introduced in halibut fishery.
1991/2 License limitation in rockfish fishery.
1994  Prince Rupert Fishermen’s Cooperative Association dissolved.
1998  Coho conservation measures. Salmon license buyback.
2002  February: Rockfish conservation measures.
2002  August: Protest fisheries regarding salmon abundance.
2002  October: COSEWIC Emergency designation of Cultus Lake and Sakinaw Sockeye.
2004  May: Joint Task Force on Post-Treaty Fisheries Report Released (McRae and Pearse)
Preface

My path to studying local knowledge in Prince Rupert was indirect, much like the highway route from Vancouver which must traverse inland, then north, and finally out to the coast again to reach the most northern coastal community in British Columbia. In 1997 I worked as a research assistant on a project investigating the involvement of the Tsimshian First Nation in the forest industry and thus received my introduction to territory of the Tsimshian and the city of Prince Rupert that lies within it. While asking Tsimshian people about their work in the forest industry, I was struck by how often people spoke about fishing; the two industries were closely connected in most people’s experience, and I became interested in this integrated aspect of the industrial economy. And surprisingly, I hadn’t been repelled by the rain which fell almost constantly during our month on the north coast, so I began planning dissertation fieldwork in Prince Rupert.

In 1999 I had the privilege of participating in a SSHRC-funded workshop on Ecological Knowledge at St. Francis Xavier University in Antigonish, Nova Scotia. This two-week long workshop drew together researchers investigating fisheries and resource use issues from a variety of countries to develop methodologies for the documentation of ecological knowledge. This workshop experience introduced me to the key debates regarding alternative knowledges, and I sought to combine this growing field of study with my interest in political economy and the ethnography of work.

Finally, it was my first experience observing the dynamic between the Department of Fisheries and Oceans and commercial fishers that crystallized for me, the most pressing issues around resource workers’ knowledge. In November 1999, I attended the DFO’s workshop on selective gear. The Coho Crisis (see chapter 3)
necessitated the development of selective fishing gear that could avoid encountering, or
limit the mortalities of, non-target species. This workshop was a forum for the
presentation of test fishery results and discussion of future directions in gear
development. Early on in the workshop Homer Stevens, a long time salmon fisher and
union activist (who has since passed away) stood up at one of the microphones. He
commented that the requirements of selective gear would significantly impact both the
pre-season costs and the in-season success of small-boat fishers. He expressed concern
that selectivity would eventually result in corporate ownership of the fishery: “Jimmy
Pattison will end up owning everything”. The workshop facilitator did not respond to
these concerns, but instead asked that all comments be restricted to the technical aspects
of gear selectivity. As I watched this interaction, I realized that only a very small part of
fishers’ knowledge is of interest to resource managers. They are focused on the technical
and ecological knowledge of fishers, but do not want to engage with fishers’
understandings of political, economic, or social processes. Homer Stevens had spent a
lifetime trying to improve the position of small-scale fishers, and his perceptions of the
potential impacts of the new regulations would have provided a valuable resource for
fisheries planning. What the fishers thought about the Coho Crisis, about new gear, and
about fisheries restructuring was not the focus of the DFO workshop, and it has not been
the focus of a great deal of social science research. This is what I wanted to discuss with
resource workers in Prince Rupert.

I moved to Prince Rupert in January 2001, and have lived there ever since.
During my first two years there I spent a lot of time interviewing fishers and loggers,
hanging out on the docks and at a fish plant, at various coffee shops and a few bars. I
attended as many meetings, workshops, and presentations as I could. I also began to learn how to fish, and I say “began”, because for me, this will be a lifelong learning process. I am far from a natural fisherman. I am nevertheless falling in love with fishing, and I also fell in love with the first fisherman who refused to be interviewed for my project. When I married him, the blurry lines between researcher and community member became more and more faint. Yet now I am writing this dissertation, analyzing the words of close friends and beloved family members, and re-invoking a distance that has been shrinking since my first cup of coffee at Cowpuccino’s.

I have, however, remained a researcher throughout my time in Prince Rupert, through both my primary project and a number of other assignments over the last three years. The first of these was the two-year TEK research project that Charles Menzies directed in collaboration with the Gitxaala First Nation. I spent many weeks from November 2001-April 2003 in the Gitxaala village, asking community members about their use of aquatic and terrestrial resources, and their traditional structures of resource management. This research was extremely important in developing my understanding of TEK research in practice, and the politics of documenting traditional knowledge. The experience of living in Gitxaala provided me with the opportunity to better understand some of the issues regarding First Nations peoples’ experience in the north coast economy, and the north coast social structure.

In 2002 I began working in Oona River on another component of the Forests for the Future project. Oona River is a logging and fishing community on Porcher Island (20 miles south of Prince Rupert) with approximately twenty-five full-time residents. The loggers and fishers of Oona River helped me to understand how local knowledge is both
positioned and placed, and their varied and unique perspectives on resource use have significantly informed my thoughts on these issues.

Finally, Charles Menzies was contracted (through UBC) to work as a consultant for the North Coast Land and Resource Management Planning Process, and under his supervision, I worked as a contract researcher on two land-use projects. One was an investigation of the importance of the informal economy and subsistence harvesting to the non-Aboriginal residents of the north coast region. The second project was a Cultural and Social Spatial Analysis that involved mapping areas of non-economic significance to north coast residents. These projects provided me with a better understanding of the way in which people in Prince Rupert and the outlying communities interact with the landscape and the natural resources in non-commercial activities.

All of these research experiences informed and influenced my dissertation research and enriched my understanding of life on the north coast of British Columbia. They supplemented and complemented my interviews and informal research by broadening my engagement with the issues of land and resource use in the region. These projects also reinforced my researcher role in the community after I had ceased “asking so many questions” of the fishermen that I came to know. All of this research is part of my “field experience” and while this dissertation draws primarily from my independent research with commercial fishermen, these other research experiences significantly inform this ethnography.

My time in Prince Rupert and its surrounding communities, and my experiences in fisheries both on the north coast and the Gulf of Georgia have resulted in an ethnography that is both situated and multi-sited. It follows fishermen between areas,
reflecting the current fracture of community and fishing fleet. I conducted formal
interviews primarily with fishermen resident in Prince Rupert, but I have learned much
from speaking with fishermen throughout the coast.

My fieldwork also involved research with small-scale loggers in the Prince Rupert
area, but this material has been dedicated to other documents. Logistically, the forest
industry in Prince Rupert particularly, and British Columbia more generally, was in such
a state of flux during the period of my research, that it proved difficult to procure the
equivalent level of detail to that of the fishing case study. The impacts of the Skeena
Cellulose pulp mill shutting down in 2001, the disintegration of the Softwood Agreement
with the US, the closure of the Rupert office for the small business forestry program, and
the massive restructuring of timber tenures by the new Liberal government, lead me to
the decision to make the forestry node of my research a much smaller project than
anticipated, and to write about it outside of this dissertation.

The following is essentially an ethnography of local knowledge interactions in the
fishing industry in British Columbia. Each chapter is structured around a moment of
intersection between fishers' knowledge and a more dominant knowledge system, be it
that of the academy, or federal government management structures. This approach
allows for an investigation and discussion of various issues surrounding fishers'
knowledge and the fisheries regulation, within the context of particular resource conflicts.
These critical encounters provide a vehicle for understanding the dynamics of knowledge
interaction, specifically, and significantly, in the context of the everyday life of fishers.

This study is based on an understanding of fishers as individuals who know about
and understand the ecosystem and economy within which they work. It argues for an
expansive understanding of fishers’ knowledge, an understanding that allows for engagement with their own theories of regulation and resource management, and their own constructions of lived experience.

Thus my dissertation is an effort to provide the intellectual tools needed to improve the way in which resource management engages with resource workers. The commercial fishing fleet of British Columbia continues to shrink, and the communities that depend upon, and are defined by this industry, face significant challenges regarding sustainability and stability. Issues regarding how to effectively understand, communicate with, and work with fishers remain critical and immediate questions for both academics and government agents. Community-based research that engages with fishing peoples’ daily working lives, as well as their politicized experiences in resource management contexts, can investigate the links between the ecological and social relationships that shape fishing knowledge. This case study indicates what we can learn when we listen to what fishermen have to say about more than just catching fish.
Acknowledgements and Dedication

Living in Prince Rupert and learning from the people there, was a privilege for which I am very grateful. I was overwhelmed by the generosity of the people in Prince Rupert who donated their time so that I might understand their work and their lives. Many community members contributed to this dissertation, and I am extremely grateful for their kindness and patience.

It is necessary to recognize those who significantly shaped my research experience. Esther and Quincy Sample were the source of much information, guidance, and support throughout my first two years in Prince Rupert. Many of my research opportunities were the result of their efforts and kindness. Peter Haugen and Doug Mavin have made considerable contributions to this work and other projects. Fred and Linda Hawkshaw facilitated both my early research and comfort in Prince Rupert. Jamie and Sara Ridgway, and Norm and Margaret Ostrom have provided me with a sense of community. Des Shearing has helped more than anyone else to teach me about forestry issues, and I hope to do his efforts justice in future work. Curtis Sample and Steve Fauts found room for me on their fishing boats. Brad Mirau has been incredibly patient and accommodating, and his insights have contributed immensely to my analysis of these issues. Des Nobels has been both helpful and inspiring with his knowledge of and passionate defense of the fishing industry. Ken Campbell created my primary map, and Paula McKay at Excel Printing formatted the fishing area maps which were kindly provided by Karen Jeffrey at DFO Licensing. Kathleen at the Prince Rupert Public Library made it possible for me to do much of my theoretical research long distance through countless inter-library loans.
Many people helped me through the joys and trials of research and writing. Katy Barker and her family made Rupert a warm and welcoming place from the moment I got off the plane. Urve Voitk gave me a home and a social life, which made all the difference. Mercedes de la Nuez has been a steady source of support and friendship and proofreading, and she and her family have fed me regularly. The Lemon family gave me a home in Oona River, and dear friends in town. My fellow students Kim Brown and Morgen Smith have been valuable resources and kindred spirits. Without the support of Chris Thompson, I wouldn’t have made it through my comprehensive exams. Morgan Reid and Jen Rashleigh housed me during my many trips to Vancouver and they, together with Ted and Nina Rashleigh, coached and supported me through the defense process.

I am grateful to Julie Cruikshank and Bruce Miller who have waited patiently and positively for this dissertation, and who have provided significant support, guidance, and inspiration throughout my time at UBC. My supervisor Charles Menzies has been an incredible role model in all things: research, teaching, writing, family commitment, and community activism. I have been privileged to work with him and learn from him.

My family has always been a crucial source of support throughout my studies and I could not have made it this far without their love and help. I can’t overstate their contributions. My sister Toni spent her precious days off from fishing formatting my bibliography. Recently I have been blessed with in-laws and extended family who have also provided encouragement throughout this process.

Justin Dickens has shared with me his love for fishing, and that has shaped the nature of my research and this dissertation. He was the first fisherman to critique my project and he warned me against “building a career on the backs of fishermen”. It seems
instead that I am to build a career side by side with a fisherman. I could not have done this without his loving support.

This work is dedicated to the memory of Sid Dickens and Russell Pierce,

fishermen who are sorely missed.
Chapter 1: Understanding Knowledge

Their remembrances are very selective, and to their benefit.
No one has asked to be moved out of a fishery.
Robert Thibault, Minister of Fisheries and Oceans, July 2003

The federal Fisheries Minister was in Prince Rupert to sign an agreement with the
BC Minister of Fisheries John Van Dongen regarding increased communication and
consultation. He was not there to speak with commercial fishermen. The day before on
the Queen Charlotte Islands, he had met with sports fishing lodges and the Council of the
Haida Nation. Earlier that day, he had met briefly with the United Fishermen and Allied
Workers Union, and toured a processing plant. I met him at a reception hosted by the
local federal Liberal party members. There was only one fisherman in attendance, and he
had to leave before he got a chance to meet the Minister. A local fish processor had told
me that this particular Fisheries Minister does not welcome situations where he must deal
with a group of vocal fishermen. This Minister does not walk the docks.

When my turn came to meet Mr. Thibault, I explained that I was doing research
on local knowledge in resource management. I asked him to comment on the place of
fishermen’s knowledge in the Department of Fisheries’ management structure. His reply
was a long but vague insistence that local knowledge was an important part of the
structure of fisheries management, was incorporated into the design of science programs,
and that the Minister’s recommendations reflect the input of fishermen. As I struggled to
transcribe the steady flow of words, the leader of the local Liberal women’s group
interjected a comment extolling the knowledge of the old, especially First Nations,
fishermen who had fished the local salmon runs for many decades.
Thibault’s response to this party member, quoted as the epigraph to this chapter, expresses what appears to be a conservative bureaucratic understanding of resource harvesters’ knowledge. The ecological knowledge of resource workers such as commercial fishers is increasingly cited as an input into resource management plans, however, there appears to be persisting skepticism regarding its validity and utility. Because fishermen “never” ask for a fishery to be closed, they are perceived as an imperfect data source\(^1\). Their understandings are “selective and to their benefit”, invoking the ubiquitous binary oppositions constructed to describe the differences between local and/or traditional knowledge and scientific knowledge.

While Thibault’s comment could be regarded as dismissive and disrespectful, he is pinpointing a key obstacle to efforts towards meaningful co-management and consultation in natural resource industries. He is indicating the political nature of local knowledge, that what one knows is influenced by what one needs or what one does, or who one is. Local knowledge cannot be easily distilled from its context. That, however, is not the fisherman’s problem. It is the Department of Fisheries and Oceans’ problem\(^2\). And it is the anthropologist’s problem. This dissertation will argue that management structures which meaningfully engage local knowledge sources are possible through a re-thinking of the construction and utilization of local knowledge.

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\(^1\) This is in fact, not the case. Local fishermen identified several instances of requesting fisheries closures during the last decade, and the UFAWU has made such requests in the past (Charles Menzies, personal communication).

\(^2\) Henceforth referred to as DFO.
When I related the story about the Fisheries Minister to a fisherman, I waited for an indignant response to this qualification of what fishermen know. Instead, Don responded “He’s right. No one talks himself out of a job.” When I insisted that as a fisherman with over thirty-five years experience he must know a lot about fish that would be helpful to managing stocks, he provided the following metaphorical description of the issues around fishermen’s knowledge:

*It’s like this: You’re gillnetting in Johnstone Straits, and it’s narrow in there. You’re fishing the starboard side, and there’s a cruise ship coming up. The guys on the port side are calling the cruise ship and telling him it’s okay to go up the starboard side. You guys on the starboard side are calling and saying it’s okay to go up the port side. And that’s just like fishermen. The guy in the cruise ship doesn’t know which way to go. So he goes up the middle. Everyone tries to make their life easier, and you can’t blame them.*

Don’s example suggests that what one knows reflects where one is positioned. It also highlights the fact that fishermen are differentially positioned. And the moral of the story is, I think, that one needs to understand these positions in order to navigate among them.

This dissertation is therefore an effort to elucidate the various ways in which fishers’ knowledge is positioned, to understand the politics of those positions, and thus the politics of local knowledge. As such, this work is both inspired and informed by the growing literature on alternative knowledges (such as Indigenous, Traditional, Local.). My research attempts to broaden the way in which social scientists and resource managers understand the knowledge of commercial fishers. I do this by approaching

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3 Names of contributors have been changed, except those working in an official capacity for a government institution.
local knowledge more holistically, drawing upon an anthropological tradition that has historically focused upon a body of information that includes, but is not restricted to, what is today often referred to as ecological knowledge (see, for example Worsley 1991; Cruikshank 1990, Scott 1996). I suggest that the focus on fishers’ knowledge as only ecological is limiting and less productive than a more expansive approach informed by anthropological understandings of the multiplicity of knowledges and their interconnection in human experience. In anthropological research, “local knowledge” has been approached as knowledge of the environment in the broadest sense: of the ecosystem, and of social relations, social organizations, ritual and symbolism, food gathering and food use. Anthropologist Paul Sillitoe has described the local knowledge movement in the development arena as the “introduction of a more overt anthropological perspective and awareness into development” (1998:205). However, I would argue that the local knowledge concept in fisheries anthropology has resulted in the opposite: local knowledge research in fisheries has wandered from an inclusive anthropological understanding of knowledge.

Fishers’ knowledge is thus much broader than the ecological information that allows them to successfully find and harvest fish. This knowledge includes ecological information about fish, but also political understandings of fisheries management and the larger context of their fishing activities. This type of knowledge is becoming increasingly important as a factor in harvesting strategies and business success. Fishing behaviour is based on both ecological knowledge and understandings of current and future opportunities, competing interests, public perception, and government mandates. Without an adequate comprehension of both the ecological and non-ecological aspects of
fishers’ knowledge, the future success of fisheries management cannot be anticipated in either academic or applied fora.

There are three key arguments that underlie my discussion of local fisheries knowledge. The first is that local knowledge is politically constructed. It is shaped by circumstances of competition, regulation, and resistance. Commercial fishers understand their own activity, that of their peers and rivals, and that of the government, in light of past and current experiences of allocation and conservation initiatives, and within the power structure underpinning resource management. Fishers’ understandings of ecosystem health, as well as their business strategies, are shaped by their perception of politics and power.

Secondly, local knowledge is political, and its political aspects have been chronically overlooked by social science research. Ecological knowledge researchers have recognized the political influences upon local ecological knowledge, but have failed to meaningfully investigate the political aspects of local knowledge. Thus, the broader and more theoretical knowledge of resource harvesters (especially non-indigenous commercial resource users) has been relatively ignored within the applied literature. This reflects a focus on documenting ecological facts that can inform mainstream resource management, rather than attending to the tenets of harvesters’ critiques of that management system. Commercial fishers know important things about fish, but they also know about fisheries, and this political and politically constructed knowledge warrants academic analysis.

My final argument is that this political knowledge has great significance to the successful management of natural resources. Modern fisheries management has focused
on the regulation of fishers' behaviour: limiting their harvests, defining their gear, determining their seasons. However, to successfully manage fisher behaviour, one must fully grasp the understandings which inform fishers' strategies and activities. Management initiatives that do not attend to power dynamics and which do not recognize their own political implications tend to further alienate fishers from the management system. Current issues of legitimacy and compliance cannot be resolved without meaningful engagement with the ways in which fishers experience and perceive regulation and management.

While scholars have recognized the way in which knowledge is situated and positioned, and how it is politicized (Felt 1994, Nazarea 1998), such research is still focused on ecological data. The politicized context of fisheries knowledge is recognized, but what remains undeveloped is an understanding of its political aspects. The fisheries knowledge literature has pursued the issues of what fishers know, how they know it, how to document it, and how that data can be integrated with fisheries biology and management. It is my contention, however, that this growing field of social science research is based on a restrictive, and fragmentary understanding of what people know about fishing. Rather than asking only what fishers know about fish, we must begin to ask them what they know about fisheries.

In management scenarios, and even in some academic research, the knowledge of resource workers is often approached as technical, static, and monolithic. My study emphasizes the variation within this type of local knowledge, its dynamism, and its breadth beyond ecological or technical facts. Local knowledge is not simply ecological and it is not just a source of resource management alternatives. Local knowledge is the
product of individual and community interaction with wider structures and processes, and informs both people’s everyday choices and their life decisions. Or as anthropologist Andreas Roepstorff suggests, knowledge simultaneously exists at the two interfaces between people and their (natural) surroundings and between different partners – in an politicized arena of power (2000: 165-66). Workers in a natural-resource economy are located between a local resource base and a wider net of economic and political forces. They have knowledge of both these spheres, which informs their decision-making.

Fishers have well-developed understandings of the politics of resource management and interpret government policies according to these understandings. Yet fisheries anthropologists and other social scientists who have participated in ecological knowledge research have tended to isolate the ecological knowledge of fishers from the complicated structures and relations in which it is embedded. Despite a growing recognition that sustainable fisheries management is best achieved through the successful management of humans, the non-ecological understanding of fishers have not been extensively ‘tapped’ in order to inform this type of management, or for that matter, to change it.

The emphasis on ecological knowledge in applied maritime anthropology in particular, works to limit the scope of ethnographic contributions to solving fisheries problems. By isolating ecological knowledge from other significant aspects of fishers’ knowledge and focusing on facts about fish rather than understandings about fisheries, anthropologists relegate themselves to the position of fact-collector for biologists. An emphasis on the political knowledge of fishers and their critiques of, and reactions to, fisheries management, retrieves anthropological research on fisheries out of the ecological rut, and provides a more comprehensive understanding of fisheries problems.
**Alternative Knowledges**

My discussion of political knowledge reflects a critical engagement with several different streams of literature regarding the interaction between Western science and alternative knowledges. During the last two decades, there has been an efflorescence of interdisciplinary research and theory regarding the relationships between western science-based knowledge and various other ways of knowing. These alternative, or marginal knowledges are referred to by numerous acronyms: IK (indigenous knowledge) TEK (traditional ecological knowledge) LK or LEK (local (ecological) knowledge) and FK or FEK (fisheries (ecological) knowledge), in addition to other less widespread categories such as tacit knowledge, practical knowledge and others. These alternative epistemologies are compared and contrasted to science, Western knowledge, or Western scientific knowledge. This category has remained somewhat monolithic and undertheorized in many of these literatures but its key trait is its persisting hegemony over all other forms of knowledge. Western scientific knowledge has been interrogated and theorized by authors within the growing literature on the sociology and anthropology of knowledge and of science (see for example Latour 1999, 1979, Nader 1996). The alternative knowledge literature has indicated the cultural construction and “localness” of scientific knowledge, but has focused on fleshing out the characteristics of marginalized ways of knowing. Thus, alternative knowledges are often characterized and analyzed primarily through their relationship with “Science”. It is perhaps this focus on a scientific foil that has lead to the emphasis on ecological facts in fisheries research.

In terms of framing the theoretical position of this dissertation, it is helpful to deal with this general literature as a whole, what I have called “alternative knowledge theory”, as well as investigating the particular categories of knowledge and their development. I
use this term “alternative knowledges” to indicate the multiple ways of knowing that have been identified in opposition to “Western science”, as subordinated knowledges seeking validation and recognition. Norwegian sociologist Eythorsson suggests that the lack of validity attributed to fishermen’s knowledge, for example, reflects asymmetric power relations, rather than meaningful differences between science and local knowledge (1998: 187). Agrawal has emphasized the dangers of overstating the differences between western and indigenous knowledges, and indicates convergences and congruences between them (1995). Thus, the distinction is structural rather than substantive and “the ‘locality’ of local knowledge is primarily derived from its peripheral relations to power” (ibid.). It is this peripherality that is common to IK, TEK, LEK, and FEK; their epistemological and political opposition to “western science” in both theoretical and practical discussions creates a somewhat cohesive canon which can be drawn upon to understand political knowledge. While there are identified differences between indigenous and non-indigenous knowledge, between traditional and local knowledge, many of the important discussions in each separate acronym-based literature are relevant to the others. And while it is important not to overemphasize the differences between knowledges, or to reify “Science”, the political differentials and social constructions of opposition between powerful and subordinate epistemologies are meaningful forces shaping human understandings and academic theory. The different research foci listed above are part of a more general movement to understand the diversity of human ways of knowing, and the political nature of interactions between different epistemologies.

Alternative knowledge research has become a growing field of study during the last twenty to thirty years. Anthropologist Anja Nygren relates the development of local
knowledge theory to globalization, and the increasing opposition of global and local categories (1999: 268). Interest in alternative knowledges can also be read as a symptom of postmodern skepticism towards science (Eythorsson 1998: 197), and the questioning of dominant paradigms. This interest in local-level ecological knowledge is connected to the development of political ecology, which combines an ecological focus with political economy theory (Blaikie and Brookfield 1987: 17). Anthropologist Tom McGuire notes emergent work that supplements the methods of cultural ecology with attention to the intersections of class, production, penetration of capital, and loss of local power (1998: 239). Such an approach relates environmental degradation to social and economic processes at the global level. McGuire emphasizes that political ecology should be skeptical of folk management (ibid.), and thus encourages an interrogation of local-level power dynamics, and a critical analysis of local knowledge.

Indigenous knowledge research is directly related to the increasing recognition of indigenous land use rights and the failure of mainstream approaches to development (Agrawal 1995: 415). In Canada, indigenous knowledge has been studied primarily as Traditional Ecological Knowledge and most early TEK studies occurred in the context of land claims research in northern areas (see Nadasdy 2003). Mailhot identifies the birth of TEK as happening during the mid-1980s, and its parents being ethnoscience and cultural ecology (1993: 3). Research by various researchers working with the Quebec Cree in the 1970s and 1980s made a direct contribution by linking cosmology and subsistence, and studies of indigenous taxonomic systems in various places emphasized the rationality of non-western resource use (ibid.).
The knowledge of small-scale fishers was encouraged as a particular field of study by marine biologist R. E. Johannes’ work in Palau (1981), which identified the scope and detail of artisanal fishing knowledge. This development dovetailed well with the increasing participation of social scientists in fisheries-focused research. Human ecologist Bonnie McCay dates the intensification of anthropological engagement with fisheries issues to the late 1970s when the Law of the Sea expanded the territorial claims of most coastal nations, and encouraged the creation of new and aggrandized institutions to manage these resources (2000: 202). While anthropologists have been working in fishing communities for a long time, the Law of the Sea encouraged a focus on fisheries management and policy issues, and a more applied focus in maritime anthropology. In Canada, this field has increased dramatically in light of the recognition of the limits of fisheries science as a basis for successful management, which was reinforced by the dramatic collapse of the east coast cod and the establishment of a moratorium on the Newfoundland cod fishery in 1991. The east coast work has tended to use the label “TEK” reflecting the long term residence of non-Aboriginal fishers in the east (for example, Neis et. al. 1999b, Davis and Wagner 2003).

The labeling of knowledge research has been a source of debate throughout its development. Anthropologist Gisli Palsson, who works with Icelandic fishers expressed dissatisfaction with the labels of ‘indigenous’ or ‘traditional’ because these are value loaded, ambiguous, and reproduce colonial boundaries (1998: 52). Instead, he suggests Practical Knowledge (PK) as an epistemological category that avoids cultural and temporal evaluations, and that is less exclusive (ibid.). Practical knowledge is developed
through contextualized learning and is situated in immediate experience; it is an “emergent and embodied phenomenon” (Palsson 2000: 39).

King and Durrenberger later offered an amendment to this definition suggesting Social Ecological Knowledge (SEK) to emphasize the “lived in, experienced, and practiced nature of reproducing and creating ecological knowledge” (2000:11). According to these anthropologists, SEK = TEK + PK, highlighting the social aspects of an ecological system, and making TEK experience-based, rather than simply information-based. SEK demands attention to local capacities for dealing with allocation and distribution issues within communities, and links knowledge to the contexts of its production and use (ibid.).

This part of the fisheries knowledge literature links to research on the bodily aspect of knowledge associated with work. White suggests that work imparts a knowledge that is both bodily and social, and relates this to Bourdieu’s habitus: “working communicates a history of past work; this history is turned into a bodily practice until it seems but second nature” (White 1996: 179). This bodily knowledge is social in the way in which it is transmitted in a community of work. Satterfield builds upon this notion, and links it to praxis. She reads “experientially driven knowledge” as praxis becoming habitus, practical action becoming embodied knowledge, and emphasizes its expression of class and culture (2002: 94). Fischer’s definition of tacit knowledge also assumes this embodied and implicit nature, as “part of a long cultural continuum of habituated practices” (2000:197).

Workers’ practical knowledge deriving from the labour process has been devalued in contemporary capitalist society, resulting in class-based constructions of “valuable”
knowledge. Canadian anthropologist Thomas Dunk suggests that workers reject the
devaluation of their knowledge by emphasizing “common sense” and maintaining an
anti-intellectual position (1991 132-51). Other scholars have focused less on class-based
constructions as the more general lay versus expert opposition. Ordinary knowledge is
thus that which originates in “common sense, casual empiricism, or thoughtful
speculation” (Lindblom and Cohen 1979) rather than formal experiments and education.
Similarly, Popular Knowledge has been described as that which is created in the “daily
experiences of work and community life” (Fals-Broda and Rahman 1991: 138).

Thus, there are numerous ways of understanding what people know about their
environment, and numerous labels for this knowledge. What connects these different
types of knowledge, and what allows me to deal with the various theories as multiple
strands of a common literature is their status as subordinate epistemologies. These
various literatures inform the discussions in each of the following chapters, and have been
drawn from in order to construct my understanding of local political knowledge (which I will not turn into another acronym). I use the term local knowledge in the title of this dissertation for several reasons. First, the people I spoke with and learned from were both First Nations and non-Aboriginal. While I point to both the convergent and divergent aspects of their knowledge, I do not differentiate them as distinct systems, as I spoke with them as members of the commercial fishing community. The knowledge that I deal with in this dissertation is local in that it is grounded in the experience of fishing on the north coast of British Columbia. While locality is becoming increasingly fractured in the fishing industry, ‘local’ remains a key attribute of the understandings that
I present in the following chapters. Residence shapes the experience of and understanding of resource use in a very particular way, and while this ethnography became “multi-sited”, it remains rooted in Prince Rupert. While I do believe that there is a great deal of tradition inherent in the livelihoods of resource workers on the north coast, I do not want to label their knowledge as traditional. I was specifically interested in the way that knowledge was constantly changing and the new types of knowledge that have become critical to fishing success. I find Palsson’s discussion of practical knowledge extremely useful, but it was not the technical and practical knowledge of resource workers that this research sought to understand. King and Durrenberger’s Social Ecological Knowledge resolves some of the problems of isolating ecological knowledge from its context, but remains focused on ecological questions. I will not use the term ecological to indicate the thrust of my research, because it is out of the ecological rut that I am trying to wrest fisheries knowledge research. While I will discuss some details about what fishermen know about fish and the ecosystem they work within, I will do so to illuminate non-ecological issues and forces. Thus, what I have documented and analyzed, and what I am arguing for as a focus of social science research, is ‘local political knowledge’.

**Local Political Knowledge**

While I have not encountered any anthropological or social science work that approaches resource workers’ knowledge in the way that this dissertation attempts to, the literature does contain encouragement in that direction. There is emphasis on the need to investigate the heterogeneity of local knowledge, to engage with and recognize local

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4 First Nations fishers may participate in a TEK system as members of a First Nations community; this knowledge may overlap and influence their commercial fishing knowledge, but that is beyond the scope of
theories of experience and social discourse, and to interrogate the power structures implicated in the construction of and validation of knowledge.

I am approaching “politics” as the power relations at work in lives of Prince Rupert fishermen. These include relations between fishermen and the state (chapters 3, 6, 7), between fishermen (chapters 3 and 4), and between fishermen and researchers (chapter 5). My approach to fishing politics is informed by the characterizations of four modes of power provided by Eric Wolf. The first two modes are defined respectively as the capability of the individual, and the ability of the individual to impose their will on another in social interaction. “Tactical Power” refers to the control over the settings in which people exercise their own capabilities, and interact with others. Finally, “structural power” is conceptualized as organizing those settings of social interaction in which tactical power is exercised: “Structural power shapes the social field of action so as to render some kinds of behaviour possible, while making others less possible or impossible” (Wolf 1990: 587).

Nadasdy uses Wolf’s definitions of tactical and structural power to analyze the continued subordination of First Nations’ knowledge in resource management contexts. Bureaucrats (state actors) exercise tactical power within management scenarios, and those management scenarios are constructed and constrained by the structural power of the state (2003: 268). The power relations that shape the context of TEK research and implementation in the Yukon are the focus of Nadasdy’s analysis.

My dissertation explores how fishermen understand power relations, how they act upon these understandings, and the implications of this type of knowledge for resource management. The focus of my analysis is upon the political knowledge of fishermen, and

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this dissertation.
this can be conceptualized as how they contend with the modes of power described by Wolf. Fishermen’s understandings of how all four modes of power operate within and around their fishery influence their fishing practice. Their own capabilities, the interactional control of other individuals, and most significantly, forms of tactical and structural power that maintain the authority of capital and state, are the political relations that shape fishermen’s realities and experiences.

The literature is replete with directives to future research exploring the heterogeneity of local knowledge, to breakdown the monolithic aspect that this knowledge has taken on in its opposition to dominant knowledge. Geographer Chasca Twyman notes a marked lack of recognition of the diversity of local resource use and resources users (2000:323), and Nygren laments the lack of focus on the contested and hybrid character of local knowledges (1999: 268). Gaventa and Cornwall identify the danger of reifying local knowledge and treating it as singular; greater attention is needed to the positionality of research participants (2001: 74)

The early work that developed lists of binary oppositions contrasting indigenous, traditional, or local knowledge to western science tended to reify alternative knowledges as a singular opposite to a reified dominant knowledge. Thus, the interrogation of power dynamics has been focused on those shaping the relative positions and interactions between “Western science” and marginalized knowledges rather than the microlevel power dynamics within either system. This has glossed over both the heterogeneity and differentiation between, and within communities. Not all subordinate or subaltern knowledges are the same, and within even small communities, knowledge is not uniform. It is critical to explore the forces that shape knowledge production within these other
systems. There are other forms of competition, domination, and inequality that shape what fishermen know, beyond the epistemological hegemony of a biological science model in resource management. The dominance of that model shapes the field of discourse within fisheries management, and creates sites of tension between biologists and managers and commercial fishers. However, it is the sites of tension creating and created by other knowledge conflicts that I interrogate in the following chapters.

During the last decade researchers have worked to understand the ways in which knowledge is differentially distributed and differentiated. The variability of individual knowledge is beginning to be interrogated: the way in which a resource user’s knowledge is shaped by their position within the resource economy, their age, their ethnicity, their gender etc. Ecological anthropologist Virginia Nazarea insists that researchers must turn their attention to “the interface between cognition and action – or decision-making frameworks and behavioural outcomes- and the lenses and latitudes that shape and structure these interconnections” (1998: 7). She emphasizes the situated nature of knowledge, its locatedness, and the ways in which history, power, and stake shape environmental perception and action (ibid.: 19, emphasis added).

History, power, and stake as critical determinants of environmental perception provide a useful frame for understanding the political aspects of resource workers knowledge. “Locatedness” must be interrogated in both its all of its manifestations: place-based and other. Local knowledge is situated locally, but it is also positioned by multiple other factors in groups and in individuals.

Sociologist Lawrence Felt has provided a very helpful example of the political influences on ecological knowledge and the importance of considering the circumstances
of both knowledge production (fishing practice) and also the context of its use and articulation (1994: 253). Knowledge claims are influenced by factors such as resource competition and union participation, and fishers often assert conclusions about resources that reflect their own economic interests, or the perspective of an organization to which they belong. Thus, salmon fishers in Newfoundland express different perspectives on the abundance of salmon stocks depending on their proximity to the spawning grounds, and depending on their participation in the union (ibid.). Felt’s work encourages a critical analysis of both the practical and political context of ecological knowledge, suggesting that this knowledge can only be made useful when it is interpreted in light of the forces at play in its construction. Thus, the “processes whereby something becomes known assume at least as much importance as the knowledge claim itself” (ibid.).

Palmer and Sinclair warn, like Felt, that knowledge claims need to be evaluated in their political context (1996: 275). Their sociological research with trawl fishers in Bonavista Bay revealed the way in which divergent interests in the fishery created divergent views on its management. They emphasize that no research can actually directly access fishers’ knowledge, rather what they engage with is fishers’ statements about the fishery and the ecosystem, made in a sociopolitical context (ibid.: 268). Thus there is a potential difference between what fishers know and what they know they should say in order to promote their interests in a co-management setting.

This work is an attempt to take these suggestions further, to evaluate the political content of knowledge claims, to investigate the nature of fishers’ divergent interests and to determine the implications of both. The political knowledge of fishers is intertwined with their ecological knowledge, but it is not simply the “background noise” that
complicates LEK research. This knowledge provides important information about how fisheries work, and how communities function.

This approach is thus based on an expansive understanding of local knowledge that moves beyond the current focus on ecological knowledge. Much research on alternative knowledges has been conducted in the context of resource management and conservation, and has engaged with local ecological understandings. This reflects a limitation of local knowledge to ecological facts, and theories of environmental relations. My focus on the political knowledge of resource workers allows for an engagement with locally-developed theories of politics, economics, and social relations. In fisheries anthropology this reflects a re-integration of the more holistic aspects of anthropological approaches into fisheries research.

During the last forty years, fisheries anthropology has developed an increasingly applied focus. Earlier studies contextualized fisheries production through an analysis of social and economic relations, and research in maritime communities made contributions to various fields of anthropological theory. More recently, fisheries anthropologists have been increasingly focused on finding solutions to resource management problems. Much research has been dedicated to supplementing or improving fisheries science with social science. I have identified three phases in this progression from 'embedded' to 'disembedded' fisheries knowledge research.

The first phase is essentially the 1960s and 1970s, when maritime anthropology clearly emerged as a subfield, until the ratification of the Law of the Sea in 1977, which significantly impacted fisheries management and regulations in many countries. Ethnographic research in fishing communities at this time focused upon social relations
and the organization of production. Anthropologists were especially interested in kinship relations and their impact on crew recruitment (Nemec 1972, Stiles 1979, Faris 1972). It is difficult to find a piece of work conducted in the 1960s, especially within Canadian research, that does not include a kinship chart. The significance of household production was a major focus of studies in Newfoundland, as family labour was critical to the processing of cod. The investigation of the particularities of fishing as an ecological and economic adaptation reflected the theoretical thrust of the time, and the influence of peasant studies (see Orbach 1977). Of particular interest is the fact that in 1972, a title referring to "resource management" indicated the use of family labour resources in the operation of a fishing enterprise, rather than state regulation of the fishery (Lofgren 1972). Ecological knowledge and fishing practice remained embedded in the wider social context in this phase of research.

The second phase progresses from 1977 until the early to mid-1990s, and reflects a focus on resource management problems and their resolution through social measures. The Law of the Sea, which expanded national jurisdiction over fisheries to 200 miles offshore, resulted in major policy changes in many coastal nations. Some nations increased the catching power of their domestic fleets to more fully exploit the newly territorialized waters, which later resulted in problems of overcapacity. License limitation and fleet rationalization was necessary in some regions (see discussion of BC halibut fishery in Chapter 4). In the United States, the Fisheries Conservation and management Act of 1976 implemented a policy of "Optimal Sustainable Yield", shifting management priorities to include social and economic issues and thereby increasing the opportunities for anthropologists' involvement in fisheries management (Acheson 1981).
This phase of research is marked by an American-driven critique of fisheries management approaches (Smith 1982, Davis 1991a, Wilson and Kleban 1992). Privatization in fisheries prompted debates regarding common property, and anthropologists became involved in refuting the assumptions of Hardin's Tragedy of the Commons theory (1968). Studies documenting alternative forms of property rights, and the impacts of privatization of fishing rights were part of this new focus on resource management (Acheson 1988, Jentoft 1993). It is here that we see a more explicit focus on fishers' knowledge, in research attending to how fishers can maintain the sustainability of their fisheries. This work however, maintained attention to social and political relations. Interest in the knowledge of fishers remained integrated with an analysis of broader power structures and local social organization.

The property right debate dovetailed into fisheries research which emphasized "Folk Management". Broadening from the refutation of the Tragedy of the Commons, this body of research investigated the multiple forms of "traditional" management at work in fisheries, drawing heavily on examples from the developing world. Dwyer and McGoodwin's volume, *Folk Management in the World's Fisheries* (1994), reflects the nadir of this thrust in research. Marine biologist R. E. Johannes' work in Palau (1981) was particularly formative to this research development, documenting the detailed ecological knowledge of fishers and their resulting ability to manage fisheries for long-term abundance.

I date the third phase of fisheries research to the collapse of the Northern Atlantic cod stocks, and the resulting moratorium on commercial cod fishing in Newfoundland in 1991. This high-profile failure of fisheries management combined with the increasing
focus on alternative/subaltern knowledges in social science research, encouraged the development of ecological knowledge research in fisheries anthropology. The last fifteen years has seen an increasingly applied focus in this area of research, as anthropologists and other social scientists have sought to improve fisheries science and fisheries management with local knowledge (Davis and Wagner 2003, Neis et. al. 1999).

In addition to the academic shifts encouraging this research, there have been economic and regulatory changes which support this kind of work. McCay and Jentoft identify a trend toward decentralization of fisheries management to lower levels of government in many countries, and an accompanying shift towards greater user participation in management structures (1996: 237). Co-management of fisheries encourages greater incorporation of fisheries knowledge into management and planning. Davis suggests that the recommendations of sociologists and anthropologists are increasingly being incorporated into government and industry discussions of fishery management options (1996: 223).

The recent emphasis on ecological knowledge thus reflects the endpoint of a steady progression toward applied research over the last several decades. This "evolution" has resulted in a transformation in anthropological understandings of local knowledge. In the first phase of research, local knowledge was approached as kinship relations, economic and ecological adaptation, and the organization of work and production. This reflected a more holistic understanding of local knowledge as conceptualizations of the ecological, economic, social, and political environment of a community. In the second phase of research, local knowledge became somewhat more ecological in focus but did not completely lose its social and political aspects.
Researchers attended to the ways that communities managed their relations with each other and the environment to maintain sustainable harvesting of resources. Fishers’ knowledge was researched in order to understand how they managed their fisheries. In this final phase of research, the ecological knowledge of fishers is essentially documented to provide data for the management of fisheries by bureaucratic structures. Ecological knowledge is disembedded from the social and political context of its construction in order to provide information that is hoped to improve state management of fisheries through the mechanisms which were critiqued by much of the research of phase two in the 1980s and 1990s.

There are of course, fisheries anthropologists whose work has not segregated social and ecological realms. Durrenberger notes that there is an increasing literature that emphasizes the need for a more holistic understanding of the various components of such complex systems (1996: 9). Palsson’s approach to fishermen’s knowledge is focused on social relations and the broader context of fisheries production. He analyzes “folk theories of nature and production”, revealing how different relations of production in the history of Icelandic fishing have created different explanatory models or paradigms (1991). He explores how local understandings are shaped by changing social, economic and ecological circumstances. Durrenberger has also analyzed folk models in his discussion of Mississippi shrimping (1996), and his work on the skipper effect with Palsson (Palsson and Durrenberger 1990, Durrenberger and Palsson 1982). Durrenberger emphasizes that fishermen, biologists, and economists all have their own folk models that justify and rationalize their actions (1996: 12). Ethnographers must not
idealize nor dismiss these models, but investigate their authenticity, and their role in the system of production (ibid., and Palsson and Durrenberger 1990).

Following Palsson and Durrenberger, my work is an effort towards revealing the explanatory constructions that north coast fishers use to understand the context of their fisheries. However, my focus on local political knowledge emphasizes attention to the theories developed regarding the political machinations of resource management and fisheries regulations, rather than on models of local production. I do not use the term “folk model” because there is not sufficient cohesion and consensus within this political knowledge to form a folk model. The understandings of commercial fishermen in British Columbia that I am dealing with are too fragmented and positioned to be described in terms of a model, or even multiple models. Rather, referring to these diverse perceptions and understandings as “political knowledge” captures the political construction and political impact of fishermen’s knowledge, without suggesting the systematization or homogeneity reflected in a folk model. While there may be folk models of production at work in the BC fisheries, there do not appear to be folk models of regulation and management, but rather, there is diverging and conflicting political knowledge of this realm.

I also draw on the work of Paul Nadasdy, whose critique of TEK research and research products in the Canadian North provides important guidelines for the production of ecological data. Nadasday has criticized the TEK literature as constructing TEK as “a set of discrete intellectual products completely separable from the cultural milieu that gives them meaning (2003: 22). It is my contention that this caveat against ‘disembedding’ indigenous knowledge from its cultural context must be extended to
other forms of ecological knowledge research. In contemporary commercial fisheries, rather than a *cultural system*, I would suggest that fishers' knowledge is embedded in a *political structure*. The problems of decontextualization and distillation that Nadasdy warns of regarding TEK of indigenous peoples, can compromise research in other communities. Distilling fishers' ecological knowledge from the political context of their harvesting practices is problematic, if not impossible.

Nadasdy is also critical of the underlying political issues at work in TEK research and integration into resource management. Nadasdy suggests that TEK research, although purporting to empower First Nations and validating their knowledge, in fact extends the power of science (2003: 141). There are similar arguments made regarding the negative impacts of participatory development in the critical volume *Participation: The New Tyranny* (eds. Cooke and Kothari 2001). The participatory development movement purports to enhance the empowerment of local communities in development projects, and to include local knowledge. However, Mosse suggests that participatory development approaches can disguise external interests as local needs (2001: 22) and Hildyard et. al. identify the ability of participation to "engineer consent" (2001: 59). Henkel and Stirrat point to the way that Western epistemological hegemony is maintained even in participatory development; local information remains bounded by Western constructions (2001: 182), similar to the relationships described for Nadasdy regarding processes of distillation of First Nations TEK.

While fishermen in North America may for the most part be part of the dominant culture, political and economic vulnerability creates a particular context which requires as
close attention to power relations and social context as necessary as when TEK research is translating between epistemological traditions.

Sociologist Petter Holm has identified similar issues of power relations and decontextualization within fisheries knowledge research. Holm distinguishes between “in situ” or “raw” FEK which is embedded and contextual, and “FEK*” which is the collected and refined research product (2003: 10). Raw fishers’ knowledge is described as:

a huge pile where a few nuggets of genuine insights and well-tested truths are entangled in a wide variety of beliefs, speculations, rumors, misunderstandings, lies, hopes, ides, exaggerations, superstitions and anecdotes. The basic problem becomes one of untangling the good stuff from the bad – truths from beliefs, insights from hopes, observations from anecdotes, sound interpretations from politically charged ones” (2003: 12).

Holm identifies two standard solutions to this problem: using FEK as testable hypotheses for science, and using FEK as data (focusing on fishers’ observations of natural phenomenon). There are a number of “filtering processes” (2003: 21) that are involved in the transformation of raw FEK, which reflect both a dis-embedding of FEK from the cultural, social and political contexts, and a re-embedding of it into science. The relevance of the FEK data to scientific practice is a key determinant of its scientific status. Holm argues that “orthodox science” has rejected FEK because it is “heterogeneous and polluted” and that FEK researchers take on the role of cleaning it up for scientific use, and thereby reaffirm the epistemological privileges of science (ibid.: 25).

Holm’s arguments relate directly to Nadasdy’s critique of the role of TEK in co-management contexts for First Nations people. The epistemological hegemony of science and the political hegemony of the state are perpetuated by the distillation and
decontextualization of First Nations knowledge. Within fisheries management, the
"cleaning up" of fishers' knowledge results in a similar maintenance of power structures.
By filtering out political content from FEK, social scientists discard potentially valuable
critiques of and counterpoints to fisheries science and management.

It is important to emphasize that this way of understanding the political aspects of
local knowledge is not intended to undermine the validity of local ecological knowledge.
The Cartesian approach to knowledge that has dominated western thinking has tended to
"reduce local ecological knowledge to mere trivia and to assume that what people have to
say about ecological matters and human-environmental interactions is pure ideology, or
relevant only as cultural data" (Palsson 1998: 51). I do not argue that fishers' knowledge
is inimical to use as a data source for mainstream resource management due to political
influences upon it, and its political content. Fishers do hold important information
regarding the fish they harvest and the ecosystem in which they work and this
information can provide complementary data to inform resource management. What I do
argue is that this information must be understood in light of the context of its production
and articulation (Felt 1994), and that the aspects of this information that provide critiques
and deconstructions of that context must be considered. Ecologically-focused, applied
social science research does have an important role to play in broadening and improving
the data sources that inform resource management, and in emphasizing the value and
scope of the knowledge held by local residents and resource users. My argument is that
we must also attend to what fishers have to say about the health of their fisheries, not just
the health of fish they catch and how they catch them; we must ask them about the Coho
Crisis, not just about Coho salmon stocks. We must ask them about the impacts of
selective fishing gear on their fleet and their communities, not just whether this gear
avoids Coho encounters.

**Knowledge Encounters**

This dissertation is thus an investigation of the way in which people come to
know and understand their social, political, and economic environment. Following the
lead of contemporary political economy studies in anthropology, this is “an ethnography
of a problem not a people” (Dombrowski 2001: 4). The research for this dissertation was
multi-sited; although rooted in Prince Rupert, I followed Rupert fishermen to the
southern fishing areas in the herring and sockeye seasons. Rather than focusing on the
“place” of local knowledge, I have focused on its interactional construction and
expression. I have structured this dissertation as a series of case studies of “local
knowledge encounters”, each of which provide a platform for the discussion of particular
issues that arise from the interaction between fishers’ and other epistemological systems.
Each chapter thus describes and analyzes a specific resource management crisis or
research initiative which highlights the complications that arise from government and
academic efforts to engage with resource workers’ ecological knowledge.

In my initial interviews with resource workers, I asked them how their ecological
knowledge might better be integrated into resource management. Many provided a
similar answer to the effect of: “I’d be happy if they just managed it based on real
biology, not politics”. Many fishers were not as concerned with the lack of attention to
their ecological knowledge in fisheries management as they were about their perceptions
that political goals were overwhelming biological imperatives in the management of the
commercial fisheries. Their concerns regarding politics in the fisheries encouraged my
research focus on the political aspects of management and fishers’ understandings of these issues. Despite my focus on political issues rather than ecological questions, it is through an analysis of ecological knowledge encounters that I have come to understand the politics of local knowledge. Throughout my fieldwork, I participated in and observed meetings, workshops, and presentations that dealt with natural resources, local knowledge, and resource management and/or conservation. The following case studies have been developed from the many encounters between government and academic institutions, and fishers. TEK and LEK are en vogue research topics, and are often mandated data sources for government resource management structures. Co-management agreements are increasingly implemented to both re-structure resource governance in recognition of Aboriginal rights, and to restructure fisheries management in order to relieve costs to government and to legitimize regulations. Thus, there were many opportunities to observe bureaucratic efforts to engage with or to deal with resource workers’ ecological knowledge during my research.

I have built this work around analyses of “knowledge encounters” because these moments of epistemological conflict and negotiation provide insight into the political content of fishers’ knowledge, and the political relationships between divergent knowledges in resource management contexts. Fishers’ critiques of coho salmon conservation measures speak to issues of both fishing practice and resource competition (Chapter 3). The conflict between fishermen and a biologist over rockfish behaviour (Chapter 4) and between members of the Fraser Panel over sockeye fishing opportunities (Chapter 6) reveal the persisting hegemony of biological science in fisheries management. These interactions also indicate the ways in which fishermen’s knowledge...
is shaped by this hegemony and broader political forces. Angry and frightened fishermen yelling at university researchers (Chapter 5) highlights both methodological and political complications of academic research in contemporary fishing communities. Protest fisheries due to conflicting perceptions of abundance highlight the convergence of ecological and political knowledge in determining fisher behaviour (Chapter 6). And finally, an analysis of government definitions of knowledge contextualize the bureaucratic environment in which these relationships play out, and the political mandates enforcing epistemological hierarchies (Chapter 7).

The knowledge encounters thus provide me with ethnographic examples through which to analyse theoretical problems, but they also ground the discussion within the context of current epistemological relationships. Local knowledge is not just an academic research focus—it is a powerful force within contemporary resource management contexts. Although there persisting barriers to the inclusion of fishers’ knowledge in fisheries management and planning, the discourse of local knowledge is impacting the political field. The increasing focus on local and traditional ecological knowledge in academic, government, and environmentalist spheres during the past decade has subtly altered the way in which fisheries conflicts play out. Fishers have always believed that they know important things about fish; now that knowledge has been defined and has a greater public and political value. Several fishermen suggested to me that DFO policy has been far more restrictive since the collapse of the Newfoundland cod stocks in the early 1990s. This fisheries collapse also accelerated and amplified discussions of the value of fishermen’s knowledge in resource management contexts. Thus, while fisher and government interactions have in the past involved epistemological
power struggles, these struggles now take place in the context of an explicit recognition of fishers' ecological knowledge and formalized within co-management structures.

Thus, the current emphasis on alternative knowledges provided me the ethnographic and bureaucratic context for my research. The fact that there were researchers studying fishermen's TEK in Prince Rupert (Chapter 5), and the government is mandated to include traditional knowledge in endangered species assessments (Chapter 7), allowed for the analysis of the forces shaping local knowledge and structuring knowledge relations in resource management scenarios.

**Structure of the Work**

I detail my adventures in observation, participation, and interviewing in the second chapter, which provides an account of my research methods and timeline, and a description of the north coast region and Prince Rupert. The relevant background information on the industry is provided through a discussion of key issues impacting the primary fisheries in the north coast region. Chapters 3-7 are case studies of local knowledge encounters, and Chapter 8 provides conclusions regarding this research and the implications for academic engagements with local knowledge, and for resource management. Appendices I and II provide the technical background information regarding fishing gear and fisheries management.

The case studies begin with a discussion in Chapter 3 of the Coho Crisis, a conservation initiative in 1998 that had a massive impact on commercial fisheries, and resulted in major fleet restructuring. Commercial fishermen in Prince Rupert were unanimous in their suspicion of the underlying motivations of the drastic measures taken to conserve coho. The diversity of their analyses of these motivations provides valuable
insights into fleet dynamics and the way in which local knowledge is positioned and differentiated. This politicized understanding of local knowledge provides a foundation for the discussion in the other case studies.

The Rockfish Crisis (Chapter 4) provides a classic example of the way in which scientific knowledge can clash with local knowledge. A DFO presentation to announce rockfish conservation measures for the long-line fisheries provided a forum for a debate on fish behaviour that typifies many characteristics of fisher-manager conflicts identified by fisheries knowledge researchers. The rockfish crisis also illuminates the new forms of knowledge that fishers require in order to cope with the contemporary management structure. Quota-based management has transformed the way in which fishers contend with the environment, and with each other, and has altered understandings of work, ownership, and equity.

Chapter 5 describes the encounter between fishermen's knowledge and academic models. This case study details the participation of Prince Rupert fishermen in a research project designed to model the health of the Hecate Strait ecosystem at various points throughout history. This modeling project, conducted by the UBC Fisheries Centre included fishermen's TEK in addition to other data sources. The workshop which presented the modeling system resulted in angry, discouraged, and confused fishermen whose knowledge, and more importantly interests, could not be easily integrated with those of the research team. This encounter indicates the methodological importance of situating knowledge, and highlights the politics of local knowledge research.

The next chapter moves the focus to the south coast, and the Fraser River sockeye fishery of 2002. The fishery was fraught with conflict over conservation values,
allocation policies, ecological knowledge, and abundance modeling. These controversies resulted in a parliamentary review that recommended a significant overhaul of the consultation and co-management structures in place for the Pacific salmon fisheries, reflecting the inability of current resource management arrangements to deal with fishers’ knowledge and needs. A protest fishery prompted by conflicting models of fish abundance resulted in a court ruling that speaks directly to the issues surrounding political knowledge of conservation and allocation. The court case reinforces the key themes of politicized knowledge and its relationship to diverging economic interests.

The final case study explores the emergency designation of two species of sockeye by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) at the end of the 2002 sockeye season. My analysis of the COSEWIC mandate regarding local knowledge and traditional knowledge illuminates broader level issues regarding the way in which government institutions understand and validate different types of knowledge.

These case studies reveal the complicated nature of local knowledge, and suggest the need to deal with all aspects of local knowledge, not simply its ecological components. These knowledge encounters point to various epistemological issues functioning on a number of scales. The micro-level issues of context and individual position in the construction of knowledge are highlighted, illuminating the way that fisheries regulations have fragmented the interests and perceptions of the commercial fleet (chapters 3 and 4). At a meso-level, the practical and political issues arising from the interaction between different interests and different forms of knowledge are analyzed (chapters 5 and 6). At the macro-level, the ways in which knowledge forms are
differentially represented and utilized by government is analyzed in light of academic
theories of knowledge differentiation (chapters 6, 7).

The case studies provide helpful anecdotes and are useful stepping stones to theoretical discussions regarding different types of knowledge and their construction. However, these examples also indicate the frequent and multiple ways in which local knowledge is either fragmented, sought after, ignored, or contested by powerful institutions and structures. The fact that there were so many examples to observe, so many meetings to attend, that involved and engaged the local knowledge of resource workers is also meaningful to this project. Local knowledge, ecological and non-ecological, is not just the topic of anthropological debates and dissertations. It is an important point of interaction between dominant forces and local people, between resource workers and resource managers, between government and citizens. Local knowledge is not merely that which informs resource workers’ livelihoods and their daily interactions with their natural and social environment. Local knowledge is what informs debates over environmental issues and social values. The politics of local knowledge are implicated in, and created by, a broader political economy and broader fields of power.
Chapter 2: Community Context and Research Methods

This dissertation is structured as a series of case studies which highlight different aspects and forms of local knowledge, and its interaction with science and government management institutions. As such, it is a study of a particular set of relationships and power dynamics. This very specific investigation, however, is informed by a classically ethnographic research experience. This dissertation reflects an examination of the social and political environment of a specific region and a particular way of making a living. While the case studies focus on critical moments of epistemological interaction, these moments are embedded in a much broader experience of life in a struggling natural resource community. They are examples chosen from many incidents I have observed over the three years I have spent in Prince Rupert. The quotes that I have selected for inclusion in each chapter are short excerpts from detailed stories people told me about their lives and livelihoods. While there are many issues, experiences, and interviews I have not been able to include in this work, all of the conversations I had and observations I made over the course of my fieldwork have contributed to my understanding of the issues presented here.

The objective of this chapter is to contextualize the place and practice of my research. While each case study presents the specific background information relevant to the issues discussed in that chapter, this chapter presents the more general context of the project as a whole. In the following pages I will provide three types of background information regarding this dissertation:

1. The historical, social, and economic context of the research, in the form of an introduction to Prince Rupert and the north coast region.
2. Basic background information on the fishing industry in British Columbia.

3. Research methods and a description of research practice.

Prince Rupert and development dreams lost at sea.

The history of the north coast extends to time immemorial and the origin stories of the Tsimshian-speaking peoples. Aboriginal people have been living in the north coast region of what is now called British Columbia for many millennia. According to the Gitxaala Nation’s Treaty Negotiator John Lewis, the village of Lax Klan (40km south of Prince Rupert) has been continuously inhabited for over 11,000 years (personal communication). The First Nations of the region have continued to use and manage the lands and resources of their territories, and have maintained sovereign social and legal systems through the matrilineal inheritance of names, property, and rights, and the feasting traditional system (see Seguin1984).

European, Russian and American ships began visiting the north coast during the maritime fur trade (1789-1825) to trade various goods for sea otter pelts. The Hudson Bay Company established a trading post on the Nass River in 1831, which was later moved to Tsimshian territory at the encouragement of Chief Legaic of the Tsimshian. Fort Simpson became a key point of economic and cultural contact between First Nations and Euro-Canadians. The reserve community of Port Simpson/Lax Kw’Alaams now lies at this site, where nine Tsimshian tribes located their winter homes in order to participate in trade with the fort. Tsimshian peoples traded logs, fish and other food products with the HBC traders, as well as working for wages in various fort-related activities such as logging and building (Menzies and Butler 2001).
Missionaries began their conversion work in this region during the 1850s and many Aboriginal people were converted to Protestant forms of Christianity (Anglican and Methodist particularly) during the next few decades. William Duncan established what he touted as a “utopian” Christian settlement at the winter village of Metlakatla in 1862, and encouraged the development of various industries (see Usher 1971). Missionaries were extremely active in the establishment of sawmills in this region. They encouraged the shift from avunculocal lineage-based households to nuclear family households and a focus on waged labour. The sawmills provided the required lumber for new houses, and jobs for Tsimshian men. Several of the early sawmills are associated with missionary activity (Menzies and Butler 2001).

Salmon canneries effected the next major transformation in the north coast economy. The first cannery was built at Inverness on the Skeena River in 1876, and there were 12 canneries in the region by 1902 (Lyons 1969). Newell identifies 41 cannery sites on the Skeena and Nass rivers and in Prince Rupert, between 1876 and 1966 (1993: 68). Canneries relied on the processing labour of First Nations women and children and Asian men, and the fishing labour of First Nations men (see Musjynski 1996). Port Essington on the Skeena River was the centre of economic activity in the region at the turn of the century, boasting several canneries, sawmills, hotels, and which became the regular stop of the steamships roaming the coast and the river. The community was established by a lay missionary, Robert Cunningham, who was “fired” by Rev. William Duncan of Metlakatla. Port Essington began to fail when it was by-passed by the railway built on the other side of the river, but remained inhabited until the village burned in 1956.
The canneries encouraged the development of the local, small-boat fishing industry. Large schooners had been harvesting halibut in north coast waters since the late 1800s (see below), but the canneries encouraged local small boat gillnet fishing, and later, the development of a local seine fleet. The canneries also provided a growing market to local sawmills, requiring a great deal of lumber for buildings, piers, as well as yearly supplies for boxes and crates. These mills were supplied by independent hand-loggers who logged small coastal claims by hand and dragged their log-booms to the mill behind a fishing boat. Communities such as Oona River and Dodge Cove, which were settled in the first decade of the twentieth century, relied on a seasonal combination of fishing, logging, milling, and boatbuilding.

Prince Rupert was incorporated in 1908, in anticipation of the site being the terminus of the Grand Trunk Railway, which was completed in 1913. The town soon eclipsed Port Essington as the regional economic hub. However, Prince Rupert was denied its full potential by a twist of fate. The future of the town went down with the Titanic.

Charles Hays, president of the Grand Trunk Pacific Railway, was planning for Prince Rupert to become the major port of British Columbia. It had a deep, ice-free harbour and until the building of the Panama Canal, was the closest North American port to Asia. Hays planned to blast the top of the mountain behind the town (now called Mount Hays) in order to decrease rainfall, and expand the geographic area available for building. He envisioned a 450 room hotel at the railway terminus, and the diversion of many major industries to the north. While returning from England with the plans for the hotel, and agreements for financial backing, Charles Hays died on the Titanic.
Prince Rupert is thus a place that “might have been”. The legacy of Hayes and the unfulfilled potential of the port and the city is the wistful history of Prince Rupert. This tragic identity as “Hay’s Orphan” (Hick 2003) is felt especially strongly during periods of economic downturn such as that which coincided with my research. Prince Rupert has been in a period of economic recession since the late 1990s, after decades of resource-based boom.

The Second World War initiated a major boom in Prince Rupert. Forty thousand American troops came through the region during the war, resulting in a paved highway inland and improved local infrastructure. The population hit its peak in 1942-45 at 21,000 (City of Prince Rupert 1995a: 3). While fishing effort declined during the war, the post-war decades saw expanding participation and expenditure. For decades Prince Rupert was the “halibut capital of the world” with tonnes of halibut moving through the port each year. A pulpmill was built in neighboring Port Edward in 1949, which despite chronic labour disputes and regular closures, provided up to 750 jobs until 2001.

The fishing industry experienced several ups and downs throughout the century, but the Prince Rupert Fishermen’s Co-operative Association provided some degree of stability to Prince Rupert fishers between 1931 and 1994. Established by salmon trollers to increase their independence from the large companies, and to ensure markets for their product, the Co-op established a processing plant in Prince Rupert, employing 350 shoreworkers (Menzies 1993: 161). They expanded to include diversified local processing facilities, and plants in Uclulet and Vancouver. With a membership in the early 1990s of 500 skippers and crew, and a member-owned fleet of 200 boats, the PRFCA was a significant force in the northern fishing industry. The affiliated credit
union (established 1940) provided accessible financing for fishing enterprises, and the cooperative marketing system resulted in higher fish prices for members (15-30% better than alternative buyers) (ibid.: 165). Failed attempts at diversification resulted in large losses in the late 1980s and extensive restructuring. The ultimate failure of the Co-op in 1994 resulted in significant losses to members who had money invested in Co-op shares, and who had received down payments on their fish but were waiting for the end-of-season “returns”. The Co-op facilities were eventually taken over by J.S. MacMillan Fisheries, however, the site remains identified with the PRFCA. Even in 2003 it was not uncommon for a fisherman to say that his boat was “tied up at the Co-op”. North coast fishers now sell to one of a half-dozen fishplants operating in Prince Rupert.

While cannery consolidation and closures resulted in a steady decline in processing jobs from WWII onward, the income for fishermen increased in the later decades of the century. Japanese imports of salmon and herring products resulted in strong prices in the 1980s and 1990s. However, many fishermen experienced difficulties in the early 1980s due the dangerous combination of high interest rates and a boat-building boom.

Post-war cannery consolidation hit the First Nations very hard. Tsimshian families had begun to incorporate industrial fishing, cannery work and handlogging into their seasonal pattern of resource harvesting by the turn of the last century. This pattern was disrupted by the cannery consolidation and closures after WWII, industrialization of forestry, and the prohibition of drag seining as a fishing method in 1964\(^5\). The economies

\(^5\) Drag seining involved the harvest of salmon by net at the mouths of creeks, and often the areas used were previously the sites of stone fishing traps. These fishing sites were the centre of lineage-based production of fish and other food and trade products in the summer months. The sale of fish to canneries became an important part of the Aboriginal economy and allowed for the maintenance of fishing sites and the
of the reserve communities on the north coast have suffered further from the more recent
debates in resource-based industries, and unemployment rates range from 49% to 83% (Tamblyn and Horn 2001: 86). The restructuring of the fishing industry through the Mifflin Plan in 1996 (see below) resulted in the community of Kitkatla (pop. 480) losing 14% of its jobs (Gislason 1996: s-11). The Tsimshian communities are currently investigating various forms of economic development that will provide the basis for their economies after the settlement of land claims currently under negotiation. Aquaculture and forestry joint ventures, and tourism are major foci for development plans.

Restructuring of the commercial fishing industry in the 1990s, reduced catch limits for sports fishing operations, the US-Canada Softwood Lumber dispute, the closure of the local pulpmill and a sawmill, and increasing logging costs in the north coast region have resulted in a period of economic difficulty in the region (Tamblyn and Horn 2001: 95).

The 2001 population of Prince Rupert was 15,302 according to the 2001 Census, having dropped 12.1% since the 1996 population of 17,414. The Aboriginal population of the city is 4,625; Aboriginal residence in Prince Rupert increased by almost 120% between 1961 and 1991, reflecting the movement of First Nations people away from reserve communities (City of Prince Rupert 1995b: 2).

The 1990s brought significant changes to the fishing industry. Five hundred fishing-related jobs (50%) were lost in the area after 1996 (Tamblyn and Horn 2001: 97)

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subsistence harvest of other species. The outlawing of drag seining severely disrupted Aboriginal economic production, and many families have not returned to their fishing camps since 1964. This began an era of increasing unemployment in the coastal communities (see Butler and Menzies nd).

Prince Rupert's non-Aboriginal residents identify many ethnic origins. Early twentieth century immigration to the region was largely from Scandinavian countries, and the last decades of the century has seen a marked increase in Asian immigration to the area.
due to reduced shorework opportunities and the rationalization (reduction) of the commercial fleet. The major growth of global salmon aquaculture during the last two decades has resulted in a significant reduction in salmon prices. Adjusted for inflation, salmon prices in 1996 were approximately half of what they had been in 1988 (Gislason 1996: s-4). This coincided with new conservation concerns and low cycle years of salmon abundance and 1995-96 saw the lowest two year catch since the late 1950s (ibid.: s-6).

The current economy of Prince Rupert is dominated by five basic industry sectors which contribute to the economy as follows (percentage of basic after tax income):
Public Sector (27%), Forestry (22%) Fishing (15%) Transfers (13%) Tourism (8%) (PREDC 2001: 3). The unemployment rate is almost twice the BC average at 15.8%, but earnings remain close to the BC average. Occupation statistics attribute 500 jobs to the “Agriculture and other resource-based industries” category, with 95 of those jobs held by women. Education statistics indicate considerably lower high school graduation rates than the rest of the province. 7

Despite the last decade of decline, there have been recent developments that have inspired hopefulness in the residents of Prince Rupert. Cruise ships began visiting Prince Rupert in 2003 and it is anticipated that 400 jobs will be supported through this form of tourism (Tamblyn and Horn 2001: 96). In the summer of 2004 it was announced that a container port facility will be established in Prince Rupert by 2006, creating 500 direct jobs. Containers will arrive by rail and will be loaded onto ships bound primarily for Asian ports. There is anticipation that the moratorium on oil and gas exploration in the
region will be lifted, resulting in some economic benefits to Prince Rupert. Discussing these and other potential developments, and the rising house prices at a dinner gathering, a former pulpmill worker who had recently found steady employment remarked: "Maybe Charles Hays' dream is going to come true after all". Ninety years later, the unfulfilled ambitions of the railway magnate remain the yardstick by which ‘Rupertites’ measure their town’s success.

**The Intricacies of the Fishing Industry**

This brief history of Prince Rupert and the north coast region reveals the significance of resource industries to the local economy, and the impacts of industrial rationalization and restructuring in the post-war era. An important aspect of Prince Rupert is that it “used to be” a fishing town. The fishing industry was once the major economic driver in the region, but its stability and prosperity have been drastically compromised. The industry and the town are both but shadows of their former selves, and this significantly shapes the politics of resource management. In this section, I will summarize the changes in the industry that have been formative in creating the context for my research.

The fishing industry in British Columbia is a web of very complex regulatory structures that have created discrete fisheries by species and gear type. A comprehensive history of the industry and a detailed explanation of contemporary fisheries management structures are beyond the scope of this dissertation, however, there are several key transformations during the past four decades that have significantly impacted commercial fishing in Prince Rupert. This dissertation focuses primarily on the debates surrounding

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7 In the 20-34 age category, 31.9% had less than a high school diploma compared with a provincial average of 14.6%.
salmon and halibut fisheries, and so the key issues impacting these fisheries are outlined below. For a basic description of the fisheries by species, and the key divisions of boat size and gear, see Appendix 1.

1. **License Limitation**

For the early part of the twentieth century, fishing effort was not limited by license restrictions. In 1890 only 500 fishing licenses issued for the Fraser River were allowed (Meggs 1993: 34), 350 of which were issued to canneries, but the limits on independent fishermen were soon lifted. The United Fishermen’s and Allied Worker’s Union (UFAWU) began encouraging some form of license limitation in 1943, due to concerns about an influx of veterans increasing fishing participation (Meggs 1993: 162). Fishing was open to those citizens who bought a license for a nominal fee. Growing capacity in the fleet and low incomes prompted the DFO to review the possibilities of license limitation (Sinclair 1960) to solve the problem of “too many fishermen chasing too few fish”.

The Davis Plan (named after Fisheries Minister Jack Davis) was implemented in January 1969. Vessels with sufficient qualifying landings were designated A licenses, and those with less than the required poundage were allocated “B” licenses which would expire after ten years. License fees were doubled to $10 to discourage “moonlighters”, and to finance a buyback of excess capacity.

The Davis Plan was designed to reduce fishing capacity and improve the income of remaining fishers. The union warned that most Aboriginal fishers would qualify for B licenses, and that A licenses would increase rapidly in value, thereby intensifying capital

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8 In this buyback 354 vessels were removed from the fishery at a cost of $5.8 million, and sold at auction, recovering $2.6 million. The vessels were sold outside of the BC fishery (Sinclair 1978: 35).
investment in the industry (Meggs 1993: 191). The restructuring in fact resulted in increased capacity and capitalization as boats and licenses increased in value, as new, larger and more efficient vessels replaced older boats. In the first year of the program, 76 vessels were replaced, which replaced 187 tons of fishing capacity valued at $174 00 with 596 tons valued at $1 773 000 (Sinclair 1978: 36). The number of native gillnetters declined 29% in the first two years of the plan (Meggs 1993: 197). Within a decade the capital value of the fleet had risen from $91 million to $432 million, and the value of salmon licenses from $0 to $150 million (ibid.: 208).

The high salmon and herring prices of the 1970s also encouraged the building of new vessels, leaving the fleet heavily indebted during the rising interest rates of the 1980s. The reduced fleet was still investing in technology to win the “race for fish”, and fishing effort and increasing marine pollution and spawning habitat destruction were impacting salmon stocks. Further rationalization was considered necessary in the 1990s (see below).

Since license limitation in the salmon fishery, there has been a steady movement towards limitation in most fisheries, and the right to harvest non-salmon species has been increasingly removed from the A license. For example, halibut became limited entry in 1979 (see Chapter 4), crab in 1983, and rockfish in 1993. Fishers allocated licenses during limitation processes have benefited both by retaining the right to harvest that species, and through the increased value of the license. Those who were not allocated a license lost fishing flexibility and opportunity, and younger generations have had to purchase licenses at significant expense. The current market value of gillnet and troll licenses are $100 000 - $250 000, and seine licenses are valued at $400 000.

In 1996 the Mifflin Plan (named after Fisheries Minister Fred Mifflin) introduced major restructuring in the fishing industry to cope with the overcapacity which was partly created by the Davis Plan. Prior to these changes, an A license allowed a vessel to fish salmon in any coastal fishing areas in British Columbian waters, using any of the three types of gear (troll, seine, gillnet). Many small boat fishers would troll in the spring and fall, and gillnet in the summer in order to maximize their fishing opportunities. In 1996, fishers had to choose one gear type and designate their A license as troll, seine, or gillnet. The coast was divided into different areas for each gear type and each fisher had to choose one area to fish with their current license. If they wanted to fish another gear type, or another area, they would have to purchase another license from a participating vessel. Seines chose between area A (north coast) and Area B (south coast), gillnets between C (north coast) D (central coast) and E (Fraser River), and trollers between F (north coast) G (west coast of Vancouver Island) and H (Gulf of Georgia/ Johnstone Straits) (See appendix).

Single-gear licensing reduced the flexibility and fishing opportunity of salmon fishers, especially that of the small boat fleet. Area licensing reduced the fishing opportunities associated with an A license, requiring fishers to invest in a second license in order to retain access to areas they had previously used. When fishers “stacked” another license on their vessel, these licenses became “married” and could not be separated for future sale or transfer, significantly reducing flexibility.

The Mifflin Plan also included an $80 million buyback program through which 810 out of 4412 eligible salmon licenses were voluntarily retired through sale to the government. The buyback inflated the value of licenses by creating a new market,
making “stacking” more expensive for fishers trying to retain their previous level of fishing opportunity.

5. Quota-based management.

The Tragedy of the Commons theory has encouraged a shift towards privatization in many fisheries throughout the world. Garrett Hardin’s 1968 paper characterized resource depletion as the inevitable outcome of open access. Using the metaphor of a common pasture, he posited that the individual benefit of adding another sheep was greater than the individual loss, but the cumulative individual actions would ultimately deteriorate the pasture. H. Scott Gordon’s work focused on common property problems in fisheries (1954), and these approaches have informed many of the fisheries management structures of the later decades of the twentieth century.

Individual quotas have been introduced in several fisheries worldwide (Norway, New Zealand, Iceland, and a few US fisheries). Fishers are allocated a portion of the Total Allowable Catch for a species, and thereby acquire perpetual harvest rights, making a common resource into a form of private property. IQs often become ITQS (individual transferable quotas) which allow their transfer (permanent or temporary) between fishers.

Quotas are supposed to end the “race for fish” that results in overcapitalization, by establishing a “fixed share of the catch” for each fisher (Copes 1986: 279). Fishers can spread out their effort, improve quality and safety, and reduce harvest gluts (ibid.: 280). Transferability is assumed to improve efficiency and increase rationalization. Quota-based management, however, has been criticized for many issues including high grading, increased enforcement costs, harvest setting complications, crew reductions,

Quotas were first introduced to BC fisheries in 1980 in the abalone and herring spawn-on-kelp fisheries (Crowley and Palsson 1992: 3). There has been a steady trend towards quotas in the BC fisheries, and currently discussions focus on the introduction of salmon quotas. Transferability in some quota fisheries has resulted in high quota prices. The ability to lease out quota and thereby make income from a fishery without fishing, has increased the value of quota holdings. Quota-based management has resulted in fisheries such as sablefish and halibut becoming very expensive for new fishers to buy into, and has generated significant wealth for those allocated initial TAC percentages. For a detailed discussion of the issues surrounding quota see Chapter 5.


During the 1990s, conservation concerns have increasingly impacted the commercial fisheries in Canada. The collapse of the East Coast Cod stocks and resulting fishing moratorium significantly shifted the approaches and principles of Canadian fisheries management. As a signatory to the International Convention on Biological Diversity, Canada has committed to maintaining diversity within and between species (DFO 1998). Canada’s Oceans Act of 1996 identifies the goal of ecosystem-based conservation to maintain biological diversity and productivity, and requires the application of the precautionary approach to conservation, management and exploitation of marine resources (DFO 1998). The uncertainties of stock assessment and prediction require a “precautionary, risk averse approach” (DFO 1998). The precautionary approach is outlined in Principle 15 of the 1992 *Rio Declaration on Environment and*
Development as: "Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation".

Risk-averse management in the Pacific fisheries results in "weak stock management". In mixed stock fisheries, such as commercial salmon harvesting in tidal waters, the fishery is managed to the weakest stock of salmon that might be encountered. Fishers intercepting various runs of salmon en route to their spawning beds are limited to a minimal impact on the most vulnerable run. Thus, when Upper Thompson coho stocks were identified as low, the Fraser River sockeye fisheries were limited, because coho were caught as by-catch in these fisheries. Although the target species might be able to sustain a sizable fishery, the incidentally-caught species becomes the "bottleneck" which determines the fishing opportunities.

Biological diversity within a species must also be maintained, conserving spawning populations in various watersheds. The northern (Area F) troll fishery for Chinook/Spring salmon is limited by their impact on spring salmon that spawn in the rivers of the west coast of Vancouver Island. Harvested fish are DNA-tested to determine their origin, and the fishery is opened and closed based on the percentages of Vancouver Island fish and extrapolated mortalities.

Most recently, the designation of Cultus Lake and Sakinaw Lake sockeye as endangered species by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) has had major implications for the salmon fisheries in southern waters (see Chapter 7). Sockeye fisheries must be managed to limit the impacts on these stocks,
which encourages a shift to terminal fisheries (fisheries conducted near the spawning beds of specific runs to ensure targeted harvests).

7. Aboriginal Rights and Claims

The First Nations peoples of what is now British Columbia have used the marine resources of this region since time immemorial. The basis of many Aboriginal economies in the coastal and riverine areas was the seasonal abundance of salmon, and other fish such as oolichan and halibut were major contributors to coastal diets (see Blackman 1990, Mitchell and Leland 1988). While First Nations people were critical to the early development of the salmon fishing industry in British Columbia, their participation in commercial fishing has been limited by many factors, including deliberate policies of exclusion (see Menzies NDb). The participation of First Nations people in the commercial fishing industry is estimated at 29% (Gislason 1998), as license limitation, quota-based management, and buyback programs have decreased Aboriginal participation at significant rates (see Meggs 1991, Newell 1993).

The marine resources of British Columbia are a major focus of First Nations claims. Treaties were not signed in most of British Columbia during early settlement, and the federal and provincial governments are currently in the process of negotiating contemporary treaties with the First Nations governments. The Nisga’a Treaty ratified in 2001, provided the Nisga’a with rights to significant portions of the Nass River salmon runs as part of the settlement. The Nisga’a Treaty required the retirement of 1 gillnet and 5 troll licenses to transfer fishing effort, and licenses and vessels have been transferred to several other First Nations communities through voluntary retirement programs.
The Sparrow case of 1990 established that First Nations rights to fish for food, social, and ceremonial purposes are a first priority after conservation goals, in the allocation of fish resources. This case did not recognize an Aboriginal right to a commercial fishery, but did encourage the establishment of the Aboriginal Fisheries Strategy. The AFS provided an interim (pending treaty) right to sell salmon from the food fish allocation of some of the First Nations on the Fraser River. I have written elsewhere about the failure of the AFS to fulfill First Nations fishing needs, in both legal and practical terms (Butler 1998). The AFS has been widely criticized by commercial fishing interests, due to the perception of allocation and enforcement inequities, resulting in several court cases. In R. v. Kapp, the AFS was ruled unconstitutional, but this was ruling was overturned on appeal in 2004. The DFO is working to restructure the AFS to combat some of the enforcement issues that have garnered criticism.

The report of the Joint Task Group on Post-Treaty Fisheries was released in May 2004. The report proposed a shift to quota-based management in all BC fisheries, which would facilitate a proportional shift of fishing rights to First Nations. The report anticipated that 35% of the overall TAC would be reallocated to First Nations through treaty agreements (McRae and Pearse 2004). This proposal draws from the New Zealand model, where quota was used as a tool to settle Maori claims (see Bess 2001). The British Columbia Aboriginal Fisheries Commission released its own report a few weeks later, recommending the immediate transfer of 50% of the BC fisheries to First Nations. This claim references the Boldt decision in Washington State, where in 1976 Washington tribes won a case that enforced a treaty right “to fish in common” with non-Natives. This
treaty right was interpreted as a right to 50% of the Washington fishery resources (see Boxberger 1993, 1989).

The manner in which First Nations rights to fish resources will be recognized, and the scope of those rights, remain uncertain. However, the treaty process will have a major impact on the structure of the fishing industry and the allocation of resources. Aboriginal participation in the commercial fishery is anticipated to increase, and First Nations community-based commercial fisheries will be established in permanent treaty settlements. This is perceived by commercial fishers as a significant threat to the commercial industry, as it will entail a reallocation of presumably 30% to 50% of the total allowable harvest. Commercial fishers' reactions to Aboriginal fishing rights are a product of both the legacy of colonialism in this country, and the structural vulnerability of fishers (see Menzies 1994).

The issues outlined above are not the only ones shaping the experience of commercial fishers in British Columbia. Market issues such as competition from farmed fish, the health of the Japanese economy (a key importer of BC seafood products), and the strength of the US dollar, each has an impact on fishing incomes. However, the ongoing trend towards privatization in the fishery, competing resource users, and increasing conservation restraints on harvest are key factors influencing the perspectives and strategies of the fishers with whom I worked.

**Collaborators and Contributors:**

My engagement with Prince Rupert fishers involved various methods of ethnographic research, and the use of local social networks. Formal interviews were a significant part of my fieldwork in Prince Rupert and I used the snowball technique to
identify potential research participants. Snowball sampling has been defined as a chain of contact starting from an index individual (Levy and Hollan 1998: 333). The initial participant is asked to identify acquaintances who have a desired characteristic, or type of knowledge. My research engaged a series of snowball samples. Six index individuals were identified through prior contacts and my preliminary visit to Prince Rupert in September 2001. Each of these individuals provided the names of potential participants who were engaged in the fishing industry, and in some cases, from targeted subgroups. For example, initial contacts were asked to identify “local experts”, key figures in their respective industries, as well as their specific industry peers, i.e. seine skippers were asked for the names of other seine skippers. This process allowed for both a breadth of contacts from various positions in the industries, as well as key players identified within the community.

The identification of local experts was not as quantitatively systematic as that employed by Davis and Wagner (2003) in their investigation of Nova Scotian fishers’ ecological knowledge. However, as my research objective was not the documentation of ecological knowledge as a management dataset, but rather the understanding of the political knowledge of fishers, this approach provided an appropriate cross section of industry participants.

During my core research period, I conducted formal interviews with 66 people variously involved in fishing and living in Prince Rupert. A total of 49 fishermen contributed to the project, 3 sports fishers/charter operators, 2 fish processors, 4 environmentalists, and 8 resource managers/government employees.

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9 My fieldwork also involved interviews with small-business loggers, and resource managers involved in forestry and land use planning, however, this data is not included in this dissertation.
I spoke with fishers involved in all three commercial salmon fisheries (seine, gillnet, troll), halibut and rockfish longline, groundfish trawl, shrimp by trawl and trap, prawn, crab, cucumber and sea urchin, herring roe by seine and gillnet, and herring roe-on-kelp. While I made efforts to include participants who reflected the range of species, gear types, and size of enterprises in the fishing industry, the majority of my collaborators were those working on and/or owning “small” salmon and halibut boats (under 50 feet), with 20% of the sample of fishers representing larger enterprises. This closely reflects the size distribution of vessels within the fleet.

Most of the fishers were skippers and/or boat owners, rather than deckhands. I did interview individuals working as crew to understand crew issues and concerns, but the particular focus of the research, and the need to compare across fisheries lead me to concentrate my investigation on the perceptions of those investing in the industry and skippering vessels. I also targeted female fishermen, and included interviews with non-fishing wives of fishermen, to incorporate a gendered perspective. This dissertation does not focus upon the gender issues of the fishing industry, but my research did attend to questions of female experiences and gender relations.

Eleven of the fishers with whom I spoke were of Aboriginal ancestry. Some were quite closely tied economically and socially with local First Nations communities and others were not. Eleven First Nations fishermen out of a sample of 49 reflects a lower

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10 The fishing women with whom I spoke prefer to be referred to as “fishermen”. Several of them indicated that they like the history associated with this term, and their desire to be included in this category rather than creating a feminized version of it. No one I met liked the gender-neutral term “fisher” because that word also refers to a “rodent”. (Note: the fisher is not in fact a rodent according to biological classifications). Throughout this dissertation, I do use the term fisher to refer to commercial fish harvesters in general, and groups that include fishing women who I do not know or with whom I have not discussed preferred labels. However, where I am referring to male individuals, all-male groups, and individuals or groups which include women who have indicated their preference to me, I use the term “fishermen” to reflect their preference.
percentage than the average rates of participation (29%) according to Gislason et al (1996: s-12). The number of First Nations fishermen I worked with might be lower than the average for a number of reasons. Firstly, a key pattern in the network of snowball samples that my research engaged a predominance of Prince Rupert Fishermen’s Co-op fishermen. The snowball sample created by my initial collaborators resulted in most (approximately 85%) of the fishers I worked with were former Co-op members, and the Co-op had relatively few First Nations members. Many First Nations fishers were closely tied to the non-cooperative processing companies throughout the twentieth century. Their lack of access to credit (due to the non-alienability of reserve land as collateral etc.) and the particular history of First Nations family and community ties to canneries, meant that Aboriginal fishers were less likely and less able to fish for the Co-op. The vast majority of the fishermen I worked with directed me to fishermen they knew through their Co-op ties, and thus it is not surprising that I was directed to relatively fewer First Nations fishers. Furthermore, the ethnic segregation that continues to shape social experience in Prince Rupert would reinforce the likelihood that I would be directed to non-Aboriginal fishers. Finally, First Nations ownership in the fishing industry is lower than First Nations participation as workers in the industry, which would also have impacted my research demographics, as I focused my research on owner-operators.

A Week in the Life: Research in Practice
Having described the contributors to this research, I will now describe the research process. The following pages represent an adapted and abbreviated version of
my fieldnotes from a week of research early in my fieldwork period. These notes characterize and essentially epitomize my research practice and field work experience.

It was a Wednesday morning, the last week in March 2001. I had been summoned over to a fisherman’s house to learn how to prepare prawn traps for the coming season. Through my landlady, I had met some young fishermen (men and women) who had essentially taken me under their wing. The first halibut trip of the season was over, and the price of halibut had crashed, so the prawn skipper had decided to work on gear until the price improved. We worked in the basement of the house, with a stereo playing 80’s music, eating the homemade cookies which I brought to every interview. The skipper of the boat and the two deckhands were there all week, but other fishermen came and went, visiting and helping. The herring fleet was in town waiting for their opening, and other fishermen had come up from the south for the start of the halibut season.

I learned to tie a bowline knot and tighten the webbing on the cylindrical prawn traps. There were hundreds of traps to fix. At first I was the topic of conversation: my project, my career plans, what I thought of the fishing industry so far. Most of the time was spent talking about halibut prices, and halibut fishing spots, especially if there was more than one skipper in the room. There was a fair amount of time spent discussing weather. There were stories of green deckhands and practical jokes, and of stinky observers1 who ate peanut butter straight from the jar. There were stories about the ‘good old days’ when the harbours were busy and the street fights downtown would last all night.
The next morning I got a call from one of the fishermen that his friend who was a helicopter pilot was making a test flight and could take passengers. Three of us went along for the ride. We headed out over the harbour and Tuck Inlet to Big Bay, where the herring charter was testing the fish for roe percentages. The herring spawn stretched in a greeny-white line along the bay. We buzzed by the test-fishing vessel, that was owned by the uncle of one of the fishermen whose prawn traps I had fixed. On the way home from the helicopter, we stopped at the gear store to pick up a knife. We met an older gillnetter who was in there having coffee. There is a regular crowd of retired fishermen who meet there every morning. My friend Luke introduced me, and insisted that I interview the “old-timer”. I made an appointment with him for early the next week.

That afternoon I went with Luke down to the Fairview Harbour floats where the herring boats were tied up waiting for the opening. We went onto one of the boats with a crew from Pender Harbour, his home town. That was my first time aboard a seine boat with an all-male crew. They were talking about hockey and when the fishery would open, and there was porn on the walls.

That evening a group of us went out for Vietnamese food. There are several Vietnamese restaurants in Prince Rupert. Vietnamese immigrants came to Rupert in the 1980s to participate in the crab and prawn fisheries. After dinner we went to Eddie’s News to buy the latest Fisherman Life magazine, and read it over coffee at Tim Hortons. The fishermen told me they would have to teach me how to read the industry magazine properly: back to front. One starts with the boat broker advertisements at the back of the magazine where there are listings of licenses and boats for sale. Whether one is

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11 The halibut fishery requires 25% observer coverage to document and regulate by-catch discarding. An observer working for an independent research company is sent out on the boat to record the harvest and
shopping for a boat or not, that is the most important part of the magazine: who is selling their boat, and for how much.

Friday morning I went for a coffee at Cowpuccino's, the coffee house on Cow Bay Road. I ran into 3 fishermen, and was introduced to a logger. So for the next few days I interviewed loggers. One was the one introduced to me by a fisherman in Cowpuccino's. Another logger had been referred to me by his wife, whom I met at a sewing club.

When my fishing friends returned from a second halibut trip, I was invited down to watch them deliver at the Aero Trading Company fishplant. Watching the technical aspect of unloading the fish was helpful, as was meeting the other fishermen delivering at the same time. The most enlightening aspect of the day was observing the deckhands dare each other to eat disgusting things for small sums of money, as they waited for their skipper to settle up. A piece of rotten salmon left in the baiting box brought $50 to a brave fisherman.

These adapted fieldnotes capture the way in which my research progressed and the context of many of my informal conversations with commercial fishers. I will operationalize the research methods in more detail in the next section.

Research Methods

My research integrated a number of standard anthropological methods, all of which contributed significantly to my understanding of the politics of local knowledge in the fishing industry. Participant observation, informal conversations, and text-based research both contextualized, and provided questions for, my formal interviews with monitor compliance.
fishermen. Attendance at meetings and workshops provided me with the knowledge
counters that are the foundation of each case study.

1. Formal Interviews

The interviews I conducted were semi-structured, following a standardized
schedule, but also allowing the participant to direct the conversation to areas of specific
interest and importance to them. The basic structure of the interview centred on three
themes: 1) the position of the individual and their family within the regional economy
and their history of resource use, 2) their understanding of local economic and ecological
change, 3) their perceptions regarding their own future in the industry, and that of their
community. These themes were investigated primarily through the participant’s “work
history”. The participant was asked to describe their career from the earliest experience
of paid employment until the present time. This was a particularly effective method for
eliciting comments regarding business investments and key transformations in the fishing
industry.

This methodology thus draws selectively from the life history approach in
anthropology. Life histories and oral histories enjoyed increasing popularity in the social
sciences during the 1980s and 1990s. The life history is well suited to the analysis of
social change (Thompson 1983) and can reveal how individuals understand their own and
of multiple life histories as core ethnographic data can provide insight into the subjective
experience of material forces (Smith 1989, Menzies 1997). This method of multiple,
work-focused life histories allows for engagement with local understandings of the
ongoing transformations of the fishing industry.
The work histories themselves were structured around three temporal themes:

*The retrospective story:* Collaborators were asked about their family history of resource use and employment, and how they got started fishing. They were then encouraged to describe the course of their career, where they had worked, what sort of operations, ownership and accumulation patterns. This established their position within the industry, but also cued participants to recall changes over time, and prompted them to reflect on historical processes.

*The contemporary story:* Participants identified key issues impacting their livelihood, they described the current state of resource health and market strength.

*The projective story:* A projective life history reveals an individual's anticipated trajectory, their constructed future based on their understanding of their past (Fololyen 1989, Angrosino 1995). This part of the work history was crucial for illuminating local understandings of political and economic processes.

In addition to the work history, the participants were asked directed questions about key developments in the industry, and recent events, if they were not mentioned during their initial narrative. For example, salmon fishermen were asked about the Coho Crisis (see chapter 3).

These loosely structured work history interviews provide a profile of the individual that illuminates their relative position in the structure of the fishing industry. The interview data also reveal fishermen’s understandings and perceptions of regulatory changes, conservation initiatives, and market issues. Thus, the method provides data that includes a balance of material facts, structural forces, and personal knowledge and interests.
The main objective of the interviews was to document the heterogeneous individual perceptions that fishermen have regarding their enterprises and industries. Stivers asserts that:

There is no such thing as “unbiased” knowledge in the sense of knowledge ungrounded in a set of intellectual assumptions and constitutive interests; this awareness validates the kind of particular, contextual knowledge personal narrative imparts… (1993: 410).

She encourages the juxtaposition of alternative stories in order to develop an understanding of structures of domination that acknowledges peoples’ “self-understandings”, but engages multiple constructions (ibid.: 423). These self-understandings, these “individual interpretations” that are apparent through the analysis of personal narratives, provide insight into the way in which individuals are positioned within society, how they experience and understand social structures, and how they change them. Stivers emphasizes that the relationship between structures and actors suggests that individual interpretations are themselves a process of social change, and that neglect of this power objectifies the subjects of research (ibid.: 424). Paul Thompson also emphasizes the importance of individual decisions in the process of social change, and the need to include the role of the individual in sociological and historical interpretation (1981: 299).

Throughout this dissertation, I have quoted the interview material where possible in order to include resource workers’ voices, and to contextualize the ecological and social issues through their words.
2. **Text-based Research**

During the core research period I collected articles and letters to the editor from the Prince Rupert Daily News which related to natural resource issues. I also subscribed to the available regional fishing and natural resource industry magazines (*Fisherman Life*, *Resource People*, *Western Fish and Seafood*, *the Fisherman*, and *National Fisherman* (US)). I surveyed the back issues of *West Coast Fisherman* (which became *Fisherman Life*) to collect material regarding the public discourse on the Coho Crisis and quota-based management. I had access to a number of fishing organization newsletters, specifically those of the Pacific Halibut Management Association, the Gulf Trollers Association, the Northern Trollers Association, and the Pacific Vessel Owner's Guild. I used materials from the Department of Fisheries and Oceans library, as well as the Prince Rupert City Archives. The International Pacific Halibut Commission Annual Reports from 1947 onward were available online and provided a significant source of information regarding the history of that fishery.

3. **Participant Observation**

This signature method of anthropology was a key aspect of my research in two different ways, and each contributed important information and context to this dissertation.

a) Fishing

Participant observation in the form of apprenticeship became a key part of my research during the summer months in 2001 and 2002. I accompanied several different fishermen on shrimp, prawn, halibut, rockfish, and salmon (gillnet and troll) fishing trips. This allowed me to better understand the actual mechanics of fishing, crew dynamics, the context of ecological knowledge production, and the experience of resource-based labour.
I performed such work as baiting hooks, bleeding, dressing, and washing fish, sorting shrimp and prawns by size, scrubbing down the deck, and cooking.

These fishing opportunities allowed me to engage in discussions on the “back deck” with crew, in the wheelhouse with the skipper, and also to listen to the discussions between skippers on the radio.

b) Meetings

A crucial aspect of the research for this dissertation has been my attendance at a broad variety of public meetings regarding natural resource issues and resource management. I attended every meeting I could that was related to forestry or fishing, environmental issues, and the Prince Rupert economy in general. I provided note-taking services at the meetings of the Prince Rupert branch of the Northern Trollers Association.

I attended more informal gatherings of fishermen, public workshops, and official consultation meetings with the DFO. These meetings were extremely helpful as they often reflected moments of interaction between local and non-local knowledge, and conflicts and competition over resources.

4. Informal interviews and conversation

The formal interviews provided individual viewpoints and experiences, but much of what I learned about the fishing and forest industries was gleaned from informal conversations and question-asking. Some of my most rich conversations with fishermen happened on the docks at the Aero Trading Company or the Fairview floats (formerly the site of the PRFCA). “Dock talk” is a crucial forum for the sharing of information in the fishing industry and I therefore spent as much time as possible at the main harbours in Prince Rupert. There are other places where fishermen gather and talk about their work,
and I also learned many things and asked many questions at Breaker’s Pub, Cowpuccino’s coffee shop, and Tim Horton’s.

My research therefore involved a lot of time participating in a very common activity of fishermen: “having a bullshit”. This is how fishermen refer to their conversations in the coffee shop, on the dock, and in the gear store. The long hours spent discussing the state of the industry, the price of fish, the weather forecast, and the best spots to catch lingcod, are all referred to in this way. These informal discussions were as important to my research as the sixty-six formal interviews. I put in my hours on the docks and in the coffee shop, and much of what I understand about the fishing industry is from listening to fishermen talk to each other, and ‘at’ me, about what they saw happening to their livelihood and to their community.
Chapter 3: The Coho Crisis: conservation, allocation and the perceptions of a divided fleet

The coho crisis was specifically engineered. Coho was a legitimate concern but was used to the advantage of certain user groups. There were more political things involved.

Bob, former troller

In May 1998, Fisheries Minister David Anderson announced a comprehensive Coho Recovery Plan that would result in massive changes to, and reductions in, the salmon fisheries of British Columbia. The ‘Coho Crisis’ was one of the most controversial topics that arose in my conversations with commercial fishers. The motivations and methods of this conservation initiative were questioned and refuted. The associated retirement of commercial salmon licenses was interpreted as the ultimate purpose of coho conservation, and many fishermen believed that the Coho Crisis was manipulated to encourage fleet reduction. There was general consensus from commercial fishers I spoke with that coho conservation was a disguise for the reallocation of fishing opportunities. However, particular fishers understood the details of this perceived allocation initiative in very different ways. The Coho Crisis provides a helpful case study for the investigation of how knowledge is differentiated within the commercial fishing industry. This chapter will focus on the positionality of fisher’s knowledge, and the fine details of its social construction in a competitive, fractured industry.

The Coho Crisis case study links to current research that seeks to refine early TEK work. The heterogeneity of ecological knowledge within even small communities has been recognized as a complicating factor in TEK research, demanding the fine-tuning
of methodologies. My analysis of the Coho Crisis emphasizes the way in which the non-ecological knowledge of fishermen is also heterogeneous and how this heterogeneity is structured by fisheries management and regulation.

**Biological concerns and risk averse management**

Coho are one of the five species of salmon, targeted by troll and recreational fisheries, and currently encountered primarily as by-catch by seine and gillnet fisheries. Coho have been, and remain a food source for First Nations, but tend to be a less-preferred species, compared to sockeye and chinook. Department of Fisheries and Oceans’ stock assessments in 1997 indicated declining abundance of coho, with especially drastic declines in the Upper Skeena populations (coho stocks from the tributaries of the Skeena above the Babine watershed) and the Thompson River (a tributary of the Fraser river). Abundance declines were attributed to over-harvesting (at rates of 60% for Thompson coho), habitat degradation, and poor marine survival rates (as low as 3% in the 1990s). Conservation measures specific to coho had been introduced during the 1997 season, due to extremely poor returns attributed to decreased ocean survival, but spawner counts in the Autumn proved insufficient. Regional Coho Response Teams were created in February 1998 to consult with stakeholders and report to the Minister by May, when he announced massive changes to fishing practice and fishery structure.

Minister Anderson announced that in 1998 there would be no directed fisheries on coho, and mandatory non-retention in all fisheries. The coast was divided into Red and Yellow zones based on differential risks to coho, and resulting in geographically-

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12 Coho were targeted in the past by the seine fleet.
differentiated fishing opportunities. In red zones there would be an objective of zero fishing mortality of upper Skeena and Thompson (Fraser) river coho stocks, which effectively closed all salmon fishing. In yellow zones, where coho from these high risk stocks are not prevalent, there would be limited fishing when the risk of coho mortality was minimal. Barb-less hooks would be required in all commercial troll and recreational fisheries. There would be increased monitoring and enforcement in all fisheries\(^\text{13}\).

The federal government committed $400 million to the coho recovery plan, with $100 million of that money directed to enhancing salmon habitat. In light of the major impacts the conservation measures would have on commercial fishing opportunities throughout the anticipated term of coho recovery (at least 6 years), a further $100 million was dedicated to assisting communities and individuals in adjusting to the changing fishery\(^\text{14}\). Finally, $200 million was allocated to fleet restructuring, including license retirement, fishery diversification, and the development of selective fishing techniques.

At total of $195 million was spent on license retirement, funding the purchase of 1,404 commercial salmon licenses. The Voluntary License Retirement Program was conducted through a reverse auction process in three bidding rounds. An independent advisory committee reviewed applications, and ranked bids of vessel owners with similar

\(^{13}\) The friendly relationship between Fisheries Minister Anderson and major fishing lodge interests has been criticized by commercial fishers, especially after yellow coho zones were designated around the large lodges on Langara Island, north of Haida Gwaii.

\(^{14}\) Of the funds allocated to alleviate the impact on communities, Human Resources Development Canada was allocated $23.1 million to assist clients not eligible for Employment Insurance. HRDC programs included Targeted Wage Subsidies, Job Creation Partnerships, Term Job Creations, Self-Employment Assistance, Training and Skill Development, Local Labour Market Partnerships and Employment Assistance. There was $6.9 million allocated directly to First Nations communities for services and programs. A further $25 million created a Community Economic Adjustment Initiative which funded 102 community projects, 50% of which were Aboriginal initiatives. A $6.7 million recreational fishery loan program assisted lodge owners and charter-boat operators to upgrade and diversify. In 1998, the DFO sponsored the waiving of license fees, as well as providing fixed payments to those chose not to fish that season, but who had incurred pre-season costs. This vessel tie-up program distributed $9.1 million to 1266 vessel owners, roughly 38% of the 1998 fleet.
gear type and vessel length. The program prioritized the retirement of multiple license packages, and licenses on vessels which only fished salmon over those with access to other fisheries. Through the buyback, 216 seine, 628 gillnet and 460 troll licenses were retired from the fishery. Combined with the $80 million buyback during the Mifflin Plan, the salmon fleet was reduced by 54% between 1996 and 2000.

Species selectivity became a major focus of DFO salmon programs and $18 million was spent between 1998 and 2001 on selective gear development. Projects included the testing of alternative technologies (fishwheels, tooth tangle nets) and release techniques designed to reduce coho mortality. Selectivity requirements became integrated into the fishery regulations, and remain in place. All gear types were subject to time and area closures in order to minimize coho encounters. The seiners were restricted from using their stern ramps to haul their nets onboard, and instead had to ‘brail’ the fish, using small dip-nets to bring hundreds onboard at a time, releasing coho unharmed. Trollers had to clip the barbs from their hooks to facilitate easy release of coho, although this also made landing other salmon more difficult. Gillnetters fished shorter days (to avoid dawn and dusk sets which traditionally encountered higher numbers of coho), and were required to pick their nets after short sets to minimize coho mortality. All gear types were required to ‘resuscitate’ encountered coho in a revival box. These boxes of flowing saltwater were considered to improve the survival rates of released coho, by reviving them after the stress of capture, prior to releasing them gently back into the ocean or river.

Thus, the federal government approached the Coho Crisis using both technical and financial strategies. Nevertheless, the impact of the conservation initiative was
extreme for many fishing communities, and the political ramifications continue to
influence salmon politics. The Coho Crisis was one of the first critical conflicts over
issues of biodiversity, and by-catch within the Pacific commercial fishing industry. As a
signatory to the international Convention on Biological Diversity, the Canadian
government had committed to sustainable resource use and the protection of bio-
diversity. There are ten thousand different breeding stocks of salmon that spawn in BC
streams (Copes 1998: 2), however, the relative of health of those stocks is extremely
varied. This variability poses a significant problem for the management of mixed stock,
interception fisheries, which include most commercial salmon fisheries. Bio-diversity
and risk-averse management mandates that the DFO manage to the weakest stock, which
means fishers can see an abundance of fish, but are prevented from fishing due to the
micro-management of particular streams. In the coho fishery, this conflict between
abundance and biodiversity was heightened by the fact that most of the commercial
salmon fisheries (north coast troll excluded) did not target coho, and so their sockeye
fisheries were being curtailed due to efforts to save the weaker stocks of a by-catch
species. The situation was one where thousands of sockeye could be not be harvested, in
order to save a few hundred coho spawners.

None of the commercial fishermen I encountered spoke against the conservation
of salmon. Most of them were extremely committed to maintaining healthy fish stocks
for their own future, and that of future generations. However, the specific conservation
values and priorities of commercial fishers often differ from the general goal of
biodiversity and the practice of risk-averse management. North coast fishermen question
the ability of the DFO to micro-manage biodiversity to the degree that they attempt to do
so. They perceive that the limited DNA testing that DFO budgets afford restricts the department's ability to truly enumerate various stocks and understand their dynamics.

The fishermen tended to express much more utilitarian conservation priorities:

*The upper Skeena and upper Fraser coho stocks are comparable to the number of people in the world living at greater than 10 000ft above sea level. There are not very many of them, and they are just hanging on. It's just not good habitat. They can exist there, but it's tough, and can easily be put off balance. The upper river stocks – there is a point where they aren't viable. There's a reason those stocks are in danger – they are on the fringes. They are an indicator, perhaps, but if they are in trouble there is no reason to panic about the stocks in general. To make those stocks the standard is not realistic. Things in marginal environments go extinct. That's history.*  (Sam, commercial troller)

This fisherman supports conservation measures but is more pragmatic in his approach to biodiversity concerns. The upper Skeena and upper Thompson coho stocks were not perceived to be a valid conservation priority due to their marginal habitat and fragile population despite fishing effort. Prince Rupert fishermen suggested that the upper Skeena streams did not consistently have the necessary water levels to support spawning, and thus coho spawns were always intermittent:

"Some of the rivers they worried about never did have cohos. We haven't fished them in 3-4 years and there are still none up there and never will be... instead of buying us out now they are starving us out"  (Dave, commercial troller).

While fishers' conservation values and priorities differ to those of environmental organizations and the DFO, the conflict over the Coho Crisis was not based on disparate
valuations of biodiversity. The Coho Crisis and fishermen’s responses to it are characterized by a debate over allocation.

**Responses to the Coho Crisis**

I arrived in Prince Rupert two and a half years after Minister Anderson’s prescriptions of changes to fishing practice and fishery structure. Some had weathered the storm, others had not. More than half of all salmon licenses had been retired since the process of fleet reduction had begun with the Mifflin Plan in 1996. Selectivity requirements for salmon fishing remained in place, as well as time and area closures for coho avoidance. The northern trollers hadn’t had a viable season in three years, and were frequently described as ‘doomed’.

An early introduction to the issues surrounding this ongoing crisis was a co-management meeting prior to the commencement of the salmon season for the net fleet (gillnet and seine). At the North Coast Advisory Board meeting on June 4, 2001, coho mortalities were a major issue for the net fleet (gillnet and seine). Present at this preseason planning meeting were DFO managers and biologists, representatives from the Tsimshian Tribal Council, the Native Brotherhood, UFAWU, World Wildlife Fund, Canfisco, and Ocean Fish (the last two being fish processing companies). Below is a summary of the reactions of the Native Brotherhood representatives to the proposed gillnet fishing plan. The Native Brotherhood is the oldest Aboriginal organization in Canada, and has protected the interests of First Nations fishermen in British Columbia since 1931.

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15 A consultative body that includes the net fishing fleet (gillnet and seines), First Nations representatives, sports fishers, and fish processors.
North Coast Advisory Board meeting, June 4, 2001. Crest Hotel, Prince Rupert.

The salmon resource manager introduced the fishing plan for Area 4 (mouth of the Skeena river) which was based on concerns for both early runs and coho stocks, which enter the river around the 18th of July. The representatives debated the logistics and benefits of using short sets of the net (soak time) and shorter-length nets in order to further reduce the coho mortalities.

The Native Brotherhood representative from Prince Rupert, Hank, responded to these ideas: "We’re not opposed to selective fishing, but we don’t want to be pushed in the corner. You’ll never catch enough fish in 15 minutes. A 15 minute set, your net is in the water for a total of 5 minutes."

A Native Brotherhood representative from Kitsumkalum added: "After the 18th [of July] you’re concerned about coho. The Terrace DFO issued 7000 sports licenses this year. The Tribal Council would like to see the year 2000 sports catch totals from the River to Langara."

The DFO manager responded: "Coho have been reestablished on the communal licenses [tribal food fisheries] to pre-1995 levels. The sporties are limited to 2 fish a day. And there will be a selective gillnet fishery after the 18th."

Hank: "We don’t want a fish war. But the restrictions put on one group should be the same for all. The seines were tossing fish and they were drifting into gillnets. The gillnet mortality increased. They also destroyed habitat – there’s not krill, no crabs in the river. Sockeye are now feeding on juvenile herring, not krill. That’s the wrong feed for them. Even a rat if you push him in the corner will fight back. You want a fish war to get rid of the gillnets."
A Native Brotherhood representative from Gitskan territory focused on the difference between DFO studies and selectivity requirements, and fishers’ experiences:

"You just go by the smart people, the biologists. You’ve never seen what’s happening in the water, what nature will take. The old people don’t go by the machine (points at the overhead and the mortality chart), but what is going on around them. They go by the snow, they go by the weather.

We always blame the sporty but the reason why we blame them is that you allowed them to catch all the coho while we were quit fishing. You don’t consider the fishermen who have been fishing here for years... the recovery box is too big for small boats.”

Hank added: “It’s the hang ratio too – there are 600 fathoms of web in some nets. You should pay attention in the fishery, the observers, to that, and depth. 90 mesh nets catch more coho than 60 mesh.”

There were two types of concerns raised by the fishing representatives at this meeting. The first type involved equity and allocation. The fishers demanded equal restrictions on the various fisheries and equity in allocation of opportunity, and coho mortalities. The recreational fishery and the seine fleet were identified specifically by the NB gillnet fishermen as competition within this conservation-based structure of regulation. Secondly, they were concerned about the practice of selective fishing and the logistics of the selectivity requirements. They expressed concerned about double encounters due to fleet placement: the seines releasing coho only for them to be caught again by gillnets, thereby threatening coho survival and increasing gillnet mortality rates.

16 This fisherman is concerned about the density of the net – the length of web strung along the line – and the depth of the net – deeper nets have 90 mesh (units of web) from top to bottom.
The DFO’s focus on recovery boxes\textsuperscript{17} and short set times was perceived as eclipsing other significant conservation issues: the concern about 90-mesh nets was raised at both this meeting, and at a workshop on selective methods for gillnetters. Coho tend to swim deeper than sockeye, so the deeper nets were believed to encounter more coho. The lack of restrictions on hang ratio and net depth was perceived as a shortcoming of DFO coho policy.

These First Nations gillnet fishermen were concerned about their own opportunity and ability to catch sockeye under these stringent regulations, but were also focused on the opportunities afforded to other users, in this case, the seine fleet. Any restriction of fishing access is evaluated by fishers according to both their own losses, and the relative opportunity of competing interests. For the most part, fishers express support of conservation ideals and have voluntarily limited their harvests in periods of low abundance. However, conservation initiatives lose legitimacy and support when they are become enmeshed in the competitive web which structures fishers’ perceptions of the regulatory system. Fishermen will conserve fish, but not for someone else’s net.

\textbf{The Context of Competition}

Fisheries regulations and management structures have divided those who fish salmon into discrete communities of interest. At the broadest level, the fishery is dividing into three user groups who compete for access to the resource: First Nations fisheries, Commercial fisheries, and Recreational fisheries. Within the commercial fishery, the three gear types, seine, gillnet, and troll can also compete for time, area, and

\textsuperscript{17} The recovery boxes were designed to revive distressed coho before releasing them into the water. This is understood to improve their chances of survival by ensuring they are fully conscious and active before encountering predators or other fishing nets. These boxes have been protested by trolls, who find the
fish. And finally, the politics of allocation, have resulted in Aboriginal commercial fishers within all gear types having a particular perspective on access to salmon.

At the intersectoral level, the First Nations fisheries reflect the regulatory segregation of Aboriginal fishing practices. The Aboriginal "food fishery" was created in 1877 by regulations which falsely differentiated the commercial and subsistence aspects of Aboriginal fisheries. Current First Nations fishing opportunities reflect the recognition of the communal right, and the priority of First Nations to fish for food, social, and ceremonial purposes that was established through the Sparrow case in 1990. Since 1991, the DFO has generally managed First Nations fisheries through the Aboriginal Fisheries Strategy, which provides salmon allocations to First Nations and structures food fisheries and commercial openings. While the AFS does not recognize that First Nations have an Aboriginal right to a commercial fishery, a pilot sales program has been developed to allow the sale of food fish allocations. First Nations commercial fisheries have been strongly opposed by commercial fishing interests, most vocally by the Fisheries Survival Coalition (see chapter 6).

Recreational fisheries have been a steadily increasing source of competition for access to salmon and other species during the last two decades. In 2002, saltwater recreational fishers bought 333,753 licenses and the sports fishing industry generated $550 million in sales, making it a significant political and economic force (McRae and Pearse 2004: 11). The commercial component of the recreational fishing interest, the charter and lodge operators, have proved a well-organized and well-funded adversary to commercial fishers during allocation conflicts. A DFO study on the economic value of heavy box of water on deck to be hazardous when fishing in open water in a large sea swell, and by the smaller gillnetters who have limited deck space.
salmon to the commercial and recreational fisheries supported the allocation of salmon to the recreational fishery based on the greater contribution to the economy made by a recreationally caught salmon (Blewett 1996).18

During the 1990s these three sectors have regularly clashed over access to salmon resources. Since the commencement of the AFS, commercial fishers have criticized First Nations fisheries as “race-based” commercial fisheries, and have participated in protest fisheries during pilot sales openings. Commercial trollers and the recreational fishery compete directly for access to spring and coho salmon, and since 1999, priority access at times of low abundance has been allocated to the recreational sector. Low abundance has been the key issue determining the heightened intersectoral conflict during the last fifteen years.

Gear type has not always been such a meaningful category of experience in salmon fishing. Prior to 1996 it was common for boats to participate in both troll and gillnet fisheries at different times during the season. People moved between gillnetting and seining at different points during their careers, especially First Nations commercial fishers (see Menzies 1994). However after the single-gear restriction in 1996, the gear types were fully separated by licensing structure, and were designated percentages of the annual commercial harvest. Adjusted to account for the changes in fleet distribution from the license buybacks, the allocations of the commercial salmon harvest are now: 38%

18 The relative economic evaluations of the recreational and commercial salmon fisheries have are often commented upon and critiqued by commercial fishermen. The way in which the value was calculated is called into question. Specifically, several fishermen have suggested to me that the value of the commercial fleet was omitted from the calculation, whereas every sports boat added to the economic value of recreational fishery.
gillnet, 22% troll, 40% seine.\textsuperscript{19} Despite this allocation process, restricted opportunities in recent years have heightened the competition between gear sectors.

It is within this context of competition that we must understand what fishers say about the Coho Crisis. Since the Mifflin Plan the commercial fleet has become increasingly fractured by differences such as gear type and fishing area. Within the commercial fishery, regulations and management policies have cemented and reinforced the differences between gear sectors. Broader-level policies, such as the AFS, have increasingly constructed competition between Aboriginal and commercial fisheries, and during the last two decades, commercial fishers have faced increasing external competition from the recreational fisheries. Simultaneous to these processes, the price of salmon has steadily decreased, and fishing opportunities have been restricted, resulting in an 80% decrease in the landed value of salmon over the last decade (McRae and Pearse 2004: 8). Commercial salmon fishers are thus experiencing significant impacts from both competition and conservation, and the two forces are increasingly intertwined in fishers’ understandings of the contemporary fishery.

\textbf{Perceptions of allocation}

Many of my interviews with commercial fishers became structured around regulatory changes over time. Regulation provided the temporal structure for their work histories, with datable seasons of disruption and change that shaped their fishing careers. Hence, as a pivotal moment of change, the Coho Crisis came up in every interview with a salmon fisher. There were differing opinions regarding the biological basis of the coho conservation measures. Approximately half the fishers believed that there had been real

\textsuperscript{19} The 1996 intersectoral allocation set the gear allocations at 34% gillnet, 24% troll, 42% seine.
declines in the abundance of the Thompson coho, or Skeena coho, or both. The other half of the fishers expressed doubt regarding the validity of the population concerns. They suggested that coho stocks were healthy throughout the 1990s and that the basis of the coho crisis was completely bogus. What there was complete consensus on, however, was that the Coho Crisis operated as means of reallocating salmon between competing groups of resource users.

Whether they agreed that coho abundance had declined, and to what degree, all the fishermen understood the Coho Crisis to have been used by the DFO to effect desired transformations in the fleet and in salmon allocations. The Crisis was either read as reallocation disguised as a conservation measure, or as a conservation concern which allowed the opportunity for long-desired changes.

They have an environmental and conservation angle that no one can argue with. It's a powerful tool and they can do everything they want to the commercial fleet... I don't know if the coho crisis happened deliberately or it was a real concern. I think it was a biological concern and they realized after what a tool it was. Then they did use it to manipulate the industry.  

Dave, gillnetter/troller

It's neat. You set up a crisis, and find a solution to the crisis. If you create the crisis, you can have the solution ahead of time. This is one of the things the government has done with the fisheries... Resource based industries have come under extreme fire, in most cases for politics alone. In other cases, there have been some real concerns and issues. But over all it did tend to be political in nature...

Conservation became a convenient way of instituting the changes the government felt would better suit their purposes. Very seldom did it really deal with fish biology.  

Don, former gillnetter

It was bullshit. It was a political move. In my mind, they were trying to starve the fishermen out, particularly the troll sector... It's easier to buy back licenses when guys are making $10 000 rather than $100 000.  

Gary, longliner, former troller

Coho was a political creation. Its basis was some weak runs in the Upper Skeena, but they were never historically strong fish. The big year of the crisis was the biggest coho run. ... It was part of the DFO policy to beat the crap out of
the troll sector to soften them up to buyback their licenses. Bob, longliner, former troller

A classic ecological knowledge research approach would focus on what fishers had to say about coho populations: whether they had observed declines in abundance prior to 1998, and other data derived from their interaction with the fish. I contend that what is especially interesting here is the data derived from their interaction with the fishery and the conservation measures. Three years after the Coho Crisis was announced, these fishers perceived the biological issue in light of the buybacks and restructuring, and their continued lack of access to previous levels of fishing opportunity. For them, the key issue is not whether coho populations declined or remained abundant, but that this real or invented decline was the basis for the achievement of government goals for change and reduction in their industry.

Dyer and Moberg have noted similar responses of Florida shrimpers to Turtle Exclusion Devices (1992: 28), a technology designed to limit turtle mortality in the shrimp-dragging fishery. Shrimpers believed that they were bearing all the responsibility for turtle conservation because they were easier to control than other contributors to turtle population declines, such as industrial pollution etc. The perception of unfairness lead them to attribute a “conspiratorial intent” to TED regulations, and read the conservation measures as a means of reallocating coastal zone use (ibid). Perceptions regarding the underlying motivations of conservation measures have significant implications for compliance and participation. Dyer and Moberg found that shrimpers resisted turtle conservation measures surreptitiously (ibid.). While Pacific fleet compliance to coho conservation measures has not been identified as a major problem, there are fishers who
resist the requirements for short sets, half-nets, and the use of revival boxes, due to their perceptions regarding the overstatement or fabrication of coho declines for political reasons.

The most important information that was derived from interview questions about the Coho Crisis was regarding the way in which different fishers understood the reallocation process to function. All of the fishers perceived the Coho Crisis through the lens of reallocation, however, they perceived different beneficiaries of the reallocated harvests.

That was reallocation under the disguise of conservation. They are trying to squeeze out as many as they can to make room for fish farms and commercial sports fisheries. Len, troller.

They want people out of the industry so they can reallocate to the Aboriginal groups in treaties. And to the sports fishing industry which they think makes more money. Ken, former gillnetter/troller

With the Skeena Coho – they are trying to save 4000 coho and they are willing to curtail an entire multimillion dollar sockeye fishery? It's just an excuse to give it to the seine boats. Bill, gillnetter

There are record runs and we're not allowed to take them. Many people have a gut feeling that the government is trying to make it so you can't make a living fishing, so they can give it all to the Natives. Ross, seiner.

It's a pile of bullshit. There isn't a coho crisis really. They're just trying to reallocate the resource to the sporties. Pam, gillnetter (First Nations)

There is thus both consensus and divergence in commercial fishers' understandings of the Coho Crisis. Most fishermen appeared to read the conservation measures as heavy-handed, with an ulterior motive of reallocation. Yet the understanding of reallocation was differentiated by both gear type, and ethnicity. Of the fishermen I spoke with, the trollers were focused on their loss of fish to the sports/recreational sector.
Euro-Canadian gillnetters perceived both a loss to the large boat fleet (seines) and to First Nations fisheries. Seiners tended to see First Nations fisheries as the beneficiaries of reallocation. First Nations gillnetters did not see any benefit to themselves (within the commercial fishery) and understood the sports sector as benefiting from their loss of access to coho.

**Fig. 3-1  Fishers’ perceptions of reallocation**

<table>
<thead>
<tr>
<th>Fisher Position</th>
<th>Fish reallocated to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Troller</td>
<td>Sports</td>
</tr>
<tr>
<td>Gillnetter (Euro-Canadian)</td>
<td>First Nations or Seines</td>
</tr>
<tr>
<td>Seiner</td>
<td>First Nations</td>
</tr>
<tr>
<td>Gillnetter (First Nations)</td>
<td>Sports</td>
</tr>
</tbody>
</table>

The trends identified above can’t be extrapolated to the entire fleet, but reflected a definite pattern within the sample of northern license holders who participated in my research.

It is important to recognize that there are both direct and indirect readings of reallocation at work here. The trollers understand the Coho Crisis as a reallocation of coho. They participated in a targeted coho fishery, and thus lost direct access to this species. The sports sector also targets coho, and the trollers perceive the recreational access to be both less affected by conservation measures, and that they benefited by the closure of commercial troll activity. This is a direct reading of reallocation. Similarly, First Nations commercial fishers also talk about a direct reallocation. When asked about where the reallocation of fish was going, they indicated the sports fishery. When queried
about other fishers' perception that fish was being reallocated to the First Nations fisheries, they replied that First Nations don't use a lot of coho – they prefer sockeye.

Seiners and gillnetters on the other hand, perceived an indirect reallocation of fish. It was not coho, but rather sockeye, that they saw as being reallocated to First Nations fisheries. The Coho Crisis resulted in restricted fisheries on all species where coho might be encountered as a bycatch. The sockeye fishery was severely restricted in both access, and practice, in order to avoid coho mortalities. The associated buybacks removed considerable sockeye-fishing effort from the commercial fishery. The seiners and gillnetters understood their restricted access to sockeye as benefiting First Nations fisheries for sockeye. Sockeye was perceived to be the motivation of reallocation, coho was simply the tool.

Furthermore, these understandings of reallocation do not simply reflect the restricted fishing access during the first seasons of the coho conservation measures. Fishers understood the reallocation processes that were initiated by the Coho Crisis as gradual and incremental. The Coho Crisis restricted fishing opportunity over both the short and long terms. It changed fishing practices for the long term, and transformed the future of both fisheries management and fisheries practice. These changes forced and/or encouraged many people out of the industry by way of the license buybacks. The fishing effort retired by the buybacks could be allocated to other sectors by the government.

Fishers also recognized that the Coho Crisis instantly achieved a major cutback to fishing opportunity. Pre-1998 levels of opportunity and access have not been restored, despite perceived conservation successes. Fishers initially understood the restrictions to
be meant as temporary, and the permanence of the cutbacks to opportunity are now associated with permanent reallocation.

**The Distribution and Differentiation of Fisheries Knowledge**

The perceptions of the commercial fishers regarding the Coho Crisis reveal that fishers’ knowledge of this issue is differentiated by gear type and ethnicity. Their understandings are shaped by their particular positions in the industry and the specific experience of resource competition that is most significant to their fishery. This differentiation of political knowledge, the way that it is situated and positioned, has major implications for both fisheries knowledge research and resource management.

This case study contributes to a growing literature on the way in which different people hold different knowledge. The fact that ecological knowledge is not evenly *distributed* between members of any given society or community, has been noted by many contemporary researchers (see for example Johannes 1981, Felt 1994, Ruddle 1994). Researchers have come to understand that the distribution of knowledge is “segmentary” (Ellen and Harris 2000: 5) and “fragmentary” (Sillitoe 2000: 4), and that knowledge does not exist in a totality, even within small, traditional communities. The various literatures on alternative knowledges have identified a number of individual (personal) attributes as well as social or status attributes, that effect the distribution of knowledge:

**Fig. 3-2 Knowledge differentiation**

<table>
<thead>
<tr>
<th>Personal Attributes</th>
<th>Status Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Education</td>
</tr>
<tr>
<td>Gender</td>
<td>Occupation</td>
</tr>
</tbody>
</table>
Understandings of knowledge differences have been developed in the context of applied research which generally seeks to document the details and extent of traditional resource use. The original focus was thus on *distribution* as a methodological issue that impacted the comprehensiveness of the data collected. Fernandez relates gender specificity of knowledge to the division of labour and suggests that men and women may have “different knowledge of similar things, different knowledge of different things, different ways of organizing knowledge, different ways of preserving and transferring knowledge (1994: 2). The recognition that women hold different knowledge than men, or that Elders’ knowledge differs from that of younger, apprenticing harvesters has allowed applied researchers to refine their project designs to cope with the breadth of community knowledge.

This focus on distribution works from an assumption that women know different facts from men, facts that complement and supplement male knowledge, or that Elders know more, or more about the past, than younger people, whose knowledge is more detailed regarding current environmental conditions. This reflects an understanding of TEK as the composite of the skills and knowledge of a whole community, based on their

<table>
<thead>
<tr>
<th>Clan/Class</th>
<th>Involvement in commercial harvest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of curiosity</td>
<td>Income level</td>
</tr>
<tr>
<td>Observation skills</td>
<td>Social Status</td>
</tr>
<tr>
<td>Ability to travel</td>
<td>Roles and responsibilities in community</td>
</tr>
<tr>
<td>Area of resource use</td>
<td>Technology and strategy of resource use</td>
</tr>
<tr>
<td>Place of residence</td>
<td>Degree of autonomy/control of resources</td>
</tr>
</tbody>
</table>

different types of involvement in land or resource use activities. Essentially, the literature on the distribution of knowledge suggests that community members with different experiences of resource use each hold part of the greater whole that forms the TEK of that community. Each individual’s resource use experience (past, present, male or female, in particular areas, with particular species) provides part of the overall picture. Researchers must thus take care to consult a variety of collaborators in order to document the breadth and totality of community knowledge.

I have discussed another aspect of this issue elsewhere (Butler ND), focusing on the way in which colonialism fragments ecological knowledge. The disruption of established resource use patterns, and the reallocation of access to non-Indigenous users can result in a situation where information regarding a particular site or species must be documented from a number of different communities. For example, on the Fraser River, the ecological knowledge of First Nations Elders, young Aboriginal fishers, recreational fishers, and commercial fishers must be combined to create a comprehensive understanding of the state of the salmon stocks, due to the disruption of First Nations fisheries and the increasing participation of non-Aboriginal resource users.

Thus, ecological knowledge can be distributed within and without communities, thereby complicating the research process and methodologies. More recently, this understanding of knowledge distribution has been expanded upon to attend to the differentiation of local knowledge. Whereas the distribution of knowledge relates to the way individuals know diverse things, the differentiation of knowledge relates to the way individuals know divergently. The former assumes that individuals with different
experiences may know different facts. The latter understands that individuals in different positions may have very divergent understandings.

A focus on the differentiation of knowledge reflects a greater attention to the issues of power, politics, and inequality within communities. Sillitoe has indicated the need to pay attention to internal power dynamics, and assess the variations of knowledge and social position (1998: 233). Indigenous knowledge research must, he argues, address the issue of whose knowledge it will privilege (ibid.), thus suggesting that all indigenous knowledge is not the same in substance or nature. Gaventa and Cornwall note the danger of reifying local knowledge and treating it as singular; greater attention is needed to the positionality of research participants (2001: 74). Nygren emphasizes the need to analyze local knowledges as “highly situated ways of knowing, that have been subjected to multiple forms of domination and hybridization” (1999:270). Her research in the rainforests of Nicaragua found that local knowledge could not be separated from peoples’ competitive positions and their historical practices (ibid.: 279).

Nazarea has explored these issues in regards to ecological knowledge in the Philippines. She looks at the extent to which landscapes are ideologically constructed – how different lenses of ethnicity, gender, age, affect the way in which different people view the biophysical landscape (1996b: 92). “What we are dealing with in every aspect of resource management is people’s sense of place – the lenses through which they construct the environment and estimate their latitudes of choice and opportunities for challenge and refutation “(Nazarea 1999: 105). Her conclusion is that “disposition is very much a product of position” (Nazarea 1999: 103).
Anthropologist Miriam Wells' research with strawberry farmers in California revealed the way in which the interrelationships between economic and sociocultural variables create distinct “knowledge systems” in the industry (Wells 1991: 741). These knowledge systems, which are differentiated for Japanese, Mexican and Anglo strawberry growers, are distinct in structure (social networks) and content (management styles) (ibid.: 743). The differentiated knowledge of the three groups results in different decisions that effect levels of capitalization, forms of production, and the use of scientific information. Wells concluded that farmers vary systematically by ethnic group rather than randomly by individual farmer in their “evaluative perspectives, constraints and resources” (ibid.: 766).

Within fishing communities specifically, there has been research that indicates the multiple differentiations of fishers’ knowledge. Gatewood and McCay’s survey of levels of job satisfaction among commercial fishermen captures the nuances of differentiation within a fishing fleet. Their research points to the ways in which different fishermen (by species and gear type) enjoy different aspects of fishing (1990: 23). Their perspectives are very much differentiated by position within the industry. Maurstad has identified the way in which fishing practice, and thus fishing knowledge, is intricately related to the very individual aspects of each fishing enterprise. Boat length does not provide an adequate basis for estimating fishing effort because actual capacity is related to material attributes such as debt load, but also to personal characteristics such as industriousness. Fishing effort and experience is thus determined by a needs base that is broader than basic capitalist orientations (Maurstad 2000a: 42). Maurstad’s research suggests that what fishers know about fish will ultimately be related to both economic
position and personality. This work also underscores the differences between individual enterprises, the way that fishers are relatively positioned within a fleet and also within a broader political economy.

The way in which fishers’ knowledge is differentiated has been dealt with in particularly useful ways by researchers in Newfoundland. Lawrence Felt successfully fleshes out these issues in his discussion of the social construction of knowledge among Atlantic salmon fishers. Felt argues that the successful utilization of fishers’ knowledge lies in "understanding the processes and context within which local knowledge is produced" (1994: 253). He suggests that articulations about resources must be deconstructed to illuminate how such conclusions are constructed by external factors such as experience of imposed management restrictions, competition for the resource, and degree of political participation (ibid.). Quotas eliminate a fisher's ability to detect stock depletion (ibid.: 270) and union members feel pressure to echo union position (ibid.: 276); such factors have significant influence on a fisher's description of the health of a salmon run. Felt concludes that the more regulated, commercial and competitive a fishery is, the more important an understanding of the contexts and social construction of user knowledge becomes.

Many of these traits of differentiation relate directly to ecological knowledge, and when we move to a focus on political knowledge, the categories of differentiation become even more multiple and contingent. Davis and Bailey (1996) document the different attitudes of crew and owners to limited entry licenses (LEL) in Nova Scotian fisheries. They found that these differences reflect "concrete divisions in the material and social experiences of [limited entry]" (ibid.: 252). Similarly, Acheson’s research in
Maine reveals that fishers' attitudes towards limited entry differed according to the fisher's structural position in the industry (1980: 20). Fisher age, the primary species they exploited, and the versatility of their fishing operation (ability to move between different fisheries) influenced how fishers viewed limited entry as a potential management tool for their fisheries (ibid.: 25).

Palmer and Sinclair investigated fishers' opinion regarding fleet rationalization in Newfoundland. They found "divided knowledge" within the community of fishers; large vessel operators believed in the need for fleet reduction, and smaller boat owners wanted to see more vessels participating in the fishery (1996: 275). They concluded that "local knowledge of the sociopolitical landscape needs to be studied before the local knowledge of the environment can be properly incorporated into the formulation of co-management programs" (ibid: 276). While these authors recognize the significance of political knowledge in commercial fishery contexts, their conclusion remains focused on a successful way to access ecological knowledge. Political knowledge is considered as an influence on ecological knowledge. I contend that it is important to engage with political knowledge as a local theory, and as a local critique of dominant structures of resource management and as a basis for decision-making.

Discussions of positionality and the situatedness of knowledge can lead to the dangerous ground that Palsson warns of (discussed in chapter 1) where local knowledge can be reduced to "ideology" according to Cartesian dualism (1998: 51). However, attending to the differentiation of local knowledge need not de-validate it, but rather, can provide the tools for more accurate understandings of ecological facts and social realities. Deconstructing local knowledge, as Felt promotes, allows for the illumination of
ecological facts that are directly supported by the diversity of fishers' practical experience. This type of research redeems fishers' ecological knowledge for resource management by establishing both its limits and scope. Furthermore, a focus on the political influences on ecological knowledge is critical for an understanding of fisher behaviour, and for the establishment of appropriate and equitable resource management structures.

Hutchings and Ferguson have recognized that the difference between “local knowledge” and “opinions” is difficult to define, and that there should be a role for fishers’ opinions on resource management issues (2000: 95). An opinion, defined as “judgment resting on grounds insufficient for complete demonstration...belief of something as probable, though not certain or established” (Oxford English Dictionary), shares key traits of contingency with local knowledge. Indeed, according to the methodological requirements of the “scientific method” (see Neis et. al. 1999a), local knowledge cannot be ascertained to be more than an opinion or shared opinions.

Diversity has tended to be approached as a methodological issue within ecological knowledge research. Variations in local knowledge due to gender, age, etc. must be attended to and documented by stratifying the sample of informants within the community (see for example Neis et al 1999a, Grenier 1998). The “interest contortion” (see Holm 2003) must be factored out by assessing the political influences that cause variation in ecological knowledge. However, I would argue that diversity of knowledge is a conceptual issue, not a methodological one. The differentiation of knowledge, its situatedness and positionality, should be a focus of social science research, not a complication to it.
The key issue, however, is thus not whether fishers are “right”; we must recognize the multiplicity and heterogeneity of local knowledges “that emerge out a multidimensionality reality in which diverse cultural, environmental, economic, and socio-political factors intersect” (Nygren 1999: 292). If the value of local knowledge is in its relation to direct experience, the variety of human experience, even in small ‘localities’ must be recognized. This does not decrease local knowledge’s relevance to resource management, but rather, provides a new premise for its use: informing regulatory structures regarding the important nuances of resource users’ experiences, concerns, and needs.

**Conclusion**

“It feels like a dirty trick. They chopped the fleet in half and then didn’t let us fish.” Luke, gillnetter.

More than six years have past since Minister Anderson announced the Coho Crisis and the conservation measures that would transform the salmon fleet and the practice of salmon fishing. The northern trolls have regained access to a targeted coho fishery, suggesting some level of conservation success and a return to pre-1998 ‘normalcy’. However, the commercial salmon fleet is much reduced, and embittered, and overall, fishing opportunities are still restricted. The legacy of the Coho Crisis is thus both practical and ideological. Fishers’ perceptions of the collapse of coho conservation priorities into DFO salmon allocation objectives has persisting impacts on fisher response to new conservation measures. Recent restrictions on commercial sockeye fishing in the southern areas due to concerns about the near extinction of Cultus Lake and Sakinaw Lake sockeye stocks (see Chapter 7) are associated with salmon reallocation to
Aboriginal fisheries on the Fraser River. Area closures for the troll fleet are understood to be initiated at the request of sports fishing lodges on Langara Island (Queen Charlotte Islands). Most, if not all DFO conservation initiatives and risk-averse management efforts trigger fishers' distrust and suspicion.

It's not beyond the realm of possibility that the Coho Crisis was in fact used as a means of reallocating fishing opportunities between competing sectors of the fleet. McCay and Finlayson note that after the collapse of the East Coast cod stocks, chaos and fear were exploited by government to impose a fishery restructuring policy that had been developed a decade before (2000: 312). Finlayson's study of the scientific assessment of Atlantic cod stocks show the way in which fisheries management decisions in Canada reflect the political control and restriction of biological science (see Finlayson 1994). Biology has been used elsewhere to legitimize political decisions, and Lipuma and Meltzoff call this a “naturalization of the political economy” (1997: 127). They point out that long-term environmental goals become compromised when conservation is used to support a political economy founded upon the interests of class and ethnicity (ibid.). King and Durrenberger have also identified this collusion of science and politics in fisheries management, and call it the “mismanagement tragedy” (2000:8).

Whether the Coho Crisis an opportunistic use of a legitimate conservation issue for political ends, or merely a coincidental stock of concern during a decade of reallocation, is not however, the critical issue. False or true, coincidental or deliberate, the Coho Crisis is, for all the commercial fishers I spoke with, wrapped up in the politics of allocation. They understand the conservation measures in light of the larger issues of intersectoral competition and gear conflicts. This has significant implications regarding
selectivity compliance for this fishery, and future biodiversity objectives. The Coho Crisis was extremely damaging to the legitimacy of DFO conservation initiatives for commercial fishers.

Academically, the Coho Crisis provides a finely detailed example of the differentiation of fisheries knowledge, the way that knowledge is ultimately positioned. Not only do fishers know different things about fish because of their different experiences of fishing, their diverse positions within the context of resource competition shape their understandings of political processes. This example of differentiation of knowledge by ethnicity and gear type does not reflect the only ways in which fishers' knowledge is severalized. Palmer and Sinclair remind us that “there simply is no single local vision or knowledge that is waiting to be heard – even within a single sector of the fishing fleet” (1996: 268). We will see that knowledge is also differentiated by generation (see Chapter 4), and depending on the particular issue or situation, there are multiple ways in which the knowledge of the fleet, or any sector, might diverge.

Finally, the Coho Crisis illustrates the political nature of fishers' knowledge. Not only do fishers’ know things about coho, they know things about coho conservation measures. They have well-developed (although varying) theories regarding the management of the salmon fishery and the relationship between bio-diversity and user-group competition. Their understandings about the politics of resource management influence their responses to, and participation in, conservation initiatives. This type of influence works on both large and small scales of behaviour. Understandings about salmon reallocation influenced both fishers’ decisions to sell their licenses in the
buybacks, and their decisions about whether to use their revival box to resuscitate coho, or to use it to store excess gear.
Chapter 4: The Rockfish Crisis: new types of fishing knowledge

An old fisherman with a grey beard sat down heavily a third row chair in the meeting room at the Crest Hotel in Prince Rupert. He sighed and muttered “I hate these meetings.”

The DFO biologist began his presentation about the rapid depletion of rockfish stocks, and the drastic measures that would need to be taken to re-build the populations. At the end of the meeting a long-time fisheries activist got up to leave and chuckled, “It’s nice to know that even after not going to any meetings for a whole year, I haven’t missed anything!” A few months later, when asked about the meeting, a fishing charter operator reflected “I hadn’t been to a good old-fashioned eye-gouging session in quite a while.”

In late February 2002, there was an article in the Daily News announcing a public meeting at the Crest where the DFO would present the issues facing the Pacific rockfish stocks, and the conservation initiatives designed to reduce fishery-induced mortalities on these stocks. The announcement drew the attendance of halibut and rockfish longliners, draggers, and charter operators, and various conservation and environmental interests. The first two reactions documented above suggest the familiarity and repetitiveness of these consultation meetings where fishers are informed of a new stock of concern. The latter comment points to the conflict between user groups, and between resource users and the DFO, which these crisis announcements invariably trigger.

The announcement of the Rockfish Crisis at the Crest Hotel on February 26, 2002 provides an interesting example of the ways in which local knowledge and biological knowledge interact and conflict in resource management contexts. The following
documentation of the meeting illuminates issues around scientific hegemony, and the persisting barriers to the inclusion of fishers' knowledge in fisheries management and stock assessment. The Rockfish Crisis itself provides a springboard to a discussion of the way in which quota-based management transforms the practice of fishing, changes fishers' ecological knowledge, and creates new forms of knowledge that become critical to fishers' success. The case study of the meeting reminds us of why this type of research is important - why attention must be paid to the complex interactions of different knowledge forms in resource management contexts. The case study of the Rockfish Crisis in general points to the new directions this type of research must take in order to comprehend the increasing complexity of fishers' knowledge.

In the last chapter, I outlined how fishermen's knowledge is shaped by the experience of fisheries regulation and management. The increasing segregation of gear types and ethnicities as competing interest groups, through various regulations and policies, has shaped the way in which fishermen understand conservation initiatives and DFO action. This chapter will outline the way in which fisheries policy has segregated fishermen by generation and access to capital. Moving beyond the construction of differentiated knowledge, this chapter will look at the construction of new forms of fisheries knowledge in the context of license and quota speculation.

**A night out at the Crest.**

*I'm accused of overfishing. I'm not a biologist, I tell them that. But as soon as I have a biological theory, they tell me I'm not one.*

Jack, longliner/troller
The Crest Hotel boasts a fine restaurant, a popular lounge, and a beautiful view of the harbour. It is the hotel of choice for visiting business people and government representatives. It is also a site where public meetings are held and where government and citizens debate issues over the management of local resources, and the survival of local livelihoods. During my years in Prince Rupert, I have attended meetings at the Crest where new forestry tenures have been presented, logging regulations reviewed, oil and gas development discussed, fish farm expansion criticized, and new fisheries crises announced. The rockfish meeting discussed below is only one of many moments of conflict between local and government interests that have played out in the meeting rooms of the Crest Hotel.

At the rockfish meetings, The DFO was represented by a biologist, a manager, and a facilitator. Attending were three sports charter operators, an environmentalist, an independent biologist, a Native Brotherhood representative, president of the Tsimshian Tribal Council, chair of the Prince Rupert Chamber of Commerce, a union activist and former fisherman, a processor, five halibut fishermen, three combination rockfish/halibut fishermen, eight rockfish fishermen, a dragger, and several deckhands.

The biologists' presentation began with a description of the rockfish species' behaviour and life cycle. He described them as non-migratory, restricted to specific habitats, extremely long-living with a slow growth rate, low natural mortality rates, and sporadic recruitment rates. The very first Powerpoint slide elicited comment from the floor, a slide with a picture of a rockfish and the label “non-migratory”. This characteristic has major implications for the management and conservation of the species.
Immediately, a fisherman commented "That's bullshit right there". One by one, the fishermen in the room stood up and spoke about the movement of rockfish.

Larry had done the Tasu and Anthony Island surveys for a 1998 stock assessment:

"In September I set 500 hooks on one string, and caught 250 yelloweye. January, I set mark to mark and only caught 15 yelloweye. The scientist said: I better shut it down – you cleaned that area out."

Here another fisherman interjects: "You bastard!" The crowd laughs.

Larry: "In March, I set again, and what do you know? 250 yelloweye."

Same fisherman: "It's a miracle!"

The DFO biologist responded "Under strange circumstances they are known to migrate". Larry’s father stood up and told the biologist:

*I've hand-lined them, I've long-lined them in deeper water. We know they move, we chase them around the ocean. You can go to the same spot for 6 months, and catch no fish. Then all of a sudden there are tons of fish – because the feed has moved in. They follow the groceries.*

The fishermen were getting nowhere convincing the DFO biologist that the data was flawed because rockfish do not stay in one spot to be counted. They moved on from biology to politics, questioning the allocation of Total Allowable Catch, and the equitability of enforcement efforts.

The biologist presented data from the south coast of BC that suggested drastic declines in rockfish populations. The mortality rates were greater than 6% of the biomass, and the management goal was to decrease catch rates to below the natural mortality rate of 2% of the population. The proposed methods to limit mortality rates
were decreased catch limits for the directed rockfish (ZN) fisheries, and halibut by-catch, and to expand the system of Rockfish Protection Areas (areas closed to fishing to protect spawning and nursery grounds). In the Gulf of Georgia, 50% of rockfish habitat would be protected; in outside areas, 20% of habitat would be included in RPAs. The new protected areas would be developed through consultations with commercial, sports and First Nations representatives.

The fishermen attending were dismayed by the lack of data for northern stocks. The data indicating declines and current levels of mortality were from primarily southern, inshore waters.

A rockfish fisherman suggested that the DFO had created the by-catch problem by outlawing the catch of certain species by certain gears, forcing fishermen to discard. Rockfish fishermen also focused on the issue of accountability and perceived discrepancies between commercial and sports enforcement.

Every fish I have caught on a ZN license I accounted for. You’re talking about accountability and I can’t even breathe, leave port, without being in violation of something. What more can we do? You’re looking at the wrong user group. We have 100% accountability.

Several fishermen suggested that seal and lingcod predation were underestimated in the mortality estimates. Even if commercial fishing ended in the Gulf of Georgia, they asserted, the seal population would result in persisting declines in rockfish abundance.

Towards the end of the discussion, a very politically active troller and longliner, Dan, described the bigger issue of trust and co-management.
Listen, we’ve got a hundred years of experience and information sitting in this row. But you won’t listen to us. We wouldn’t need observers if there was trust between the department and fishermen. You’ve got everyone in the industry so pissed off, you can’t expect any accountability!

After the presentation, I had some questions about the equations used to calculate rockfish mortalities. I approached the biologist and asked about the relation between the calculation of rockfish mortalities and that of other species. I must not have clearly articulated my question, because his response was: “I’m sorry, can you repeat your question? I have a college education, and sometimes it gets in the way.”

Local Knowledge and Biological Knowledge

The rockfish meeting illustrated the persisting conflicts between different forms of knowledge in fisheries management. This can be contextualized by the a growing literature about the difference between scientists’ knowledge and fishers’ knowledge in the context of resource management and regulation. Maritime anthropologist M. Estellie Smith asserts that all participants bring “intellectual baggage” to the resource management process, specifically, differing models of nature (1990: 4). She suggests that scientists tend to have a linear understanding of nature, and fishermen subscribe to non-linear models that construct nature as unpredictable (ibid: 6).

Other researchers have suggested that the way in which scientists’ knowledge is created is also very different to that of fishermen. Biologists work with facts that “are mainly learned secondhand, rather than experienced” (Ward and Weeks 1994: 99). Fishers’ knowledge on the other hand, is based on firsthand experience and observation. Palsson describes the knowledge of scientists as “largely normative and textual,” while
fishers; is "often tacit, tuned to practical realities" (1994: 92). Thus, their conceptions of their own knowledges are different, as well as their perceptions of the other's knowledge.

Perhaps more significant than the substantive differences between their knowledges, are the differences between their positions. Griffiths characterizes the basis of biologist-fisher conflict as the fact that biologists must focus on escapement or recruitment, whereas fishers must contextualize these issues in a far broader frame of reference (2002). Thus, it is not the nature of their knowledge that differs, but the scope of their engagement with fisheries problems. Scientists and fishers are divided by their different positions in relation to power, and the different values attributed to their knowledges reflects these power relations (Eythorsson and Mathison 1998: 218). Torben Vestergaard characterizes the relationship between fishermen and scientists as essentially competitive, as they possess rival competence in knowledge of fish:

It is not only disagreement on factual matters that separate fishermen and biologists, but also the violation of social taboos: a hierarchical social relation that cannot be avoided, neutralized, or turned into social exchange. The relationship exposes an antagonistic unequal relation of power, a combination of rivalry with inequality in relation to an administrative hierarchy and unequal claims to objective truth. (1990: 28).

The conflict between biologists' and fishermen's knowledge can also be analyzed in terms of class conflict. Anthropologist Thomas Dunk's (2003) discussion of workers' knowledge focuses on class-based constructions of 'valuable' knowledge. Anti-intellectualism and an emphasis on common sense reflect an inversion of the hierarchies of mental over manual labour and theoretical over practical knowledge. Anti-intellectualism is reinforced by perceived disregard for and discounting of workers' experience-based knowledge. Dunk's work deals with the more general opposition of practical and theoretical knowledge, and class conflict, rather than the very specific
conflicts which derive over control of resources. The conflict between fishers and scientists for example, can be understood as is influenced both by class issues and the social construction of different types of knowledge. However, where Dunk’s workers tend to understand themselves as knowing about different things than the technocrats, the conflict between fishers and scientists is over knowledge about the same thing.

Anthropologist Priscilla Weeks, on the other hand, indicates the “permeable boundaries” between scientific and ‘lay’ discourses, and the ways in which biologists’ and fishers’ knowledge can both converge and diverge in management scenarios (1995: 434). She suggests that fishers appropriate science as a discourse, and as a resource, and frame their responses to management within a scientific approach (ibid.: 435). This suggests the transferability of knowledge, but indicates the hegemony of scientific knowledge as the discourse of choice and validity within resource management scenarios.

Sociologist Rik Scarce has investigated the processes which contribute to the social construction of salmon for biologists (2000). He suggests that both micro-level social interactions and macro-level social institutions produce the multiple constructions of salmon articulated by biologists (ibid.: 177). Thus, it is important not to construct fisheries science as a monolithic, non-social counterpart to fishers’ varied and experienced-based knowledge. Scientific knowledge is clearly as political, constructed, and divergent as fishermen’s knowledge. However, it must be recognized that in resource management contexts, biological science is in fact constructed as a powerful monolith that is free of social influence. This construction is often used to underwrite DFO power, and to structure their engagement with fishers regarding policy and regulation. In this context Science, with a capital S, is constructed as a black box, even if
it does not function as one. It is Science that DFO refers to as the basis for its decisions, and it is Science with which fishers must debate over fishing opportunities. Fishermen and scientists usually sit on opposite sides of the table in resource management scenarios (despite increasing co-management and collaboration efforts). Both the literature on ecological knowledge, and the discourse of fishermen is shaped by this trope of opposition. Thus, the biologist at the rockfish meeting represented Science in a scripted play of caricatures that is staged at many resource management meetings.

The DFO biologist who spoke at the rockfish meeting presented a rather extreme version of the science-oriented approach that has been identified as a significant barrier to the successful inclusion of resource users in fisheries management. He refused to accept the knowledge of local fishers regarding the behaviour of rockfish. This provoked conflict, and the meeting thus became focused on the question of whether rockfish are sedentary or not, rather than on issues such as how to improve the stock assessment data, and how to manage the fishery in light of new rockfish mortality targets. Had the biologist appeared to even halfheartedly engage with what the fishermen were saying about rockfish behaviour, their potential acceptance of the rockfish harvest limits would have been more likely. His recalcitrance however, resulted in conflict in the short term, and skepticism regarding the validity of the conservation measures, in the long term.

The biologist’s comment to me, that his college education “gets in the way” provides a perfect description of the relationship between expert and ‘lay’ knowledge. The biologist was implying that he couldn’t understand my question because of our assumed diverse educational backgrounds. Fishermen have complained to me that biologists dismiss their knowledge because the fishermen don’t have a science degree.
Despite the self-deprecating tone of the comment, it does suggest an emphasis on the difference that education makes, and in combination with his dismissal of fishers’ convictions regarding rockfish movements, indicates a validation of scientific knowledge over experience at sea. At a meeting later that year, a First Nations resource manager told a story about a DFO biologist he met at a workshop on TEK. The biologist told him, “We have to deal with traditional knowledge, but I don’t really believe in it.” It was the same biologist.

The conflict at the Crest provided yet another “Big Bad Biologist” story to add to the repertoire of fishermen. Stories such as these are widely used by fishermen to articulate the relationship between fishers and the DFO or between fishers’ knowledge and “Science”. One fisher who attended the meeting later told me a story about dealing with another DFO rockfish scientist and having a similar experience. Some of the rockfish fishers in Prince Rupert initiated a voluntary tagging study to investigate rockfish mortalities and movements.

*When we were tagging we put 26 tags in one spot and got three back.* [The scientist] said: “That proves that 85% die”. *When she said that, my wife asked her:* “Are you trying to upset me or are you being ignorant?”

The return of only three tags on that particular spot indicated to the fishers that the fish had moved. The fisheries biologist interpreted these results as emphasizing mortality rather than movement. This was the same biologist with whom the rockfish fisherman Larry conflicted with over the test fishery at Tasu (see previous section). In these stories, the biologist or resource manager or fisheries enforcement officer is characterized less as an individual than as a caricatured representative of the bureaucratic regulatory structure.
These stories are metonymic devices, representing the broader power struggles between fishers and state representatives through personal stories of individual conflict. While fishers might assert that a particular manager or scientist is especially difficult to deal with, the emphasis is on the structural and systemic recalcitrance of the DFO as an institution.

The biologist at the rockfish meeting provided fishermen with another story about DFO ignoring their ecological knowledge. The biologist's emphasis on scientific data developed by the DFO prevented him from engaging with the information being provided by fishermen: data on fish behaviour, and identifications of stock assessment lacunae. Throughout the evening he admitted repeatedly that budgetary constraints limited the DFO's ability to adequately research rockfish stocks. He admitted that their data was limited in scope. However, despite these constraints on DFO research, he refused to admit that fishers might have any data to contribute to the Department's rockfish program. His lack of engagement with fishers' knowledge mired the meeting in debates regarding rockfish movement - debates which were essentially about the conflict between local knowledge and scientific knowledge- rather than discussions about appropriate fisheries adjustments.

The meeting at the Crest went poorly. Fishers walked away angry, suspicious, and frustrated. They had been told that northern rockfish stocks were assumed to be low (based on southern trends) and that they were to expect significant cuts to their directed rockfish fisheries and by-catch allowances. They would have to wait for six weeks to learn the exact damage to their livelihoods. Moreover, their critiques of DFO data collection and stock assessment practices were ignored. The two hour meeting reflected
a microcosm of the industry's problems in general: the conflicts between different resource users, between resource managers and fishers, between science and local knowledge.

The meeting at the Crest, however, is just a very small moment in a much larger conflict, both the culmination of a decade of changes in the longline fisheries, and also the beginning of a new process of transformation.

**The Rockfish Crisis and the development of an integrated groundfish fishery**

Rockfish licenses (ZN licenses) were issued in 1991 (inside) and 1992 (outside), creating a separate license for targeted rockfish long-lining. This fishery was divided into inside and outside areas (inside being the Gulf of Georgia, and outside constituting the rest of the coastal waters of BC). The license was fished under three different options, selected each year by the owner; a fourth option was added in 2000 to allow for greater rockfish by-catch in the halibut fishery. Each option targets different species and receives different monthly or seasonal limits. Option A provides live fish to the market, targeting inside species such as quillback and copper rockfish. Option B targets yelloweye (red snapper) for a fresh market, and Option C targets deep water species, such as rougheye, for both fresh and frozen markets. Option D is fished in combination with an L license (halibut) and provides extra by-catch quota.

Many of the ZN license holders who were small boat-owners and participated in targeted rockfish fisheries (options A, B, or C), understood the Rockfish Crisis to be associated with the desires of larger operators to gain access to rockfish quota. The ZN license holders had voted against a shift to quota-based management in 1995. This
prevented the expected easy transfer of rockfish into the halibut fishery as by-catch quota. The rockfish crisis threatened to fully dissolve targeted fisheries and make the ZN license valuable only as a by-catch allowance for the halibut and blackcod (sablefish) fleets. The rockfish crisis accelerated management discussions regarding an integrated groundfish fishery, which would enforce no discarding; quota would be required for all species encountered. This would necessitate the movement of quota between the blackcod, halibut, ZN, and trawl fisheries. The small-scale ZN license holders worried whether they could maintain their positions within this type of fishery.

*The rockfish push is coming from big halibut and blackcod owners with ZN licenses. They were hoping to lease them out when it went quota and got stuck with licenses. They are trying to figure out how to get rid of the ZN guys because they are impeding their ownership of rockfish quota. ... If they bring up a conservation concern, they will have to ‘rationalize’ the fleet. That magic rationalization word. In rationalization, the guys with the licenses win."

Dan, ZN option A fisherman.

They want to close us down and force us to sell. With the government cutbacks they are cutting down DFO so they don’t want so many boats. The user-pay will be big enough that only a few boats can do it. Crews will be paid $6/hour. The skipper who doesn’t own anything, $200/day. Blackcod and halibut boats want ZN for bycatch. The environmentalists are pushing no discards. The larger boats always push the little boats out. Pete, ZN Option B fisherman.
For ZN – the threat is from halibut boats, not from DFO. Frank, ZN Option A fisherman.

This is part of the DFO plan to reallocate fish using by-catch. Jack, Zn Option A fisherman.

There were rumours of secret discussions between the Sierra Club environmental organization, and multi-license holders who would profit from the dissolution of targeted rockfish fisheries and the resulting increase in by-catch availability and transferability. The Sierra Club had initiated research into the status of rockfish stocks in 2001, and the results of their study resulted in public pressure on the DFO to limit rockfish fisheries. The small-boat ZN fleet, especially single-license holders and small-scale operations, suspected that they were being cannibalized by the bigger players.

Conspiracy theories aside, the economic implications of an integrated groundfish fishery were recognized by the fleet even before the Rockfish Crisis. In the halibut industry, the consultation structures tend to be dominated by large quota holders. The entrepreneurship involved in these positions has been identified by fishermen’s organizations. The Pacific Halibut Management Association is a co-management organization that was developed after the shift to quota in the halibut fishery. The PHMA levies fees for management costs, and its Board of Directors participates in co-management consultations with the DFO. At the PHMA 2001 annual general meeting, a motion was moved which identified and sought to remedy the manipulation of management structures for personal gain. The following is an excerpt from a resolution regarding conflict of interest:
Whereas Directors of PHMA, who, in 2000, owned ZN or K licences and actively promoted the integrated groundfish management policy, which if adopted by DFO, would:

(i) serve to increase the value of ZN licences as a result of forcing halibut fishermen to buy them or to lease rockfish quota from ZN licence holders

(ii) block any attempt by PHMA to regain its historic right to a share of the blackcod resource

(iii) block any attempt by PHMA to help the halibut fleet regain permanent control of enough rockfish resources to secures its future access to the halibut fishery...

The motion went onto suggest that halibut license holders without other holdings needed a voice that reflected their “distinct” interest in the fishery, and resolved that all candidates standing for election to the Board of Directors should disclose all their interests in groundfish licenses prior to an election. Thus, the halibut fleet had recognized at least a year before the Rockfish Crisis that halibut fishers with ZN licenses were lobbying for an integrated fishery. Diversified license holders might not have been colluding with the Sierra Club, but many would have welcomed the push towards integration that the Rockfish Crisis provided.

There has been a noticeable shift towards ZN licenses being used to access by-catch for the halibut fishery. During the 2000-2001 season, 69 of the 191 rockfish licenses (36%) were fished as Option D in the halibut fishery. In 2004, 111 licenses or 58% selected Option D. These licenses primarily moved from Options B and C into
option D; Option A (the small-scale live fishery) participation has remained relatively stable.

The Rockfish Crisis and the promotion of an integrated groundfish fishery are the latest in a series of movements towards privatization and corporatization that have unfolded from the shift to quota-based management in the halibut fishery. The shift to quota has had tremendous economic, social, and ecological impacts on the fishery, and has created new forms of fisheries knowledge that are now crucial to a fishers' success.

*The halibut fishery and the shift to quota*

The halibut fishery has been a key aspect of the industrial fishery in the waters of British Columbia since 1888. By the early decades of the twentieth century, the stocks of fish in BC and Alaska were at risk, and landings began to decline after 1915. A joint US-Canada treaty was signed in 1923 which created the International Commission to investigate the conservation requirements of the fishery (IPHC 1947: 8). A winter closed season was established, and in the 1930s fishing areas and associated catch limitations were identified. Use of nets was prohibited, a minimum size limit established, and nursery areas closed year-round.

During the 1930s BC fishermen initiated trip poundage and time limits. Halibut trips were eight days long, with a ten day layover in between trips. Later, trip limits were based on number of crew – a vessel was allocated 2800lbs per man per trip. According to a fisherman who started fishing as a halibut deckhand in 1939, this system encouraged the building of large boats and the retention of large crews. Large boats fished primarily in Alaskan waters. The layover program ended during WWII but was re-introduced by fishing organizations in Canada and Alaska in 1956 in order to extend the season, to
establish rest periods for fishermen, to provide for orderly delivery, and to conserve stocks (IPHC 1975). The system was discontinued in 1977. During the later decades of the twentieth century, short fishery openings were established rather than an open season, in order to limit the harvest to the identified TAC.

In 1977, when Canada and the US ratified the Law of the Sea and enforced the 200 mile expanse of exclusive economic zone from their shores, the Canadian vessels fishing halibut in Alaska were forced back to BC waters by 1981. This concentration of the fleet encouraged the implementation of license limitation in the halibut fishery in 1979 (see Turris 1995). The right to fish halibut was no longer part of the privileges of the A license and became a separate L license, and the halibut fleet was reduced to 435 vessels with the requisite landings in qualifying years (3000lbs or more in 1977 or 1978).

During the 1980s these 435 vessels participated in increasingly brief fisheries 2-4 times a year. Turris characterizes the pre-quota fishery as “unsafe, overcapitalized, wasteful and difficult to manage” (1995: 132). In 1990 the BC halibut fishery lasted a total of 6 days, compared to a 60 day season in 1982 (Casey et al. 1995). Since license limitation in 1979, fishing capacity had been steadily increased by larger crews and technological changes (ibid.). The majority of the fish was frozen upon delivery, and ex-vessel prices were relatively low (1988-1990 B.C. average ex-vessel price was $1.72/lb US). The TAC for halibut was exceeded in eight out of the ten years of fishing in the 1980s.

The shift to quota is often attributed to a series of meetings in 1989, initiated by industry stakeholders (see Turris 1995). However, increasing participation rates (to 100% in 1989, from 76% in 1985) suggest that rumours of a shift to quota-based
management had reached the entire fleet. The year 1989 was the last qualifying year used to determine quota allocations, and the first year since license limitation that the entire fleet participated in the fishery. The 1989 survey of vessel owners that resulted from the preliminary meetings suggested that 77% of the respondents (which represented 82% of license owners) were interested in discussing the potential of quota-based management for the halibut fishery. The final proposal was supported by 70% of vessel owners and opposed by the Deep Sea Fishermen’s Union (crew union) and large processing companies (ibid.)

The halibut TAC for British Columbia was divided between the 435 licensed vessels, 70% based on their best annual catch in the years between 1986 and 1989 and 30% based on vessel length. The season was lengthened to eight months, during which the vessels could fish at any time. The harvest of each vessel was validated by dockside counts, which the fishers paid for through a per-pound levy. The fishery became the only one in North American where the costs of management were totally recovered from participants (Turris 1995: 147). There was no transferability of quota between vessels for the first two years.

The longer season allowed for most of the harvest to be sold fresh, increasing ex-vessel prices by 55% in the first two years of the program (Casey et al. 1995: 218). The percentage of Canadian fish landed at US ports decreased (Turris 1995: 145), and the number of processing facilities able to buy halibut increased (ibid.). The longer season also allowed fishers to avoid bad weather and to fish at a reduced pace, presumably increasing the safety of the fishery (Casey et al. 1995: 218).
The impacts on crew employment and wages were immediate, and predominantly negative. Casey et al. found that 44% of vessels reduced their crew during the 2 years after quota, reducing crew employment by 32%. They attributed 18% of this from crew size reductions, and 14% from crew displacement from non-active vessels (ibid.: 225). At the time 59% of crew shares had increased on vessels operating with less crew. Turris suggested that while crew employment decreased by 25% in the first year of the program, the total number of man hours in the fishery increased (1995: 143). However, this cannot be understood as a positive shift, as halibut crew members do not receive an hourly wage. In fact, this suggests a further deterioration of crew income.

**Transferability and the shift to “sharecropping”**

At the time of Casey et.al.’s survey, transferability was limited by a block system. The initial allocation was divided into two equal shares. Two could be leased out, or two additional leased to harvest. There were 74 licensed vessels no longer participating in the fishery (ibid.: 226). Those vessels with larger allocations were more likely to lease additional quota, suggesting a movement towards consolidation (ibid.).

Since this early survey, many of the limits on transferability have been lifted. Quota transfers between boats can be of various sizes, and are not limited in number. The maximum amount of the TAC that can be held by, or fished by, any license is 1%. At a TAC that floats in the 10 million pound range, as it has for British Columbia for the past several years, a full “tab” of halibut is in the vicinity of 100 000lbs. Those with small quotas (the minimum quota attached to an L license is 0.001% of the TAC), can lease quota from “armchair fishermen”, quota holders who do not actively participate in the fishery.
The lifting of the transferability limits has resulted in considerable changes to fishery participation rates. The number of active vessels has decreased considerably during the decade since quota transferability was implemented. In 2002 there were only 214 active licenses out of the 435 licensed vessels. This means that 221 license owners leased out their quota to another vessel. In total, 422 licenses were involved in quota transfers (compared to 196 in 1998), with approximately 65% of the TAC involved in temporary transfers. While the DFO statistics don’t allow for accurate isolation of the lessee/lessor ratios, it appears that there are approximately equal numbers of licenses leasing out and leasing in. In other words, an inactive half of the fleet leases their quota to an active half.

The quota leasing structure negatively impacts lessee vessel owners, and almost all crew on halibut vessels. Halibut quota is usually leased for a specific price per pound before the fish is harvested, with the processing company acting as a middleman. Active fishers lease various units of quota (up to 1% of the TAC), and quota owners are usually paid up front by the fishing company. The cumulative lease prices then become a debt of the active fisher to the processing company, obligating them to sell their harvest to that company. When an active vessel delivers halibut, the lease price is deducted from the ex-vessel price of the fish, in addition to the management fees that are part of the mandatory enforcement and validation system. Whatever is leftover is the true price paid to the skipper and crew for their labour and risk.
Averaged example for 2002 halibut season:\(^{20}\):

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<tbody>
<tr>
<td>Ex-vessel price /lb</td>
<td>$3.83</td>
</tr>
<tr>
<td>Quota lease price /lb</td>
<td>-$2.35</td>
</tr>
<tr>
<td>Management fees /lb</td>
<td>-$0.28</td>
</tr>
</tbody>
</table>

$1.20/lb for expenses, crew and boat shares

This example shows that in 2002 the return to those involved in harvesting the resource was approximately half of that paid to the “armchair” fisherman who was allocated quota in 1991 or bought quota in the succeeding years. In 1997, high lease prices and low ex-vessel prices resulted in some active fishers actually losing money fishing halibut, or barely breaking even.

The per-pound lease price for halibut quota fluctuates depending on a number of factors. This is the type of ‘political’ information that fishermen know. The price-determining factor is difficult to determine, and individual fishers explain the price relationship differently. Lease prices are tied to quota purchases prices, and to ex-vessel prices, which are in turn related to purchase prices, resulting in reciprocal and circular relationships. The following factors influence or have influenced lease prices at different moments during the period of transferability:

1) The lease price appears to be tied to ex-vessel prices for halibut, and has a reciprocal relationship with the per-pound purchase price for halibut quota. Higher ex-vessel prices can raise the price of halibut leases during any given fishing season. The purchase price of quota is increased by rising lease prices, but can also influence pre-season lease prices based on a percentage relationship between quota price and lease price (see 2).

\(^{20}\) Derived from interviews with halibut fishers.
2) Some quota investors seek a 10% return on their investment. A quota-owner who paid $25/lb for quota often wants to see a $2.50/lb lease price for his fish. This 10% return reflects the way in which quota has come to be understood as an investment, similar to playing the stock market.

3) There appears to be a control factor on the lease prices that leaves a target of $1.00/lb available to the lessee for expenses, crew and boat share. This is an arbitrary amount that has developed as a baseline ‘wage’.

4) The up-front financing of halibut quota leases by the processing companies has had an inflationary effect on the lease price. The companies’ ability to pay lease prices before the opening of the halibut season has weakened the relationship between ex-vessel price and lease price. Furthermore, the competition between companies for access to halibut landings encourages the companies to pay high lease prices in order guarantee that fish will be sold to them. This cost is then transferred to lessee fishers.

The quota leasing system generally encourages the active fishermen to achieve the highest prices and profit margin that he can, by conducting longer, larger trips, and catching large for which he will receive the greatest price\(^2\). However, the $1.00/lb target can also invert the price structure during periods of high ex-vessel prices. The 2003 season saw extremely high ex-vessel prices for halibut, reaching above the $5.00 mark. Some quota owners put their quota on the market at a fixed price per pound for the lessee, rather than at a fixed price for the lessor. A Prince Rupert fisherman fished halibut quota

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\(^2\) During the first few years after the introduction of IVQs, the size-based price split in ex-vessel halibut prices was not common. Most processors paid a standard price for all sizes of halibut (see Casey et. al. and Turris). However, the price differential for 3 size categories of halibut has become standard once more.
for $1.10/lb, which left the increasing value from high prices available to the quota owner. While this has not become the standard agreement, it suggests the potential for a shift towards fishing for wages. Some quota owners who structure their agreements this way stipulate that the quota be fished during the autumn months when the prices are relatively higher. This forces lessees to fish in more inclement weather, reducing the assumed safety impacts of quota-based management.

Price differentials and inverted lease agreements encourage quota owners to refrain from leasing their quota out during the early part of the season, leading to lease price speculation. They speculate on different ex-vessel prices throughout the season, and on the lease prices paid by various companies. The competition between processing companies for access to halibut has increased the power of the quota owners to set lease prices. Processing companies, acting as the middlemen for most leasing agreements, may acquiesce to high lease prices to secure access to halibut.

Crews shares\textsuperscript{22} have generally been thus reduced to less than 10\% of the value of the \textit{after-lease} value of fish they catch and process, which can translate to approximately 3\% of the ex-vessel price of the fish. This is case for most boats, whether fishing owned or leased quotas. During the second half of the 1990s many quota owners started to lease their quota to themselves, thereby removing a lease price from the gross earnings on owned quota. Crew on many boats, regardless of the relative percentages of owned or leased quota fished by the vessels, receive a crew share drawn from often less than a

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\textsuperscript{22}Halibut crews have traditionally been paid on a share system. A boat share is taken from the gross payment for the fish (20\% in the post-WWII years, now upwards of 35\%) and is paid to the owner of the vessel. Then bait, fuel and other expenses are calculated. From the remaining funds, the skipper and crew shares are derived.
dollar per pound. Thus many crew appear to be no better off if they fish on a boat with a large owned allocation of quota or a boat for which the majority of the quota is leased. Family operations and vessels with long-term and steady crews provide the exception to this general tendency.

During the first two years of the Individual Quota program, the value of halibut licenses nearly doubled (Turris 1995: 148). More significantly, the purchase price of halibut quota has risen dramatically due to the steady income provided by leasing quota. Retired fishers can lease their quota holdings in perpetuity, often making more per pound leasing out their quota than they were paid for fishing halibut in the late 1980s and early 1990s. In fact, the leasing system has encouraged many fishers to stay at home, as many suggest that the return for their labour, their risk, the wear on their boat etc. is not worthwhile. Leasing out their quota makes more economic sense than fishing it themselves.

The leasing option also encourages older fishers to transfer their other fishing investments into halibut quota. Fishers nearing retirement might sell a salmon license and buy halibut quota, reflecting the leasing option and the current tax restrictions on liquidation of fishing assets. Fishers can sell another license and buy halibut quota with less of a tax impact, whereas selling out of the fishing industry completely involves considerable tax losses. Halibut quota thus has become a retirement savings plan for older fishers. There is little incentive to sell their holdings to younger fishers.

Quota allocations and the leasing system have created a significant generation gap in the fishing industry. Those that were fishing in 1991 received allocations based on previous participation in the fishery. The price of halibut quota has risen from 0 in 1991,
to highs of $35.00/lb in 2004. The 1991 allocations, ranged from 4000lbs to 70 000lbs, with a mean of 33 000lbs. This mean allocation would now be worth $1 155 000, at a $35/lb quota price. At a current lease price of $2.80/lb, this quota could provide the owner with an annual income of $92 400.

Younger fishers, who were not participating in the fishery prior to 1991 must lease or purchase quota to fish, at what are perceived to be ‘inflated’ prices. They thus face significantly higher debt-loads than previous generations of fishers. In order to own the means of production, they must not only purchase a vessel and gear, but also make even larger investments in licenses and quota. Their ability to purchase quota is limited by the refusal of banks and other lending institutions to accept quota or licenses as collateral. Fishers must borrow against the value of their vessel. Fishers who received an initial allocation in 1991 are better able to purchase quota and increase their holdings than younger fishers are able to buy into the fishery; consolidation of quota ownership is an increasing concern.

These effects have not been unanticipated by fisheries scholars. Simon Fraser University economist Parcival Copes wrote a scathing critique of the use of individual quotas in fisheries management five years before IQs were introduced in the BC halibut fishery. Among the equity problems he identified are:

• Decreased returns to skilled fishers
• Decreased returns to crews
• Concentration of benefits in first generation of license holders and their heirs.
• Concentration of ownership in hands of larger companies
• Minimal return on investment to secondary buyer (Copes 1986).
In addition to these impacts on social and economic equity, Copes identified a number of negative ecological and regulatory impacts of individual quotas such as high-grading, data fouling etc. (ibid.). Nevertheless, there has been a steady encouragement of a shift to quota in various Pacific fisheries by the DFO since the 1980s.

**Social and Economic Impacts of Quota**

The quota system described above has had a variety of social and economic impacts, and these seem particularly pronounced for the younger generation of fishermen. My friend Luke walked into my house after the first halibut trip of the season and told me that he was ‘broken’. His back hurt and his carpal tunnel syndrome had flared up. “I’m 28 years old, and I’m broken. It’s halibut quota that is doing it. It’s breaking my back. The old guys never fished that much halibut.”

Quota fishing was taking its toll on Luke’s body. He was crewing on a three-man boat that would catch 65 000 lbs of quota between salmon and prawn fisheries. Compared to the two decades immediately prior to the shift to quota, he was in fact, probably dealing with more pounds per man than those particular “old guys”. The short openings in the 1980s encouraged large crews, and limited production. Earlier, during the middle of the last century, halibut boats fished ten days and took eight days off. They had a trip limit of 2800 lbs per man, which controlled the amount of labour involved. However, during the 1950s and 1960s many of the Canadian boats fishing in Alaska engaged in extremely large production, with annual harvests that can be averaged to over 40 000 lbs per crew man.

Some of the “old guys” did fish that much halibut, however, the current leasing structure does encourage reduced crew sizes and increased labour per man in order to
mitigate against the low return from leased fish. A 33 year old skipper, Josh, hired one deckhand in 2003, and fished a full tab of halibut (120 000lbs) on his 46ft boat. After trolling closed in May, they fished three consecutive halibut trips, delivering 75 000lbs in under three weeks. After the third trip, Jeff, the deckhand, dropped his coffee three times in one morning. His hands couldn’t grip the mug. Josh couldn’t use a can-opener or write a cheque.

Josh’s dentist had been encouraging him to buy a mouth-guard, because he seemed to be grinding his teeth in his sleep and was steadily losing tooth length. During those halibut trips, Josh realized that he wasn’t grinding his teeth in his sleep, but rather, it was when he was hauling gear. Every time he pulled a large fish over the rails of the boat, he was clenching his jaw. The larger crews often rotated between stations on deck, working the rolling, then coiling etc. The loss of skilled deckhands due to the decreased crewshares means that there is less flexibility on deck. Josh hauled all 120 000lbs of halibut over the side of his boat that season, as he had most other seasons. He had lost several millimeters of tooth length during the seven seasons he had fished halibut on his own boat, usually with one deckhand.

Young skippers and deckhands know that the shift to quota has not benefited them. They feel it in their backs, and in their teeth.

The shift to quota has thus created a significant generation gap in the halibut fishery, by creating what Jentoft called “a licensing aristocracy” (1993: 23) in his study of quota issues in Norway. Thus, what young fishermen understand about the fishery is very different than their father’s generation. Those that have benefited from the increased ex-vessel prices and quota prices extol the virtues of quota-based management.
Those that were not allocated quota (because they were too young, or because they were not license owners) are extremely critical of the quota system, specifically the leasing structure.

*That era, the guys from 1950-1990, that 30-40 years of fishing, they took it.*

*They've made it and taken it all and some of them are still accruing it.*  Ken, 42 years old.

*What right do they have to deny a future to the next guy, the next generation? In Europe, 200 years ago, our ancestors came here looking for opportunity because there was no available land. They were sharecroppers in Scotland. Now people are limiting access and implementing the same policies here. It should be looked at as a broader, public issue. It will effect how resources are distributed in the future.*  Dan, 36 years old.

*The younger guys pay their crew better because we just finished deckhanding. We remember. The old guys are greedy. They want $2.60/lb for halibut leases but they forget they paid $10 for the license. There shouldn't be a value attached to halibut. You make a good living on it, pass it on.*  Carl, 27 years old.

*People vote for quota for personal gain. Lazy guys want quota, and guys near retirement. I was a deckhand too many years to believe in canceling deckhands.*  Paul, 50 years old.

One fisherman wrote a letter to regarding this issue, intended for the Minister of Fisheries, the Prime Minister, and for publication in major Canadian news papers. He felt the issue of privatization in the Pacific fisheries was an issue that should concern all Canadians. Interestingly, this fisherman was the one of youngest license holders to
receive a quota allocation in 1991, so he was part of the cohort that benefited from the ‘windfall’ allocation – what he calls the “Haves”. However, he, because he fishes more leased quota, he is negatively impacted by the leasing system, and has been unable to increase his halibut holdings due to the inflation of prices.

There is now a huge chasm between the Haves and the Have-nots. Many of the top producing halibut fishermen in the BC fleet do not own their own quota and if they want to fish halibut, must lease someone’s quota. While people fishing prior to 1991 received huge windfall quotas, a decade later young prospective fishermen have to pay $28/lb for quota and cannot hope to raise the capital necessary to buy into these IVQ fisheries. One generation has been made wealthy at the cost of all future generations...

Opportunity to new participants has been effectively limited to that of an employee role. The chance of self-employment that once attracted so many to the fishing industry now only exists on a very limited basis. ...

Imagine for a moment what it would be like if you had to “lease” your job from your predecessor, often paying as much as 75% of your salary to him or her and their descendants, forever.

Practical and Ecological Impacts of Quota

The shift to quota-based management has had significant impacts on the practice of long-lining, and the knowledge that contributes to success. Fishers also point to perceived ecological impacts that have set the stage for the current rockfish crisis.

Success in the derby fishery was dependent on effort and efficiency. The increasingly short openings encouraged skippers to find specific “hotspots” and “farm”
them, setting string after string in the same area. There was little time to travel, and production was reliant on large crews rolling through a lot of gear. Rockfish by-catch was usually discarded by the smaller vessels in order to save room in the hold for halibut, or was often used for bait.

The shift to quota allowed fishermen to experiment with different areas and different habitat. Fishermen developed a larger repertoire of fishing spots, and have the time to move between these spots during individual trips, and throughout the season. The reduced need for large crews also encouraged a technological change from "traditional gear" to "snap gear" which has been characterized as a process of de-skilling (Charles Menzies, personal communication).

The practice of fishing has been transformed, and has resulted in a redefinition of the relationship between halibut and rockfish. After the shift to quota, rockfish could be retained, due to decreased concerns regarding hold space. In fact, quota encouraged the retention of by-catch species.

The leasing structure that developed during the mid-1990s began to limit the returns to the quota harvester. Halibut lease prices increased, as did the management fees, reducing the profits accruing to the active vessel. In 1997 falling halibut prices meant that lessees barely broke even fishing leased quota. By-catch became an important subsidy to leased quota, and fishers identify a link between the leasing system and increased Yelloweye (red snapper) landings. The DFO statistics do not accommodate the isolation of Yelloweye landings before and after quota, so this perception cannot be tested against harvest data. However, many fishermen attribute an increasing pressure on rockfish stocks to the quota system:
Halibut leasing definitely hit the rockfish. There has been a group of longline fishermen targeting Yelloweye as by-catch—they're wearing on them. [The DFO] are responding to the political thing instead of the biological. When you can't avoid them, there are quite a few there. Dale, 50 years old.

The DFO came up with the rockfish problem. I never targeted rockfish... When you look at who is targeting rockfish, it's people leasing halibut quota and paying too much for it. They need to maximize, and catch every rockfish available. That's where the pressure is coming from. Fraser, 65 years old.

The decreased rockfish allowance has put us out of the halibut fishery. The only way to make money with leasing was the by-catch. Pat, 48 years old.

When fishers were allowed to land Yelloweye equal to 20% of the weight of their halibut, this resulted in a significant increase in the value of their trip. On a 20 0000lb halibut trip, they could also land 4000 lbs of Yelloweye, worth $2.25 in the mid-1990s. On leased quota, that would be an increased trip value of approximately 40%. The Rockfish Crisis and limited Yelloweye quotas have transformed the relationship between the halibut fishery and rockfish by-catch. Currently, halibut fishers must work hard to avoid rockfish by-catch, or must discard it at sea in order to remain within their by-catch allowances.

The shift to quota thus entailed a transformation of fishing knowledge, and a change in the definition of by-catch. The practice of fishing was changed, and thus the knowledge that contributed to fishing success was redefined. By-catch was also redefined, resulting in the targeting of rockfish stocks while halibut fishing.
Changes in practice and knowledge were not limited to the deck of the boat. The context of fishing was transformed, and knowing how to catch the fish became a smaller factor in the success of fishing enterprises. Knowing how to position one’s self within the fishery has become a more important kind of knowledge. Knowing what license to buy, and when, has become a critical part of decision-making for commercial fishermen. The following section describes the new forms of knowledge created by quota-based management.

**Creation of new knowledge**

_I diversified because of the corporate interest in the fishery. The halibut lobby was working for rockfish by-catch. So I have slipped sideways and bought 5000lbs of halibut, three years ago. So now I hopefully have my bases covered. If rockfish goes to [the halibut fishery] I will get a percentage. I can supplement my rockfish income. If they shut it down I can keep my halibut. That’s how I’ve survived, I’ve slid through everything. You have to outguess everyone._

Randy, 52 years old.

In a quota fishery, fishers do not have to “race for fish” and thus some of the knowledge and skills that determined success in the derby fishery become less relevant (see Copes 1997, Palsson 1991). While the benefits of higher prices and a more relaxed pace of fishing are enjoyed by most fishers, some note with sentimental regret the loss of old skills and the thrill of competition that the pre-quota fishery involved. “We’re not fishermen anymore – we’re catchermen. You know exactly what you are going to catch before the season even begins. You just go out and get it.” Josh, 33 years old.
Palsson has described how the shift to quota-based management can impact the basic understanding of a fishery: local models of fishing success are transformed as the criteria for success are removed from the skipper’s sphere of influence (1990: 141). In Iceland, folk models of fishery success shifted from the “skipper effect” (the skills and knowledge of skippers determining relative success) to differences between boats and gear, in other words, from human skill to technological innovations (ibid: 143).

Vestergaard points out that quota “severs the relationships between knowledge, action and social identity”, by preventing fishermen from implementing their skills to cope with stock and price fluctuations (1996: 88). Thus, in addition to transforming the basic practice of fishing, quotas transform the social and cultural context of fishing, so that fishermen don’t feel like “fishermen” any more. Their knowledge and skills, developed in competition with each other, are somewhat devalued by the quota system.

However, the complexity of quota-based management and its snowball effect on other fisheries, do result in the development of new forms of knowledge that are crucial to the continued prosperity of a fishing operation.

Major regulatory shifts in fisheries management result in winners and losers in the fishing industry. Those able to anticipate these changes, especially those involved in industry-government consultation processes, can position themselves in ways that allow them to profit from such changes, or simply to weather them.

The increased participation rates in the halibut fishery from 1986 onward, suggest this kind of anticipation. Not every license holder participated in the halibut fishery every year during the derby fishery of the 1980s. In 1982 participation reached a low of 301 boats. However, during the years that were selected for quota allocation qualifying
years, participation rose steadily to 100%. License owners anticipated the shift to quota and fished accordingly. The last year before quota, the TAC was exceeded by 10% (Casey et al.). This reflects the phenomenon of "fear fishing". During the seasons immediately prior to license limitation or a shift to quota, fisheries can experience increased rates of participation and increased production. This is due to fishers trying achieve larger catch histories, and to make as much as they can from the fishery before participation and/or harvest levels are restricted. Thus, quota-based management and other fisheries management changes, result in a transformation of fishing practices even before these policies are in place. Fishers must anticipate such changes in order to increase their catch history and thereby their allocated share of the Total Allowable Catch.

Knowing what to catch and when to catch it is only part of the new knowledge that is developed under quota-based management. There is a new form of fishing knowledge developing that is related to license ownership and speculation. A fisher must know what to buy in order to maintain their position in the industry, and/or profit from the shifts in resource management. Some fishers have made more money in the last decade from increased license and quota values through leasing or selling than they have from harvesting fish. License speculation is a new basis for fishers’ economic success, and requires a different form of fisheries knowledge.

The shift to quota in one fishery may lead to quota-based management in related fisheries, and often in all fisheries in a region. The snow-ball effect of quota appears to be associated with both the ease of consistent management structures for regulatory bodies, and the ease of transferability of quota between fisheries that encounter the same
species. Quota-based management in the halibut fishery (and blackcod fishery) is driving the shift to quota in the long-line fisheries such as rockfish and lingcod, and moving toward an integrated fishery structure. The longline fisheries (halibut, blackcod, rockfish, lingcod) and groundfish trawl will become integrated, meaning that quota from each fishery will become transferable to the other fisheries to cover by-catch. This will alleviate the current need to discard non-target species. Currently, a vessel fishing rockfish under option A, B, or C of the ZN license must discard halibut, even if that vessel owns a halibut license. Under an integrated system, each vessel would access the species quota necessary to prosecute their fishery without discards. Ideally, rockfish fishers would access enough halibut quota to cover their halibut encounters, and halibut fishers would access enough rockfish quota to cover their by-catch.

Due to the rockfish crisis and the resulting decreased allowable catchess for many rockfish species, rockfish are anticipated to be the “bottleneck” in an integrated fishery. According to many fishers, there is not enough Yelloweye quota available for both targeted rockfish fisheries and the halibut and blackcod by-catch needs. This perceived bottleneck has encouraged speculation on ZN licenses in anticipation of integration. Fishers have bought these licenses both as economic investments, and as by-catch “insurance”.

**A case study of new fishing knowledge at work.**

The increasing importance of non-ecological knowledge to fishing enterprises is most easily understood by analyzing the land-based decision-making of a skipper. Hilborn has emphasized the importance of studying investments as an aspect of fisheries
research (1985: 5). This analysis of one fisher’s investment in licenses and quota gives us an understanding of the decision-making that shapes current fishing enterprises.

Josh, 33, had participated in the halibut fishery since buying his own boat in 1995. He had weathered the poor salmon seasons since 1998 by fishing a full ticket (approximately 100 000lbs) of leased halibut quota each year. He owned a halibut license with the minimum quota, and was trying to purchase more quota when he could. He was limited by the lack of availability of small (less than 1000lbs) packages of quota which he could finance.

In June 2001, Josh bought 30 000lbs of trawl quota. He did not have a trawl license, nor was he planning to buy one. He bought the quota as an investment, and as an insurance policy. The quota worked as an investment because the price of trawl quota appeared to be steadily increasing in value. He was also paid a yearly lease of approximately 7% of the value of the investment. Participating in the quota leasing system as lessor was somewhat distasteful to a young halibut fisher who felt the squeeze of fishing predominantly leased quota each year. “I hate this – now I’m part of the problem”, he complained.

However, the quota was also an insurance policy. Josh knew as early as 2001 that integrated groundfish fishery was being negotiated, albeit slowly at that point. He wanted to establish ownership of some trawl quota, anticipating that trawl quota would become part of the integrated fishery. Having a foothold in that pool of quota would allow him to trade for the species he required with the other species for which he held quota.23

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23 Trawl quota is sold in blocks which include small amounts of numerous species.
In February 2003, Josh decided to purchase another halibut insurance policy: a ZN license. During the year since the announcement of the rockfish crisis, he had debated this purchase constantly. Rockfish licenses had fluctuated in value as the industry tried to decide if they were worthless (due to the threatened dissolution of target fisheries) or invaluable (as necessary by-catch allowance for halibut and blackcod fisheries). In February 2003, this was still unclear. The 61 ft license that was available, the only one large enough for his boat,\(^{24}\) was $140,000. Josh anticipated that he would have 1-2 seasons of Option C fishing where the license would actually make income\(^{25}\). Then the license might become worthless, or might be the key factor in his continued participation in the halibut fishery, depending on how the integrated fishery became structured. The license was an expensive gamble regarding the future of the fishery.

By early 2004, it became clear that this gamble might in fact pay off. The by-catch allowance attached to halibut licenses was steadily shrinking, making the fishery close to impossible without extra by-catch through an option D. In fact, Josh never fished the license as Option C because of the reductions; he had to fish it as Option D in order to have access to adequate rockfish to cover his halibut by-catch. The discussions regarding integrated longline suggested that both the trawl quota and the rockfish license would reduce Josh’s vulnerability in the new fishery. Without owning any considerable amount of halibut or blackcod quota, Josh would have very little trading power in the new fishery. He would be a quota price taker and not a price setter, remaining in the same position as he is in the current halibut fishery. The little available rockfish quota

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\(^{24}\) ZN licenses used for Option D have no length restriction – smaller licenses can be put on larger boats. However, for options A, B, and C, the license must be long enough for the boat.

\(^{25}\) The sale value of Option D fish is minimal because the quotas are small; its value lies in its facilitation of the halibut fishery.
will be expensive and may result in the further consolidation of the halibut fishery and fleet reduction. The ownership of two different forms of rockfish quota will hopefully protect him from being extremely vulnerable in the new fishery.

Quota-based management and the shifts that it has engendered, have created a new kind of knowledge in the fishing industry that is equally important to business success as the practical knowledge of how to catch fish. Fishers must know what to fish and when, in order to position themselves within new limited-entry and quota-based fisheries. They must also know what to buy, which quota and which licenses, in order to maintain or improve their positions within the changing sphere of integrated and by-catch limited fisheries. They must be able to anticipate the shifts in management, and their meaning for the practice of fishing. Catching the fish is the least of their worries, especially in a quota fishery with a long season. They must buy licenses that facilitate their harvest of both target and by-catch species in changing management structures, and they must buy them before the license value increases beyond accessibility.

Thus, fishers' success is no longer based on their ability to catch fish, their fishing knowledge, but also on their ability to navigate the management structure and license market, their fisheries knowledge. The successful fisher of the 21st century is a savvy businessman, entrepreneur, and speculator, rather than a traditional "highliner". Delbos and Premel have characterized this as a redefinition of the role of the fishermen to an "economic actor" (1996: 236). The ability to act on this economic knowledge, however, is limited by position. The fisher must have sufficient capital and/or credit to make the purchases he deems necessary for future success or stability in the industry. The necessary capital tends to be concentrated in the hands of those who have profited by
initial license and/or quota allocation, thus perpetuating and exacerbating a hierarchical structure of ownership in the industry. The debt-load of many young fishers who are trying to establish their position in the industry is now primarily associated with licenses rather than vessels, assets that can be made worthless by regulatory changes or conservation crises.

This transformation of fishers' knowledge, and the shift towards increasing capitalization can be related to transformations in fishers' perceptions of risks. Smith has noted that:

For most commercial fishermen today, it is not storm, demons of the deep, and/or cosmological views grounded in a primitive folk science that pose the most critical "clear and present dangers". Rather, it is the dynamics generated from the economic, political and technological contexts within which commercial fishing operates today. This has resulted in a new prioritizing of the hierarchy of risks (Smith 1988: 30).

Similarly, Lofgren has suggested that the capitalization of fisheries has resulted in the ecological and technological insecurity associated with earlier eras being superseded by financial insecurity (1982: 169). Fishers today fear bankruptcy and displacement from the industry more than the risks posed by natural forces.

In this climate, the crucial knowledge and key activities for success shift away from understanding fish behaviour and participating in fisheries, to understanding management structures, and participating in consultation and negotiation. Acheson and Knight noted the important role of "political entrepreneurs" in the development of lobster conservation laws in Maine (2000: 232). Fishers taking an active role in the regulatory transformation of their fisheries tend to be the more powerful industry players. Smith suggests that the most economically vulnerable fishers are the least likely to attend consultation meetings, due to the opportunity costs of participation (1988:36). In the
halibut fishery, this issue was also identified by the PHMA (see above), whose members noted the power of multiple license holders in the co-management structure.

In current co-management discussions for the integrated longline fishery, one of the key issues is the devaluation of licenses through the transferability of quota between different fisheries. Blackcod licenses (48 K tabs) and halibut licences (435 L tabs) have been worth considerable sums since license limitation, but some other longline fisheries have not been subject to limited entry and therefore do not have a separate license (such as lingcod and dogfish landed under privileges of A and C licenses by 3500 fishers). The increased value of K and L tabs due to license limitation stands to be negated by integration, but the license owners, some of whom paid large sums for their licenses, are negotiating a structure that will maintain license value. Thus, the management of the new fishery will potentially be structured by issues of license value rather than conservation and management efficiency.

This potentiality reflects an apex of the impacts of license speculation. The increasing value associated with fishing licenses due to license limitation, and later quota-based management, has created a system where fishing practice, fisheries investment, and fisheries management is driven by the attachment of value to licenses. Fishers intensify participation to improve their landings in anticipation of limitation and quota allocations. They invest in licenses to insure their harvests against restrictions and to speculate on increasing license and quota prices. And they negotiate for fisheries management structures that maintain the high prices of their licenses.
Conclusion

The rockfish meeting at the Crest provided me with a view of knowledge relations in practice. The relations between Science and Local Knowledge were entwined with and complicated by the opposition of conservation and resource use. These relationships became articulated through the debate over whether rockfish are "sedentary". The conflict between the biologist and the fishermen regarding rockfish movement illuminates the ways in which "science" and "local knowledge" become constructed as opposing knowledges through the interaction of opposing interests. Fishermen’s patterned reaction to the scientific data was structured by political positions. Because of the ultimate power of stock assessment science in fisheries management and policy, the fishermen reacted to the biologist and his suggestions in a particular way.

There are several reasons why the fishers focused upon the issue of rockfish movement. The first is a direct refutation of a label that doesn’t make sense according to their fishing experience. The first Powerpoint slide of the presentation characterized rockfish as sedentary, and before the details of reduced TACs and aggrandized protection areas were even introduced, the fishermen were angry and defensive. The emphasis on mobility was both a defense of their knowledge of fish behaviour, and an effort to de-legitimize the entire Rockfish Crisis. If the DFO biologists did not understand that these fish were mobile, how could they produce valid stock assessments and appropriate allowable catches?

The mobility of rockfish was also an important factor in the conservation initiatives proposed by the DFO. Rockfish Protection Areas, where fishing activities that impact rockfish are prohibited, had been created in identified spawning and nursery grounds to improve recruitment. This system of protected areas would be expanded in
the year following the announcement of the Crisis. Protection areas are only an effective conservation tool if the fish in question are in fact sedentary, and thus the argument for mobility reduced the value of these no-harvest zones. Finally, the assumption of sedentary patterns would influence DFO stock assessment protocols, so if rockfish were in fact migratory, the data suggesting decreasing populations could be questioned.

The biologist’s suggestion that his college education was a barrier to communication and cooperation was misplaced. The knowledge conflict that took place was a product of power relations rather differing levels of education. Fishers believed rockfish move because of their fishing experience, but they also had to believe rockfish move, in order to refute DFO knowledge claims.

The political relationships between fishers’ knowledge were revealed by the broader implications and historical background to the rockfish crisis. After the debate on rockfish behaviour petered out, the focus shifted toward resource allocation conflicts. Commercial fishermen focused on the “lack of accountability” of the recreational fishery in terms of accurate data on their landings and incidental mortalities. There were the first hints of tension between the halibut and ZN fisheries. This was the “eye-gouging” part of the meeting. The meeting thus illuminated competitive relationships in the form of both knowledge conflicts and resource conflicts.

What was missing from that meeting was a discussion of the broader reasons for, and implications of, the Rockfish Crisis. These conversations came later, in both private and public forums. During that two hour meeting, rockfish and halibut fishermen started to grasp the drastic changes that were about to transform the longline fisheries in British Columbia. Their rockfish licenses were suddenly either worthless, or incredibly valuable.
and they waited to see which was the case. The snowball effect of quota in the halibut fishery was crashing into the rockfish fishery. The conflicts that happened that night at the Crest were the result of changes begun a decade before in another fishery. Like all major management shifts, fishers realized that this one would make some fishers wealthy, and would end the careers of others. When they stood shouting about the way that rockfish follow feed from place to place, they were shadowboxing with the threat of displacement.

A broader analysis of the Rockfish Crisis reveals links to the process of privatization in the longline fisheries, and its ecological and social impacts. Fishers understand the Rockfish Crisis as linked to halibut quota in several ways. First of all, the leasing structure of quota is associated with increased landings of rockfish. Lessee fishers attempting to maximize their profit on leased quota subsidized their halibut fishery with “free” (non-leased) by-catch landings. Secondly, the push for an integrated longline fishery, which will reduce or eliminate rockfish discards, will benefit halibut and blackcod quota owners, and those who have used their quota-created capital to speculate on ZN licenses. Rockfish fishers understand themselves as being cannibalized by larger fishing enterprises, by the “Golden Boys” or “Quota Kings”. Their independent fishery is becoming a source of by-catch allowance for larger, more lucrative fisheries.

The shift to quota-based management has thus engendered many impacts. The practice of fishing has changed, and thus the practical knowledge associated with catching halibut has been transformed. The quota structure has created a generation gap in fishers’ political knowledge, between older and young fishers, between haves and have-nots. Depending on a fishers’ quota holdings, they understand the quota issues very
differently. Most young fishers, or those who were not allocated halibut quota, are very critical of quota-based management, the leasing system in particular, and oppose the introduction of individual quotas in other fisheries. Those who have benefited from quota allocations and the leasing system adamantly defend this structure and encourage privatization in other fisheries. Thus we see another example of the way that fisheries knowledge is positioned, in this case, essentially by age and participation. The quota system has resulted in the development of a class structure within the industry. Initial allocations and the leasing structure have created a wealthy, highly-capitalized class of fishing property owners and lessors, and a highly indebted "sharecropping" class of lessees, and has bifurcated halibut license owners into active and non-active categories of almost equal membership.

Finally, this structure has created a new form of knowledge that determines the success of a fishing enterprise. The crucial type of knowledge is shifted from an ecological focus to an economic and political one. The elements contributing to fishing success are shifting steadily from practical skills and experience to savvy investment and speculation. This fisheries knowledge relates to anticipating regulatory shifts in order to achieve targeted landings, and to make informed license and quota purchases. Successful license speculation and ownership of key holdings can be more critical to prosperity than the practical fishing knowledge associated with efficient harvesting. Privatization has encouraged a differentiation between fishing knowledge and fisheries knowledge. The context of knowledge development is thus moved from the deck to the dock, or even to the boardroom where fisheries management consultations occur.
Of those fishers present at the rockfish meeting at the Crest, some of them would weather the Rockfish Crisis and its broader impacts by applying this new form of fisheries knowledge. A rockfish fisherman invested in the halibut fishery. A halibut fisherman invested in a ZN license. Both of these fishers anticipated the incipient integration of these two fisheries, and positioned themselves accordingly. This reflects a combination of their fisheries knowledge and their economic position. Their access to capital (owned and borrowed) allowed them to make these investments. Some small-scale ZN fishers can see the writing on the wall but cannot afford to participate in the changes. They wait to be eaten up by a “bigger fish”.

This chapter has pointed to the political relationships between knowledges, and the political content of fishermen’s knowledge. It has also emphasized the practical meaning of this political knowledge for both fishing success, and resource management. The transformation of fishing practice and politics by the shift to quota-based management transformed both fishing knowledge and fisheries knowledge. Fisheries regulations are thus critical forces of change for both ecological and political knowledge. How a fishery is regulated and managed has significant implications for what fishermen know, how they know, and how they put this knowledge to work.
Chapter 5: Broken Rulers and Pieces of String: Academic Models and Fishers’ Realities

I’m going to make a model of UBC out of broken rulers and pieces of string and see how they like it.

Luke, gillnetter

Community members showed a healthy balance between skepticism and interest at having their knowledge and input taken seriously by scientists.

Prof. Tony Pitcher in FishBytes, UBC Fisheries Centre Newsletter July/August 2002

The preceding chapters have identified the ways in which fishers’ knowledge is shaped by regulations and fisheries management structures, in both practical and political ways. Fishermen’s ecological knowledge is shaped by the restrictions placed on their fishing activities by government regulation. Their political knowledge is constructed by the context of competition and the broader implications of government policy. Both of these forms of knowledge are diverse and contingent, reflecting the relative positions of fishers in the industry. I have indicated the significance of knowledge diversity and politics to fishing practice, investment, and negotiation. I have also indicated some of the sites of tension between the priorities of government and those of commercial fishers, and the persisting political and conceptual barriers to government representatives’ productive engagement with fishers’ knowledge. The political aspects of fishers’ knowledge can also confound academic research. This chapter analyses how the politics of local knowledge can complicate, and indeed disrupt an academic project.

In the following pages I explore the reactions of Prince Rupert fishermen to a research project that included TEK interviews with commercial fishers and a community workshop presenting the resulting ecosystem simulations. The UBC Fisheries Centre
"Back to the Future" project illustrates some of the methodological complications posed by the regulatory impacts on fisheries knowledge. The project also indicates the potential political complications posed by researching fishers’ knowledge in a highly competitive and volatile context. This particular project failed to contend with the political issues confronting commercial fishers, resulting in disgruntled participants, and more seriously, de-contextualized data regarding community conservation goals.

**Back to the Future**

In December 2001 I attended a three-day workshop in Prince Rupert hosted by the UBC Fisheries Centre “Back to the Future” project team. The workshop provided a forum for the researchers to present the computer models they had derived from ecological data on the north coast region. Their research included TEK data derived from interviews with Prince Rupert fishers, conducted in July of that year. The BttF project was a component of *Coasts Under Stress*, “a large national project designed to assess the impact of changes in society and resource harvest patterns on individual, community and environmental health” (workshop brochure).

On the brochure for the Prince Rupert workshop, the BttF project was described thus:

> Back to the Future marine ecosystem restoration projects bring resource users, researchers, First Nations, government, and other interests together to create computer simulation models of present and past ecosystem states. Comparison of the ecological, social, and economic value of past states enable collaborators to set restoration goals and work to achieve them.

The “Hecate Strait” model presented at the Prince Rupert workshop was one of several applications of the BttF concept and methodology. *Back to the Future* is explained as an academic project, a resource management philosophy, and a form of
restorative justice: a set of modeling tools that will unite conflicting interests to re-create past marine abundance (Haggan 2000: 85). Haggan describes the elements of the BttF philosophy as:

a neutral forum where different sectors feel sufficiently comfortable to meet and share knowledge in the interests of conservation and rebuilding; participants with a common interest in a particular marine ecosystem; a commitment to respect other traditions and systems of knowledge besides one's own; cross-validation and integration of different traditions and systems of knowledge; new ecosystem modeling tools that can reconstruct past systems using the inputs; and the use with Aboriginal communities of ceremonies of respect and reciprocity. (2000: 93).

Pitcher suggests that BttF has a "ceremonial aspect" where participants come to terms with marine ecosystem depletion because the model enables them to grasp the interplay of ecological, economic, social and cultural forces in their working ecosystem (1998: 2). The model program makes explicit the losses that must be incurred to restore abundance and biodiversity, and characterizes the value of different fishery products (ibid.: v).

The Back to the Future project involved the combination of several data sources to general models of the north coast ecosystem. The data sources for the models included Traditional Ecological Knowledge of fishing communities, historical and archaeological data, and DFO catch statistics and stock assessments. The project also combined several computer modeling programs to construct ecosystem models, and to simulate the ecological impact of different management options. The ECOPATH computer program simplifies an ecosystem by combining species in up to fifty groups, consisting of fish that eat and are eaten by the same things. It works like an accounting system to model food webs, by using the average weight of each group, amount the group grows each year, what it eats, amount it eats each year, and the amount of the group caught each year.
(Pitcher 1998). ECOSIM allows for the exploration of the impacts on those ecological
groups of different interventions over time (harvest rate, harvest technology etc.). The
computer models were intended to allow for the reconstruction of the biodiversity and
abundance of ecosystems in the past, and to simulate the effects of policy options on
those levels of abundance (see BttF website27).

The Prince Rupert workshop would present to the community the models of past
and present aquatic ecosystems, and evaluations of their current economic and social
value. Participants would then be able to use the models and simulations to choose
between various policy options according to their impacts on the ecosystem as a whole,
and particular species.

The Back to the Future methodology was progressive in many respects. The
project emphasized collaborative data-gathering and co-operative decision-making,
involving various stakeholders and resource users. Commercial fishers were involved
both at the data generation stage, thus validating their ecological knowledge, and at the
modeling stage, thereby recognizing their stake in determining conservation goals.
Ecosystem modeling improves upon the single-species focus of much contemporary
fisheries management, and allows for the anticipation of policy impacts upon a wide
range of ecological and social interests. However, the researchers on the Back to the
Future Hecate Strait team encountered several problems at the Prince Rupert workshop,
which reflect the political complexities of contemporary fisheries. The conflicts revealed
at the workshop underscore the academic difficulties involved in dealing with fishers’

26 While the Back to the Future project as a whole involved the use of other modeling programs, the two
aforementioned programs are the ones relevant to the Prince Rupert workshop.
27 www.fisheries.ubc.ca/projects/btf/
ecological and political knowledge. Models are not neutral and simulations are not innocently hypothetical for fishers facing ecological and political uncertainty.

**Workshop Day 1: Conceptual Issues**

The conference room of the Highliner Hotel was wallpapered with colourful charts and graphs, depicting the models generated by the Back to the Future Project. The few participants wandered around the room, familiarizing themselves with the preliminary research results. Commercial fishers who had participated in the TEK interviews in July, and representatives from other stakeholder groups were invited to the workshop to view the models and participate in discussions regarding conservation goals. On the first morning there were five commercial fishermen at the workshop, including the one that I had recruited, and one that had met the research team the evening before at the hotel and had been invited. Three of the previous interview participants had attended, all three of them were over sixty years old and one was retired. Also in attendance was the Tsimshian Tribal Council president, a member of the Prince Rupert city council, two representatives from the Allied Tsimshian Tribes of Lax Kw’Alaams, the chair of the Northern Maritime Institute (a local research organization), a representative for the fisheries of the Haida Nation, two representatives from the World Wildlife Fund (who co-sponsored the workshop), and eight UBC researchers.

The models for northern British Columbia, (subsumed under the label of the Hecate Strait) included four time periods: 1750 (pre-contact), 1900 (pre-steamtrawling), 1950 (described as the “heyday” of the BC salmon fishery) and 2000 (present-day). Two fisheries simulations (using ECOSIM) were developed for each time period, and presented at the workshop. These simulations modeled the effort of two different fishing
fleets on the ecosystems for each era. One simulation was labeled “Today’s Fleet”, which modeled the pressure exerted by the current fleet, and the other simulation was labeled “Team’s Choice” and reflected a fleet without trawl nets or gillnets.

Graphs detailed changing biomass over time in the region. The research team had also estimated the economic value of various fisheries on the north coast, to facilitate participants’ choices regarding conservation and restoration.

The agenda for the first day of the workshop was a series of presentations about the project in general, the different time periods used for simulation, and the results of the TEK interviews and how they were used. There were several indications of differing perspectives between the researchers and the commercial fishers who were present.

As one young fisherman toured the graphs, his first comment was that the species on the charts weren’t all found in the “Hecate Strait.” It was explained by a researcher that the entire northern BC marine ecosystem was included under the title “Hecate Strait”. Josh replied, somewhat confused: “So when you say Hecate Strait, but you mean the entire north coast? You just liked the name?”

The inaccurate use of place names made no sense to a commercial fisherman who understood the Hecate Strait to be a significantly different ecosystem to other areas included in the label. His next comment was regarding the basic premise of restoring former level of abundance. “The old fishermen, and all of us, we all talk about the old days, but they weren’t that good”.

This comment suggests a difference in temporal conceptions between the research team and a commercial fisherman. Josh’s “good old days” are only a couple of decades in the past, when salmon prices were rising and incomes were high. He thinks of the
stories he has heard from his grandfather, and the older skippers with whom he has worked.

The past is that of the industry, not of the ecosystem. His timeline is industrial – it is human, and social. The idea of attempting to restore abundance to 1750 levels didn’t make sense to him in light of his dependence on fish harvesting.

Professor Tony Pitcher’s introduction to the project characterized the idea of modeling past ecosystem abundance to serve as a conservation goal as similar to coming upon a “lost valley”. He posed the question: if we were faced with an undisturbed ecosystem of abundant resources (rather than contending with current issues of depletion), how would we choose to exploit those resources? In other words, if stakeholders were unrestricted by the issues of current environmental depletion, how would they plan in a perfect world?

Gary was a middle-aged crab and halibut fisher, and an active participant in the co-management organizations of both fisheries. He disagreed with the assumption of general environmental degradation and declining abundance.

>You’re wrong about total ecosystem decline. Halibut has increased in recent years. Crab has increased ... And this group is not representative of stakeholders – where is the industry? We need everyone here in order to come up with a direction...

Frank, a retired halibut fisherman with decades of experience in the fishery agreed with Gary’s contention regarding abundance: “Halibut abundance increased when the Japanese trawl fleet got out of Alaska. The noise they made impacted abundance. Noise drives them away.”
The commercial fishermen were focused on relatively recent patterns of abundance, and the ups and downs of the particular species that they fished. Longer term changes in overall biomass were less meaningful to them in terms of fisheries planning. Pitcher conceded that halibut stocks had increased in recent years, but emphasized that they had been stronger prior to 1950.

I interviewed Gary during the summer after the BttF workshop. The bulk of the interview was focused on his work history and the innovative co-management structure of the Hecate Strait crab fleet. At the end of the interview, I told him that I remembered his participation during the first day of the BttF workshop and asked him whether he had been interviewed for that project also. He had in fact simply met some of the research team in the hotel restaurant the night before the workshop. He had been very excited about their work, and their interest in fishers' knowledge. He became disillusioned during the first day of the workshop and did not return.

*I quickly realized at the meeting, I didn't see any science there. There was no vision like mine where science is a neutral player for the resource... The single point of that whole meeting was the presumption that all species were in a depleted condition and we had to do something. They didn't want to hear that there was more halibut and crab than when I started fishing. It was based on a policy issue from the federal government. Here we are a year later and the trollers are hammering the spring salmon. There's loads of them.*

Gary was critical of the extreme restoration goals suggested by the project and articulated a more pragmatic understanding of conservation:
We can't go back to the future. The world is heating up, there are regime shifts. El Ninos are driving regime shifts. There are more El Ninos per decade now. So how could we talk about what happened fifty years ago? We have to measure environmental factors, not just single species.

The first day of the workshop revealed some differences between conceptualizations of the research area, ideas of abundance, and the temporality of conservation goals. These relatively innocuous and simple differences suggest that the fishers approached some of the basic ideas of the project rather differently than the research team.

**TEK Interviews: Methodological Issues**

My primary interest in the Back to the Future project was the way in which the research approached and documented fishers' ecological knowledge. Traditional Ecological Knowledge interviews were one source of data for the ecosystem models. Community members' identification of relative abundance of various aquatic species was compared to and combined with DFO stock assessments, archaeological data and other information sources. I was interested in the contextualization of fishers' ecological knowledge, specifically, the way in which the research dealt with regulatory change. By the end of the first year of my fieldwork, I was beginning to understand the significant impact that fisheries regulation had on fishers' ecological experiences and therefore their knowledge. The difference between fishing different species under various management structures was becoming clear in my own interviews with commercial fishermen. In their discussions of fishing practice, fishermen emphasized the impacts of regulatory shifts such as quota-based management or area-licensing, and structural changes like the
removal of Canadian halibut vessels from Alaskan waters. Participating fishers were able to identify the significance of these types of events for TEK data at the workshop, and offered critiques of the data.

The following information is drawn from the TEK interview schedule I received at the workshop, and review of the Back to the Future website and various project publications.

The BttF TEK interviews were conducted in July 2001 with forty-eight residents of Prince Rupert and the Queen Charlotte islands, including long-time and retired commercial fishers, First Nations elders, and other community members with knowledge of the marine ecosystem. Respondents were asked to indicate any perceived changes in abundance for 129 species of sea creatures, fish, birds, and mammals in the waters of Northern BC. Fishers were shown a picture of a particular species and asked if that fish had increased or decreased in abundance during the fishers’ career. This data was contextualized by background information on the fishers’ experience. Information about fish targeted by that fisher was weighted more than information about species the respondent did not harvest directly.

The Fishing Experience questions were to be answered in an approximately half-page area. The interviews appear to be designed primarily for commercial fishers, however, the fishing experience categories included:

- Commercial fishery
- Recreational fishery
- First Nation (type?)
- Boat owner past or present?
- DFO
- Processors
- Conservationists
- Other
The questions contextualizing fishers’ experience were:

- Year when started fishing
- Age range (<30) (30-50) (50+)
- Last season fished
- Number of years fished (0-5) (5-10) (10-20) (20-30) (30-40) (40+)
- Number of generations family has been in fishery
- Always in this community/region?
- Sectors fished?

Each of these questions was allotted a single line-space in the page for the answer.

Two charts dealt individually with offshore fisheries, defined as more than 1km offshore, and inshore, in coastal inlets. Each chart listed the different gear types for offshore and inshore fisheries in the left-hand column, and for each gear fishery, asked for the number of crew years and skipper years of experience, and the primary species targeted in that fishery. The final question was “Who taught you how to fish?”

The TEK questions focused on the list of 129 species including categories of mammals, birds, salmonids, forage fish, flatfish, rockfish, bottom fish, pelagic fish, sharks, skates and rays, squids, crabs, shrimp, bivalves, and other invertebrates. For each species, the respondent was asked:

- Observed locally? Where? (map) When? (season or month)
- Which have disappeared during your career? Locally? Regionally?
- Abundance increased? (<1x, 1-3x, 3-10x, >10x)
- Abundance decreased? (>50%, 10-50%, <10%)
- Other common names?
- What gear types are used?
- Where did you learn this information? (e.g. traditional/family knowledge, self-taught)

The TEK questions provide both general and quantifiable data regarding changes in species abundance during the career of each respondent. However, these questions do not sufficiently interrogate fishers’ differential knowledge of various species. There are no questions regarding the frequency of encounters of different species. Some fishers
will encounter albatross, for example, far more often than other fishers, depending on the areas they fish. So while the model weighted the data given for a fishers' primary species more heavily than data for other species, a similar weighting could not be factored for non-target species. While different fishers may have extremely different encounter rates with non-target species, this diverse knowledge could not be effectively evaluated.

Explicit links between area fished, years of experience, and specific species are not developed in the methodology. To increase the accuracy of attempts at preferentially weighting data, fishers could have been asked to evaluate the certainty of their information about each species. Fishers could have been asked to indicate whether they were highly certain or uncertain regarding the abundance trends of a given species.

Not only were there limits on the accuracy of the TEK data due to the lack of detail in those questions, the fishing experience questions did not adequately contextualize the TEK data. There are several ways in which the structure of the Fishing Experience questions limited the scope and detail of the data which later informed the models. The separation of offshore and inshore fisheries does not accurately reflect the way in which fishers usually conceptualize their fisheries. Trollers can move between offshore and inshore areas, as defined by the project, within one season, often within one fishing opening. Thus, differentiating between their years of inshore and offshore fishing appears difficult. Similarly, some halibut fishers may fish both inshore and offshore areas, depending on tide, weather, and season. While these categories work for some fisheries, they are not regulatory categories, nor wholly natural categories of fishing practice. Indicating the license area would provide a more detailed explanation of recent fishing practice. Key areas of expertise should be identified by management area and
sub-area, reflecting logbook records. North coast trollers identify their daily fishing areas in their logs (for example “Management Sub-Area 101-2”), indicating a relatively small area of the coast with definite boundaries, rather than a broad “offshore” or “inshore” designation.

Fisheries questions need to reflect the practice of fishing, and therefore need to be derived from the regulatory structures that shape that practice. The categories of “Trawl” “Trap” “Longline” etc. that were used to define fisher experience for inshore and offshore waters are imprecise. The blackcod fishery, for example, can be prosecuted by trap or longline. Listing the particular license (T, K, R, L) would provide accurate data regarding target species as well as gear type. For some fisheries, even more detail is necessary; for the ZN (rockfish) fisheries, the “option” is a critical point of information as the different options A-D target different species of rockfish and therefore often mean fishing different sub-areas.

Gary, the crab and halibut fisherman present at the first day of the workshop, identified this as a key problem with the data collection.

_I fished Cape St. James for halibut. I knew from Charlotte City to the Cape without charts. Then I fished crabs in the north part, a separate region. I wouldn’t be the guy to talk about species abundance going up and down. I fished two different areas._

Gary indicated that his particular fishing history had significant implications for what he could determine about species abundance in different areas. He was concerned that the methodology did not deal with the details of individual experience.
The next summer, I interviewed Leslie and Jim who troll salmon and long-line live rockfish. They have been very active in promoting collaborative research and co-management. Leslie was interviewed in July 2001 by the BttF research team but chose not to attend the December workshop. She expressed similar concerns about the simplification of fishers’ experience and knowledge in the TEK interview.

*I can’t answer those questions because I haven’t been able to fish the same way, or in the same places. The questions were meaningless... They didn’t take notes, the tape ran out but they didn’t check when to go back. They hurried over the rockfish information and that is the species I could really answer. They didn’t want to hear about the tagging study we did.*

Thus, the charts created to contextualize fishing experience poorly reflected the reality of fishing practice, and provided relatively little detail regarding fishers’ knowledge of species and areas. The categories were not meaningful designations because they did not reflect the way in which fisheries are managed and regulated. Fisheries regulations shape both the way in which fishers fish and the way they conceptualize their fisheries. If a fisherman wanted to understand what another fisherman knew, their questions would involved details of licenses fished, areas, boat length, size of crew, specific gear, and during which particular season.

Indeed, the “when” of the fisheries experience questions was a major focus for fishers. Fishers’ TEK data was dated by the range of their experience (first year fished, last year fished) and the total number of years fished. Thus, the interview questions identified if a fisher had fished continuously or not, but did not date any hiatus. The charts documenting offshore and inshore experience by gear type asked for the dates of
crew experience and skipper experience. Yet the temporal data was not correlated with management changes.

A young halibut fisherman who attended the workshop was concerned about the differentiation of knowledge between fishermen.

*If you ask an old halibut fisherman about rockfish, he probably fished the Hecate Strait where the encounters were low, and he probably threw them all over the side because they were worthless and he needed the room in his hold for halibut. I fish mostly on the west side [of the Queen Charlotte Islands] where I catch lots of rockfish, and I keep most of them. I know each species and what they are worth a pound. The old guys, called them all cod, or shack bait*.

What Josh was suggesting was that the interview model did not account for the differences between fishers' experience and thus the differences in their knowledge. He emphasized the generational, geographic, and regulatory influences upon their knowledge. The difference between fishing in Hecate Strait (proper) and the west coast of the QCI will have meaning impacts on rockfish knowledge. The shift to quota in the herring, halibut, and trawl fisheries completely transformed fishing practice and definitions of by-catch. Josh identified the key difference between long-liners as the experience of fishing halibut before and after the commencement of quota. On an even more detailed level, fishing owned versus leased halibut quota may have influenced rockfish retention (see Chapter 4), and consequently perceptions of rockfish abundance.

The questions recognize the crucial difference between crew and skipper experiences and knowledge, as well as the influence of gear type, age, and length of

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28 Shack bait refers to non-target species caught during longlining which are cut up and used for halibut bait.
experience. However, the questions do not capture the complications of regulatory changes, area-specificity (beyond offshore/inshore distinctions), boat size, debt-load, and the significance of licenses owned. Currently, fishing halibut in combination with a ZN Option D\(^29\) license is different in practice from fishing halibut quota without the extra by-catch allowance provided by a ZN. One may fish different areas, at different times, to avoid Yelloweye rockfish if one does not have the by-catch quota available to ‘cover’ that species.

These finely-detailed differences in fishing practice have significant implications for fishers’ knowledge of different species. Yet the Fishing Experience Questions do not differentiate fishers’ knowledge in the ways that fishing practice differentiates their knowledge. Thus both the TEK and Fishing Experience questions fail to engage fully with the scope and variety of fishers’ knowledge. The contextual information is superficial at best, and the TEK data is inadequately related to context.

Furthermore, I could find no detailed description of the sample of community members interviewed for the TEK portion of the project. There is no indication that the researchers attempted to include informants with a broad range of fishing experience, nor is there any kind of delineation of participants’ fishing experience. To capture the diversity of fishing experience and knowledge in the north coast fleet, it would be necessary to stratify the sample by age, ethnicity, species fished, gear type, and license area, and preferably by further details such as boat length. The two preceding chapters of this dissertation document the way in which gear type, ethnicity, and age can impact

\(^{29}\) The D option for the ZN rockfish license allows the ZN and L (halibut licenses) to be fished together. The ZN license is allocated various rockfish quotas that provide extra by-catch. This allows halibut long-liners to avoid discards, and to comply with rockfish limits that often act as a bottleneck in the halibut fishery.
fishermen's ecological and political knowledge. The particular experience of fishing different licenses under different regulatory regimes is critical for achieving accuracy in encounter rates etc.

The key problem with the interview structure is the lack of significance attributed to regulatory structures and changes. Fishing practice in contemporary fisheries is dictated primarily by regulations, and the historical changes in regulation were not factored into the interview schedule. The interview structure appears to assume that TEK is developed out of a direct and stable relationship between fisher and ecosystem. In reality, this relationship is mediated and transformed by fisheries regulations.

This problem confounded the use of the TEK data. The herring abundance data was inconsistent: some of the fishers indicated herring abundance was declining, and others indicated that it was increasing (Charles Menzies, personal communication). This was due to the fact that some of the fishers had participated in the herring reduction fishery in the 1960s which had significantly reduced the stock and resulted in a closure of the fishery. Fishers who had participated in the herring roe fishery since the 1970s have witnessed the improving health of the species. The question of herring abundance was, for fishers, contingent and relative, and determined by their experience fishing under two different management structures. According to Josh, the question of rockfish abundance would be similarly contingent. These data issues emphasize the need for detailed engagement with the history of fisheries regulations in the documentation of TEK.

Thus, the TEK component of the Back to the Future project reveals the methodological complications of accurately documenting commercial fishermen's

30 Herring were harvested in great amounts for reduction into fishmeal.
31 Herring are harvested for their roe which is exported to Japan.
knowledge. Fisheries knowledge is differentiated by fisheries regulations. Restrictions on areas and gear, and overall fishery structure (such as product focus for herring, or quota-based management for halibut) create significant differences in how fishermen encounter both target and non-target species. Accurate weighting of data is dependent on correlating TEK data to regulatory timelines and maps.

The Workshop Day 2: Political Issues

On the second day of the workshop, the number of industry participants had tripled. I had personally encouraged the attendance of three other fishermen, hoping to increase the industry input into the process, but as I looked around I realized that the room was full of gillnetters and draggers. I commented on this to a participant who responded that they were all former Prince Rupert Fishermen's Co-Op fishermen. I asked a couple of them how they had heard about the workshop and it came to light that one of the fishermen participating in Day 1 had made phone calls to a few gillnetters and draggers, who called more of their peers. This older gillnetter had sat quietly during the first day of the workshop without commenting upon the proceedings. That evening, he had gone home and begun a series of phone calls, warning the gillnetters and draggers he knew through his Co-Op ties that UBC was trying to shut down the gillnet and trawl fisheries.

Halfway through the first presentation, Hank, an active gillnetter and representative of the local chapter of Native Brotherhood of BC, stormed into the room. He started yelling at the door, and was still yelling when he sat down at the front of the room. This usually quiet, soft-spoken man had one fist raised in the air as he made his way between the tables of smiling fishermen.
"I hear you are trying to shut down the gillnet and trawl fisheries. I don’t know who you are but you can’t do that! I’m here to stop you. I’m on the warpath to save the gillnetters!" When he spoke this last line, he half-smiled himself, but his anger and fear were sincere.

Very early during that second day of the workshop, with increased attendance due to the dragger/gillnetter phone tree, and after the angry entrance of Hank, the political impacts of the “Team’s Choice” fleet model became apparent. As described above, two fisheries simulations had been modeled for each time period: “Today’s Fleet” and “Team’s Choice”, a fleet that excluded gillnets and trawlnets. The research team was quick to emphasize that the Team’s Choice Fisheries were simply an alternative simulation, and that the model did not reflect a research team bias against gillnetting and dragging, nor was the objective of the project to close down these fisheries. However, the research team provided a list of the criteria that they used to make their fleet choices. These criteria assume very specific conservation goals and do not include any socio-cultural considerations, other than those dealing with First Nations access.

1. Minimal by-catch discards
2. No damage to habitat
3. Include Aboriginal Fisheries
4. Include traditional target species
5. No charismatic species
6. Use ecosystem sensitivity index
7. Exclude fisheries on juveniles
8. Participatory vetting of fisheries
The compilation of the Team’s Choice Fisheries was not an arbitrary choice to provide an alternative fishing effort for simulation purposes. It reflects particular ecological and conservation priorities. While the goal of the project may not have been to shut these fisheries down, the research team had found the gillnet and trawl fisheries lacking according to their defined conservation objectives.

Later that morning, participants were divided into five working groups which included one or two members of the research team. Each group was asked to select an ecological restoration goal (1750, 1900, 1950), and discuss which fisheries should be included (this choice was open, and groups could create a preferred fleet, including and excluding any gear type). That evening, the research team would simulate the impacts of these preferences for presentation on the third day of the workshop.

I was part of working group #4 which included two trawl skippers in their forties, a couple in their twenties who both gillnet and work as deckhands in the halibut fishery, a 36-year-old skipper who fishes gillnet, troll, halibut, and rockfish licenses, and the former president of the Tsimshian Tribal Council. The group decided on 1950 as a reasonable goal for ecological restoration. The fishery would include all current gear types, Aboriginal and recreational fisheries. By-catch would be reduced to levels that were realistically attainable with current technology (5%).

My notes indicate that the majority of the time was spent discussing management issues impacting the groups’ fisheries. Canadian and Alaskan harvest limits were compared, the impact of the sports fishery, and the impact of quota on the halibut and trawl fisheries. The fishermen emphasized the cutbacks they had already experienced, and their skepticism regarding the DFO’s management abilities. Several comments were
made regarding the data informing the models, specifically the lack of accurate catch and mortality statistics for the sports fishery, and the impact of quota-based management on catch per unit effort (CPUE) data.

The reports on the discussions of the working groups were compiled in the report on the workshop (Fisheries Centre Research Reports Volume 10 Issue 7). The summaries suggest that the four groups discussing preferred ecosystems and fleet structures spent much of their time articulating the current problems faced by commercial fishermen. Topics discussed included: increasing corporate control, fleet reduction, sports fishing, over-escapement DFO management, aquaculture, First Nations fishing rights, quota-based management, trawl impacts on habitat, and seine impacts on juveniles (Power et al. 2002). The current issues faced by fishermen thus became the focus of discussions, rather than the hypothetical conservation goals and fleet models of the project. The fishermen also demanded more detailed modeling: inclusion of recreational fishery impacts, particular discard rates, and percentage reductions of particular catches. Some of these demands could be modeled, others could not. Reduction of the sports fishery and trawl catches could only be modeled indirectly by reducing the "price" of the fish, which would discourage effort (Power et al. 2002: 24). This reveals a limitation of the program, as sports fish do not have an ex-vessel price. The model could not incorporate all of the issues raised by fishermen, indicating that their fishing reality is far more complex than the model could simulate.

Furthermore, there were aspects of fishermen's contributions that were not included in the reports or the models. A fisherman in Group #4, Anna, suggested three times that it was critical that the large and increasing seal population be highlighted in the
modeling program. She indicated that gillnetters tend to view seal predation as a major impact on salmon stocks. Anna’s comments regarding seals, repeated three times during the working group discussion and directed at the research team note-taker, were not included in the report on this group’s discussion. Fishermen’s suggestions were selectively integrated into the reports and simulations.

Fishermen, however, were also selective and political in their approach to these simulations. Working Group #1 was primarily composed of older and retired commercial fishermen. This group chose the current ecosystem (year 2000) as their baseline, and requested a simulation using the current fleet, with a reduction of 50% in the sports fishery harvest. This simulation choice is something of a political statement, reflecting a refusal to go “back to the future” by selecting a former ecosystem as a conservation goal, and emphasizing the impacts of the sports fishery over commercial capacity. In this instance, the fishermen participated in the exercise in a way that did not compromise their political position regarding fishery sustainability and conservation, and which highlighted issues of resource competition. By choosing the contemporary levels of abundance as a conservation goal, they were arguing for the sustainability of the current industry.

The anger over the Team’s Choice fleet, and the focus on political issues during the working group discussions highlight the political issues at work in fisheries research. The exclusion of trawls and gillnets from the Team’s Choice elicited a strong reaction from Prince Rupert fishermen. Simulations such as these are not “academic” for fishermen, they are perceived as real threats to their livelihood. The fishermen’s reactions emphasized that conservation goals cannot be developed lightly or without evaluating the impacts on individuals and communities. The working group discussions
reveal fishermen’s focus on current policy issues rather than hypothetical conservation models. The discussions emphasized issues of equity rather than relative abundance and biodiversity. Fishermen’s concerns for the future were of a different nature and scope than those of the project.

**What future do you want? The Restriction of Choices**

The fishermen were asked to define their conservation goals more directly through a paired comparison survey. The survey asked participants to indicate their preferences between eight different scenarios of ecological abundance, twenty-eight pairs in total. This survey was handed out during the first day of the workshop, and then again on the second day when there were considerably more participants (see below). Several participants (including myself) declined to participate, but most of the older fishermen attending the workshop filled out the surveys.

Each question asked the respondent to choose between two different scenarios, each a combination of the four time periods (1750, 1900, 1950, and 2000), and the two fleets, Today’s Fleet and Team’s Choice. For example, a choice might be between Today’s Fleet in 1950 and Team’s Choice in 2000. In order to allow respondents to conceptualize the difference between these scenarios, supplementary information from the computer simulations was provided as context. The supplementary information provided at the bottom of the page characterized the meaning of each choice according to the general trend of increased or decreased abundance and value (of commercial species) of select species (i.e. halibut catch increase, value increase, seals decrease). Power notes that these indicators were simplified to the extent that there were few differences between
the abundance trends for different scenarios and that often the only difference was in the otter and whale populations (2003: 30)\(^2\).

A fisherman beside me didn’t want to fill out the survey because the questions made no sense to him. Even with the supplementary information, these choices were abstract and meaningless for him. The time-based restoration goals were not appropriate environmental objectives as they did not provide relevant scenarios. The two fleet choices were similarly incongruous options, by restricting the choice to current levels of effort or a politically difficult choice to exclude two gear types. For the fishermen, the scenarios lacked relevance, and did not allow them to make a meaningful choice or to express their own environmental values.

For my part, I didn’t want to fill out the survey because of the political implications. Fishers were being asked to potentially select themselves out of the fishery. The structure of the survey, which required them to choose between Today’s Fleet and the Team’s Choice (without gillnets or trawls) in 1750, 1900, 1950, and 2000, meant that half of the options involved selecting a fishery excluding their own gear types (as almost all of the participants were gillnetters or draggers). Especially as a non-fisherman, I did not feel it was appropriate for me to participate in a survey that could document choices that suggested eliminating the gillnet and trawl fleets. While the survey probably has little real power to sway resource management decisions, any document suggesting that community members even hypothetically advocate environmental measures that would decimate their own livelihoods is threatening.

A number of fishermen did fill out the paired comparison survey, and the result was that the 1950 ecosystem with Today’s Fleet was the marginally preferred choice.

\(^2\) This survey was analyzed in a member of the research team’s doctoral dissertation.
However, the low number of respondents (13 usable surveys) led Power to conduct a second round of surveys with the Fisheries Centre research team who attended the workshop in order to analyze the survey for her dissertation. Participation in the workshop ensured that all “respondents would have an equal minimum knowledge of the models and discussions and events occurring during the course of the workshop from which to form their judgments” (2003: 117). Eight researchers completed the survey for a combined number of 21 respondents. What is interesting here is that participation in the workshop is considered the experience required to make these choices — familiarity with the modeling project — rather than identity as a fisheries stakeholder. If the survey was designed to determine the conservation priorities of stakeholders/community members, the relevance of the research team’s answers is questionable.

Power notes that the number of perfect responses (consistent preferences) was extremely low among fishers (8%) and high for the researchers (38%). She suggests several explanations for this disparity. She recognizes that for the researchers, these choices were “purely academic and theoretical” and for the fishers, the choices were “more ‘real’”, in that they represented potential threats to their livelihoods (2003: 118). Thus, the researchers were potentially “less likely to be biased” towards a particular scenario than the fishers who understood how they might be affected by these choices. The researchers were also more familiar with the models and the methodology, and aware of the errors in the models. Power notes that comments from fisher respondents indicated that the choices were confusing, and that the supplementary data provided to explain the impacts of each choice were not sufficient (2002:119). Specifically, respondents were interested in impacts such as job loss associated with each given scenario.
Finally, Power reflects that the furor over the Team's Choice fleet may have influenced respondents' choices. Fishers would have been reluctant to choose the Team's Choice scenario, as it essentially chose a fishery without draggers and gillnetters, and the majority of participants were draggers and gillnetters (ibid.).

The low level of consistency in fishers' answers means that they did not consistently choose Today's Fleet, but presumably made some choices based on the relative abundance of species suggested by each scenario. For example, 1750 with Team's Choice would reflect considerable increased abundance of several species compared with 2000 with Today's Fleet, and would thus appear as a more appropriate preference. Power has identified some key problems with the design of the survey (see above) but the most crucial issue with this survey is that fishers were asked to participate in a survey in which they were likely to provide answers that suggested they viewed their own fisheries as destructive and potentially out-dated.

This survey could not accurately capture the conservation goals and priorities of fishermen for several reasons. The structure of the survey proved confusing, and failed to provide clearly differentiated choices regarding ecosystem health. The restriction of choices to Today’s Fleet and Team’s Choice mean that fishers’ real perceptions regarding fleet capacity and sustainability could not be measured due to the political problems associated with the Team’s Choice model. When the two samples (community members and research team) were combined, the scenario ranked highest was the 1750 ecosystem with the Team’s Choice fleet fishing. This is in fact the most abundant ecosystem paired with the most conservative harvest impact, suggesting high level conservation goals. However, the working group discussions and fishermen's comments throughout the
workshop suggest that they did not support the Team’s Choice model, nor the “extreme” restoration goal of an eighteenth century ecosystem. The structure of the survey and the combination of the samples thus resulted in data that do not accurately reflect fishers’ priorities and interests.

The survey, like the TEK interview schedule, did not attend adequately to the context of contemporary commercial fishing. The TEK questions did not accurately capture the regulatory impacts on knowledge and resulting differentiation. The paired comparison survey did not factor in the social, economic, and political implications of ecosystem restoration and fleet transformation. The survey thus asked fishermen to make choices in a restricted field, with limited biological data and no socio-economic data regarding the impacts of those choices. The survey clearly “worked” better for the research team, who were able to select options consistently (see above). The fishermen, on the other hand, exhibited “intransitivity” (Power 2003: 111) in their surveys (none of which were answered perfectly consistently), due to both methodological and political issues.

Conclusions: The Politics of TEK Research

The Back to the Future project involved innovative methodologies and the combination of several cutting edge modeling programs. The application of this type of research technology to fisheries problems could provide helpful methods of analyzing regulatory impacts on ecosystem abundance. However, the December workshop upset several of the participants and they became disillusioned about the prospects of academic research.
After the second day of the workshop, Josh, the young long-liner and troller, was worried and depressed. His first exposure to a large-scale, quantitative academic research project had been confusing, annoying, and alarming.

*Is this what all university research like? Sitting back and making pretty graphs and choosing impossible conservation goals?... How much power do these people have? Is this going to go to the DFO, is it going to become policy? If this is who is going to make the decisions regarding the industry, we are screwed. Should I sell my herring license?*

Josh perceived the herring gillnet fishery as directly threatened by this project which had modeled a fishery without trawlnets and gillnets: “I don’t want to go back there tomorrow. It’s too depressing.”

Luke and Anna, who had attended the second day of the workshop, did not return. Anna told me on the phone: “We’re not going back tomorrow, sorry. It’s making Luke too mad.” Later that week, Luke and I were in his truck, running an errand. I asked him what he thought of the research project. He replied that it was all ‘bullshit’: “I’m going to make a model of UBC out of broken rulers and pieces of string and see how they like it.”

For Luke, the complexity of the ecosystem in which he worked could not be simplified into a computer model. The issues that impacted his livelihood and his community could not be simulated and predicted. To attempt to do so was the equivalent of making a physical model out of salvaged stationary products.

This workshop provides a valuable case study of the interaction between fishers’
knowledge and academic research. Analyses of the project design in general, and of fishers' responses to the workshop in particular, illuminate some of the complications, and indeed pitfalls, of ecological knowledge research. The ‘Back to the Future’ project included fishers’ knowledge as a data source to generate a model of past and present species abundance. As such, the project reflected an inclusive and progressive approach to data collection. The program also asked fishers to choose ecological restoration goals that would benefit their community, proposing to include fishers in policy design and environmental decision-making. However, the “rapid appraisal” approach of the research limited the value of the TEK data by failing to adequately differentiate and contextualize fishers’ knowledge. The ecological choice component of the project asked fishers to choose ecosystem restoration goals without indications of the social and economic costs of these environmental measures. Choices were not open-ended, but restricted to scenarios developed by the research team and reflecting their own environmental values. Fishers were essentially asked to make choices, albeit hypothetical ones, that could eliminate their own livelihoods.

Local knowledge research can provide an opportunity for the broadening of ecological data sources, as well as improving the understanding of social and economic issues in fishing communities. However, this type of research also poses a degree of risk to participants. Local knowledge research can pose as consultation, and suggest a higher degree of community agency than is actually the case. The current participatory thrust in academic research and in resource management legitimates a project that boasts inclusion of fishers’ knowledge and values. Local knowledge research can thus hijack fishers’ knowledge into forms, conclusions, and choices that do not accurately reflect fishers’
realities or values (for similar arguments regarding the pitfalls of participatory development, see Mosse 2001).

The Back to the Future project indicates two major types of issues regarding local knowledge research, the first is methodological, and the other is political.

Ecological knowledge research necessitates extremely detailed investigation of stratified samples in order to create data that can be quantified and compared in the manner required by ecological modeling programs. The TEK aspect of the data collection in the BttF project did not adequately deal with the differentiation of fishers’ knowledge. The preceding chapter details the way in which fishers’ political knowledge is differentiated by position within the industry. Fishers’ ecological knowledge is similarly differentiated on micro-levels by their economic position, the years they fished, and the regulatory context of their fishing. The practice of fishing is so finely-tuned and highly differentiated that in order to use fishers’ knowledge to inform a model of ecosystem abundance, the data must be equally differentiated. The knowledge of fishers with high encounter rates of a species, and whose fisheries target that species, should be weighted relative to the data provided by fishers with low encounter rates, and who do not harvest, or who discard, that species. The model focused on fishing technology changes rather than regulatory changes. The fishers themselves were able to identify the methodological problems with the TEK interviews; they were concerned about the lack of detail regarding their fishing practice and experience.

Thus, the TEK aspect of the project reveals the way in which fishing knowledge must be highly operationalized in a research context. The BttF protocol was progressive in its inclusion of TEK, but the complexities and realities of fishing practice were not
adequately represented in the interview questions. The general categories of the fishing experience questions couldn’t contextualize fisher knowledge for comparison and extrapolation. The BttF example provides helpful guidelines for the design of projects that involve commercial fishers’ TEK by highlighting the significance of regulatory structures. Interview questions need to relate directly to the regulation of the fishery, reflecting the gear, species, and area categories used to manage fishing activity. Temporal questions such as years of fishing as skipper or crew need to be correlated with changing regulations over time, such as the shift to quota or license limitation, which drastically transform fishing practice. Without this level of detail and attention to regulatory impacts, TEK data cannot be differentiated or weighted accurately.

The Back to the Future project was not able to deal with the details and nuances of fishers’ knowledge. The fishermen who participated in the three day workshop had many concerns and questions about the data sources for the model, the ways in which these data were combined, and the missing information (such as accurate sports fishery catch statistics). These critiques and suggestions, however, were not the focus of the workshop. Rather than ground-truthing the modeling program by allowing fishermen to comment on it, the workshop was aimed at generating new data by having the fishermen select their preferred simulations.

Finally, there was no room for fishermen’s own models of ecosystem relationships and socio-political relationships. When Anna emphasized the problem of the increasing seal population, this thrice repeated remark went undocumented. Haggan suggests that “The Ecopath mass-balance approach to aquatic ecosystem modeling has parallels with the way longstanding fishing communities view the environment. Both are
more concerned with relationship interactions and connections within an ecosystem than
which achieving a deep understanding of isolated elements” (2000: 85). This might be
ture, however, fishers’ approach to understanding the ecosystem within which they work
is even more holistic than this, because it includes understandings and concerns about
social, cultural and economic relationships between the ecosystem and the fishing
community. It is this complexity of relationships that the model could not incorporate at
the Prince Rupert workshop.

Local and traditional knowledge research must be conducted in a way that
respects the values and livelihoods of the participants. The BttF project asked fishers to
participate in research that constructed their own actions as the main cause of ecosystem
decline, and which selected their fisheries for termination. The paired comparison survey
limited fishers to choose between healthier ecosystems (in the past) and their own
fisheries. The Back to the Future project did not approach fishers’ as political actors, and
the methodology ignored the context of resource competition and declining incomes.

This project reflected a degree of respect for fishers’ knowledge and its value for
increasing data on changing species abundance. However, the project did not reflect a
respect for fishers’ positions. They were expected to participate in a process whose
underlying goal was ecosystem restoration, and which understood current harvesting to
be inimical to restoration. The conservation-oriented goal of the project left little room
for engagement with issues surrounding the social impacts of restoration. Fishers were
asked to make choices about the natural environment without being provided with the
relevant information on social impacts. The result is de-contextualized data regarding
fishers’ ecosystem preferences. This project was not inclusive of the values and concerns
of fishers, but only of their knowledge. Resource workers do not have the privilege of making environmental decisions without contemplating their social and economic impacts. This project, however, required them to do just that, to choose a restoration goal and to define a "clean" fishery.

The BttF website suggests that the process of bringing different sectors together will provide participants with a "sense of ownership of the process". However, the methodology was so structured, and the choices so restricted, that fishers in Prince Rupert had no real ownership over the scenarios generated. The program has the capacity to measure costs associated with conservation measures, and the risks of different scenarios to both the ecosystem and to fisheries sectors. However, at the point at which Prince Rupert communities members were involved, the model did not include this type of information. Fishers were asked to make choices on ecological indicators alone, which did not recognize their vulnerable positions and personal risk.

Anthropologists and other social scientists have been deconstructing science as a contingent, political, and culturally constructed way of understanding the world. Fairhead and Leach have interrogated the links between science and policy and the way in which understandings of nature are framed in relation to institutional objectives (2003). Science is also a system of knowledge production that is culturally constructed, a local knowledge that denies its locality and contingency (Semali and Kinchelo 1999: 28). Academic projects are thus not free from political influences, and their relative power has significance for resource management. Finlayson has identified the dangerous power inherent in models used for fisheries management. These paradigms construct the questions that can be asked, define data as "relevant", and determine the interpretation of
ambiguous data (1994: 68). He suggests that “models incorporate basic assumptions about the nature of reality, and tend to determine cognitive reality” (ibid.). Thus these simulations, and theoretical and computer models are not simply interesting exercises or innocuous academic tools. These constructions act to construct reality, to frame the way in which ecological relations are understood, and policy decisions are made. Choosing a fleet without gillnets and trawls is not a neutral simulation, but creates a model for an alternative future. It is a model that academic biologists with little stake in the north coast fisheries believe to represent a “cleaner” fishery.

During the second day of the workshop, a retired halibut fisherman sat down next to Josh and told him that he knew his grandfather well. They were close in age, had both fished for the Co-Op, and were both involved in the Deep Sea Fishermen’s Union. The conversation turned to the contemporary halibut fishery and the difficulties encountered by young fishermen with the quota leasing system (see Chapter 5). The old fisherman told a story about the consultation meetings before the fishery shifted to a quota structure. He had fished halibut for over forty years, and had been involved in the fishery’s management and organization, through the Co-Op and the Deep Sea Fisherman’s Union. Although recently retired when the quota debates began in 1990, he stood up at a consultation meeting and warned of the threats to fishermen and fishing communities that he believed a shift to quota-based management would bring. Another fisherman called him down, saying that because he had recently sold his license, he had no say in the matter – he no longer had the right to comment on the fishery.

The fisherman’s voice was cracking as he told Josh this story about trying to protect the interests of fellow fishermen, and having his opinion and his years of
experience discounted. The incident had occurred over a decade ago, but still evoked significant emotions for the fisherman. Josh was also moved, and there was emotion in his voice when he related the story later that day. Quota-based management in the halibut fishery has impacted Josh’s career in very significant ways, making his livelihood less viable, and limiting his ownership of the means of production. Quota has created a significant generation gap in the fishery, positioning younger fishermen against their father’s generation (see Chapter 4). A story of a fisherman from his grandfather’s generation anticipating and critiquing these changes was extremely meaningful to him, and simply relating this second-hand, decade-old story affected him.

This moment between two fishermen, this story-telling that happened in a brief coffee-break during the Back to the Future workshop, provides a very powerful foil to what was happening at the Highliner Hotel that day. The story, and the way that both fishermen told and re-told it, sheds light on the way that fishermen engage with their livelihood, their industry, and the policy decisions that shape both. Shifts in regulatory structures, conservation initiatives, and any related policy decisions have real meaning in the lives of fishermen. They reflect upon these changes with lumps in their throats. Furthermore, their ability to speak to and about these changes, to participate in decision-making and debate, is important to them. The story stands in sharp contrast to the workshop where university researchers were comfortably creating computer simulations that assumed the end of the livelihood of hundreds of commercial fishers. A fisherman could not talk about a management shift in the halibut fishery without great emotion, yet researchers could create a “Team’s Choice” fleet that implicitly villainized the gillnet and trawl fisheries. They were sincerely surprised by fishers’ fierce reaction to this
"hypothetical" scenario. The BttF model could not contend with fishers’ attachment to their livelihoods and their emotional investment in the industry. These complications could not be integrated into the computer model and the simulations.

I have used the Back to the Future project to indicate some of the problems with academic ecological research projects. This project was not ill-intended, nor essentially anti-fisherman. The project recognized the ability of TEK data to improve patchy stock assessment and annual catch data. The design of the project involved several participatory aspects and was ultimately intended to facilitate the inclusion of diverse stakeholders in ecosystem restoration. The problem with this project is an issue common to many academic approaches to fishers’ knowledge. The project approached fishers’ knowledge without attending to the political experiences and vulnerabilities shaping that knowledge. The project engaged the knowledge of fishermen without adequate sensitivity to the context of fishing as practice and of fishing as a livelihood. The political vulnerability of commercial fishermen was not taken into account in models that select fisheries based on external concepts of sustainability, and which ask fishermen to do the same.

These issues were not ignored by the Back to the Future team. The furor over the Team’s Choice’s model prompted communication between the team and community members. The importance of language was emphasized, and the meaning of these models to fishermen was made clear. The processual nature of the Fisheries Centre projects, involving workshops and discussions at several phases of research and analysis, provides the opportunity for development and refinement of projects. The Fisheries Centre thus draws on a broad range of community and scientific experts to finely tune
their research projects. The Back to the Future project is not a wholly negative example of research, but provides useful examples of the complications and pitfalls of ecological knowledge research. The inclusion of fishers as participants in a project requires attention to methodological and political details. This is still a relatively new form of research and it is pioneering interdisciplinary projects like Back to the Future which can provide us with the tools to develop appropriate research practice.

The previous chapters have described the competitive and political context of modern commercial fishing. Fishermen in most fisheries face daunting challenges to their continued success and economic stability. I have identified the methodological problems caused by ignoring context, but the political problem is more serious. Fisheries research must attend to the problems that fishermen face, and the real and perceived threats to their livelihoods. Interview questions and computer models must take into account the real meaning of hypothetical policy changes and conservation measures. It is not possible to neutrally simulate alternative futures. This particular project did not engage with the politics of knowledge, nor the politics of fishing, and thus provided fishermen with models of their livelihood which were as useful to them as "broken rulers".
Chapter 6: Sockeye 2002: Political Knowledge and Scientific Management

The ocean is not an aquarium. They can't count the fish. They are guessing at numbers. It's like throwing a dart at a board. They hide behind the word science, but they don't use it. When anyone starts to argue with them, they put up the conservation flag.

Spike, salmon fisherman.

Sockeye Fever is a common ailment of commercial fishers in British Columbia. The first symptom is a low-level agitation that often manifests in the early Spring. This condition is extremely contagious. The early agitation is exacerbated by dock talk, rumours, and speculation, and easily escalates to full-blown excitement. At this point, the fisher can think of nothing else but catching boat loads of salmon, and can be observed obsessively calculating potential income. Clouded judgment and nervous enthusiasm are often experienced for the length of the season. I’ve heard it described as worse than a drug, but equally as addictive.

The Coho Crisis had been a strong antidote to Sockeye Fever for several years before 2002, and the DFO forecast was for an average or below average season. Nevertheless, by June the odd comment could be heard on the dock and in the gear stores about the possibility of decent fishing on the Fraser that year. In early July the test fishing scores suggested that despite less than desirable spawning escapement in the brood year, fish were returning in reasonable numbers. By late July the troll fleet was on five day notice, with rumours flying about surprising at-sea survival rates and impressive test scores.

One skipper I knew hadn’t gone south to fish his southern (Area H) troll license in past three years. It hadn’t been worthwhile to make the journey down south, to switch the gear, or to postpone halibut fishing until the autumn months. This year, however, he
caught the fever and started the forty hour journey through the Inside Passage to the top of Vancouver Island.

The skipper's sockeye fever, however, was soon overwhelmed by a different complaint: the Port Hardy Hangover. Unrelated to alcohol consumption, this is a legendary feeling of despair and disappointment that a fisherman feels as soon as the boat is tied to the dock in that port. The troll fleet sat tied up in Port Hardy and other Vancouver Island harbours for days and later weeks, waiting for short openings that allowed them limited access to the fish that were migrating through Johnstone Strait in surprising numbers. Conference calls and emergency meetings of the management committee did not procure the fishers the opportunity they deemed appropriate, based on the abundance of fish they perceived. The season culminated in several protest fisheries and disappointed fishers citing huge losses of potential income. Trollers charged with illegal fishing during the protests contested the charges, resulting in a controversial court ruling.

The 2002 Fraser River Sockeye fishery provides another case study in which power and politics are implicated in the construction of knowledge. This chapter documents the struggles between local knowledge and scientific models as played out within the management of the Fraser river sockeye fisheries regarding exploitation limits, and the resulting protest fishery by Area H trollers. The following chapter analyzes the aftermath of the season: the designation of two sockeye runs as endangered by the Committee on the Status of Endangered Wildlife in Canada.

This chapter expands upon some of the issues developed in the chapter on the Coho Crisis. The context of resource competition and its impact on fishermen's
understandings and actions are reinforced by this case study. The conflicts between fishermen's knowledge and biological science indicated in Chapter 4 are also revisited in the analysis of the management of the sockeye fisheries. The impact of political knowledge on the industry is highlighted by the way in which the troll protest is defended in court. This case study thus underlines the continuity and commonality of these problems throughout various fisheries in the BC industry.

This chapter moves the focus from the north coast of British Columbia to the southern fishing areas. This shift reflects the reality of the fishing industry, as many fishers harvest in fishing areas distant from their place of residence. The majority of the owners of northern salmon fishing licenses live in the south of the province. Northern residents also travel south to fish their "stacked" salmon licenses. The herring fleet fishes in several areas, many fishing both the Gulf of Georgia and then the northern waters a few weeks later. While halibut licenses are not differentiated by area, many fishers who live in the south travel north to fish halibut in the abundant grounds off of the Queen Charlotte Islands. 'Locality' is thus complicated in the contemporary fishery and both my research experience and this dissertation reflect the coast-wide focus necessitated by the structure of the industry. This ethnography is based in a northern fishing community, but I followed northern fishermen to the south to observe the sockeye and herring fisheries. The preceding chapters on the Coho and Rockfish crises describe northern fishermen's responses to those issues, but the conservation measures were coast-wide concerns. This chapter and the following one focus on southern fisheries and conservation issues, but these issues have direct relevance to, and impact on, northern fishers, whether they fish those areas or not. The Fraser River sockeye fisheries reflect a
highly complicated management scenario with many competing user groups and extreme environmental issues, and these issues are common to many fisheries. Thus, although this chapter shifts the research site from Prince Rupert to Johnstone Strait (north end of Vancouver Island), I traveled there on a Prince Rupert fishing boat, following the seasonal movements of multi-licensed vessels.

**Dire predictions and surprising returns**

The Fraser River Sockeye fishery illustrates the complicated and uncertain process of salmon management in the northwest Pacific. Of the many small salmon fry that leave their natal streams, only a small portion survive the years at sea, and even fewer survive the migration upriver to successfully spawn. The DFO must estimate the number of fish that will return and the number of spawners (escapement goal) required to maintain the stock, in order to establish harvest rates for the various fisheries that will intercept the migrating fish. For the Fraser sockeye stocks, the DFO uses quantitative models based on the number of spawners in the brood year and averaged ocean survival rates to create 50% and 75% probability returns for a given sockeye season. Prior to 1999, the DFO used the 50% probability prediction, but as part of the risk-averse approach, now uses the more conservative 75% model. The sockeye spawning in the tributaries of the Fraser river are divided into four aggregate stocks, based on their spawning areas and timing of their migration.
**Fig. 6-1** 2002 Pre-season estimates and escapement goals for Fraser Sockeye

<table>
<thead>
<tr>
<th>System</th>
<th>Return at 75% Probability*</th>
<th>Escapement Goal at 75%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Stuart</td>
<td>59,000</td>
<td>59,000</td>
</tr>
<tr>
<td>Early Summer</td>
<td>326,000</td>
<td>227,000</td>
</tr>
<tr>
<td>Summer</td>
<td>5,204,000</td>
<td>1,900,000</td>
</tr>
<tr>
<td>Late</td>
<td>2,322,000</td>
<td>2,000,000</td>
</tr>
<tr>
<td>Total Fraser</td>
<td>7,911,000</td>
<td>4,186,000</td>
</tr>
</tbody>
</table>

* Probability that the actual return will reach or exceed forecast levels. *(Review of 2002 Fraser River Sockeye Fishery, External Steering Committee 2003: 17, 18)*

These anticipated returns reflected an average to below average abundance for the cycle. The Early Stuart and Early Summer runs have been the source of conservation concern for several years, pushing fisheries later to the Summer runs, which peak from late July to mid-August. Since 1996, the Late run stocks have also become a focus of conservation efforts due to increased pre-spawn mortality. The runs that arrive on the coast in mid-August have historically remained in the marine areas for several weeks before commencing their journey up-river. Beginning in 1996, there had been a new trend observed where late run fish did not follow historic patterns, and proceeded directly up the river rather than remaining in saltwater. This early migration was resulting in 90% mortality before the fish reached the spawning grounds, due primarily to parasitic infection (ibid.:19). Late run stocks such as the Cultus Lake Sockeye were identified as specific conservation concerns. In order to preserve enough fish to survive the

33 These goals are lower than the Interim Escapement Goals established in 1987 and reflect target percentages of returns, rather than desired escapement for increased production of Fraser sockeye.
anticipated mortality rates, a 15% exploitation cap was established for the late run fish in
the fishing plans for the Fraser river fisheries.

What happened in the coastal waters of southern British Columbia in 2002
highlights the unpredictability of fish, and uncertainty of pre-season models. Ocean
survival rates greatly improved, and Summer and Late run sockeye returned in
unexpected numbers. The Late run returns were three times the anticipated abundance (at
75% probability). However, the Late run fish arrived earlier than ever before,
overlapping considerably with the Summer run. Usually there is an average two week
gap between these runs but in 2002 there was only five days between the peaks of the
Summer and Late runs (ibid.: 26). This caused DFO management to speculate that Late
run pre-spawn mortality would continue to be extremely high. However, the fish
confounded expectations, and many returned to the pre-1996 migration pattern, schooling
at the mouth of the Fraser river for a period, before heading up the river to the spawning
beds. This significantly reduced the pre-spawn mortality from an anticipated 90% to
20%.

There were more fish, they were early, and they returned to a migration pattern
that had been disrupted since 1996. These unexpected twists in fish abundance and fish
behaviour proved disruptive to the processes of management and consultation established
for the Fraser River fisheries. I will deal with the management scenario in general, and
the Area H Troll fishery in particular. The Area H fishery provides a useful focus within
this case study for several reasons. I participated as a deckhand in the fishery in 2002,
and discussed the issues with fishermen on the grounds. Secondly, the Area H trollers
particularly felt the impact of the contested 15% cap on Late run fish, harvesting less than
half of their pre-season allocation of fish. Finally, the Area H fleet participated in a protest fishery that culminated in a court case that brought to the fore issues of allocation in the Fraser river salmon fisheries.

**In-season conflicts**

Integrated Fisheries Management Plans are developed prior to the season in consultation with stakeholders. The plan for salmon in Southern BC adopted the 15% exploitation cap for Late run sockeye, and identified variable harvest rates for Fraser sockeye based on varied return scenarios. In-season management of the Canadian Fraser river fisheries is the responsibility of the Fraser Panel, which operates under the Pacific Salmon Commission\(^\text{34}\). The Canadian Section of the Fraser River Panel oversees Canadian test-fisheries, biological sampling, and catch monitoring, as well as monitoring in-river migration environment and progress of escapement to spawning grounds, consults with affected harvest interests, and opens and closes fisheries (in collaboration with US section for Panel waters). The panel is also responsible for escapement estimates, catch data, and post-season review. Canadian Panel members include DFO personnel, commercial, recreational and First Nations stakeholder representatives, and meet in person or by conference calls throughout the sockeye season.

Commercial fisheries began in late July, and due to the early timing of the Late run, within days it was announced that the 15% exploitation cap on Late run sockeye had been reached, based on the 50% probability forecast of 2.9 million fish. Consultation with industry stakeholders and the United States Panel allowed for an adjustment of the

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\(^{34}\) The Pacific Salmon Commission was established in 1985 by treaty between the governments of Canada and the USA to implement the Pacific Salmon Treaty. The treaty deals with salmon originating in one country that are subject to interception by the other country's fisheries. 4 regional panels provide advice
calculation of the 15% limit. It was decided that all Late run fish caught in the Fraser River up to August 17 would not be counted against the 15%, as these fish were expected to suffer extremely high mortality rates by entering the river so early. These fish were not considered to be potential spawners, and could therefore be excluded from the exploitation assessments. This allowed for further fishing opportunities for the commercial fleet. Despite this additional fishing time, commercial stakeholders were extremely critical of the lack of opportunity to harvest the incredible abundance of fish that fishers were witnessing. Fishermen insisted that returns were considerably greater than DFO pre-season estimates and in-season adjustments, and that the process of upgrading those estimates, based on counts at the Mission Bridge counting fence, was slow (External Steering Committee 2003: 22).

As fish continued to pour through the approach areas throughout August, industry criticism increased. The UFAWU criticized the lack of fishing opportunity throughout August 2002. A media release from Jim McIsaac of UFAWU, August 22 2002 stated:

And fishermen continue reporting sockeye salmon from Langara Island on the northern tip of the Queen Charlotte Islands through all the southern waters including the reaches of Johnstone Straits and Juan de Fuca Strait, yet the DFO refuses to acknowledge his abundance of sockeye with fishing time... For the last month fishermen have been telling the DFO fisheries managers that the Fraser River run is coming in strong, at historic levels, and that fisheries should be opened on these runs. But the DFO, not listening to fishermen, has done

and recommendations regarding fisheries. The Fraser Panel is unique in its responsibility for in-season harvest regulation of Fraser river sockeye and pink fisheries.
everything in its power to prevent fisheries from happening and limit the public
knowledge of the run size.

There are various perceptions of the degree to which stakeholder knowledge was
integrated into the management process in 2002. An industry participant in the Fraser
Panel, and Area H troller characterized the management issues of the season:

Fish abundance and its identification was essentially the crux of the issue. That
coupled with a rigid imposed harvest rate relegated the commercial fleet to very
little opportunity. Anecdotal information could not be plugged into the PSC
assessment models. ... The management plan allowed for no flexibility if the run
was larger than forecast or late run migratory behavior returned to normal,
which did happen. During the summer the plethora of anecdotal information was
essentially disregarded. In the past that information was generally corroborated
by fisheries, but in this risk-averse atmosphere, those fisheries were not tolerated.

A DFO representative on the Canadian Fraser Panel Chair was more positive
about the role of LEK/TEK in the pre-season and in-season management process.

I would argue that LEK and TEK is heavily utilized in-season. Pacific Salmon
Commission and departmental [scientists] provide the statistical and analytical
structure to provide the scientific basis for run size, timing and migration
behaviour projections. LEK and TEK is incorporated into the management
decisions to assist with and support the selection of options and decisions.

However, the information that industry representatives brought to the Fraser Panel
regarding fish abundance and behaviour could not in fact influence the alteration of pre-
season plans, as the DFO manager goes on to explain.
The commercial representatives relayed to the Fraser River Panel process the advice and viewpoints their constituencies were telling them. That is, that there were many more sockeye than the official projections were indicating. Moreover, they sensed that based upon the larger, more vigorous sockeye they were observing that the survival prospect for the Late run sockeye entering the Fraser River was going to be very different from recent years. Because their comments and advice could not be incorporated into the management models, their advice could not be used to modify the management plans nor the policy frameworks.

Many fishermen will tell you that they knew what was happening well before the models and assessment frameworks could verify their beliefs. The 2002 season might exemplify the extremes of differences that might occur between LEK/TEK and formal assessment frameworks. During most regular seasons the differences in views are smaller.

...While best efforts are made to develop credible scientific rationale to explain and predict salmon behavior and abundance, limitations in resources or available information will inevitably create gaps between the predictions based on science and observations from the “wheelhouses of the fishing fleets”. It is during those occasions when LEK/TEK have the greatest value and impact. It is also during those occasions when conflicts between the managers and fishermen arise.

This characterization of the 2002 season suggests that stakeholder knowledge is valuable and important, but that it cannot be integrated with the models used by the Pacific Salmon Commission. The models of abundance and spawning requirements developed pre-season could not incorporate local knowledge data regarding high levels of
abundance in Johnstone Strait in early August. The data from the counting fence at Mission adjusted the run size estimates, resulting in a lack of fishing opportunity and fishing success for interception fisheries later in the season.

The commercial Total Allowable Catch is divided among the gear types and areas, and fishing opportunities are designed to achieve these targets. This is due to the nature of the fishery where the fish are intercepted at different points in their migration by different gears in different areas. The expected catch of the Area H troll fleet was 525 000 pieces (12 % of the TAC). The actual catch was 119 000 pieces, (5.6%) (External Steering Committee 2003: 40). This was the smallest commercial harvest of the allocated areas/gears, and the worst percentage ratio, expected versus actual.

**Fig. 6-2 Commercial allocations of Fraser Sockeye**

<table>
<thead>
<tr>
<th></th>
<th>Seine B</th>
<th>Gillnet D</th>
<th>Gillnet E</th>
<th>Troll G</th>
<th>Troll H</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Expected Catch</strong></td>
<td>1,619 K</td>
<td>634K</td>
<td>1,247K</td>
<td>350K</td>
<td>525K</td>
</tr>
<tr>
<td><strong>% Share</strong></td>
<td>37%</td>
<td>14.5%</td>
<td>28.5%</td>
<td>8.0%</td>
<td>12.0%</td>
</tr>
<tr>
<td><strong>Actual Catch</strong></td>
<td>681K</td>
<td>236K</td>
<td>948K</td>
<td>124K</td>
<td>119K</td>
</tr>
<tr>
<td><strong>Actual %</strong></td>
<td>32.3%</td>
<td>11.2%</td>
<td>45.0%</td>
<td>5.9%</td>
<td>5.6%</td>
</tr>
</tbody>
</table>

(External Steering Committee 2003: 24).

The unexpected migration patterns and abundance resulted in greater fishing opportunities for in-river fisheries (Area E Gillnet) while the ‘outside’ interception fisheries (such as Area H troll) failed to achieve their allocation. Further opportunities could have been designated to the Area E gillnet fleet, which could target the Summer run while the Late run remained in coastal waters. The Area H troll fishery in Johnstone and Juan de Fuca on the other hand, which intercepts the fish en route to the river, would
have minimal fishing opportunity due to their higher encounter rates of Late run fish.

Industry stakeholders could not come to a consensus regarding the question of maximizing catch versus maintaining allocation balance, and therefore the DFO maintained the distribution percentages rather than allowing increased opportunity in one area. This exacerbated the frustration of in-river commercial fishers, who saw more and more fish pass by them.

In late August there were illegal fisheries by the Area H trollers and Area E gillnetters, protesting the lack of fishing opportunity being given to the fleet.

**The View from the Grounds**

I spent the month of August waiting for short sockeye opening in Area H, on a Prince Rupert troller. I was a second deckhand, an extra pair of hands that would help if we were to run into the great fishing the fishermen were predicting. The following excerpts from my fieldnotes reveal the rapid shifts from expectation and elation, to disappointment and frustration that characterized the sockeye season for trollers in the southern fishery.

August 1. We had waited for an opening for almost a week, having left Prince Rupert when the fleet was put on 48 hour notice for an opening. We had fished 2 days in Johnstone Strait without much luck, and were waiting for an opening in the area around the mouth of the Fraser, and the Gulf Islands. We made our way down the east coast of Vancouver Island at night, and I took my first wheel turn as we passed the lights of Nanaimo. The fleet was gathered at Pender Bluffs, but the fishing was slow. The dozen fish that we caught the first day was the perfect rate of harvest for me to learn how to run through the gear, pull in a fish, and dress it slowly and carefully. However, it wouldn't cover the fuel bills. The skipper became frustrated and pulled the gear, to move up the island to Johnstone Strait again.

We fished in Robson Bight in Johnstone Strait on August 10 and 11, after far too long in Port Hardy. We were eager to get fishing again after long days of reading and watching movies while tied to the dock. The fish started to appear mid-morning, large 7lb sockeye that appeared to be attracted to the boat when
the stereo started playing rap music. My ability to land the 7lb sockeye slowly improved, but there were several fish that fought themselves free of the hook as I struggled to bring them aboard. Every time one got away the skipper yelled “20 bucks!” from the door of the wheelhouse, reminding me how much money I had just dropped off the line. The first day was exciting – over 200 fish - but the skipper’s frustration grew, as some of the boats around us had caught twice as many. This appeared impossible, the boats were fishing in an area only a few square kilometers in size, following each other in a circle inside the small bay that is Robson Bight. Yet some boats were “fishier” than others.

The next day was the deckhand’s birthday, and it brought us 700 fish. It seemed like there was a fish on every hook, as we constantly rolled through the gear. The skipper donned his raingear and dressed fish most of the day, to keep us caught up. The radio talk focused on how the DFO was wrong all along with their emphasis on spawning numbers. “It was ocean survival, obviously, that determined abundance, because 1998 had been a low spawning year, and look at all these fish!” The credibility of scientific predictions was triumphantly dismissed as the skippers watched fish after fish come aboard their boats.

Long after we pulled the gear from the water after sunset, we were dressing fish. At midnight, I looked at the pile of sockeye still waiting in the checkers to be gutted and iced. I wept quietly in the stern of the boat as I stood on my toes to relieve my aching heels, and reminded myself to take some ibuprofen before bed so that I wouldn’t wake up with the dreaded “Claw”, unable to open my stiff hands. Slowly the pile of fish moved from the checker to the hold, and I was finally able to crawl into my bunk in the bow of the boat. I’d heard stories about how this felt – to get into bed after a long day of fishing. At this point I was glad the opening was over, that we didn’t have to fish again tomorrow.

Many of the boats returned to Port Hardy to await an announcement of another opening. With the abundance of fish that we had seen in Johnstone Strait, and the news of test fisheries further north that were encountering high numbers, the skipper anticipated that we’d be fishing again soon. We enjoyed the first two days of relaxation after the hectic opening, but then the Port Hardy hangover returned. The skipper was restless, silent, and grumpy. Everyone was on edge as they waited for the announcement. But it never came, we eventually gave up, took ice and bait, and headed up north to fish halibut in the Hecate Strait. Sockeye were jumping everywhere as the boat moved up past Cape Caution, and the skipper swore never to get sucked into fishing the south again.

We were back up in Prince Rupert, after a halibut trip, and ready to head out again. We took ice and bait and set off toward Carpenter Bay, down at the bottom of the Hecate Strait. When we were about 2 hours south of Rupert, the skipper got a call on the radio phone. There was going to be another troll opening in Johnstone Strait. While were were halibut fishing, there had been a protest fishery by those who were still waiting for more fishing opportunity. We had felt lucky to have the option to fish halibut, instead of waiting in Port Hardy. Now, we veered toward the Inside Passage, and pulled the trolling gear down from the roof of the wheelhouse. We were 40 hours away, and the fishery would
open in 46 hours. The skipper pulled out his calculator and started estimating what he would make if the fishing was as good as the last opening. At 700 a day for several days, it would be worth all the traveling we had done up and down the coast.

We tied up in Port MacNeil late the night before the opening. Before dawn we headed back to Robson Bight. The skipper was nervous. It had been almost 3 weeks since the last opening. The fish were probably more abundant further south, near the mouth of the Fraser. Why did they have to open the Strait, rather than further down? After a slow morning, we heard that a few hours south of us, in area 13, the fish were more abundant. We pulled our gear and started traveling down Johnstone Strait but didn't get very far. Over the two days we caught 120 fish. Further south they had a few more, but nothing like what they had hoped for. The trollers had missed the peak of the run. We turned north again to fish halibut, and put the calculator away in a drawer.

The Gulf Troller Association newsletter, which provides information on management and markets to Area H license holders, calculated massive losses of potential income to the Area H fleet due to the lack of fishing opportunity. Fishermen counted every fish that entered the spawning beds over the pre-season escapement goal of DFO as a lost fish to the commercial fleet. The radio discussions on the ground and the post-season meetings emphasized the season that might have been.

**Crisis management**

As the DFO rep on the Fraser Panel pointed out, the 2002 season reflected an extreme example of conflict between science-based management prerogatives and LEK/TEK. The DFO generated various probabilities of returns, estimating run size and run timing, migration patterns and pre-spawn mortality, and required escapement numbers. The salmon runs that returned to the Fraser River in 2002 confounded these scientific calculations so that the pre-season plan managed for a run of 300 000 instead of the eight million fish that arrived (Gulf Trollers Association Newsletter, November 2002), due to unexpected returns and reduced pre-spawn mortality. The limits of the DFO’s ability to accurately predict fish abundance and behaviour, the inflexibility of pre-
season management plans, and their inability to act on fishers’ perceptions of fish abundance and behaviour, produced a season rife with conflict and non-compliance.

As soon as sockeye abundance appeared to be greater than pre-season predictions, fishermen on the grounds began to emphasize the importance of at-sea survival rates over spawning numbers as the key determinant of abundance. The DFO had estimated low returns based on the escapement numbers for 1998. Fishers emphasized the uncertainty of stock assessment and the unpredictability of ocean conditions and fish behaviour. The limits of science became a major topic of discussion during the early part of the 2002 season. The slow process of upgrading the run sizes was a key focus of critique. The anecdotal information from northern area commercial fishers, the limited test fishery data, and the encounter rates that the fleet experienced during fisheries in the second week of August, all indicated high levels of abundance. This type of data could not be integrated into the management models, nor could it be verified in a timely manner by DFO assessment processes. The fish counting fence on the river at the Mission bridge provided verification of abundance after the fish had passed the majority of the commercial fleet’s fishing grounds.

When escapement estimates began to appear in the Autumn, the outcry grew. The in-season estimate of Summer spawners of 4,740,900 was almost double the escapement goal of 2,448,000, prompting criticisms of “wasted fish”. In a September news release, the UFAWU estimated the loss (retail prices) to fishermen and the BC economy to be $144 million. Many fishermen traveled to the spawning grounds in the Autumn to witness the abundance of fish that reached their natal streams, and worried about the impacts of overspawning on the abundance of runs that would return in four years. Not
only did they perceive lost harvests in 2002, but the fear of weak stocks in the future loomed as another impact of the management decisions made that season. Debates regarding the impact of “overspawning”, the theory that too many fish entering the spawning beds results in lower fry survival rates, began on the fisheries email forum, and in fishing industry magazines.

In the Autumn of 2002, the Fisheries Minister called for a review of the Fraser Fishery, which involved the input of commercial, First Nations, and recreational stakeholders, and conservation groups. The review provided a forum for the discussion of management processes and conservation goals. One third (4 out of 12) of the recommendations of the commercial sector to the Sockeye Review focused on issues regarding the regulation of First Nations fisheries (see External Steering Committee 2003: 40). The rest of the recommendations emphasized management flexibility, the role of science and assessment, and industry representation. All sectors (commercial, recreational, First Nations, conservation) expressed concern regarding data quality. Both First Nations and commercial fishing interests indicated that their “traditional or on-the-ground knowledge was not taken into account properly” (External Steering Committee 2003: 42).

The review recommended an overhaul of the consultation process, based on concerns from all sectors regarding consultation for both pre-season development of fishing plans, and in-season management. The review recommended that a new policy advisory process be developed by Autumn 2003 to facilitate “improved, transparent consultation” (External Steering Committee 2003: 48). This process was to be more “streamlined” and would involve more thorough cross-sectoral representation.
Specifically, conservation groups would be involved in the advisory process in a more formal capacity. The integrated planning process created northern and southern area harvest committees, which have been criticized by some fishermen as effectively limiting direct representation at the highest planning level. This new advisory process was not a new model for consultation; this format had been an objective of the DFO for several years, and the Sockeye Review provided the opportunity to implement this process. McCay and Finlayson noted that the collapse of the Atlantic cod was used to implement a restructuring policy that has been advocated by the DFO for a decade (2000: 312). Moments of crisis allow for management adjustments that have proven difficult to introduce during periods of stability and economic success.

The new advisory process integrates sectors in the planning process, and includes a broader cross-section of interests, but does not restructure the relationship between science and local knowledge. In terms of pre-season planning, the Integrated Fisheries Management Plan will still be constructed around a science-based risk management framework, with decision tables characterizing the impacts of different management options on various run-size scenarios. Regarding in-season estimates, improved and expanded test fisheries were recommended, and “traditional knowledge and on-water information will be evaluated as a means of augmenting these information sources” (External Steering Committee 2003: 54).

This does not indicate a new approach to reconciling fishers’ abundance estimates with those of DFO scientists. The new advisory process emphasizes efficient consultation and the integration of commercial harvest planning with other interests. The new structure essentially reduces the number of area-specific representatives participating
at the higher levels of integrated planning and consultation. Some fishermen worry that this structure thereby reduces their access to higher levels of authority and the expression of area-specific concerns and interests.

**Co-management Limitations**

The question of how to effectively include fishers in the management process is a significant topic in contemporary fisheries research. Inclusive, co-operative management is complicated and confounded by scientific and political issues. The logistics of the fishery and the politics of allocation, in addition to divergent perspectives on run assessment, make the Fraser sockeye fisheries particularly difficult to manage.

Healey and Hennessey have documented the increasing complexity of fishery management structures for the Fraser River sockeye fishery and other North American fisheries (1998). The Fraser system is inherently complicated by the fact that harvesting occurs in reverse order of priority (ibid.: 113). The Supreme Court of Canada, in the ruling on R. v. Sparrow 1990, established the order of management priority as: conservation, First Nations food, social and ceremonial fisheries, recreational fisheries and finally, commercial fisheries. However, commercial fisheries intercept the fish first, and spawning escapement occurs last. The cumulative effect of changes in the regulatory regime during the last three decades has resulted in the need for increased complexity and precision of management. This demands an accuracy and efficiency that management structures are unable to achieve (ibid.: 116). In recent years, the budget of the DFO has been steadily reduced, resulting in even greater difficulty in fulfilling the data requirements of complex resource management scenarios such as the Fraser River
sockeye fisheries. Fishers increasingly question the ability of the DFO to compile the data needed to manage fisheries according to subscribed models.

Furthermore, the complexity of management makes demands on government scientists and resource managers for predictions that might be at odds with local knowledge. Smith has identified two divergent models of Nature held by technical experts and resource users respectively. Technical experts such as biologists and economists tend to model linear relationships, defining parameters and variables of change, whereas fishers tend to adhere to an understanding of Nature in terms of non-linear “Chaotic” relationships, and a tendency to disequilibrium (Smith: 1990: 4,5). Smith warns that the “intellectual baggage” of participants in the management process impacts compliance (ibid.: 11). Thus, both the limits of the ability of the DFO to accurately assess and predict stocks, and disbelief on the part of fishermen that this kind of prediction is even possible, can combine to compromise the negotiation of management priorities and regulations. A press release from the industry representatives to the federal review of the fishery emphasized the need for flexible in-season management structures because “Salmon fisheries are dynamic, highly variable and notoriously unpredictable... This resource cannot be managed by a cookbook or by remote control” (December 10, 2002). Thus, as Vestergaard has indicated for northern European fisheries: “there is a conflict between the attempts to impose control and advance planning on fish catches, on the one hand, and fishermen’s habitual understanding of the relevant facts, their accustomed strategies of action, and their interpretation of their role in society, on the other hand” (1996: 25).
Coincident to the increasing complexity of management, has been the shift towards the inclusion of stakeholders in formal co-management processes. Increased involvement of fishers in the management process provides the opportunity for direct engagement with, and critique of, management structures and stock assessment models, and also increases stakeholders' potential disappointment with the system. Co-management's two most lauded attributes are the expansion of the data that informs management and regulation through the inclusion of harvesters' knowledge, and the enhancement of legitimacy and thus compliance by including harvesters in decision-making (see Felt 1994, Jentoft, McCay and Wilson 1998). However, while co-management has been established as a "panacea" for the current crisis facing fisheries management (Pinkerton 1987), it is not successfully resolving issues of regulatory legitimacy. And while co-management structures are usually born out of "crises of consent" (Pinkerton 1989:23) which prompt a reworking of management, fishers' consent to be regulated must be maintained by a credible process.

Jentoft has noted that co-management participation itself can become a new source of legitimation crisis by creating a discrepancy between ideals and realities, between intent and results (2000). In earlier work, Jentoft distinguished between forms of legitimacy in fisheries management. While there might be "content legitimacy" to a set of regulations, meaning that they serve their purpose, are understood, and function justly, the structure might not have "procedural legitimacy", derived from stakeholders' input in decision-making and their concerns being heard in a manner acceptable to them (1996: 109). While the Fraser River Panel decisions may have had content legitimacy in
their focus on conservation concerns, the lack of procedural legitimacy resulted in non-compliance.

Jentoft identifies two different reactions of fishers to regulatory regimes at odds with their interests. One option is “voice” where fishers express their disappointments publicly and engage with the management system. The other option is the “exit response”, showing discontent by non-compliance with regulations (Jentoft 2000: 140). Co-management is intended to enhance the perceived legitimacy of fisheries management for stakeholders (ibid.: 148), thereby encouraging the “voice” option and increasing compliance. However, if co-management structures do not fulfill local moral and practical expectations, these consultative structures themselves can become the source of disappointment (ibid.). Thus the crisis of consent that Pinkerton identifies as encouraging co-management, can be re-created by unsuccessful co-management experiences.

The unexpected patterns of the 2002 Fraser River sockeye runs resulted in conflict between fishermen and managers, and disappointed and disenchanted fishermen. Fishermen were discontent with the discrepancies between DFO’s pre-season predictions and the realities of the run, and with the management decisions made in light of these discrepancies. The ability of the DFO to accurately predict and efficiently manage fish abundance was called into question. The inability of the structures of management to incorporate local knowledge regarding abundance during the course of the season left fishers frustrated and prompted an “exit” response. Protest fisheries resulted in over one hundred charges against commercial fishers.

The Anderson Case, the prosecution of Area H trollers who participated in a protest fishery on August 20, shifted the focus from questions of abundance and biology
to questions of allocation and equity. The “exit” response of fishers resulted in a new “voice” option; their critique of DFO management found a forum in the provincial court system. The case provides an example of how the inadequacy of co-management structures to meaningfully incorporate local knowledge can have significant political impacts. The Anderson case transformed the Area H trollers’ frustration regarding risk-averse management into part of a larger battle regarding Aboriginal fishing rights.

**From Abundance to Allocation: The Shifting Focus of the Sockeye Conflict**

While the abundance of fish and the DFO’s inability to adjust management plans accordingly were the major issues throughout the late summer, the focus increasingly shifted towards questions of allocation. The sports fishery representative on the Fraser Panel resigned in response to an in-river Aboriginal commercial fishery (under the Aboriginal Fisheries Strategy) that was scheduled for August 7-8 without the required approval protocol. The representative, in his letter of resignation, linked the closure of recreational fishing to a Vancouver Island food fishery. Bill Otway’s final report to the Fraser Panel noted that as of August 7th, Aboriginal commercial fisheries had achieved 55% of their pre-season allocation, and were continuing to fish. The commercial fleets (gillnet, seine and troll) had achieved between 4% and 22% of their allocation, and were officially closed. The sports fishing representative suggested that the Fraser Panel had worked well in the past, but that DFO had “hijacked this process to serve the commercial fishing interests of the Canadian Aboriginals.” Subsequently, the 15% exploitation limit on late run fish was adjusted so that the commercial fleet gained further fishing opportunity, but the link between opportunity and allocation became an increasing focus of stakeholder criticism.
The order of interception of salmon results in coastal commercial fisheries encountering the fish before the majority of in-river Aboriginal fisheries (commercial and subsistence). The harvests of the former must thus be controlled in order to maintain enough of a run for in-river fisheries and spawning escapement. Coastal fishermen thus interpret the closure of their fisheries as an effort to provide fish to Aboriginal fisheries. This conflict does not breakdown simply according to ethnic lines. The 2002 sockeye season was subtly reinforcing the perception of a breach between coastal and river First Nations. Some Aboriginal commercial license holders understood their fishing opportunities to be directly affected by the in-river “pilot sales” fisheries mandated under the Aboriginal Fishing Strategy (AFS). On the dock in Port Hardy that summer, I ran into a fisherman I knew from Prince Rupert, who had traveled down south to gillnet in Area D. Hank is approaching seventy years of age, and is a member of the Tsimshian Nation. Hank sat down beside me outside the port office and we talked of the short openings and the rumours of great abundance. Hank sighed and said:

"There are lots of fish, but they are sending them upriver for the Indians up there. They don't care that there are Indians out here trying to fish."

Early in next season the Native Brotherhood of British Columbia released a press statement that the Pilots Sales component of the AFS was “divisive and destructive to the livelihood of the coastal native People, who are almost all commercial fishermen” (Native Brotherhood July 8 2003). Thus, the perception of allocation process at work in the management of salmon fisheries resulted in an Aboriginal fishing organization speaking out against the Aboriginal Fisheries Strategy. Aboriginal fishers in the commercial fleet perceived themselves to be in conflict with the Aboriginal fishers in the
First Nations commercial fisheries. This example reveals the way in which competition over salmon resources is more complex than an ethnic conflict between “white” commercial fishermen and First Nations peoples, although it is often constructed as such. It also emphasizes the way in which the context of resource competition is perceived according to position in the industry and position along the migration route of salmon to the spawning grounds. Finally, this points to the way in which DFO conservation measures are consistently interpreted by many different fishers as methods of reallocation.

Allocation to the in-river fisheries was not, however, the primary focus of most dock-talk in Port Hardy that summer, nor the focus of most of the battles in the Fraser Panel. Fishermen emphasized the fish they had encountered and the fish they were hearing about from various sources along the coast. The question of Aboriginal access was raised later, in the courts. The Anderson case reveals the way in which knowledge conflicts and resource conflicts are inextricably combined in the contemporary fishery.

On August 20, the Area H troll fleet conducted a protest fishery which they termed an “information fishery”, catching approximately 5400 fish. Most of the fish were distributed to family, the public, and food banks. Forty fishers were charged with illegal fishing in Johnstone Strait. Gillnetters in the Fraser River (Area E) also protested in late August, with over 100 charges laid. An Area H representative stated that the “primary issue of the protest fishery was DFO’s inability to respond in a flexible manner to changing circumstances”. A UFAWU Brief submitted to the House of Commons Standing Committee on Fisheries suggested that the “information fisheries” conducted in late August were a response to DFO manager Wayne Saito’s cry of “Show me the fish.”
in reply to industry requests to adjust the 15% cap on Late run fish. The court case that followed however, focused on issues of allocation rather than abundance.

During the Johnstone Strait protest fishery, thirty-nine trollers and one gillnetter were charged with fishing during a closed time contrary to Section 53 of the Pacific Fishery Regulations. The average catch was 135 sockeye per boat, and ranged from five hundred fish to none. The Gulf Trollers Association, the Area H representative organization which participated in co-management consultations with the DFO and market development, decided to support the defendants, raising money for, and organizing the defense. The Gulf Trollers’ Association contacted the Fisheries Survival Coalition regarding financial and organizational support.

The Fisheries Survival Coalition is an organization that has been focused for the last decade on criticizing the Aboriginal Fisheries Strategy and its impacts on coastal commercial fishing opportunities. Coincident to the trollers’ case, the Coalition was involved in the final stages of a court case dealing with a protest fishery in 1998 during which 140 charges were laid. The fishers had set gillnets in the Fraser River during a First Nations AFS commercial fishery, protesting what they called a “race-based fishery”. The Kapp case defense (after John Michael Kapp, the first-named defendant) focused on issues of enforcement in the in-river First Nations fisheries, and the question of discrimination against non-Aboriginal commercial fishers. Defense attorney Chris

35 A thorough analysis of the FSC’s activities and rhetoric is beyond the scope of this dissertation, however, some discussion of their role in fisheries activism is necessary. The FSC opposes the First Nations commercial fisheries provided under the pilot sales program of the Aboriginal Fisheries Strategy. They describe these fisheries as “race-based” and thus unconstitutional. Their protest fisheries are correspondingly described as “all-citizens fisheries”. This discourse challenges the assertion of Aboriginal Rights by inverting the language of the civil rights movement, thereby collapsing Aboriginality into ethnicity. The politics of the FSC share many common features with the European ‘new right’ as discussed by Holmes (2000).
Harvey had a long history of fisheries litigation, and the Fisheries Survival Coalition suggested that he represent the trollers in the latest protest fishery case.

The trollers, rather than pursue the lengthy and costly proceeding associated with a plea of not guilty, opted to plead guilty with extenuating circumstances. The basis of their defense was questioning the justification of the 15% harvest limitation on late run stocks, management inflexibility, inadequate assessment, and lack of enforcement of the in-river fisheries (Gulf Trollers Association Newsletter Dec. 2002). The court case essentially shifted the trollers' critique of DFO management from abundance estimates to allocation politics. A Gulf Trollers Association representative suggested in-season debates of the Fraser River Panel focused on stock assessment issues, and allocation within the commercial framework (i.e. maintaining the distribution balance between Areas). Stock management issues were the impetus for the protest, but the FSC linked the troll closures to ongoing issues with the AFS fisheries.

*The primary issue of the protest fishery was DFO’s inability to respond in a flexible manner to changing circumstances. They could certainly respond by closing fisheries if abundance was lacking, but were unable to move when the fish were there. At the time of the protest there was literally too much to ignore and far too much for escapement. Many of my group wondered whether this commercial closure was enjoyed by all commercial harvesters. It took Chris Harvey and Phil Eidsvik to connect the dots. Our guys were willing to face the consequences of their actions based primarily on their conviction that the department had become dysfunctional. Chris, fortunately, recognized the inequity of enforcement and built the case according.*
The defense of extenuating circumstances was developed around both biological and political issues: the inflexibility of in-season management of the fishery, and the characterization of greater opportunities afforded to in-river AFS fisheries. The Defendant’s Book of Documents included:

- excerpts from Aboriginal rights cases, which emphasized the common property aspect of fisheries and lack of exclusive rights for Aboriginal commercial sale
- transcripts from the Kapp case, detailing enforcement problems on the Fraser River
- DFO funding shortfalls, highlighting the department’s inability to adequately assess certain stocks of fish which were presented to undermine the accuracy of pre-season predictions
- respective openings and closures for commercial and Pilot Sales fisheries
- PSC material citing positive indicators for run size and low pre-spawn mortality, and material indicating difficulties in accurately estimating run size
- post-season estimates of high levels of spawning escapement
- historical catch data for Fraser River sockeye
- 2002 Review recommendations re. DFO stock assessment and run size/timing estimates
- Fraser River Sockeye Decision Rules from IFMP, which show increased harvest rates when run size reached certain levels

The defense estimated that based on the surplus fish, and the Area H allocation of 12%, the trollers lost access to 687,347 fish ($13.8 million), or gross revenue per vessel
of $91,000. The average actual gross revenue per vessel based on the Area H catch, and 151 participating vessels was $15,740.

The textual material presented by the defense was divided almost equally between documents and notes regarding biological management, and those regarding First Nations commercial fisheries. The judge’s ruling however, emphasized the question of fairness and resource allocation. The Anderson case (after John Albert Anderson, first-named defendant), became focused on the enforcement of the AFS fisheries.

Judge Saunderson focused on the transcripts provided from the Kapp case of the testimony of Jacob Redekopp, DFO enforcement officer on the lower Fraser River. The testimony emphasized the lack of funds and managerial support provided to enforce fisheries regulations during Aboriginal fisheries. The judge found that the Minister of Fisheries and Oceans “has intentionally refused to provide the means and instructions to enforce the rules relating to the Fraser River Sockeye Indian food and pilot commercial fisheries” (BC Provincial Court 2003: 4).

The conclusions of the ruling were a damming critique of the DFO’s allocation and enforcement policies, resulting in absolute discharges for all the fishermen involved.

The result of what some might describe as the DFO’s policy of political correctness, but what I choose to call a lack of courage to carry out its mandate as defined by our highest court, is the loss of its moral authority.

...This is not a matter requiring proof of a direct causal link between the Aboriginal Fishing Strategy and the fishing closure in question. Nor is it a matter of people who fish illegally avoiding punishment if they can show, after the fact, that the DFO could have opened the fishery without harm to the fish stocks – such is not a proper decision for the court. At the end of the day, it comes down to a matter of fairness and the perception of fairness. Unquestionably, on the facts of this case, the DFO has not acted in an even-handed way toward all commercial sockeye fishermen (ibid.: 5).
The judge stated that the DFO had lost its moral authority. Interestingly, the debates throughout the summer had been focused on the Department’s scientific authority. Moral issues of equity of access and enforcement were drawn into the defense as the FSC and their attorney analyzed the reports of the Fraser River Panel regarding fishing opportunities in coastal and river areas respectively. The Anderson case became linked to the much larger Kapp case, in which the constitutionality of the Aboriginal Fishing Strategy was being debated. Kapp transcripts became evidence for the trollers’ defense, and Judge Saunderson’s ruling became a feather in the cap of the Fisheries Survival Coalition in their battle against Aboriginal commercial fishing rights. The conflict between local and scientific knowledge that could not be resolved through the Fraser River Panel, was thus transformed into a debate over Aboriginal fishing rights and commercial harvest allocation.

**From scientific models to moral authority**

This analysis of the Fraser fishery highlights the links between ecological knowledge and political knowledge in the context of resource management. In a highly politicized management context such as the BC salmon fisheries, ecological issues collapse readily into political maelstroms. Risk-averse management of Late run sockeye, in the form of the refusal to increase the exploitation rate from 15%, became interpreted as part of a re-allocation process removing fish from the coastal commercial harvest to in-river Aboriginal fisheries. Thus, critiques of the DFO citing wasted fish and hundreds of millions of lost dollars were followed closely by the condemnation that the Department had “lost the right to demand the respect of the public” (BC Provincial Court 2003: 5).
This issue links directly to the discussion of the Coho Crisis, and the cumulative and lasting effects of political knowledge in fisheries management. The Coho Crisis was one example of how fishermen can interpret conservation measures as a form of reallocation. The Area H case is a later example of this ongoing question in the BC fisheries, and reflects the raising of the stakes through the involvement of the judicial system in the conflict. The uncertainty of resource allocation and the lack of determination regarding the scope of Aboriginal fishing rights in BC result in the shadow of allocation looming over all management decisions. One of the key aspects of BC commercial fishermen’s knowledge is the perception and interpretation of Aboriginal fishing policy. The intersectoral competition over access to salmon harvesting opportunities shapes the understandings of fishermen and structures the interaction between government management and industry actions.

In this example, the complex intertwining of ecological and political knowledge is particularly clear. The political knowledge of commercial fishermen regarding allocation became embroiled with their ecological knowledge regarding sockeye abundance. The failure of co-management structures to validate this ecological knowledge triggered a shift to a focus on, and implementation of, political knowledge. What was a battle over abundance thus became a battle over allocation. The defense of the protest fishery, a fishery that was a response to the failure of the Fraser Panel to successfully integrate fishers’ ecological knowledge, came to emphasize the political question of allocation and equitable fishing opportunities rather than conflicts over perceptions of abundance.

The conflict over the 2002 sockeye fishery involved epistemological conflicts between two forms of knowledge: scientific stock assessment and fishers’ ecological
knowledge, and between two divergent priorities: harvest and conservation. Fishers' observations of abundance were incompatible with the models and processes of stock assessment used to conduct in-season management by the Fraser Panel. The spawning escapement priorities of the Panel emphasized a precautionary approach to upgrading the run estimates as more fish arrived. Fishers' saw fish swimming by, and emphasized the lost income they experienced and the potential dangers of "overspawning".

The management of the run and the debates over fishing opportunity in August 2002 highlight the persisting conflicts between local knowledge and resource management structures based on biological science. The incompatability of local ecological knowledge and the DFO's predictive models resulted in protest fisheries with significant political fallout. The Fraser River Panel failed as a co-management structure due to basic differences between fishers' priorities and ecological perceptions, and government mandates and biological models. Consultation processes were unable to prevent non-compliance because there was no meaningful incorporation of fishers' ecological knowledge into in-season management decisions.

The protest fishery illustrates political knowledge in practice, as fishers responded to an ecological knowledge conflict with political action. The ultimate power of the DFO's stock assessment models in determining fishing opportunity resulted in disillusioned fishers who sought to prove sockeye abundance through an "information fishery", and protest the power of DFO models. The failure of the co-management structure to satisfy fishers' expectations regarding the inclusion of their ecological knowledge, prompted a shift from ecological to political assertions. The defense of the protest fishery, based on inequitable allocation of opportunity and enforcement issues in
AFS fisheries, reflects fishers' political knowledge of the context of competition and of the legal climate of the moment. The Anderson case linked to a larger case simultaneously being prosecuted regarding the constitutionality of the Aboriginal Fisheries Strategy, and provided fishers with a venue in which to articulate persisting concerns regarding allocation.

The Area H protest fishery illustrates the entanglement of ecological and political knowledge. The protest fishery was prompted by fishers' confidence in their own ability to recognize sockeye abundance, and a distrust of DFO stock assessment and management procedures. Their ecological perceptions of fish abundance and their political perceptions of inequity resulted in a strategy of non-compliance.

The protest fishing was condoned by a provincial court judge on the basis of the DFO's loss of moral authority. After a season of debates regarding scientific uncertainty in abundance predictions and mortality rates, the question of legitimacy and authority became transferred to issues of allocation and equity. The DFO's difficulties in managing fish became overshadowed by the DFO's inability to manage fishers. Enforcement issues in the lower Fraser First Nations fisheries became justification of the troll protest fisheries in Johnstone Strait. The conflation of these issues points to the complexities of management issues in a competitive and politicized environment. The ecological knowledge of fishers could not be incorporated into the management system, but their political knowledge allowed them to relate the protest to the larger, long term debate on Aboriginal fishing rights. The political knowledge of fishers effected the redirection of the debate from fish abundance to fish allocation, transforming their "information" fishery, into a "protest" fishery. The conflict thus shifted from between
commercial fishers’ knowledge and biological science-based management to between commercial fisheries and Aboriginal fisheries.

Judge Saunderson’s ruling emphasized the importance of the “perception of fairness”. The perception of fairness speaks directly to the issues regarding fishers’ political knowledge. This type of knowledge is not necessarily correct or incorrect, it is situational and contingent. The crucial issue is that what stakeholders perceive about fisheries management and fisheries policy affects how they fish, and how they participate in co-management structures. In 2002 fishers perceived mismanagement and acted accordingly by conducting protest fisheries. The basis of that mismanagement was transformed from scientific to political in the judicial process. Whether the protest was in fact about science and local knowledge, or about Aboriginal pilot sales fisheries, ultimately doesn’t matter. What is significant is that the co-management process crumbled during a year of incredible sockeye abundance because of the limited ability of the Fraser River Panel to listen to fishermen.

This case study reveals the way in which ecological and political issues, and ecological and political knowledge are closely intertwined in the contemporary commercial fishery. Differing perceptions of fish abundance and differing perceptions of management fairness combined to create co-management and legal crises. The persisting questions and conflicts regarding allocation between commercial and Aboriginal commercial fisheries result in AFS fisheries becoming the ultimate conflict in management scenarios for southern fisheries. Conflicts over stock assessment models collapse quickly into debates over Aboriginal fishing rights as ecological issues are increasingly interpreted as political priorities. The chronic failure of the state to reconcile
fisheries allocation issues and fishers' political knowledge, and the re-occurring failure of management structures to productively engage with fishers' ecological knowledge, results in crises of legitimacy such as the 2002 Fraser River sockeye fishery.
Chapter 7: COSEWIC and Knowledge Politics

The aftermath of the 2002 Fraser River Sockeye fishery was to have a lasting impact on southern commercial fishing opportunities. On October 25, 2002, the Committee on the Status of Endangered Wildlife in Canada issued an emergency designation of sockeye populations of Sakinaw Lake and Cultus Lake as endangered. The COSEWIC designation was a dramatic ending to a season rife with conflict and rich with examples of the politics of knowledge. An analysis of the designation and the COSEWIC mandate provides a vehicle for the discussion of macro-level issues regarding the politicization of knowledge and the political context of knowledge conflicts. This chapter focuses on policy-level definitions and validations of alternative knowledges, and the practical and political implications of these concepts. Through an analysis of the politics of knowing in contemporary resource management contexts, this chapter identifies the dangers of restrictive approaches to alternative knowledges. The analysis of the government’s politicization of ecological knowledge underscores the significance of position in the way in which different knowledges interact in a resource management context. Fisheries knowledge is politicized by the context of competition and instability in the fishing industry, but it is also directly politicized by government policy.

The endangered designation is rare, and is made when the risk of extinction is imminent. Both runs had become sources of growing concern for the DFO and the commercial fishing opportunities on the late run sockeye in 2002 prompted biologist Ken Wilson to request an emergency assessment of the Cultus and Sakinaw runs. The emergency listing would allow for the COSEWIC designation to impact the 2003 fishing
plans. Wilson’s motivations for initiating the designation were the release of the status
documents by DFO and the 2002 Fraser sockeye harvest plan which set the harvest level
for Cultus sockeye at 40% (Ken Wilson, personal communication).

The Cultus and Sakinaw sockeye runs are part of the Late run aggregate of the
Fraser River. The stock assessments used for the designation were based primarily on
biological reports compiled earlier that year by DFO scientists. Their evidence suggested
that the Sakinaw population had been depleted due to overfishing, as well as insufficient
water flow and water levels to allow spawners to enter the lake (COSEWIC press release
2002). Similarly, the Cultus population had been subject to unsustainable harvest levels
most years between 1952 and 1995, and had suffered extremely high pre-spawn mortality
from 1995 onward (90% in 2001).

Many members of the commercial fishing industry reacted hostilely to the
emergency designations due to their potential impacts. New legislation, in the form of
the Species at Risk Act (SARA), added weight to the COSEWIC report. Species labeled
as endangered by the committee now go through a process of assessment by the federal
cabinet to be designated under the new act. Once an animal is listed under the Species at
Risk Act, killing or capturing that animal is illegal. If the Minister of the Environment
chooses to follow the COSEWIC recommendations and list the two sockeye runs under
SARA, it will essentially terminate most interception fisheries on Late run Fraser
sockeye.

One strategy of commercial fishing interests was to question the genetic
uniqueness of the populations. The Sakinaw population was altered by egg introductions
from a hatchery each year 1902-1906, with brood stock drawn from five different rivers. Hatchery fry were introduced to Cultus Lake in 1911, and fry from the Birkenhead river in 1921 and 1922 (Fishnet listserve November 5, 2002). Environmental and habitat degradation were also sited as major problems for each system, which would continue to impact spawning despite commercial closures. Fish farms had been in place near the Sakinaw lake since the 1980s (Fishnet November 2002, May 2004). The recreational development and traffic on Cultus Lake is frequently cited as a major issue by commercial fishing interests (Letter from BC Seafood Alliance April 30 2004 to Minister of Environment and Minister of Fisheries and Oceans).

Finally, the political and economic implications of the designation have been debated by commercial fishers who perceive this through the ubiquitous allocation lens. The designation will drastically curtail coastal commercial opportunities to fish any late run Fraser sockeye. Risk-averse management approaches will prevent fishing on the stronger runs with the threat of incidental exploitation of the species at risk. This may result in increased opportunities for in-river fisheries above the Cultus Lake, as they will not encounter the endangered fish, and more significantly, there will be more Late run fish from other runs that have not been caught in outside waters. The endangered species designation is thus also understood as part of a pattern of reallocation to the in-river fisheries.

This particular designation, and the COSEWIC process in general, provides an interesting case study regarding the politicization of ecological knowledge. The

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36 At the time of writing, the Minister has chosen not to list the sockeye under the Species at Risk Act at the present time, despite the COSEWIC designation, but he is being lobbied by environmental interests to reverse this decision.
applications for emergency designation for the sockeye runs were notable for their inclusion of Aboriginal knowledge regarding the significance of the Cultus Lake sockeye, and their gradual decline during the last few decades. COSEWIC has recently formalized their efforts to include Traditional Ecological Knowledge in their assessment and designation processes through the development of an expanded mandate and terms of reference. This mandate has meaningful implications for the way in which ecological knowledge is politicized in the resource management process.

**COSEWIC and ecological knowledge.**

The designation of the two sockeye runs as endangered involved the integration of several knowledge sources. The application for emergency designation was submitted by Ken Wilson, a former DFO biologist, a COSEWIC member, and the DFO liaison to the Fraser River First Nations. The DFO reports on the Cultus and Sakinaw runs lead him to enlist the support of the Soowahlie and Sechelt Bands for the endangered species designation. The Soowahlie Chief became coapplicant for the Cultus Lake designation. The application included biological data, and information regarding the importance of the species.

A COSEWIC press release states that the organization “used information from the Soowahlie Band” in their designation. The information included in the application for emergency designation was under the heading “Special Significance”:

Cultus sockeye are of significance to many human populations but especially the Soowahlie Band of the Sto:lo First Nation. Cultus lake is within the traditional territory of the Soowahlie Band and the Sto:lo Nation, and spawning grounds for Cultus sockeye are within the Soowahlie reserve. The location of the Soowahlie reserve adjacent to Cultus sockeye spawning grounds is not coincidental, because Cultus sockeye have placed a crucial role in the survival of the Soowahlie Band.

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37 The Fishnet listserv is an email list devoted to BC fisheries issues, subscribed to primarily by commercial fishers, but also academics, processors, and others with an interest in the industry.
Cultus sockeye remain necessary for the well-being of the Soowahlie Band and continue to be of great cultural, spiritual and economic importance. Chief Doug Kelly, of the Soowahlie Band is a co-proponent of this emergency-listing request. (from Request for Emergency Assessment)

The emergency designation application for the two sockeye runs was assessed and approved by a subcommittee of COSEWIC. In the press release quoted above, the designation was characterized as including Aboriginal Traditional Knowledge. This referred not to ecological information regarding sockeye abundance, but rather, the social and cultural significance of Cultus Lake sockeye to the Soowahlie people. The COSEWIC definition of Aboriginal Traditional Knowledge is thus more expansive than many bureaucratic understandings of indigenous knowledge or TEK, in that it includes non-ecological context and social relations. However, the way in which COSEWIC deals with alternative knowledges in general is neither expansive or inclusive.

At the time of writing, COSEWIC’s template for dealing with ATK was still in development. The terms of reference for the ATK sub-committee will not be available until the end of 2004. The definition of what knowledge will be shared, who will share it, and the protocol for sharing is being developed by the Aboriginal people who are part of the ATK subcommittee (Gloria Goulet, email communication). The approach will be informed by COSEWIC’s dealings with the Wildlife Management Boards that have been established as part of various Comprehensive Land Claims Agreements in the Canadian north.

COSEWIC defines Aboriginal Traditional Knowledge and characterizes its integration into the committee’s assessment procedures as follows:

- Includes, but is not limited to, the knowledge Aboriginal Peoples have accumulated about wildlife species and their environment.
• Other words commonly used to describe this knowledge include: Traditional Ecological Knowledge (TEK), Inuit Qaujimajatuqangit (IQ), Indigenous Knowledge (IK) and Naturalized Knowledge Systems.

• Is a complex process incorporating aspects of culture, spirituality and history. Therefore, peoples with different backgrounds (Indian, Inuit and Métis) may define ATK in different ways.

• All people who live in close association with the land, such as farmers and fishers, have knowledge about wildlife species. This knowledge is referred to as local knowledge.

Incorporating Aboriginal Traditional Knowledge into COSEWIC’s assessment of species at risk:

• Will improve the process, and therefore the quality of designations made by COSEWIC, by bringing information and perspectives on wildlife species that is not available in published scientific literature. (COSEWIC website)

The COSEWIC Aboriginal working group on species at risk includes representatives from national Aboriginal organizations and regional groups.

National: Inuit Tapiriit Kanatami
Assembly of First Nations
Metis National Council
Metis National Council of Women
Congress of Aboriginal Peoples
Native Women’s Association of Canada

Regional: Council of Yukon First Nations
Okanagan Nation Alliance
Walpole Island First Nation
Labrador Inuit Association
Inuvialuit Game Council
Union of Nova Scotia Indians
Labrador Metis Nation
Manitoba Keewatinowi Okimakanak

The ATK sub-committee is still in development, with nominations being sought from the above Aboriginal organizations. In addition to that, a network of knowledge holders will be created from Canada’s eco-regions that will facilitate Aboriginal community contact.

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38 www.cosewic.gc.ca
links for the writers of species status reports. Currently, only “available” ATK is used (i.e. previously documented data), however a recent status report on the Peary caribou does include original information from interviews with Inuit hunters conducted by the report writer (Gloria Goulet, personal communication).

The way in which non-Aboriginal, non-scientific input is incorporated into the COSEWIC process is less formalized. In response to a question about the inclusion of non-Aboriginal ecological knowledge in COSEWIC processes, Dr. Marco Fiesta Bianchet, the chair of the committee, replied:

Anybody can contribute knowledge to COSEWIC or to report authors. COSEWIC currently does not issue calls for public input, because it relies on a network of experts and of biologists from range jurisdictions who in turn rely on a network of biologists and local contacts. You must understand, however, that COSEWIC status assignments are mostly based on information such as population trends, habitat quality and trends in habitat areas, as well as introduced predators, competitors, parasites etc. In many cases, “local” knowledge has limited usefulness for Status Assignments, because it is, well, local. We look at what happens over the entire range of a species, and in most cases that means looking at the bigger pictures. In the case of species with very limited distributions, local knowledge about precise locations or historic distribution can be incorporated in status reports.

Also, please note that COSEWIC only considers available biological and ATK evidence: status assignments are not based on economic, social or political considerations. COSEWIC is not involved in management or recovery: all that it does is inform Canadians of the status of wild species. (Fiesta Bianchet, email communication Nov 5, 2002).

What is significant in this statement is Fiesta Bianchet’s suggestion of the limitations of the value of local knowledge for COSEWIC assessment purposes. He suggests that its local specificity limits its usefulness. However, the local scale and specificity of Aboriginal knowledge is one of the key traits identified by researchers (see Grenier 1998, Berkes 2000). TEK derives from the resource use of indigenous peoples in their territories over multiple generations. It shares the trait of locality with LEK, although it
is differentiated by a greater time depth. Fiesta Bianchet's statements suggest that COSEWIC assessments persist in allegiance to a mainstream western scientific framework. If local knowledge has limited practical use for COSEWIC, then the same must be said of "ATK". The difference therefore is the political weight of First Nations knowledge, not its data characteristics.

The conclusion of the statement suggests a politicized understanding of community knowledge: the committee considers biological and ATK evidence, but not economic, social or political considerations. This assumption that biological and indigenous knowledge are free from political influence is problematic, especially in light of the scenarios discussed in the preceding chapters of this dissertation. The politicization of science and that of TEK, have been discussed by social scientists (see Latour 1983, Nuttall 1998). Furthermore, the aboriginal knowledge included in the application for emergency designation of the Cultus Lake sockeye was social and economic; the significance of the species to the Soowahlie Band was the information provided by the First Nation. Finally, Fiesta-Bianchet's emphasis on science and ATK as the data sources for COSEWIC reinforces the difference between the committee's mandate and terms of reference.

COSEWIC purports to welcome information from all sources, but the key issue is its mandate to deal with this information. At a community meeting in Prince Rupert co-sponsored by COSEWIC and DFO regarding the new Species at Risk Act, the COSEWIC representative understood public input only to be relevant after a designation had already been made. I asked about the limited mandate of using the best available science and ATK data, and how local knowledge could be included in the process. The COSEWIC
representative responded that local or public input was welcome in the Recovery Planning stage.

COSEWIC’s approach to non-Aboriginal, non-scientific information is thus ambiguous. The mandate of the committee states: “COSEWIC bases its decisions on the best up-to-date scientific information and Aboriginal Traditional Knowledge available.” The terms of reference, however, include non-Aboriginal knowledge: “COSEWIC uses the best available scientific, Aboriginal and community knowledge to assess species. The assessment process is independent and transparent.” (COSEWIC website). In this case, the difference between a mandate and terms of reference is significant. The Oxford English Dictionary defines a mandate as a commission, the etymology relating to the Latin verb ‘to command’. Terms of reference more specifically “define the scope of an inquiry”. There is no sub-committee on community knowledge, or a program in place to facilitate the incorporation of community knowledge into the COSEWIC process. While community knowledge is within the scope of COSEWIC, it is not part of its mandate.

The politically-oriented mandate to include ATK in the COSEWIC process is part of the federal government of Canada’s slowly expanding recognition of Aboriginal sovereignty and self-determination. First Nations representatives (individuals and groups) are increasingly participating in governmental consultations processes and decision-making structures. Thus the ATK sub-committee reflects the recognition of the value of Aboriginal knowledge regarding species at risk, but is also an affirmation of First Nations sovereignty in resource management and conservation.

What does it mean then that there is no sub-committee on community knowledge? This implies an assumption that the scientific approach of the committee – the biological
methods of assessment and designation - reflect the knowledge system and conservation values of the dominant society as a whole. This arrangement assumes that non-Aboriginal Canadians’ interests and needs are met by the committee’s standard protocol and structure. However, research on local ecological knowledge focusing on the knowledge held by resource users has emphasized the potential differences and conflicts between LEK and “western modern science” (Smith 1990, Griffiths 2002, Neis et. al. 1999, Hutchings 2000). Biological models and data sets often do not represent the ecological understandings held by non-Aboriginal resource harvesters - commercial, subsistence, or recreational. Harvesters develop knowledge about species and ecosystems that biological studies have difficulty generating. This type of information can augment stock assessments and recovery plans.

The COSEWIC structure is perhaps reasonable and appropriate regarding power dynamics and Aboriginal sovereignty. However, while attending to these important political issues, the committee has persisted in compromising its ability to access comprehensive non-scientific data regarding species at risk by underestimating the relevance of local/community knowledge.

The COSEWIC mandate reflects a trend that is emerging in many resource management scenarios in “post-colonial” contexts. The recognition of indigenous rights, and assertions of indigenous sovereignty have prompted government resource management structures, as well as environmental NGOs, to include indigenous knowledge in research and co-management processes. Since the 1990 Sparrow decision, DFO consultations with First Nations have increased substantially. While the true nature of DFO’s engagement with First Nations ecological knowledge is less apparent, the
department is increasingly obliged to contend with Aboriginal understandings of environmental and resource health. The COSEWIC ATK sub-committee is similar to the efforts of other governmental and academic structures to add TEK wherever ‘science’ once stood alone as a data source.

The implications of the COSEWIC mandate, and similar consultation directives of other government agencies and environmental NGOs, are three-fold. First, politicization of ecological knowledge eclipses some stakeholders from environmental consultation and thus limits the alternative data that could supplement and complement the biological science that informs COSEWIC assessments. This exclusion both politicizes the data collection process and reduces the comprehensiveness of available ecological data. Secondly, the restrictive integration of Aboriginal knowledge, while including some aspects of First Nations environmental expertise, nevertheless perpetuates a colonial understanding of Aboriginal resource rights and resource use. Specifically, the definitions of ATK essentially exclude the knowledge of Aboriginal commercial fishers and thus reinforce problematic and colonial categories of traditional and modern Aboriginal resource use. Finally, the structure of inclusion of ATK in the COSEWIC process de-localizes and de-contextualizes Aboriginal knowledge.

The politicization of ecological knowledge

As academic researchers have increasingly documented the significance of indigenous environmental knowledge for resource management, TEK has garnered some support in various government processes, and is increasingly cited as a data source, or a consultative reference. However, the political issues and methodological complexities that have been identified by researchers have not been adequately engaged with by these
management structures. The definitions of TEK that are used in applied contexts can become somewhat simplified and essentializing, and the approaches to TEK documentation and implementation can be uncritical and superficial.

Early discussions of TEK and Western science tended to essentialize, idealize, and reify what are dynamic systems of knowledge. This has significant implications for the way in which consultation and co-management structures play out in colonial contexts. Political scientist Arun Agrawal has argued for a deconstruction of the opposition of indigenous knowledge and western knowledge. He indicates that the similarities between and the differences within these knowledges, as well as the dynamic movement across them, limits the productivity of categorical separation (1995:3). Agrawal suggests a multiple understanding of knowledges that avoids rigidly dichotomous classifications, oppositions which echo categories once used to suppress indigenous ways of knowing. “Counter-essentialist” (Semali and Kinchelo 1999) approaches to indigenous knowledge focus on the way that knowledge moves between different peoples, and the process of “contamination” and exchange.

Dove’s study of rubber production in Indonesian Borneo problematizes assumptions of primordiality and closure regarding indigenous knowledge systems. In this case study, what is constructed as indigenous knowledge is actually a relatively recent introduction into the local political economy. He argues that the concept of indigenous knowledge obscures the linkages between local and extra-local systems of knowledge, the steady flow of information that occurs between communities (2000: 235). This construction of IK works to position a bureaucratic authority as the mediator between these knowledges, and more importantly, between interests. Dove argues that
the focus should be on the power differences not the substantive differences between knowledge, how they are competing rather than how they are separate (ibid.: 236).

Specifically pertinent to the discussion of COSEWIC and ATK, Dove suggests that the concept of IK presents what are really differences in interest and power as differences in knowledge, and turns the political challenge to accept indigenous rights into a "pedagogical challenge to reveal the unstudied indigenous knowledge" (ibid.)

Menzies has also argued against essentializing a "primordial" indigenous knowledge, by emphasizing the significance of changing economic systems and circumstances to the transformation and development of TEK:

"Traditional" Ecological Knowledge is tied directly to the material conditions under which individuals and communities organize their subsistence and make their living, and as such TEK shifts and changes in accordance with transformation in economic activities. There are jumps and breaks, fragmentations and coalescenses" (ND: 2).

Menzies thus finds that TEK in colonial environments is shaped by both customary patterns of land use and the impacts of the global capitalist economy.

Osseweijer has argued that "Indigenous knowledge can rarely be treated as an insulated domain, especially where local subsistence interacts with commercial markets and preferences, whose ‘exogenous knowledge’ therefore needs to be apprehended within indigenous knowledge" (2000: 74). Such a position deconstructs the boundaries and differences between indigenous and non-indigenous knowledges, and indicates the need to avoid an "insular" perspective on data sources.

I have argued elsewhere (see Butler ND) that indigenous knowledge must be historicized and understood in light of the history of colonialism and resource dispossession. It is perhaps due to the primacy of northern examples and case studies in
the development of TEK literature in Canada that has encouraged a somewhat uncomplicated understanding of ‘traditional knowledge’ and its potential integration into resource management. The concentration of many of the key studies of TEK in fairly remote communities, removed from highly populated areas, seems to have resulted in limited attention to the complexities of alternative knowledges, and their interconnection with dominant knowledges and structures.

Traditional Ecological Knowledge is constructed as the opposite of mainstream management structures, which are relatively new, externally formulated, and rarely site-specific, and therefore its worth is seen to lie in its historical and local nature. However, the emphasis on the temporal aspect of traditional ecological knowledge is problematic because the assumption of continuity fails to recognize historical change, cultural interaction, and power relations.

Such a characterization of traditional knowledge assumes regular, uninterrupted, uninhibited, self-determined resource use. Colonialism has significantly impacted the resource-use experience of indigenous peoples; in some places, this interference has occurred for four centuries. In British Columbia, colonial force has been transforming Aboriginal access to natural resources for a century and a half, by affecting the natural environment, the regulatory structure of access, and the economic and social relations within First Nations communities.

Colonial settlement and industrial development resulted in environmental changes, especially in areas such as the lower Fraser River. Both forced economic change and indirect economic influences drew many First Nations people into wage labour, and reduced their participation in resource harvesting. The establishment of
reserves transformed both residential and land use patterns. Social policy such as residential schools disrupted children's learning of harvesting skills (see for example Butler 1998).

Aboriginal fisheries have been impacted by colonial regulations since 1878 when British Columbia came under the jurisdiction of the Canadian Fisheries Act, and weekly closures were enforced. The "Indian food fishery" was created by legislation in 1888 which falsely differentiated Aboriginal commercial fishing from "traditional" fishing (see Butler 1998). Aboriginal fishing opportunities were increasingly restricted, and many traditional gears were outlawed, significantly transforming fishing practice (see Butler and Menzies ND). Fisheries policy in British Columbia involved efforts to deliberately exclude Aboriginal people from the commercial fishing industry (Menzies NDb).

First Nations peoples in British Columbia have maintained a strong attachment to, and reliance upon, the aquatic resources of the region despite the environmental, social, and regulatory impacts of colonialism. It is nevertheless important to contextualize these changes in the construction of TEK. Much of the literature on TEK focuses upon the generation of knowledge through experience, but does not problematize that experience. All forms of ecological knowledge must be understood in light of the context of resource use. Emphasizing the colonial domination of indigenous resource activities does not undermine the value or integrity of IK, but rather, it engages its history of disruption and oppression and in doing so can contribute to the project of enhancing indigenous self-determination in resource use.

Aboriginal knowledge has not developed, and does not exist, in a vacuum. The forces of change generated since contact have influenced indigenous understandings of
natural resources and the environment. These forces have been different and of varying strength in different parts of Canada, but have been in effect in every community.

Indigenous knowledge is thus a knowledge of change; through considering indigenous experiences and resource knowledge, we are given a picture of the rapid transformations that have been wrought on the landscape and natural resources during the centuries of colonial settlement. Indigenous knowledge's spanning of the pre-contact past, the processes of colonization, and contemporary circumstances is the key to understanding the problems of current management strategies.

The development of an industrial fishery and the marginalization of Aboriginal fishers has created competing user groups with different experiences and different understandings. The experiences and knowledges of non-Aboriginal fishers must be examined as well as those of Aboriginal fishers. An historicized understanding of Aboriginal knowledge thus highlights the need to breakdown oppositions between user groups to create a management structure that reflects and integrates various knowledges, interests, and values to meet the needs of all salmon harvesters.

The respective literatures on Aboriginal (TEK) and local non-Aboriginal (LEK) ecological knowledges suggest both convergences and divergences of these forms of knowledge. In comparison with "western science", TEK and LEK are both characterized as more locally specific, experiential and practical, and holistic. Aboriginal knowledge has a greater time depth than local knowledge, as it is associated with longer continual residence and resource use. Cultural forms of transmission differ, and the cosmology or world view underpinning Aboriginal knowledge is unique to each Nation. Aboriginal and non-Aboriginal knowledge also differ in terms of the experience of regulation.
Aboriginal societies regulated their own resource use through sovereign structures of management and control. Non-Aboriginal communities may engage in locally-specific informal practices to regulate access etc. (see Acheson 1988) but this does not reflect a sovereign system of governance. In a "post-colonial" nation state like Canada, TEK and LEK provide complementary information regarding specific species and ecological relations. In the fishing industry in particular, the historical process of dispossession of Aboriginal peoples, current patterns of geographical separation (coastal versus up-river), as well as coincident and common fishing experiences in many areas throughout the last century, result in a pattern of knowledge distribution that requires inclusive processes of documentation and consultation.

Thus, current TEK research tends to emphasize the complications regarding the documentation, comprehension, and utilization of indigenous environmental knowledge in colonial contexts. These complications, however, tend to be eclipsed by the political mandate to include indigenous knowledge in government resource management scenarios. A political definition of significant and valid ecological knowledge results in the differential engagement with Aboriginal and non-Aboriginal ecological data and understandings.

Kalland suggests that the distinction between indigenous and non-indigenous knowledge of the environment has limited heuristic value, and that the more significant division is between science and "local" or "practical" knowledge. He constructs indigenous knowledge as the politicization of local/practical knowledge (2000: 320). Nuttall has suggested that indigenous knowledge is increasingly becoming a "political resource" (Nuttall 1998: 27) in contemporary claims regarding natural resources and
indigenous rights. Sejersen has described it as a “political crowbar” (1998: 46), a tool that can be used to the advantage of indigenous groups in a colonial context. The use of indigenous knowledge is thus a political act – it is a claim of Aboriginality, an assertion of land and resource rights, and a demand for self-determination in resource use. In Canada, the field of TEK research has developed in the context of Aboriginal claims, as well as the increasing recognition of the limits of biological science. TEK is thus as political as it is ecological in its development as a concept and field of study, and as a knowledge system.

The COSEWIC mandate emphasizes a difference between Aboriginal and community or local knowledge. Ironically, while attempting to “decolonize” the resource management structure by recognizing First Nations sovereignty and the value of ATK, the COSEWIC ‘ATK’ structure fails to recognize the colonial environment of contemporary resource management. European settlement and government in Canada during the last several centuries has transformed environmental relations in all areas. There are a multitude of user groups and stakeholders who all have different levels of access to and experience of species and their habitat. The focus on ATK over other forms of knowledge fulfills a political requirement recognizing Aboriginal sovereignty, but fails to fulfill real obligations to First Nations, and to improve the data used to assess species at risk. The ATK structure fails to recognize the ways in which ecological knowledges become entwined in the colonial context.

Information about salmon stocks on the Fraser River, for example, must be drawn from a number of local sources, recognizing the disruption of Aboriginal fishing access and practices. Young harvesters and Elders will have different knowledge regarding the
fish stocks due to changing structures of resource management and First Nations access to the river. Colonial processes have created multiple user groups with different experiences and knowledge. Specifically, regulatory curtailment of First Nations fisheries during the last century must be factored into the documentation of ecological knowledge. Furthermore, the historicization of indigenous knowledge, and its contextualization through an analysis of the impacts of colonial resource control and appropriation, provides an epistemological foundation for the reassertion and restoration of Aboriginal resource rights.

**The political limitations of ATK**

Ken Wilson, a marine fish sub-committee member of COSEWIC, the proponent for both the Cultus and Sakinaw designations, and stock management coordinator for the Fraser River First Nations, resists an exoticization of Aboriginal knowledge. While advocating the inclusion of First Nations in COSEWIC and other resource management processes, he indicates of the political limits of ATK as a means of recognizing Aboriginal sovereignty in resource management.

*I suspect there is fundamental racism involved in thinking their knowledge is fundamentally different. If you want to know what they think, ask them... I don’t see why we should get attached to ATK. It should be a process of engaging communities, and applying that advice... Their advice will contain ATK. The European approach views ATK as a resource to be exploited... “We’ve got to have ATK – it’s got to be Chapter 4”...*
We should instead be involving First Nations interests and values and communities in the decision-making process. ATK is a tool of convenience. It is a proxy for our relationship with Aboriginal peoples.

Wilson’s concerns focus on the tendency for Aboriginal values to enter resource management processes only through a “technical intermediary”. He is concerned with the disempowering impact of removing First Nations knowledge from individual and community control. The imperative, as Wilson defines it, is to recognize Aboriginal rights, and to meaningfully engage First Nations in resource management and conservation. While it is a positive step, the focus on ATK has the potential to sideline this more important goal of self-determination and nation-to-nation co-management.

ATK or TEK research can be included in a management process in the place of meaningful consultation with Aboriginal knowledge holders. ATK/TEK thus acts as a currency exchanged between dominant and subordinate epistemological systems rather than a link between sovereign political systems.

The ATK structure also defines Aboriginal knowledge in ways that are limiting to its use and to its power. Thus, the political goal of recognizing and validating indigenous knowledge is not effectively reached. The definitions of ATK fall into familiar patterns differentiating modern and ‘traditional’ practices, and glossing over individual and community diversity of knowledge. As such, the ATK structure of inclusion does not reflect a truly decolonizing process. This type of incorporation reinforces what Vitebsky has identified as the “class structure of epistemologies” through which mainstream knowledge maintains its superiority to, and control of, alternative knowledges (1995: 201). Nadasdy criticizes the “integration” approach to TEK because it takes for granted,
if not reinforces, the existing power relations between First Nations and the state (2002: 1). The use of the term “traditional” allows for the external definition of what is authentic practice and knowledge, and thus limits the opportunity for meaningful change in management procedures (Nadasdy 1999: 4).

The role of ATK in the COSEWIC structure is inherently constrained by the structure itself. There are ten sub-committees of the Committee on the Status of Endangered Wildlife in Canada. There are nine Species Specialist Sub-committees, provide expertise on taxonomic groups such as Amphibians and Reptiles, Arthropods, Birds, and Freshwater Fishes, and the tenth is the ATK Sub-committee. Thus, the ATK sub-committee has been inserted into a pre-existing structure that is based on Western taxonomic categories, and must work within and across this dominant matrix.

Nadasdy’s work in the Yukon critiques the tendency of Western science and resource management to “compartmentalize” knowledge in general, and traditional knowledge in particular (2002: 123). Kluane First Nation hunters’ TEK, for example, is not easily nor appropriately compartmentalized by species. The lack of correspondence between the indigenous experience and the categories of Western science problematizes the integration of TEK with Western resource management (ibid.: 126). The integration of “ATK” into a structure that is tightly compartmentalized will limit the type and scope of knowledge that can be included.

The national and provincial structure of representation on the ATK sub-committee illustrates the difficulty in including TEK in a national resource management body. The locality, specificity, and multiplicity of TEK cannot be directly incorporated into this type of structure. This problem relates to the growing literature on the complications of
engaging with TEK in resource management contexts. The transformation of indigenous knowledge that occurs during research, documentation, and implementation has been described and theorized at length. Cruikshank indicates the political perils of participating in the “objectivist paradigm” of TEK (1998:53). She identifies the threats of fragmentation, objectification and standardization of knowledge that are part of the bureaucratic engagement with indigenous knowledge (ibid.: 66). Duerden and Kuhn have linked the transformation of knowledge directly to the nature of the project: as the user group and the scale of application change, traditional knowledge becomes increasingly transmuted into ‘data’ (1998: 33). Decontextualization is a critical problem for researchers documenting indigenous knowledge for resource management. Reports and processes that “disembody” (Ellen 1992: 239) knowledge from its cultural context limit the value of the information. When “transplanted and commoditized”, indigenous knowledge becomes much like the fragmentary knowledge of the dominant society (Vitebsky 1995: 201).

The COSEWIC structure has the potential to reify and decontextualize indigenous ecological knowledge. The creation of an ATK sub-committee constructs ATK as a thing, a separate knowledge that is approached in the same manner as that of Arthropods and Birds: through the expertise of national and provincial representatives. The committee is designed to facilitate the inclusion of locally specific ATK data into the assessments performed by the Species Specialist Sub-Committees – to get indigenous knowledge of Arthropods and Birds, for example, into the reports of those respective committees. This approach does not significantly disrupt the process of assessment based on Western scientific categories and single-species management. Aboriginal Traditional
Knowledge is essentially inserted into the existing structures and processes. This is a very limited act of decolonization and a limited expansion of the data informing the identification of endangered species.

**The political implications of ATK**

In a political 'post-colonial' environment resource rights rather than resource use are used to define the holders of 'valid' ecological knowledge. This politicization of non-scientific data has the potential to constrain comprehensive data collection and limit the success of co-management and conservation. If the current short-comings of biological science-based management are to be remedied, an expanded definition of TEK must inform efforts to improve upon and supplement science. The political and environmental impacts of politically prioritizing environmental data sources compromise both the integrity of resource management and the health of natural resources.

While the hegemony of scientific knowledge is gradually being deconstructed, there persists a failure to adequately synthesize the diversity of knowledges that might prove the key to environmental sustainability. Politically motivated, rights-based validation of environmental knowledge reflects a problematic adoption of selected principles of ecological knowledge research. While the TEK literature has promoted the integration of multiple sources and forms of environmental knowledge, mainstream resource management continues to privilege forms of knowledge associated with political power. Furthermore, this privileging of indigenous knowledge in resource management does not necessarily result in any meaningful empowerment of Aboriginal peoples in resource control (see Nadasdy 2003).
The inclusion of ATK reflects a positive step towards broadening the information base that informs COSEWIC assessments and designations. However, the essentially fragmentary and restrictive understanding of ATK that this initiative is based upon suggests that TEK research and writing is only incompletely trickling into resource management scenarios. Research that identifies the political issues and implications of TEK, and literature exploring the multiplicity and specificity of knowledges, does not appear to inform current efforts at co-management of natural resources.

Nadasdy’s work emphasizes that knowledge (of any type) “does not exist in some pure form, independent of power relations; rather, it is constituted by those relations and draws its validity from them” (1999: 15). The COSEWIC mandate constructs and validates ATK in a particular and limited way. The designation process focuses on ATK in a way that has questionable implications for both the empowerment of Aboriginal peoples, and the improvement of Canada’s protection of species at risk.

The other case studies in this dissertation emphasize the way in which local knowledge is political and politicized. The experience of resource management and regulation shapes what harvesters know and understand about the ecological and social environments. No form of knowledge is immune to political influences, nor historical forces. Indigenous and non-indigenous knowledges are shaped and transformed by government policy, by their relative access to resources, and by their relationship to one another. Agrawal emphasizes the need to interrogate how power produces knowledge (1995: 431) and to resist essentialist differentiations of forms of knowing. The dynamics between knowledge systems must be understood, and the productive ways through which to synthesize their information in order to sustain eco-systems must be explored.
This case study illuminates the ways in which power and knowledge are inextricably linked, and how the politicization of knowledge is inherent in contemporary resource management structures. While the monopoly of western science is being challenged, new political complexities are taking shape. The recognition of Aboriginal sovereignty remains partial in the realm of resource management, but is an increasing force shaping the way in which scientists and managers contend with ecological data.

**Conclusion**

The 2002 sockeye fishery, and the conservation issues that it generated, provide further examples of the way in which local knowledge is political and politicized. The COSEWIC approach to incorporating Aboriginal knowledge into the designation of species at risk dovetails effectively with the issues surrounding the Fraser Panel’s management of the 2002 fishery, and the resulting prosecution of the protest fishery participants. In each scenario we see conflict between different ways of knowing, and the links between political power and knowledge are made explicit. The analysis of the COSEWIC structure identifies the way in which knowledges are politicized and valued in the context of competing and unequal claims to resources.

The chapter shifts the focus from the ways in which knowledge-based and resource-based conflicts play out in the fishing industry, to the ways in which alternative knowledges are constructed in the resource management context. While this reflects a significant shift in the analysis, the COSEWIC process provides an appropriate end point for the discussion for several reasons.

The discussion of the politicization of ecological knowledge in the COSEWIC process folds back upon the preceding discussions of the way in which fishermen’s
knowledge is politicized. The COSEWIC case study reveals how government resource management structures categorize and differentially prioritize TEK and LEK. The political mandate to include TEK in government processes reflects the increasing recognition of Aboriginal rights. The legal and social recognition of Aboriginal rights has significant implication for the valuation of Aboriginal knowledge in resource management. The COSEWIC process of incorporating non-scientific knowledge into the designation and assessment process indicates that rights to resources are critical in the political construction of knowledge of resources.

Earlier chapters have identified the way in which fishers' knowledge is differentiated by various factors and how these differences are often overlooked in TEK research and resource management contexts. This chapter reveals how resource users' knowledges become differentiated in the structures of resource management. The political determination of valid knowledge has significant implications regarding co-management and expanding recognized data sources. The recognition of Aboriginal sovereignty and the validation of Aboriginal knowledge reflect progressive shifts in Canadian resource management and regulation. However, the COSEWIC approach to ATK reflects several of the problems and pitfalls identified in current TEK research, and does not meaningfully disrupt the power differential between First Nations and the state, nor dislodge the primacy of biological science. The emphasis on ATK rather than a comprehensive effort to include all non-scientific sources limits the information available to COSEWIC assessment committees.

The politics of ecological knowledge in resource management are not unknown to fishermen, but the mandate of COSEWIC regarding ATK is not the current focus of
fishermen's concern. The legislative authority of the Species at Risk Act to outlaw the harvest of an endangered species threatens the future of the southern British Columbian salmon fisheries. The designation of aquatic species by COSEWIC is a growing concern for commercial fishermen, and COSEWIC is being incorporated into fishermen's political knowledge.

The federal review of the 2002 Fraser River Sockeye fishery was in process in the Autumn of that year, coincident to the announcement of COSEWIC's emergency designation of the Cultus and Sakinaw sockeye. Commercial fishing representatives, as well as those from other stakeholder groups were submitting briefs to the review committee, and meeting with government representatives. A story from these meetings made its way back to a Prince Rupert trollers' meeting. The story goes that a top-level DFO representative told an attending commercial fisherman that the COSEWIC designation was a direct result of the protest fisheries that summer. The suggestion was that the endangered species listing was punishment for an unruly and non-compliant fishing fleet.

"Myths" such as this are both the product of fishermen's perspectives regarding management and conservation initiatives, and work to shape these perspectives. This story reflects the links that fishermen identify between the various forces impacting their fishing opportunities. Conspiracy theories do not simply dismiss the biological validity of conservation measures, but more importantly, reveal the power structures and dynamics as fishermen understand them.
Chapter 8: Conclusion

Anthropology has a long history of engaging with and validating local knowledge in many forms. Both the methodological and theoretical approaches of the discipline emphasize a holistic approach to, and understanding of, knowledge. The relatively recent development of LEK as a discrete field of research has reflected attempts to broaden the scope of mainstream resource management, and encourage its adoption of a more holistic and comprehensive approach to “data”. For fisheries anthropology, however, the field of LEK has encouraged an “ecologization” of the discipline’s approach to resource use and the knowledge associated with these practices. Social scientists’ efforts to make resource users’ knowledge compatible with mainstream resource management structures has encouraged the documentation of ecological “data” discrete from its social and political context. In their eagerness to prove the value and utility of indigenous, traditional, and local knowledge to resource managers, anthropologists and other social scientists’ have “distilled” and “compartmentalized” (following Nadasdy 2003), ecological knowledge from the other forms of knowledge with which it is intertwined. The applied emphasis in much contemporary research has encouraged a focus on fishers’ ecological understandings at the cost of a more comprehensive understanding of the knowledge which shapes and informs harvesters’ practices and decisions.

Nadasdy has indicated that the integration of TEK in Western resource management does not disrupt the power relations between Aboriginal peoples and the state (2003). The ecological focus of much fisheries knowledge research reflects the same limitation. The emphasis on documenting and analyzing ecological facts provided by fishers reinforces the primacy and power of biological science-based fisheries
management. While expanding the data which informs fisheries management, this research approach does not call into question or critique the core structures of regulation and management. Although ecological knowledge research might provide scientists with a better understanding of fish behaviour, it does not develop a better understanding of fishers’ behaviour, concerns, practices, and understandings. Contemporary fisheries problems are often more structural than ecological and thus require research that tackles the complexity of human-environment relations.

The persisting hegemony of Western scientific knowledge, and the long history of the suppression of alternative epistemologies, has resulted in the defense of and research focus upon these subordinate knowledges. The scholarly literature on TEK and other knowledge forms have effected some changes in the structure of contemporary governance and resource management. The COSEWIC incorporation of ATK is an example of a shift to inclusive practices in such processes. However, these acronyms create methodological and theoretical pitfalls for anthropologists by encouraging a restrictive definition of relevant knowledge in applied research contexts. Anthropologists especially, must be careful to avoid an “ecological rut” in their approach to local knowledge research.

The reification of ecological knowledge through the TEK, LEK, and FEK literatures can segregate and compartmentalize the knowledge of resource users in a way that does not reflect the interconnectedness and embeddedness of human experience. This dissertation is an effort to re-evaluate the relationship between ecological and non-ecological knowledge, and to identify other ways in which anthropologists can contribute to the solving of fisheries problems. Ecological knowledge research has become a
favoured mode of weighing in on fisheries issues, but anthropologists have far more to offer through the ethnography of fisheries-dependent communities. Engaged anthropological research which tackles the political and structural problems of industrial fisheries, rather than only their ecological and epistemological problems, reflects a more comprehensive and holistic approach to knowledge and experience.

The preceding case studies have highlighted the ways in which local knowledge is politically constructed by the context of resource use. Competition for access to resources, shifting regulations, and the politicization of conservation and allocation issues result in politicized understandings of resource management. While other researchers have noted the influence of politics on local ecological knowledge, I argue that we must engage more directly with the political knowledge of resource harvesters in order to better understand their concerns and behaviours.

The ecological knowledge of resource users has great potential to improve the data used for biological management of stocks. The social, economic, and political knowledge of resource users can inform the management of resource industries, and improve the sustainability of resource communities. Asking fishermen about fish reflects only a part of what local knowledge researchers should be doing. We should also be asking about fisheries, about the impacts of regulations (ecologically and economically), and about how fishermen make decisions regarding industry investment and fishing effort. The decision to untie from the dock is based on more than tides and seasons, and the complexity of such decisions needs to be better understood by both academics, and government resource managers.
Researching Knowledge

My knowledge of the fishing industry has grown and transformed during my years in Prince Rupert, and in itself reflects the different types of knowledge at work in the fishing community. I began learning place-names, locating Shag Rock and Edye Pass on a chart of the north coast. I was taught that halibut move into the shallows in the summer months, and that it is important to have your gillnet in the river at slack tide. I started to grasp patterns of ownership in the industry, and the persisting networks of kin and other forms of affiliation that shape the fishing community. I came to understand resource management policy through my contributors’ lived experience of particular initiatives. The fleet rationalization initiated by the Mifflin Plan became understood through stories of family losses and community transformations. Theories of property rights were grounded by the experience of watching young fishermen contend with the financial squeeze created by increasing lease fees and decreasing halibut prices. Finally, I found myself anticipating the impact of policy changes on the price of boats and licenses.

My exposure to fishing knowledge thus touched on the range of ecological, social, and political knowledge involved in shaping fishermen’s decisions. This was a slow learning curve, reflecting a long period of fieldwork. The majority of the formal interviews with fishermen were conducted in the first fourteen months of my time in Prince Rupert. At the end of that time, I was only beginning to grasp the politics of fishing and the significance of fishermen’s political knowledge. Documenting how fishermen catch fish, what they know about fish behaviour, habitat, tidal effects etc. is, by comparison, a straightforward project. The methodological and theoretical issues
surrounding ecological knowledge research have now been operationalized by many scholars. The detailed approach to researching ecological knowledge must also be applied to investing political knowledge. Understanding the political context of fishing, and identifying the processes that construct political knowledge are complicated, and time-consuming endeavors. Fishers’ knowledge is messy and intricate and cannot be easily documented through survey-based research. This type of knowledge requires a much broader engagement with the issues of power and politics that affect industry and community experiences.

My comprehension of the varying and conflicting positions of resource workers in this ever-changing structure of access and ownership was the product of listening to many conversations, reading many magazine and internet testimonials, and watching fishermen struggle to defend their livelihoods in various fora. My grasp of these issues is of course imperfect and still developing, but it is the attempt to understand these complexities that is crucial. Identifying the factors which influence fishermen’s non-ecological decision-making is crucial to broadening the current social science approach to local knowledge, and to successfully managing natural resources. Improving the process of stock assessment of Yelloweye rockfish by including fishers’ ecological knowledge will not improve the health of the stock if the management of the halibut fishery encourages targeting of the species in the 1990s, and discarding of it (dead) in the 2000s. In this case, what fishers know about the regulation of the fishery and the profit margins of halibut leasing (see Chapter 4), is more important to maintaining sustainable harvests of Yelloweye, than their knowledge of fish habitat and relative abundance.
The way in which anthropologists and other social scientists have begun to isolate fishers' ecological knowledge from their other forms of understanding and knowledge serves to construct ecological facts which are disconnected from the realities of fishing practice and politics. As I have worked through my own understanding of the ways in which fishers' experiences are regulated, their positions constructed, and their choices constrained, the connections and disconnections between their ecological and non-ecological knowledge has become a focus of my analysis.

Social scientists and biological scientists have recognized that what fishers know about fish behaviour and ecological relationships is of value to fisheries science and management. What was once "anecdotal" is now the subject of research, and there should be a concomitant validation of fishers' non-ecological knowledge. What is considered "attitude" or "opinion" is the result of processes of knowledge production and exchange, much like those that create ecological knowledge. Those processes are worth investigating, for fishers' perceptions of all sorts, ecological, and political, can inform fisheries management. The focus upon and validation of fishers' ecological knowledge should serve as a template for the investigation of their political knowledge.

The political influences on ecological knowledge have been treated as background noise, and attempts are made to understand these influences in order to factor them out of ecological data. For example, it is important to understand the political influence of unionization in order to estimate its impact on ecological understandings (see Felt 1994). Palmer and Sinclair recognize that researchers have an "indirect" relationship to fishers' knowledge in that they document statements about the fishery which are articulated in a sociopolitical context and which may reflect individual interests (1996: 268). This
dissertation takes as its focus the ‘background noise’ that other researchers have been trying to filter out of ecological knowledge data. I treat the political aspects of fishers’ knowledge as a ‘knowledge system’ similar to ecological knowledge. It is a system of information that is based on individual experience and position, but also creates and is created by structural ties between groups of fishers. It is dynamic and cumulative. I would suggest that it is perhaps less dependent than ecological knowledge on long-term relationships with a particular environment, but that it is nevertheless often geographically situated, and thus “local”.

I approach fishers’ attitudes and perceptions as a form of knowledge, because these are not passive apprehensions; these understandings inform behaviour. Fishers’ political knowledge has become a critical information source, shaping both the harvesting and non-harvesting aspects of their enterprise. Sinclair notes that fishers affect the pace of change by their own “interpretation” of structural pressures and their resulting reactions to them (1985: 20). The processes that shape and inform these interpretations and resulting actions are the focus of this dissertation.

Ecological knowledge researchers focus on the knowledge that a fisherman gains through finding fishing spots with the topography of the ocean bottom, reading weather patterns and abundance indicators such as feed. These experiences are shaped, supplemented and refined by knowledge passed down from family and mentors, and information passed across through dock talk, radio conversations, and other ongoing communications. The process is similar for the knowledge upon which I have focused. A fisherman also navigates regulations, finds his place within structures of capital, and reads the ‘climate’ of policy and politics. What I am attempting to do is to historicize,
problematize, differentiate, and politicize the concept of “local knowledge” as it is used in fisheries anthropology. It is an attempt to understand how fisheries “work” in a more integrated sense.

**Understanding ecological and political knowledge**

I have argued that fishers’ ecological and political knowledge are intertwined, and are both implicated in their decisions regarding fishing practice. There are both similarities and differences in how these knowledges are created, transmitted, and transformed.

A middle-aged and semi-retired fisherman pulled out an old logbook and flipped through the pages with me. It contained detailed notes regarding halibut and salmon trips that Don had made during the early 1980s. There were descriptions of the weather, and information about how many strings of gear he had set and how many pounds of halibut were hauled back. He noted the “scratchy” halibut fishing he had experienced during a ten day opening in 1980, and how abundance had improved considerably since that time. Then Don pulled out a second notebook, dating from the mid-1990s. His son had skippered Don’s boat on a halibut trip for the first time in 1996, and Don had written a logbook to guide him. The book included tips on how much fuel to take, and technical intricacies of the boat. There were diagrams drawn from nautical charts of Don’s favourite fishing spots, indicating where to set the lines, with longitude and latitude provided for the starting end. Details about the length of time to “soak” the gear, and the effects of tidal action, provided a comprehensive guide to harvesting in these particular spots.
In these two notebooks were documented some of Don’s “ecological knowledge”. The first logbook was a record of past practice and success, which provided him with a resource to refer to at later time. He could use this logbook to inform decisions while fishing, integrating previous experiences in particular fishing grounds with current weather conditions. The second notebook reflected a summary of such experiences, the distillation of decades of trial and error, detailed reading of environmental conditions, and educated guesses regarding halibut activity. Over his fishing career, Don had developed detailed knowledge of particular fishing spots which provided him with consistent harvests. The guidebook reveals how this type of fishing knowledge can be transmitted between generations. In many cases this transmission is less formal and more practical, such as the many years Don had spent teaching his son on the deck of the boat. The guidebook was a formal and textual transmission of fishing knowledge between father and son, and between skippers.

Earlier that day, Don and I had debated quota fisheries over coffee. This encounter reinforced my understanding of fishers’ political knowledge. Don had fished halibut at the time of the shift to quota-based management. He had witnessed the significant improvements in ex-vessel prices and improved management of the fishery. He had been allocated quota, and had increased his holdings by purchasing more quota in the early years of transferability. He had seen his quota allocation rise steadily in value and it provided him with a yearly income through leasing. Don defended the quota system and when I asked him about the generational inequity associated with the windfall of initial allocation (see Copes 1986), he insisted that the earlier generation fishermen had worked hard fishing halibut in the derby fishery and had earned the allocation. The next
generation would be able to work hard and purchase quota, and they would benefit from the improved stability of the fishery. He went on to describe halibut quota as an investment, similar to his investments in the stock market. For him, quota and licenses worked in the same way as a stock, providing yearly dividends and significant gains upon timely sale.

As I explored the issues surrounding fisheries property rights with a halibut quota owner, the situatedness of fisheries knowledge was reinforced by his commitment to the positive aspects of individual transferable quotas. He focused on the improved safety and ex-vessel prices, increased license/quota values, and sustainable management that had been established by the shift to quota-based management. His perspective differed significantly from that of younger fishermen, but was consistent with that of other fishermen his age who had been allocated halibut quota. Don’s positive experience of this policy shift shaped his knowledge of the halibut fishery and quota-based management in general. His knowledge was positioned, reflecting his experience as an original quota recipient in 1991. This position was the key determinant of what he knew about quota based management.

It is here that the complexities of political knowledge are revealed. Don provided his son with a notebook that transmitted a portion of his knowledge of halibut fishing. There could thus be a direct intergenerational transfer of ecological knowledge, which Don’s son would build upon and add to throughout his own halibut fishing career. Don’s political knowledge, however, is not similarly inherited. Don’s son did not begin fishing halibut as a skipper and boat owner until 1995, and thus was not allocated halibut quota. Over the last decade, Josh has purchased a small amount of quota at an average of
$30.00/lb, but he leases more than 90% of the quota that he fishes on a yearly basis. Josh is critical of the quota leasing system which requires him to lease halibut quota for 75% of the value of the fish: “quota has made me a slave”. While father and son might fish the same spots for halibut, what they each know about the halibut fishery is very different.

The relational aspect of political knowledge, however, makes this intergenerational divergence more complex. Fishers’ political knowledge is relative and contingent; it is determined by and determines their position in the fishing industry. Don’s experience in the halibut fishery has influenced both his and his son’s decisions regarding investments in the salmon fishery. In May of 2004, the Joint Task Group on Post-Treaty Fisheries had released a report recommending a shift to quota-based management in all BC fisheries in order to facilitate the settlement of Aboriginal claims, and to improve fisheries management. The creation of quotas in the salmon fishery was anticipated to increase license values significantly (similar to the effect in the halibut fishery), and to eventually permit a similar leasing structure. After the release of the report, there was a flurry of activity in the market for salmon licenses. Don invested in the salmon fishery, speculating on future license and quota values. He expected that the shift to quota in the salmon fishery would result in the same kind of gains he had made during the transformation of the halibut fishery. Josh also bought another salmon license, encouraged by his father’s previous and current strategies of investment. While Josh has not experienced a windfall quota allocation himself, he has witnessed the benefits enjoyed by his father’s generation and is trying to position himself accordingly. Political
knowledge is thus constructed by one’s own experience, as well as understanding that of peers and rivals.

The political knowledge that informs decision-making in the fishing industry is thus fragmented and contingent. There are cleavages and continuities in the knowledge of different generations, which are reflected in the different ways in which fishermen will talk about fisheries management and the ways in which they will react to it. While Don can write down his ecological and practical knowledge of halibut fishing for his son, his political knowledge both can and can’t be transmitted directly. The contingency of political knowledge on individual position will result in similarities and differences across and within groups of fishermen.

Anthony Cohen has described local knowledge in a Scottish fishing community as existing in “rival versions” (1993: 32), which are embedded in the social conditions of knowing. His analysis of the “partiality” and segmentary nature of knowledge, even in the smallest of localities, suggests that local knowledge research has tended to homogenize the diversity and divergences of local knowledge in opposition to non-local, dominant knowledge. While it is possible to contrast “fishermen’s knowledge” with that of the biologists or resource managers, the rival versions within that knowledge need to be investigated and analyzed. While it is possible and sometimes useful to talk about “local knowledge” in Prince Rupert or the fishing fleet, it is critical to understand how fishing regulations have fractured locality and created new categories and communities of knowledge, and of interest.
Knowledge and Regulation

My investigation of fisheries knowledge in British Columbia has revealed the primacy of regulation in shaping the understandings, perceptions, and interpretations of commercial fishermen. The defining structure of experience, and therefore of knowledge, is fisheries regulation. Federal regulations constrain the ecological practice of fishers and their economic success, create discrete groups of fishers, and contour the relations between them. The significance of this form of government power in fishers’ lives is not unique to British Columbia but while fisheries anthropologists have recognized the significance of these systems and structures, their impact on knowledge construction has not been widely interrogated.

Pettersen, like many other ethnographers of fishing communities, has emphasized that fishing is not merely an occupation, but rather describes it as a “distinctive way of life in which it is work that orders existence” (1996: 245). If we accept that the work of fishing is the core experience for involved families and communities, we must understand that in contemporary commercial fisheries, it is regulation that defines the experience of work. Fisheries regulations control the interaction between fishers and the environment, define the encounters between fishers and the state, and mediate the relationships between fishers. Regulatory structures and initiatives are thus core determinants of fishers’ knowledge, in all forms. The ecological knowledge of fishers is created and altered by regulatory change. As suggested in chapters four and five, the shift to quota-based management in the halibut fishery significantly transformed the practice of fishing, and therefore had major implications for halibut fishing knowledge. The regulatory
change redefined by-catch species, altered the seasonality of encounters, and in some cases, the geographic scope of individuals' fishing activity. This regulatory change also created new forms of knowledge, shifting the basis of economic success in the fishery to license and quota speculation. Finally, change in the regulation of the halibut fishery created divergent political knowledge regarding quota-based management, differentiated primarily by generation and crew/skipper positions.

Political knowledge is particularly shaped by fisheries regulation and policy. The case studies of the Coho Crisis and the 2002 Fraser River sockeye fishery illustrate how fishers' understandings of intersectoral allocation can determine their reaction to conservation initiatives. Commercial fishers tend to perceive commercial fisheries closures as transferring fish to Aboriginal fisheries. Commercial fishers' compliance with conservation initiatives and restrictive regulations is determined by their political reading of the context and underlying objective of the regulation.

The case studies in this dissertation reveal that regulation and fishers' knowledge have a complex and reciprocal relationship. Regulation shapes fishers' knowledge (ecological and political), and it is the knowledge that fishers hold of regulatory structures and their impacts that are a critical source of information for improving fisheries management. The regulatory regime also fragments experience and creates discrete categories of experience and position. These categories have been increasingly reinforced as flexibility in the fishing industry has been reduced by restrictions.

Researchers must attend to the significance of changing regulations in their investigations of fishers' knowledge. The lack of attention to these changes was a key problem in the methodology of the Back to the Future project (Chapter 5).
Understanding the different experience and practice of fishers fishing in the herring reduction fishery versus the herring roe fishery, or that of the derby fishery for halibut and the quota-based fishery is critical to the analysis of fishers’ ecological knowledge. Understanding the different positions of fishers, as created by regulations such as single-gear licensing and area licensing in the salmon fishery, is critical to the analysis of fishers’ political knowledge.

North Coast fishermen’s reactions to the Coho Crisis (Chapter 3) revealed that fishermen’s political knowledge is differentiated by experience of the regulatory environment, just as ecological knowledge is differentiated by experience of the natural environment. Depending on their position in the industry (the key defining features in this case being gear type and ethnicity), fishermen perceived the impact of the Coho Crisis very differently. While the sample was relatively small, there appeared an identifiable trend in fishermen’s interpretations of the Coho conservation initiatives, with their gear type and ethnicity shaping their perception of salmon re-allocation. Fisheries policy is thus understood and interpreted according to multiple and varied perspectives that reflect the competing interests within the fishing industry. Conflict over access to resources has resulted in a relative fixing of positions that encourages gear-based and ethnicity-based readings of policy changes.

Fishermen’s knowledge of the Coho Crisis in particular, and their political knowledge in general, shape both their fishing behaviour, and the function of management structures. Thus, the association of conservation with reallocation is not an idle conspiracy theory, but is becoming a meaningful local paradigm for the interpretation of DFO policy. This type of knowledge in its various forms, correct or
incorrect, influences what fishermen do. Understanding what fishermen ‘know’ about the Coho Crisis is important for understanding how they will react to and participate in future conservation measures.

**The impacts of political knowledge**

Anthropologists have tended to approach fishers’ responses to political or policy questions as “attitudes” (Davis and Bailey 1996, Acheson 1980) and their readings of the state of the fishery or of stocks as “perceptions” (Palmer and Sinclair 1996). These attitudes and perceptions are not, however, idle reflections on external forces of change, but rather provide the basis for praxis within both daily local activity and in broader processes of change such as fisheries restructuring debates and management consultations. Despite political and economic constraints, fishers’ interpretations of and reactions to structural pressures make them active agents of change (Sinclair 1985). Fishers use their political knowledge to make decisions regarding their fishing practice and their fishing investments. I therefore argue that fishers’ attitudes and perceptions, their construction, variety, and impact, should be a key focus of fisheries research.

During my first few months in Prince Rupert, I attended a workshop for trollers, which instructed them on how to use the coho revival boxes. It had been determined by the DFO that coho that were discarded immediately upon catching were traumatized and stressed by the harvest process, and were thus susceptible to predation and re-capture. The fishermen were taught how to carefully unhook a coho, and place it in a tank facing a hose that was pumping out fresh seawater at a specific rate. A video presentation identified the traits of a revived fish with the recovered vitality to survive, and the most appropriate methods for returning the fish to the ocean. This coho conservation measure
conflicted with the ecological and practical knowledge of some fishermen. Some trollers suggested that carefully releasing a coho from the hook at or below the waterline inflicted far less stress on the fish than hauling it aboard, putting it in a tank, and then releasing it. Many trollers complained that the significant weight of the revival tanks on the deck was a threat to vessel stability in rough, outside waters. The conservation requirements also conflicted with the political knowledge of some fishermen. After I attended the revival tank workshop, I asked a troll fisherman about his revival tanks, and how he would use them. He responded: “Sure I’ll put [coho] in there. Right after I bang each goddamn one on the head”.

This fisherman did not actually club each of his discarded cohos in protest. However, it is likely that many of those cohos were not revived according to DFO protocol. This fisherman believed the Coho Crisis to be an exercise in reallocation rather than conservation, and considered the revival tanks to be unnecessary and unproductive measures used to legitimize management actions. Thus, the political knowledge I have identified throughout this dissertation has real meaning for conservation and management. Events like the Coho Crisis taint DFO initiatives in the eyes of fishermen, and influence compliance.

This reflects a direct impact of political knowledge on fishing practice, but there are also indirect and cumulative ramifications of these negative experiences and perceptions. Many of the fishermen with whom I spoke articulated their commitment to sustainable fishing and the conservation of stocks by emphasizing their ongoing individual and family commitment to the industry. Many fishermen asked the rhetorical question: “Why would I kill all the fish when I want to come back and catch them next
year?” A trawl fisherman who was gradually withdrawing from fishing and leaving his son at the helm of the boat insisted on the conservation ethic that influenced multi-generational fishermen: “I won’t put a halo on my head, but I want to retire and see fish for my grandkids’ grandkids. If I have to work till I die, I would rather see that than the money.” This emphasis on leaving fish for the next season, or for the next generation, was more prevalent with older fishermen who were close to retirement. Young fishermen, and those with children who were not yet working age were less hopeful about the next generation’s participation in the industry. Most fishermen whose children did not already have a foothold in the industry did not foresee their children becoming fishermen. These fishermen tended to believe that they themselves might be able to weather the difficulties currently facing the industry, but would not encourage their children to enter an industry with so many challenges, conflicts and constraints.

The shift to Individual Quotas, and the increasing reductions of harvest opportunity in the salmon fisheries are making fishermen less confident in the ability of fishing families to reproduce themselves in the future. Short term and long term uncertainty and instability thus have the potential to damage the conservation ethic that has encouraged sustainable use among many BC fishermen. Fear of increasing restrictions encourages effort intensity. A young fisherman commented to me: “I need to make what I can in the next ten years and get out”. This is precisely the opposite of the ethic expressed by the older fisherman who thought in terms of four generations of future fishermen. This young fisherman was not convinced of his own ability to continue in the industry, let alone that of his children. The conservation ethic associated with future harvests (individual and multi-generational) is thus threatened by fishermen’s perceptions.
of the loss of stability and sustainability in the industry. Fishermen who perceive no future in the industry may be more likely to make short term choices in their fishing practices.

This issue of intensified effort due to the concern of restrictions is epitomized by the phenomenon of “fear fishing”, discussed briefly in chapter four. The threat of fishery closure or limited entry results in increased participation and effort in a fishery. The Fraser river commercial eulachon fishery provides a useful example. During the 1980s and early 1990s, there were approximately 20 commercial fishers harvesting eulachon on the Fraser. Since the 1950s there had been no limit on the number of fishers who could participate, but the high labour and low returns of the fishery, the lack of a stable market demand, and coincident, more remunerative fisheries, kept participation levels low (Stacey 1999, Mark Petrunia, personal communication). In 1994 the commercial fishery was shut down mid-season because of an extremely low return of eulachon to the Fraser. In 1995, the commercial harvest was reduced to 20 tonnes, reflecting the new concerns regarding eulachon abundance. However, the assumption that license limitation would be introduced in the fishery due to the conservation concern provoked an unprecedented number of fishers (71) to participate in the 1996 season, resulting in a harvest of more than three times the precautionary quota. The prospect of limited entry motivated fishers to record landings39 of eulachon in order to qualify for a license in the future.

The introduction of license limitations has resulted in the rapid increase in license value in other fisheries. Many of these new eulachon fishers were presumably interested more in the future value of an eulachon license, rather than regular participation in the

39 Limited entry programs in various fisheries have allocated licenses to fishermen with sufficient landings (documented harvests) of the particular species in qualifying years.
fishery. In this case, fear fishing—intensified fishing effort motivated by threat of closure or limitation—was prompted by a run collapse and resulting conservation measures. The DFO’s lack of speed in developing a sustainable fishing plan for the eulachon in reaction to awareness of the vulnerability of the run, resulted in further and increased impact on the stocks.

The DFO is not, however, unaware of this phenomenon, and has at times anticipated this particular effect of fishermen’s political knowledge. After the limitation of participation in the rockfish hook-and-line fishery in the early 1990s (creation of the ZN license), the DFO anticipated fear fishing on lingcod. They assumed that fishermen would want to increase their lingcod landings in case a separate lingcod license was created. To discourage fear fishing, throughout the 1990s salmon fishermen received notices with their annual management plans that stated that lingcod landings would not be used to determine access to the species in the future.

Fear fishing is a key example of the ecological and political ramifications of fishermen’s political knowledge. Fishermen analyze the impacts of fisheries regulations and policies. They contemplate the context of intersectoral and intrasectoral competition for access to resources. They observe the efforts and focus of environmental organizations. They then make decisions about what to fish, what to buy, and what to sell, based on the history of fisheries management, and the current political climate. Acheson has identified a high degree of “path dependency” in management of lobster fishering in New England (2003), suggesting that there has been little deviance from the established direction of management and conservation policy throughout the last century.
Fishermen in British Columbia recognize path dependency in Pacific fisheries management. The trend of limited entry and subsequently individual quotas in BC fisheries has resulted in strategies of fear fishing and license speculation. Fishermen try to anticipate regulatory changes in order to secure access to fish as income, or access to licenses as property. These trends and strategies have created discrete groups of fishermen, segregated by gear type and area, but also by age and access to capital.

License speculation has become an increasing force shaping the BC fishing industry during the last decade. Limited entry and quota-based management have increased license values and have made some fishermen extremely wealthy. For many fishermen, shifts in regulation and management structure are more meaningful in terms of changing license values than for their actual impacts on fishing practice. The release of the McRae and Pearse report on post-treaty fisheries, which recommended quotas in the salmon fishery, has had a major impact on the salmon license market (see above).

There is a link between pre-quota speculation on salmon licenses, and the experience of the shift to quota in the halibut fishery. Fishermen who benefited from the change in the halibut fishery tend to understand the anticipated change in the salmon fishery as a positive development. And those fishermen who were allocated halibut quota, which has acted as a capital injection (see Copes 1986 for discussion of the windfall effect of quota allocation), are best positioned to speculate on salmon license values. Some fishermen with sizable halibut quota holdings are liquidating or mortgaging a portion of that quota in order to buy salmon licenses. Attitudes regarding salmon quotas are positioned in similar ways to the other forms of political knowledge I

40 Interestingly, the DFO has reversed their position on lingcod, and landings from the late 1990s are being used to allocate quota in the new integrated longline fishery. It is anticipated that this will result in
have discussed in this work. Many fishermen who are older and close to retirement support quota-based management for salmon because it will facilitate their exit from the fishery by selling or leasing out their salmon quota allocation. Single license holders who wish to continue fishing tend to be less enthusiastic because the quota allocated to a single license will probably not be enough to sustain their current level of harvest\footnote{Many salmon fisheries do not currently experience 100% participation. The restrictions on opportunities and poor prices have encouraged many fishers with other options (such as tuna fishing) to engage in other activities. Those who do participate in the salmon fisheries therefore harvest more fish per boat than they would if all licensed vessels were active. Hypothetical quota allocations are being calculated by dividing current harvests between all license holders (either by equal split or by a formula that allocates incorporates boat length). Fishers who have been active will see their opportunities reduced as the harvest is divided among all vessels rather than just active vessels.}. Thus, how fishermen understand the issue of quotas in the salmon fishery is positioned, as is their ability to benefit from this change.

Compliance in fish conservation, long term commitment to sustainable practices, the intensity of fishing effort, and license investment decisions, are thus all affected by fishermen’s political knowledge. How fishermen fish and how they manage their fishing enterprises are determined by their multiple, varied, and shifting understandings of the management context. Their perceptions have real meaning for how many of a particular fish are caught and how much a particular license might be worth. Political knowledge is a powerful force shaping contemporary commercial fisheries. This form of knowledge is complicated due to its multiplicity, contingency, and relativity, but is nevertheless a critical focal point for anthropological research. Anthropologists can adapt and expand the methodologies for ecological knowledge research to include the knowledge that fishers develop from their daily engagement with their political environment.
Interpreting Knowledge Encounters

The five case studies presented in this dissertation reveal the way in which local knowledge is politically constructed and politicized in contemporary resource management contexts. The interconnections between ecological and political issues in the fishery, and between ecological and political knowledge, are emphasized.

The Coho Crisis chapter draws from the literature on how resource users’ ecological knowledge is differentiated, and illustrates how fishers’ political knowledge is similarly differentiated and divergent. This case study emphasizes the impact of fisheries regulations in constructing diverse political knowledge regarding fisheries conservation and management. The significance of allocation issues in the British Columbia fishery is highlighted by this example.

The chapter on the Rockfish Crisis focuses on the construction of opposition between fishers’ ecological knowledge and “Science”, and the persisting influence of this conflict. This chapter reveals how fishers’ knowledge is differentiated by generation and capitalization, linking to the conclusions of the Coho chapter, which illustrates differentiation by ethnicity and gear type. The creation of new forms of political knowledge in the halibut fishery through the shift to quota-based management underscores the way in which political knowledge increasingly contributes to fishery success.

The analysis of the Back to the Future project illustrates the importance of attending to the politics of local knowledge in academic research. The political context of contemporary fisheries was not adequately engaged with by this project. The impact of regulations on ecological knowledge is emphasized in the analysis of the methodological limitations of the TEK interview structure. The project did not approach
fishers as political beings, nor did it contend with the political implications of conservation goals. This chapter provides important lessons to researchers engaged in ecological knowledge research in industrial fishing contexts.

The last two chapters focus on the conflicts and aftermath of the 2002 Fraser River Sockeye fishery. Chapter 6 links to the Coho chapter, providing another example of the impact of fishers’ knowledge of allocation issues on their response to conservation measures. The interconnection of ecological and political knowledge is illustrated by the progression of the conflict over sockeye abundance into a legal battle over sockeye allocation.

The final case study analyses the current approach to non-scientific knowledges in a particular government resource management structure. The investigation of the COSEWIC process reveals the politicization of ecological knowledge at work in contemporary co-management approaches. The prioritization of Aboriginal ecological knowledge reflects progress in the recognition of Aboriginal sovereignty in resource management. However, this involves an erasure of colonial impacts on Aboriginal resource use which poses both political and biological problems. The COSEWIC mandate fails to fully recognize Aboriginal rights, and also fails to fully improve the non-scientific data available to species assessment.

The "knowledge encounters" which structure this dissertation reveal the ways in which forms of knowledge interact within resource management contexts, and the political implications of these relationships. The interconnection of ecological and political issues in each example emphasizes the need to broaden the approach to resource management.
users’ knowledge to attend to the politics of local knowledge, and local political knowledge.

More than Fish: Expanding Local Knowledge

Local knowledge issues are essentially about power relations. Eythorsson emphasizes that the "locality of local knowledge may thus be important only as far as local is understood as far removed from power" (1998: 199). The defining aspect of local knowledge is thus its relation to dominant knowledge; it is defined by the position of its “possessors” (ibid.: 200). This general understanding of power differentials also needs to be applied internally, within local knowledge. The relative position of knowledge holders to one another, as well as relative to scientists and resource managers, has significant implications for differentiation of both knowledge and interests. Local knowledge is differentiated politically by individuals’ experience, and their position within the local matrix of power and influence. We must be more attentive to these differences. But it is not just the analyst’s understanding of power relations that must be refined. The understandings of local people about local power dynamics and differentials are also an important aspect of local knowledge that has not been adequately investigated in much fisheries knowledge research. Fisheries anthropologists must expand their definition of relevant knowledge in their research of applied fisheries issues.

Documenting fishers’ ecological knowledge is only a partial solution to contemporary fisheries problems, and one that fails to fully empower fishers in decision-making.

This dissertation has focused on the subjective aspects of local fishing knowledge, the ways in which that knowledge is multiply constructed, and how its multiplicity impacts the direction of individual fishing enterprises and the industry as a whole. This is
an effort to expand the way in which anthropologists approach fisheries knowledge. I am not arguing that anthropologists have had a wholly ecological focus in their study of fishing communities. However, the trend in applied research has been a focus on documenting ecological knowledge for inclusion in resource management. My argument is that there are other forms of fishing knowledge as relevant to resource management that are neglected through this epistemological construction. Redefining and expanding local knowledge or fisheries knowledge allows us to access the more holistic modes of inquiry and analysis that benefit other forms of anthropological research, and thereby enhance our contribution to fisheries research.

Essentially, I am arguing that anthropologists must recognize that fishermen know more than just how to catch fish. The ecological knowledge research trend has validated fishers' knowledge about fish behaviour and habitat, emphasizing that fishers can know things that biological scientists haven't yet discovered or modeled or counted. Yet this reflects a limited devolution of epistemic authority. Should social scientists not admit that fishers might hold valuable and valid theories of political, economic, and social relations, as well as ecological ones? I have emphasized the political nature of fishermen's knowledge, creating an alternative category to ecological knowledge, but essentially what fishermen have told me about is the swarm of political, economic, and social processes that shape the environment above the tide line. Fishers' critiques of fisheries regulations and conservation initiatives, although multiple and positioned, reflect a form of knowledge that can help in the creation of successful, sustainable resource management. The anthropological approach to fishers' knowledge has been relatively scientific, documenting ecological facts in a way that conforms to the needs of
science-based management. I argue for a political approach that contends with the politics of fishing, the politicization of knowledge, and the myriad of non-ecological relations that influence fishing practice.

Munro and Neher argue that effective fisheries regulations must essentially outwit fishers: the cleverness of their design must be greater than that of fishers seeking to circumvent the regulations. The proactiveness of fishers and slow reaction of bureaucratic processes limit the success of fisheries management structures (1995: 86). The increased harvest of eulachon after the collapse of the run, due to fear fishing, is a prime example of this type of problem. My research indicates that not only is this an issue of bureaucratic lag versus the ingenuity of fishers, the problem is essentially a lack of meaningful engagement with fishers’ concerns and priorities, and a poor understanding of the political context of their fishing practice. The eulachon fishers probably could have predicted the fear fishing phenomenon, if anyone had asked them.

Fisheries researchers have studied the way in which fishing behaviour is differentiated and determined by various factors. Gatewood and McCay have identified the “satisfaction bonus” as being a key determinant of fishing effort: if management plans do not take into account fishermen’s enjoyment of fishing, they will underestimate the perseverance of fishing when monetary returns are low (1990: 15). Their study also emphasized the diversity of fishermen’s affinities to various aspects of fishing and the policy implications of such differentiation. Different types of fishermen had “distinctive profiles”, which determined their attitudes towards alternative regulatory structures. Debt load has been identified as a significant determinant of fishing effort (Maurstad 1998, Cove 1973). Fishers with larger debt will fish longer and harder than other fishers.
There are thus many factors which influence fishing practice and participation. I argue that these factors also influence and shape fishing knowledge. What fishers understand about fisheries regulations and conservation measures is patterned by their position in the industry and their particular experience of both resource harvesting and resource management. The alternative knowledge literatures outline the ways in which knowledge is differentiated by experience and practice: age, gender, harvesting particular resources and in particular areas, etc. Knowledge is also differentiated politically, by the relative position of an individual within the matrix of social and economic relationships that are created by the complexity of natural resource regulation. The way in which a fisher perceives, interprets, and understands a resource crisis or a regulatory shift is related to their role in the management structure and the resource community.

The conclusions of the Review of the 2002 Fraser River Sockeye Fishery characterize some of the political forces at work on British Columbian fishing knowledge, and the way in which this knowledge is positioned, and often in conflict.

First Nations in inland areas advocate fishery restrictions in order to rebuild depleted populations, meet food, social and ceremonial requirements, and provide for terminal economic fisheries, while First Nations in coastal communities seek viable fishing opportunities that are consistent with conservation. Recreational interests have requested greater stability and predictability. Commercial fishermen are seeking to sustain their investment in the fishery and desire a more flexible management regime that will allow harvesting when stocks are abundant. Conservation organizations support a more precautionary approach to the protection and rebuilding of spawning populations. As well, they want to minimize risk, and meet broader ecosystem objectives. All of these objectives are valid, but they cannot all be met simultaneously. Achievement of one will often preclude achievement of another. (2003: 47)

This passage outlines the competing interests that vie for access to or control over the sockeye fisheries on the Fraser River. This dissertation has illustrated that such
competing understandings of the fishery also function within the commercial fleet. Local knowledge is diverse and heterogeneous, and linked to position within this matrix of competition.

This dissertation has emphasized the importance of attending to the complexities and diversity of local knowledge; both its ecological and non-ecological components. These forms of knowledge are closely connected to resource regulation and management. Government policy shapes both political and ecological knowledge, just as political and ecological knowledge shape interaction with governing structures. A fisherman who sold his salmon license in the 1996 buyback explained the way in which the Mifflin Plan had transformed his relationship with the environment:

*I hardly have any attachment to my vessel anymore. I have hardly any attachment to the water anymore. I used to be able to tell you what the tide was going to do today, tomorrow, and the next day, just off the top of my head. I couldn’t tell you if the tide was ebbing or flooding right now. I don’t know at what time it would be high or low. So those connections are slowly being broken down and as they break down so does the rest of the community, because those are the very fibers that held this community together. Both socially and economically.* (Dan, former gillnetter)

This transformation of his ecological knowledge will alter his perceptions in a very general way as well. The wider connections he speaks of, the connections between humans and the environment, which form the basis of the natural resource community, are linked to specific ways of understanding the world. Research focused on ecological knowledge can contend with how this man has lost his practical connection to the tide, but cannot contend with the larger social impacts of these changes. As this man is transformed from a fisherman, and Prince Rupert is transformed from a fishing town, there will be changes in the way all community members know the tide, and know each other. Research that approaches local knowledge in its variety of forms, including but
not limited to ecological knowledge, can do justice to what fishermen know about the changes to their fishery, to their community, and to their identity.
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Appendix I

1. Species
There are a great variety of marine species that are harvested commercially in British Columbia. The vast majority of these fisheries are limited entry (see below) and a different license is required for each species and gear type.

_Groundfish:_ These are bottom and mid-water species such as rockfish and halibut. These species are relatively long-lived and slow-growing. Halibut are caught by longline gear (L license), rockfish are also caught by long-line under a ZN license, or in vast quantities by trawl (dragger) under a T license. These fisheries have long or year-round seasons.

_Pelagics:_ These fish include herring and other smelt. Herring is the major pelagic fishery, which occurs in inshore waters, usually February to March. The fish are processed for their roe for the Japanese market and are caught by nets (gillnet, seine). A herring roe-on-kelp fishery is modeled after a traditional First Nations harvesting method, and supplies the Japanese specialty market.

_Invertebrates:_ Prawn and crab (by trap), shrimp (by trawl), geoduck, sea urchin, and sea cucumber (by dive).

_Salmon:_ Anadromous fish caught seasonally as they return to spawn in the rivers of British Columbia. 5 species of salmon are harvested: Chinook/Spring, Sockeye, Coho, Pink, and Chum. This fishery has been the focus of most management and budgetary efforts due to its economic significance and historically high levels of participation. Caught commercially by hook and line (troll), and net (gillnet and seine).
2. Gear and Boat Size

_Trolling:_

A long pole is suspended from each side of the boat at a 45 degree angle, with 3 weighted lines hanging from each pole. Approximately 20 hooks hang from each line, 6-9 feet apart. The hooks are disguised by copper spoons or plastic "hoochies" which attract the salmon to bite. Trollers harvest all five species of salmon, but coho and spring salmon have been their target species in the past. The fish are dressed, and delivered fresh or frozen-at-sea. Trollers range from approximately 36 feet to 65 feet, with the majority falling in the 40-50 foot category, and many fish outside waters (west coast of Vancouver Island, and west coast of Queen Charlotte Islands). Average crew size: 2-3.

_Gillnetting:_

The majority of the small boat fleet (under 50 ft) harvest salmon by gillnet, named for the way the salmon are caught around their gills in the straight net that is suspended behind the boat. Gillnets primarily target chum and sockeye, fishing predominantly inside waters. The fish are generally delivered round (undressed) to packers, which collect the fish on the grounds and deliver to the fish plants. Average crew size: 1-2. Gillnets are also used to harvest herring in the roe herring fishery. The net is hauled over a "beater bar" into an open skiff and the herring are shaken out of the net using the bar, and manual action.

_Seing:_

Seine nets were introduced to the west coast in the early decades of the twentieth century. Seiners are large (50 foot plus) vessels, which use a purse-like net to harvest huge (several tonnes) quantities of salmon and herring. Seines target sockeye and pink
salmon currently, but have harvested all species of salmon. Fish are generally delivered round to the fish plant. Average crew size: 5.

*Longlining:*

Halibut and rockfish are harvested using long strings of baited hooks that are set along the ocean bottom. A buoyant line suspends from a float at the surface down to an anchor at the bottom at each end of a lead-weighted line of approximately 500 hooks, which averages 1-1.5 nautical miles in length.

*Trawling:*

Rockfish species are harvested in vast quantities by large nets that are held open by metal doors and dragged along the ocean floor. Some trawls also operate at mid-water levels. Trawlers, more commonly referred to as draggers, are usually large boats (80 feet plus), with crews of 4 or more.

Smaller trawl nets, which are suspended by doors or by a long pole, are used to harvest shrimp on small vessels.

*Trap fishing:*

Traps are used to harvest crabs, prawns, and sable fish. These traps, which are generally short cylinders with a diameter of several feet, are attached to long-line gear and set along the bottom for a day or more.

3. **Salmon Fishing Areas**

Area-licensing established gear-based fishing areas for salmon in 1996. The following maps illustrate the areas for each of the three gear types.
Seine License Areas
Gillnet License Areas
Troll License Areas
Map of Research Area