THE EVOLUTION OF THE AREA 19 SNOW CRAB CO-MANAGEMENT AGREEMENT: UNDERSTANDING THE INTER-RELATIONSHIP BETWEEN TRANSACTION COSTS, CREDIBLE COMMITMENT AND COLLECTIVE ACTION

by

Laura Ann Loucks

M.A., St. Mary's University, 1995

DISSERTATION
SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS OF

Doctorate of Philosophy

in the School

of

Resource and Environmental Management

SIMON FRASER UNIVERSITY

Spring 2005

APPROVAL

Name: Laura A. Loucks

Degree: Doctor of Philosophy

Title of Dissertation: The Evolution of the Area 19 Snow Crab Co-Management Agreement: Understanding the Inter-Relationship Between Transaction Costs, Credible Commitment and Collective Action

Examining Committee:

Chair: Dr. Ken Lertzman, Associate Professor
School of Resource and Environmental Management

Senior Supervisor: Dr. Evelyn Pinkerton, Associate Professor
School of Resource and Environmental Management

Member: Dr. R. A. Clapp, Associate Professor
Department of Geography, Simon Fraser University

Member: Dr. Anthony Charles, Professor
Department of Finance and Management Science and Environmental Studies, St. Mary's University

Member: Dr. Martin Weinstein, Fisheries Consultant

Internal/External: Dr. Douglas Allen, Professor
Department of Economics, Simon Fraser University

External: Dr. Peter Sinclair, Professor
Department of Sociology, Memorial University of Newfoundland

Date Approved: March 11, 2005

SIMON FRASER UNIVERSITY

PARTIAL COPYRIGHT LICENCE

ABSTRACT

The neo-liberal economic mode of ocean fisheries governance, which emphasizes private property rights, is becoming a dominant proposal for preventing the problem of over-fishing. However, much of the economic literature on fisheries property rights places little emphasis on transaction costs: the costs of securing, monitoring and enforcing property rights. Conversely, the new institutional economic literature argues that private property rights may be very costly for common pool resource management regimes such as fisheries, while collective property rights, under certain conditions, present a viable way in which people co-operate to reduce transaction costs.

The purpose of this thesis research is to understand the transaction cost problems that perpetuate over-fishing and to explore the conditions under which these problems can be resolved through fisheries co-management institutions. In so doing, I analyse the evolution of collective property rights and transaction costs in the Gulf of St. Lawrence snow crab fishery which ultimately led to a negotiated Area 19 snow crab co-management agreement in 1996. More specifically, I examine the dynamic relationship between fishermen and policy makers over time, to illustrate both the barriers and opportunities for successful management of a common pool resource.

This research shows how the joint claimancy of common pool resource users facilitates reciprocal transaction cost problems with negative cascading effects over time. Thus, bargaining situations frequently arise between fishermen and government agencies as joint claimants attempt to reduce the reciprocal transaction cost effects by securing credible governmental commitment through collective action. However, the possibility for long enduring co-management institutions to resolve these transaction cost problems depends largely on the level of social capital and natural capital available in the specific fishery, such that credible commitment may be sustained.

In case of the Area 19 snow crab fishery, the level of social conflict over license access criteria perpetuated a reciprocal transaction cost problem, resulting in a unique bargaining situation in a specific social, economic and ecological context. Thus, this thesis demonstrates how the inter-relationship between transaction costs, credible commitment and collective action created a bargaining situation from which a co-management agreement could be successfully negotiated.

DEDICATION

To Trevor and Lilli, with love.

ACKNOWLEDGEMENTS

The data used in this research was collected during several work terms with the Department of Fisheries and Oceans Gulf Nova Scotia Area office in Antigonish. I am especially indebted to Area Director John Hanlon and Resource Manager Leroy MacEachern for numerous interviews and discussions, Licensing Manager Barbara MacArthur provided specific license data reports, Brenda MacDonald made available volumes of historical data files, and Cheticamp Conservation and Protection Manager Arthur LeBlanc provided space in which to work during my field research and patiently answered my endless list of questions.

In 2001, I received a graduate student research grant from the Sustainability Node of the Ocean Management Research Network, which financed much of the travel required to conduct interviews with fishermen in western Cape Breton, Nova Scotia. I thank these fishermen for agreeing to be interviewed, particularly those with whom I went fishing. I am especially grateful to: Leonard Leblanc, Percy Haynes, Ralph Timmons, Ronnie Doucet, Fred Lawrence, Hector MacKinnon, Brian Adams, Sheila Deveau, John Buchanan, Stanley Buchanan, and Stuart Beaton.

Over the course of writing this thesis, there were several friends and family members whose support was unfailing. I would particularly like to thank Cindy Trynor, Karen Dwyer, Michelle Dale, Josie Osborne, Ann Coutts, John Coutts, Ruth Smith, Fred Wickham, Audrey Wickham and Ron Loucks. I owe much appreciation to my husband Trevor Wickham who reviewed numerous drafts and fine-tuned the final formatting.

I am grateful for the support and direction offered by Dr. Evelyn Pinkerton. I thank my thesis advisors Dr. Tony Charles, Dr. Martin Weinstein and Dr. Alex Clapp for their insights and suggestions that improved this work.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE

1.0 Situating the Research Questions

1.1 Introduction

This dissertation is a theoretical and empirical exploration into the evolution of the fisheries management institutions embedded within the Area 19 snow crab co-management agreement. Institutions are the formal and informal rules, norms and values that shape and constrain human behaviour. In this thesis, I examine how institutions within a Common Pool Resource (CPR) management regime shape the pattern of property rights and the corresponding incentive to over-fish. The term "common pool resource" refers to a renewable resource system that is costly to exclude potential users from accessing its benefits and those who have access can subtract from the benefits of all other users. In understanding these CPR institutions, we achieve a deeper understanding of how property rights evolve and the underlying dynamic inter-relationship between transaction costs, credible commitment and collective action. Hence, the theoretical emphasis of this thesis is on the institutional dilemmas inherent to what is now commonly referred to as Garret Hardin's (1968) "tragedy of the commons".

The major empirical focus of this thesis is on the evolution of property rights institutions in the Gulf of St. Lawrence snow crab fishery, in Nova Scotia, Canada. More specifically, this research looks at the emerging conditions, over the evolution of the fishery, which contributed to the successful negotiation and implementation of the 1996 Area 19 snow crab co-management agreement.

The Area 19 snow crab fishery is one of seven fishing areas in the Gulf of St. Lawrence (Figure1) that is now managed under a collaborative co-management

agreement between the Canadian federal Department of Fisheries and Oceans and the Area 19 Snow Crab Fisherman's Association. The communities adjacent to the Area 19 snow crab fishing Area include the western Cape Breton communities of Bay St. Lawrence, Pleasant Bay, Cheticamp, Grand Etang and Margaree Harbour. Table 1 shows very little population change has occurred in these communities during the evolution of the Area 19 snow crab co-management agreement. Such population stability is uncommon when compared with the high percentage of population migration in most other rural Cape Breton communities (AHPRC and CCN 2003).

Table 1 Population Size of Selected Communities Adjacent to the Area 19 Snow Crab Fishery (1986 – 1996)

Community	1986	1996	% Change (1986-1996)
Bay St. Lawrence	570	557	-2.28
Pleasant Bay	290	273	-5.86
Cheticamp	1445	1483	+2.62
Grand Etang	590	592	+0.33
Margaree Harbour	660	657	-0.45

(Statistics Canada 2002)

Further to the low percentage of population change, the ethnicity and sense of social cohesion distinguish these communities from other coastal regions in Nova Scotia. For example, two of the larger communities adjacent to the Area 19 snow crab fishery (Cheticamp and Grand Etang) and several smaller communities in close proximity, are predominantly French speaking and Acadian in origin. Throughout time, these French Acadian communities have maintained a strong degree of social cohesion, sharing a common Acadian history, Roman Catholic religion and language, particularly since they are surrounded by English speaking communities on their

eastern and western borders and have long had to defend their French speaking identity within a predominantly English speaking Province[1].

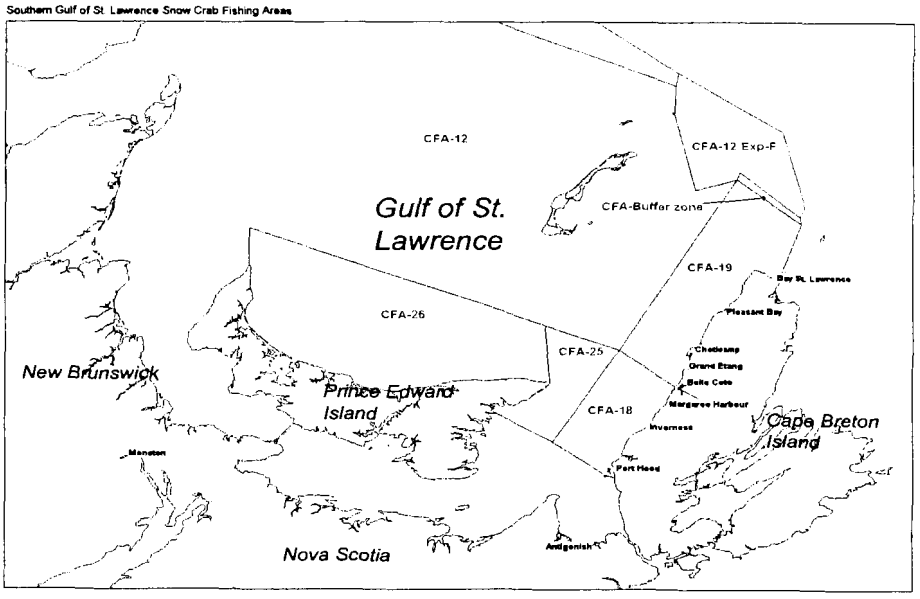
The remaining three communities immediately adjacent to Area 19 (Bay St. Lawrence, Pleasant Bay, and Margaree Harbour) flank either side of the two French Acadian communities and share a common Scottish Gaelic ethnic origin. While they share a common cultural ethnicity, these communities are isolated from one another geographically and therefore share a more localized type of social cohesion. This is particularly true for the very rural and isolated communities of Pleasant Bay and Bay St. Lawrence, both located in the highlands of Cape Breton. The ethnic origin and geographic location of the communities adjacent to Area 19 fishery play a large role in shaping the various collective action movements that eventually led to the bargaining situation from which the Area 19 snow crab agreement was negotiated. These people share a history of marginalization and survival. Moreover, they have historically relied on their relationships with family, neighbours and fellow community members to overcome challenges collectively. Consistent with this tradition, there is a pattern of strategies that fishermen from these communities have adopted to fight for their economic survival. The evolution of the Area 19 snow crab agreement is consistent with this pattern. Yet the co-management agreement is also a unique case in which the formal regulatory system operates in parallel to an informal community-based system of license sharing.

Unlike numerous examples of government regulatory systems that erode community-based rules and undermine local traditions, the Area 19 snow crab co-management agreement represents a unique case in which local government

[1] For example, the French Acadian historical society located in Cheticamp, called Le Comite Historique de La Societe Sainte-Pierre, publishes a series of historical bulletins which aim to document various struggles these communities have endured to maintain their unique cultural identity.

authorities have adopted formal allocation rules that support informal community-based sharing rules. Moreover, the co-management agreement is an example of a co-operative solution to an allocation problem with rising enforcement and protection costs, called transaction costs. However, the co-operative co-management solution was not developed instantaneously. Rather the opportunity for the Area 19 snow crab co-management agreement emerged from a series of converging events, people, values and attitudes, spread over a period of thirty years. This dissertation documents the evolution of these critical convergences and how they influenced the formal and informal institutional arrangements governing the management of the Area 19 snow crab fishery from 1965 through to the negotiation of the co-management agreement in 1996.

Figure 1 Map of Gulf of St. Lawrence Snow Crab Fishing Areas and Adjacent Communities



Source: Department of Fisheries and Oceans

In weaving together the social, economic and ecological story of the Gulf of St. Lawrence snow crab fishery through time, this thesis illustrates the inter-linkages between various social and economic institutions, at multiple levels, and how they became aligned to create the conditions under which the Area 19 snow crab co-management agreement could be successfully implemented. Finally, this research explains how local actors negotiated the formal and informal institutions of the Area 19 snow crab co-management agreement and lowered transaction costs through a combination of formal and informal property rights. Hence, the Area 19 snow crab co-management agreement is an example of an institutional framework in which the transaction cost dilemmas previously claimed to be inextricably linked to the "tragedy of the commons", have been avoided.

The central research question this dissertation endeavours to address is what institutional dilemmas inherent to the tragedy of the commons model arise in the Area 19 snow crab fishery and how can these dilemmas be resolved by fisheries co-management institutions. In Chapter Two of this thesis, I introduce the institutional dilemma inherent to Garret Hardin's "tragedy of commons" in which a zero sum game occurs when the "commons" is overexploited by self-interested sheep herders. When the same behaviour is situated within a fisheries commons, the "race for fish" is predicted to occur. Since Hardin's 1968 article was written, a proliferation of literature on private property rights has argued that the private rights regulatory system, known as Individual Transferable Quotas (ITQs), is capable of resolving the tragedy of the commons dilemma (Anderson 1986; Arnason 1998; Edwards 1994; Pearse 1988; 1994; Scott 2000). However, the Area 19 snow crab fishery was one of the first fisheries in Canada managed using an Individual Transferable Quota regulatory system and was still vulnerable to the systemic institutional dilemmas which can facilitate over-

fishing. Hence, this research contributes further analysis to advance our understanding of the complexity of institutional dilemmas, associated with the "tragedy of the commons", that is presently absent in the current property rights literature.

1.2 Research Methods

This research uses a single case study approach to explain the causal linkages between the institutions that evolved in the Area 19 snow crab fishery and the systemic institutional dilemmas described in Garett Hardin's "tragedy of the commons" (1968). Furthermore, the Area 19 snow crab fishery presents a unique case in which formal and informal institutions have evolved to mitigate these dilemmas. Hence, this research challenges the predictions of neo-liberal economic theory and its assumptions about fishing regulatory systems that implement private property rights.

Accordingly, this dissertation research meets the specific conditions under which single case studies are an appropriate research methodology. Yin (1994) cites five circumstances under which the single case study approach is recommended. A single case study method can be used:

1. To confirm or challenge a theory or to represent an extreme or unique case;
2. To explain complex causal links in real-life interventions;
3. To describe the real-life context in which the intervention has occurred;
4. To describe the intervention itself; and
5. When an investigator has access to a phenomenon that was previously inaccessible (Yin 1994).

In view of the last condition, in 2001 I had the opportunity to work for four months in the Department of Fisheries and Oceans (DFO) Gulf Nova Scotia Area office in Antigonish and carry on with my dissertation research. Over the first month of working,

I was able to establish an excellent rapport with the office personnel and establish a level of trust that is not uncommon among Nova Scotians, when the appropriate network of relations can assure a certain level of accountability. Having met this criterion, I was offered the opportunity to have unlimited access to all government documents relevant to the development of the Area 19 snow crab co-management agreement. Furthermore, I was provided with full departmental support for accessing license data files not typically available for public use. This access to information, in combination with daily opportunities for informal discussions with individuals most familiar with the Area 19 snow crab co-management agreement, provided a productive research environment.

I believe this sense of mutual trust and trustworthiness has afforded me a unique research opportunity to examine the role that government institutions play in shaping fishermen's incentives. While this area of research is necessary for understanding how co-management institutions evolve, little to no research of this kind has been documented in the co-management literature from North America. Therefore, this dissertation contributes a new research dimension and a new analytical framework to the existing body of co-management literature.

1.2.1 Types of Data Sources

As mentioned above, I had access to numerous government documents including inter-departmental memos, letters, government reports, press releases, correspondence to and from fishermen's organizations, and statistical material from government data bases. Moreover, I had access to this information freely and could return to these government documents repeatedly as the storylines began to emerge from the stacks of file folders.

The second major source of information on which I relied included focused semi-structured interviews averaging 1-4 hours (writing detailed notes) and informal open ended discussions, typically in casual conversations. To better understand specific elements of the Area 19 snow crab co-management agreement, I conducted focused interviews with key individuals who negotiated the agreement. This included individuals from the Area 19 Snow Crab Fisherman's Association negotiating team, individuals from the DFO negotiating team and individuals from the Area 19 bonafide fishermen's group (without snow crab licenses prior to the co-management agreement). However, to broaden my understanding of the Area 19 snow crab fishery system as a whole, I conducted informal discussions with a wide variety of people during my work term with DFO. Table 2 illustrates the diversity of informants whom I interviewed and consulted.

In addition to formal interviews and informal discussions, I gathered information from direct observation of the snow crab fishing practice. In the summer of 2001, I went fishing with six different captains in order to experience crab fishing in the Cheticamp Gully. I staggered my fishing trips throughout the season in order to compare the fishing practice at the beginning and end of the season. Similarly, as an employee of the Department of Fisheries and Oceans Gulf Nova Scotia local area office, I gathered information as a participant observer while attending numerous government and fishing industry meetings. In addition, my family and I moved to Antigonish in 2003 and I resumed working at the DFO Gulf Nova Scotia local area office on a part-time contract basis. This work experience also has relevance for the reliability of my research. My reputation as a scholar and a capable fisheries management advisor not only depends on the validity of my evidence, but also upon the corroboration of the people in my immediate community whose experience I am describing in this dissertation.

Table 2 Diversity of Informants and Information Types

	Focused Interviews	Informal Discussions
FEDERAL GOVERNMENT REPRESENTATIVES		
1. DFO Gulf Nova Scotia Area Office, Antigonish, N.S.		
• Area Director	2	10
• Fisheries Resource manager	1	10
• Oceans' Strategy Co-ordinator		2
• Chief of Conservation and Protection		2
• Cheticamp Conservation and Protection Officers	1	6
2. DFO Gulf Region Head Quarters Moncton, N.B.		
• Chief of Snow Crab Science		3
• Chief of Snow Crab Stock Assessment		3
• Director of Center of Data Integration		1
• Fisheries manager of Area 12	1	
• Director General of Fisheries Management		1
3. DFO National Office, Ottawa, Ont.		1
• Objective Based Management Project Director		1
• Senior Policy Analyst		1
PROVINCIAL GOVERNMENT REPRESENTATIVE		1
1. Provincial fisheries policy analyst	1	1
CHETICAMP COMMUNITY		
1. Director of Les Trois Pignons, Cheticamp Historical Society	1	
2. Previous Director of the Cheticamp Fisheries Co-operative	1	
3. Local Grocery Store Owner	1	1
4. Local Bed and Breakfast Owners	1	4
5. Priest of the St. Peter's Parish	1	
6. Fish Buyer for LaDigue Fisheries Ltd.		1
7. Local Radio Disc Jockey		1
8. Area 19 snow crab fishermen	6	10
9. Area 19 bonafide fishermen	2	10
BAY ST. LAWRENCE COMMUNITY		
1. Local camp ground owner	1	1
2. Local community organizer		1
3. Area 19 snow crab fishermen	5	7
4. Area 19 bonafide fishermen	6	6
5. Local part-time resident and social scientist		1
6. Director of the Victoria Fisheries Co-operative		1
TOTALS	**31**	**87**

1.2.2 Analytical Methods

The analytic generalizations developed from this thesis research use previously developed theories as a template against which empirical results are compared. Following this method, known as pattern matching (Yin 1994), I introduce theoretical concepts throughout the case study that are relevant to the analysis and provide

external validity. In addition, I develop a new-institutional economic property rights model from which I draw four theoretical propositions. Hence, the case study of the Area 19 snow crab co-management agreement is situated within a multi-level institutional economic analysis. In this way, I use specific theoretical predictions to provide internal validity to the research outcomes.

1.3 Outline of the Dissertation

This thesis consists of seven chapters. In Chapter Two, I develop the overarching theoretical framework in which the case study is situated. Much of the chapter broadens the neo-liberal economic private property rights model to include a new-institutional economic perspective on the institutional dilemmas that perpetuate the "race for fish". Further to this discussion, I identify four theoretical research propositions that frame the development of the Area 19 snow crab fishery case study.

Chapter Three situates the case study within the historical institutional dilemmas that led to the development of the Gulf of St. Lawrence snow crab fishery in the early 1960s. The case study is supported by an analysis of the influences of industrial capitalism and the causal linkages between bureaucratic institutions and the transaction cost dilemmas that emerge in the snow crab fishery. Chapter Four continues in this direction, documenting the inter-relationships between transaction costs, bureaucratic norms and values and the path towards resource decline.

Chapter Five introduces the theoretical concepts relevant for co-management institutions and introduces the key events, causal relationships, organizations and values that motivated the Area 19 snow crab fishermen to negotiate a co-management agreement with the Department of Fisheries and Oceans (DFO). In Chapter Six the focus of the case study narrows and looks specifically at the co-management

agreement negotiation process. Particular attention is given to the conditions within the agreement that make it valuable for all negotiating parties. Moreover, the formal and informal property right institutions embedded within the agreement, which lower transaction costs, are described. In the concluding chapter, I draw together the main strands of the argument developed throughout the previous five chapters. These arguments are summarized in a discussion of each of the four theoretical propositions outlined in Chapter Two. This final gathering of ideas creates a synthesis of the case study and offers new insights into the way in which private property rights are currently theorized. Furthermore, new analytical generalizations relevant to the theory of co-management are made and new directions for research are offered.

CHAPTER TWO

2.0 Understanding the Dynamic Nature of Fisheries Management Institutional Dilemmas: Building a Case for a Transaction Cost Analysis of Property Rights

2.1 Introduction

In 1993, people living in coastal communities throughout Atlantic Canada were just beginning to experience the devastating social and economic effects of a collapsed renewable resource for the first time in over four centuries of cod fishing. For them, and all those affiliated with the fishing industry, the relevance of the "tragedy of the commons" polemic suddenly shifted from a distant place of rhetoric to a closer place of meaning. Ten years later, after witnessing first hand the reality of scientific uncertainty, technological failure, government failure and the enormous social and economic consequences of the negative human impact on the ecology of the sea, a powerful mindset has now settled in. Everyone with whom I've spoken who is involved in the fishing industry in Nova Scotia has said in various ways 'we won't let it happen again'. Such sentiments have accompanied what seems like a new level of willingness to take responsibility for resource conservation. Within regional east coast government, a new "co-management" movement has replaced the previous institutional construct of patriarchal command and control (Hollings and Meffe 1996). Moreover, the conceptualization of the "tragedy" has acquired a level of meaning that has come to symbolize the interdependency between human and ecological systems. However, when I probe people more deeply to explain how the 'tragedy' happened, the diversity of understandings is astounding.

Such diversity in personal perspectives and their underlying construction of meaning is the subject of long historical debate within social sciences. Similarly, the

conceptualizations of the "tragedy of the commons" are equally polarized, as they are situated within the complexity of this underlying theoretical tension. My intention in this chapter is to carefully navigate a course through the layers of the theoretical debate within which the 'tragedy of the commons' is situated. Without delving too deeply into any one theoretical field, my objective is to situate co-management theory within the various nested layers of new-institutional economic theory, which are in turn, situated within the larger theoretical tradition of political economy where the debate on property rights (catalyzed by economic liberalism) is positioned.

2.2 Situating the "Tragedy of the Commons" Debate

During the twentieth century, much of the debate concerning questions about how we understand the structure and dynamics of social life was expressed in the analysis of capitalism and socialism as rival economic systems. The central argument focused on the effects of social change that the alleged impersonal market-based relations, characteristic of capitalism, were having on personalized relationship-based exchanges, characteristic of kinship focused economies (Polanyi 1944). The sociologist Ferdinand Toennies described this tension as the institutional differentiation between the twin concepts of Gemienschaft and Gesellschaft (Toennies 1967). The German term Gemienschaft encapsulated the meaning of face-to-face relationship-based exchanges characteristic of closed village communities, strong kinship ties, blood relations and spiritual connection. In contrast, the term Gesellschaft referred to the secular individualistic market-based exchanges of a society focused on commodities and self interested wealth maximization. While the body of literature surrounding the debate on the process of differentiation is too vast too summarize here, the general argument expressed by sociologists was that the economic model

underlying neo-classical economic theory was artificially removed from its larger social context. Following this view, the vast body of theory generated by social scientists over the last two centuries has largely focused on demonstrating the multiple ways in which economy and society are inextricably linked. This thesis follows in the same tradition. I begin my analysis by laying the foundation of the neo-liberal[2] economic model of the 'tragedy of the commons' and the proposed solution of private property rights. Over this, I lay down additional layers of analysis that challenge various assumptions of the neo-liberal property rights model in order to develop a deeper understanding of the institutional dilemmas found inherently within the 'tragedy of the commons'. However, rather than completely deconstruct the neo-liberal model; I build it further, with insights on property rights from institutional economic theory. Based on this deeper understanding of the 'tragedy of the commons", looking through the lens of transaction cost analysis, I ask what institutional dilemmas inherent to the model, can co-management institutions resolve?

2.3 Economic Liberalism and the Origin of Private Property Rights

The capitalist economic system arose from what was initially a social and political movement in the seventeenth and eighteenth centuries, in an attempt to challenge the domination of institutions such as absolute monarchy, feudalism, aristocratic privilege and religious oppression (Holton 1992). Its supporters sought a range of improvements for society including the increased democratisation of political institutions, the pursuit of freedom of thought, the expansion of education and scientific institutions for the development of reasoned thinking. And in doing so, they ultimately challenged the role

[2] I use the term "neo-liberal" to identify the private property rights model as a twentieth century construct that merged the ideologies of conservatism and liberalism in order to validate the capitalist world economy, after the Maoist revolution of socialism in 1968 (Turner 1996).

of government and community in the regulation of economic interactions. In this social and economic context of tremendous discrepancies between wealth, status and privilege, a movement towards individual freedom from the bonds of aristocracy was catalyzed. My point in highlighting this context is to emphasize the origins from which the theoretical propositions of neo-classical economics emerged (Schumpter 1954). It was this backdrop of rigid social and economic oppression that illuminated the radical concepts of economic liberal theory. Therefore, it is understandable that the neo-classical concept of self-interest is inextricably linked to the idea of individual sovereignty which is a moral proposition that individuals should be free to make their own choices; a privilege at one time reserved only for kings and powerful elites. The link between individual sovereignty and self interest is that the individual is not only capable of making choices for himself, but she is motivated to do so from an inherent right to their personal 'taste' or 'preference'. In this way, early liberal economists were able to differentiate the individual from his dependence on social status for his ability to make decisions. Furthermore, they argued that the self knowledge every individual possess is rational, based on an instrumental 'world view' of maximization (maximum utility). Similarly ambiguous, rational action was defined as the pursuit of means to achieve ends that improves one's situation in life. Taken together, these liberal constructs of human nature were the principal means by which individuals could function as separate entities from their social context. However, the ultimate form of emancipation was believed to be found in the individual's private rights over property. According to the seventeenth century liberal philosopher John Locke, "individuals had private rights over the resources they had utilised in their own labour, together with the goods arising" (Holton 1992:59).

Over time, the early liberal legacy of private property rights and their connection to labour value was transformed into the contemporary liberal theory of capitalism. With the mechanism of the free market and its feature of price setting, the value of property could be commoditised into more efficient forms of capital. In this way, private property rights became the bedrock of capitalism, upon which all other market exchanges were based. According to liberal economics, private property rights provide the means by which individuals satisfy their wants through the personal self interested stake they have in the efficiency and optimal use of the resources over which they have rights to. Furthermore, the liberal economic theory of capital claims that communal rights discourage personal effort because no one person is accountable for the effective management of resources. Whereas with private property regimes, so they argue, every individual owner has something to gain if the resource is well managed and something to lose if it is not (Holton 1992).

It is this debate on the level of human "stake" one has in the effective management of resources, whether they are acting within a private property regime, a state property regime or a communal regime, that characterizes the institutional dilemmas inherent in the "tragedy of the commons" phenomenon. Garret Hardin in his 1968 article, "The Tragedy of the Commons" used a largely neo-liberal analysis to describe the zero sum game that happens when the "commons" is overexploited by self-interested sheep herders (Hardin 1968). However, it is somewhat ironic that Hardin chose to use a neo-liberalism construct of human nature (self as differentiated from society) in the context of a communal management system which historically would have constrained (Berkes 1989b) individual behaviour through social processes (Hanna 1990). Perhaps as a consequence of Hardin's mixed use of metaphors and his oblivious stumble into the contentious debate on institutional differentiation, a large

body of literature has since developed around the central debate on the institutional solutions necessary to resolve the "tragedy of the commons" dilemmas (Berkes 1985a; b; 1986; 1989b; Bromley 1982; 1992a; Buck 1989; Daly and Cobb 1994; Feeny, Berkes, McCay and Acheson 1990; Maurstad 1992; McCay and Acheson 1987; Ostrom 1990; Weinstein 2000).

While much of the debate actually centers around the misconstrued definition of common property (for a distinction of terms see Ciriacy-Wantrup and Bishop (1975), generally speaking, the "tragedy of the commons" concept has generated a richer theoretical analysis on the linkages between human and ecological systems, particularly in the field of fisheries management, that was previously lacking in sociological and economic analysis of property rights. That being said, there remains a distinct polarization in economic and social theory on what institutional solutions are most capable of resolving the dilemmas inherent within the "tragedy of the commons". This will be more apparent later in this chapter.

2.4 Neo-liberal Private Property Rights Solutions to the "Tragedy of the Commons"

Prior to Hardin's analysis of the 'commons' dilemmas, the economist Scott Gordon discussed the economic and biological problems inherent to an open access fishery regime in his 1954 article, "The Economic Theory of a Common Property Resource: The Fishery" (Gordon 1954). His unfortunate misuse of the term "common-property" in describing characteristics of open-access dilemmas, forged a long held assumption that "the commons" was the root cause of failed fisheries management (Gordon 1954; Hanna 1990). Subsequently, private property rights theorists long held the upper moral hand in asserting their neo-liberal theoretical solutions to the 'tragedy

of the commons'. Yet, it is important to note that Gordon's argument was not specific to private property rights. Rather, he argued that fishermen would always fish beyond the point of economic equilibrium because their livelihood strategies considered costs at the average point, rather than the marginal point. Consequently, fishermen would move from fishing area to fishing area without considering their cost per unit effort. This fact, Gordon argued, in combination with open access regimes, would inevitably lead to over-capitalization. He predicted that the fishery would become over-exploited as fishermen continued to invest in more efficient and expensive technology, thus pushing the average cost of fishing upwards without any change in average production, known commonly as 'the race for fish'. From this point, Gordon concluded that the full productivity of the fishery would only be realized if access was limited, fishermen had the incentive to value the production of individual fish stocks, marginal costs were considered as well as average costs, outsiders could be prevented from capturing the benefits of the resource stock and the fish could be harvested at their highest production value (Gordon 1954). Following this view, Gordon argued that 'sole ownership' was central to creating the incentives for fishermen to realize the full productivity of the resource. However, 'sole ownership' was comparable to the closed biological system characteristic of free hold property similar to the property rights one would hold over a farm. Furthermore, its ownership was not understood to be held necessarily by one owner. Rather, as a closed system, its members would equally share the equity of their individual investment in the resource (Scott 1955; 1988)[3].

3 Gordon (1954) did not assume asset value was in the transfer (sale) but in the fishing. He also assumed that costs would decrease if one had exclusivity to the stock. Therefore, asset value would increase and transaction costs would decrease, because the joint claimant problem of stock flow alterability is resolved. However, stock variability is a different set of problems.

More recent economic theories on private property rights and fisheries management consider specific characteristics of property rights that can be applied to fisheries access rights and when taken together, comprise a certain level of property "completeness". This notion of having a complete set of property rights is argued as being the necessary motivating factor for fishermen to realize the full productivity of the fishery resource. Moreover, neo-liberal economists predict that fishermen will only act as "owners" if they have property rights with the full array of characteristics necessary to generate an "asset" value. These characteristics are included in the following list:

1. **Exclusivity:** Protects the right holder from the interference from others who can otherwise capture the flow of benefits from the fish stock. This includes exclusivity from outsiders as well other rights holders internal to the system who have the capacity to intervene with fish catching (Scott 2000).

2. **Duration:** Reduces the uncertainty of access rights and ensures that the holder of the right will benefit in the future from their investment in the present. Speaking specifically about fishing rights, economist Anthony Scott proposes that the characteristic of duration "encourages the right-holder to make costly changes in the size and age structure of the fish stock that may result in larger and more profitable catches even if there must be an extended waiting period" (Scott 1988; 2000:9).

3. **Security of Title:** Is the vulnerability of the title to the ownership rights of the resource being challenged by other resource users or to government cancellation (Scott 1996).

4. **Transferability:** Allows the holder to maximize the value of their individual time and capital by selling the license in the free market (Scott 1996).

Considering these four characteristics of property rights, neo-liberal economists propose that Individual Transferable Quotas (ITQs) are the most complete set of property rights in fisheries management regimes today and argue that this regime resolves the inherent dilemmas of the 'tragedy of the commons' by transforming fishermen into "owners". Just as farmers own and manage their farms for optimal

productivity, economists argue that fishermen holding property rights with all four of the above characteristics will manage the fishery with an equal incentive for optimization.

The ITQ system is premised on the annual scientific calculation of the Total Allowable Catch (TAC) for the "single stock ocean fishery" based on the scientific estimate of available fishable biomass (Scott 1996). Each ITQ holder is a recipient of some portion of the quota, either as a fixed percentage of the whole TAC or an absolute number of units of fish. The central tenet of the ITQ property rights system is that the characteristic of exclusivity removes the incentive to overcapitalize in the 'race for fish'. Following this view, an individual owner can fish more efficiently, at the lowest marginal cost. Furthermore, with a guaranteed portion of the catch, it is assumed that fishermen "do not interfere with, and do not need the forbearance of, any other fisher. The right of each is like that of a farmer who may draw a specific amount of water from a common irrigation system: their exclusivity prevents the resource users from "harming" each other" (Scott 1996:46). Subsequently, the exclusivity characteristic is predicted to lower costs to the fisherman and create a shift in attitude from being an exploiter, to being an "owner". Exclusivity is predicted to provide the incentive "to get seriously involved in improving the health, growth, or value of 'his' stock" (Scott 1996:47). Motivations to overexploit the stock are expected to decline because fishermen no longer have to compete for access to resources. Moreover, it is predicted that fishermen viewing their quota with the eyes of an "owner", will be more likely to work co-operatively with scientists in making long term decisions about the increase or decrease of the TAC (Scott 1996). Similarly, economists predict that the individual quota holder will be more likely to participate in self enforcement strategies such as informal sanctions and apply social pressure on cheaters, because any rule that is

violated will affect his future benefits directly (Bailey and Jentoft 1990; Brubaker 1996; Scott 1996; Tietenberg 1988).

An equally important characteristic of ITQ property rights is the transferability of the entitlement. Economists argue that with a high asset value, "the entitlement to fish flows naturally to those gaining the most benefit from it because their costs are lower" (Tietenberg 1988:274). When considering the next generation of quota holders who have to purchase their title to fish, it is assumed that the maximum price any purchaser would pay would be equivalent to the value derived from owning the quota (Tietenberg 1988).

However, empirical research on the New Zealand ITQ fishery in its early implementation stages concluded that economic predictions on the efficiency of transferability were not met. Rather, positive prices paid for quota purchases exceeded the capitalised value of the expected annual stream of benefits from fishing, resulting in an overall reduced rate of return (Lindner, Campbell and Bevin 1992). Similarly, the prices paid for annual lease of quota did not correspond with the capitalised value of fishing. Rather, the transfer of quota for the purpose of landing quota over-runs created an incentive for fishermen to pay exceedingly high prices (Lindner et al. 1992). In a different study on the New Zealand ITQ system, 95 percent of industry members interviewed, expressed concerns over the cost barrier of high transfer prices for young people wanting to enter the fishery (Dewees 1998). In addition, the study (and others) challenged the economic predictions that exclusivity leading to "ownership" status, would correspondingly lead to conservation behaviour (Copes 1996; 1999) I will address this issue further in the next section on new-institutional perspectives on private property rights.

Evidently, there exists some debate on whether the predictions of the neo-liberal model of private property rights hold true when applied to existing ITQ fisheries. Certainly, social scientists have demonstrated many weaknesses with the model when examined with additional sets of criteria other than efficiency (Maurstad 1992; McCay 1995; McCay, Creed, Finlayson, Apostle and Mikalsen 1995). Yet even economists with similar efficiency objectives, working in the field of institutional economics, point out several erroneous assumptions within the neo-liberal private property rights model. In the next section, I will summarize the new-institutional view on property rights within the context of the 'tragedy of the commons' dilemmas.

2.5 The "Tragedy of the Commons" and the Problem of Social Cost

The field of new institutional economics is distinct from neo-liberalism in its focus on organizational constraints that "structure incentives and shape human interactions" as they relate to economic performance (North 1992). Institutional economists look at the way in which rules, rights and duties evolve and their subsequent relationship to wealth maximization. Consequently, new-institutionalists are careful to distinguish themselves from neo-liberal economists, particularly in their definition of the term "property right". While neo-liberal economists define property rights according to the legal rights assigned by the State, new-institutional economists consider property rights to be more about the process through which an individual, or group, attains economic benefits from an asset. In this view, property rights assigned by the state are largely irrelevant if an individual or group can somehow attain an economic right. The economist Yoram Barzel makes the distinction by defining the economic property rights an individual has over a commodity (or asset) to be, "the individual's ability, in expected terms, to consume the good (or the services of the asset) directly or to consume it

indirectly through exchange" (Barzel 1997:3). This definition of economic rights is closely related to the idea of residual claimancy which recognizes that an asset can have several benefit flows which are shared between several individuals or groups. The importance of this distinction will become clearer later on in this chapter. The point here is that property rights are not absolute, but shared with every individual or group that has the ability to capture a benefit flow from the asset over which one has an economic right. In other words, property rights are not the seamless, costless and definitive rules of ownership that neo-liberal economists proclaim them to be. Rather, they are constrained opportunities for securing benefits over a good that may be equally available to other claimants, depending on a number of variables influencing the cost of securing, monitoring and enforcing the right.

Since the work of Ronald Coase, in his famous article "The Problem of Social Cost" (Coase 1960) new-institutional economists have increasingly focused their attention on the costs of capturing and protecting property rights, known as transaction costs, and their rent dissipation effects (Allen 1991; 1997; Allen and Lueck 1993; Anderson 2004; Anderson and Hill 1975; Coase 1960). Building on Coase (1960), new institutional economists argue that the transaction costs associated with defining and enforcing complete property rights will motivate bargaining behaviour between joint claimants because of the reciprocal costs for re-allocating scarce resources (Anderson 2004). In Coasean terms, environmental and social issues arise as a result of competing uses for scarce resources for which property rights are not clearly defined. Consequently, transaction costs arise as joint claimants expend resources to capture or protect the asset value of the good over which they are claiming. Furthermore, property rights can never be fully complete without cost; therefore joint claimants are motivated to bargain or negotiate a settlement that alleviates the problem of rising transaction

costs, of which each claimant can impose on the other. As Coase pointed out, the transaction costs can be mutually imposed. When the potential for reciprocal costs exists, a situation is created in which each claimant is better off bargaining with the other for a settlement, than to continue to exist in expensive disputes. For example, if Party A owns a pulp mill which is emitting hazardous fumes in the fresh air that Party B, a nearby resident, was previously enjoying before the construction of the mill, Coase would argue that if party B had an enforceable right to that air (such as the right of first possession) then Party A would be motivated to negotiate a settlement with Party B. Otherwise, the transaction costs of defining and protecting the rights in the court of law to emit hazardous fumes may exceed the benefits from having the pulp mill in the first place. While the reality of environmental degradation attributed to pulp mills and the lack of legal standing for citizens to plead their rights in Canadian courts presents a problem in which a bargaining situation is unlikely to arise, Coase's premise is not to be immediately dismissed. The strength of what Coase is saying is that the underlying problem of resource misallocation is related to the pattern of property rights that evolves as scarce resources are allocated and the subsequent transaction costs arising from that pattern. Furthermore, Coase argues that the problem of social cost arises when transaction costs continue to increase for one or both claimants, yet the burden of these costs are neither distributed nor is the property rights pattern changed to reduce the transaction costs. Thus, social costs arise as a convergence between private costs and government costs.

The Coasean view contrasts considerably from the Pigouvian approach which assumes that market externalities (negative or positive) can be compensated for with government intervention, either through taxes or subsidies (Dahlman 1979). In terms of Pigou's notion of externalities, social cost is calculated by an implicit assumption of

rights without a deeper understanding of the actual property rights and transaction cost pattern. Consequently, government action is often sought after for compensating market failure, while the underlying problem is much more confounded by the property rights institutions on which the market is based. In Coasean terms, the problem of social cost is a factor of rising transaction costs perpetuated by the underlying property rights pattern. Resource economist Terry Anderson (2004) contrasts the Pigouvian and Coasean approaches to the problem of social cost by saying, "The externality approach raises transaction costs and encourages negative sum battles over rights while the Coasean approach focuses on the positive sum exchanges that can be encouraged by lowering transaction costs" (Anderson 2004:259).

The relevance of the Coasean view for understanding the "tragedy of the commons" has to do with the premise that property rights are neither absolute, nor are they without cost. Rather, as resources become scarce, competing uses for resources create transaction costs dilemmas which, in turn, influence the emergent property rights pattern. In other words, Gordon's claim that the "tragedy of the commons" can be prevented with clearly defined property rights is largely dependent on the cost of capturing, protecting and enforcing those rights. Following the Coasean view, it is predicted that as resources become scarce, resource disputes will arise. Consequently the problem of social cost will also arise, if transaction costs are neither reduced nor shared between joint claimants.

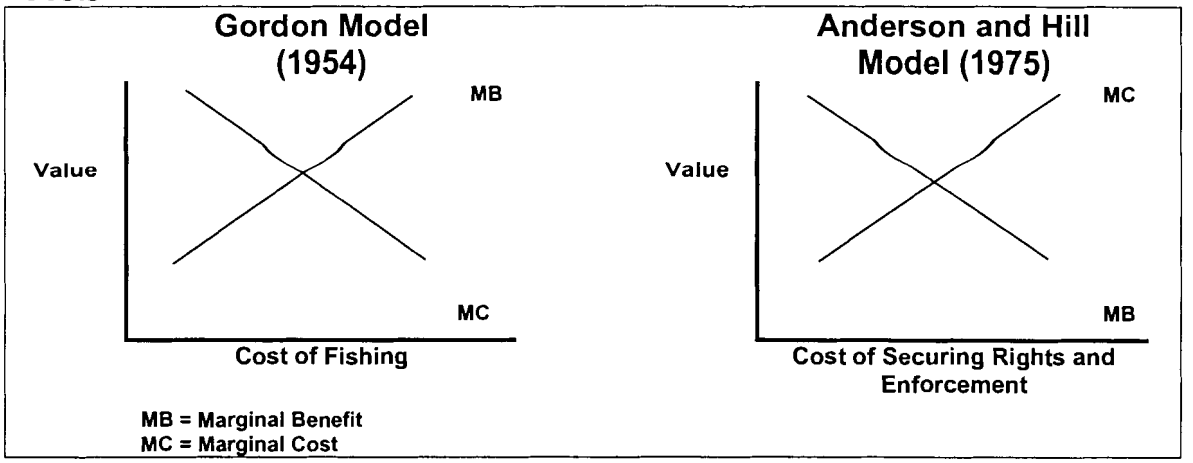
Anderson and Hill in their article, "The Evolution of Property Rights: A Study of the American West" (1975), demonstrate how property right institutions on the Great Plains emerged and changed according to the dynamic relationship between the asset value of land and the benefit of increasing levels of rights definition and enforcement. Moreover, they explain how the variables of ecological uncertainty (unusually cold

weather patterns), technological change (barbed wire fencing) and joint claimants (fellow cattle herders) all contributed to changes in asset value and the cost of enforcement, which effectively changed the pattern of property rights over time[4].

The dynamic relationship between asset value and enforcement costs challenges the neo-liberal economic assumptions centered on the property right characteristic of exclusivity. Gordon (1954) predicted that the marginal benefit from fishing would increase and the marginal cost of fishing would decrease as a result of exclusive access. Thus, he argued, exclusion regimes such as "sole ownership" would result in economic efficiency and the incentive to 'race for fish' would no longer exist. However, Anderson and Hill demonstrate that exclusivity is neither fixed nor is it independent of the asset's benefits to which claimants have a joint right. Rather, the value one can attain from a good depends on the degree of exclusivity one can attain with this right. In other words, exclusive rights are not without cost. Furthermore, this degree of exclusivity changes over time depending on the relationship between the asset value of the good and the costs associated with defining rights and enforcing rights (Figure 2).

[4] Anderson and Hill (1975) present an initial hypothesis that the marginal benefit of defining a complete set of property rights declines over time as enforcement costs increase. Similarly, they argue that the marginal cost increases because of the increased opportunity cost of resources used in protecting property rights. Using a historical institutional analysis of the emergence of property rights in the Great Plains of America, they demonstrate how the initial rule of first right of capture, which they call "squatter sovereignty" was initially sufficient for land settlement patterns until the growing demand for land caused the value to increase and hence the subsequent benefit in enforcing some level of exclusivity. Cattlemen joined together to form stock grower's associations and jointly controlled access to the Plains by controlling access to a limited water supply. Furthermore, as a group, they were able to put pressure on the Government to legislate grazing controls, which included punishment for any violation of the law, and resulted in transferring a portion of the enforcement costs from the cattlemen to the government. While this strategy was successful at transforming the commons closer to a private property rights regime, it was only temporary. One severe winter with sub-zero temperatures significantly reduced the number of cattle herds, which in turn reduced the demand for land. Consequently, the number of members in the stock grower's association declined by 75 percent and any attempt at enforcing exclusivity was minimal until enforcements costs were reduced with the technology of barbed wire fencing (Anderson et al. 1975).

Figure 2 The Reverse Effect of Securing Property Rights with Rising Transaction Costs



Anderson and Hill (1975) demonstrate that the benefit from increasing levels of rights definition and enforcement activity is related to the increased probability of appropriating the worth of the asset. Thus the marginal benefit declines at the rate of the diminishing return from investment in enforcement activity. The marginal cost increases, "because of the increased opportunity cost of resources used in property rights activities" (Anderson et al. 1975:166). Following this argument, strong exclusivity does not necessarily lead to economic efficiency. Moreover, this suggests that as the value accrued from the asset increases, the cost of defining and enforcing rights over this asset benefit also increases over time. At some point, the marginal benefit from the property right will drop below the marginal cost of protecting the right from other claimants and maintaining a high degree of exclusivity will no longer be economically efficient. This is consistent with Coase's theorem, which implies that when transaction costs are present, the gains of trade will be maximized net of transaction costs.

Anderson and Hill also point out that the relationship between asset value and the costs associated with defining and enforcing rights is dynamic rather than static. That is, both variables can rise or fall over time and ultimately affect the property rights

pattern. Furthermore, this relationship can be influenced by variables within the institutional environment, the natural environment and technological change. The costs of defining and enforcing rights can be lowered with the collaboration of individuals within their families, groups and organizations and are further secured with the coercion of government to change the law in their favour. Similarly, asset value can drop quickly with the unpredictable changes in the natural environment such as drought. Accordingly, many institutional economists have argued that historically, the pattern of property rights emerged and fluctuated according to the opportunity for social organization and the nature of the resource (Bromley 1992b; Lueck 1995)[5].

This prediction is consistent with Anderson and Hill's explanation of why the level of activity in defining and enforcing property rights changes over time. They point out that the willingness to invest in the cost associated with defining and enforcing rights, in the first place, depends on the value of the good being high. If the value is low, there is little incentive to invest in securing property rights. For example, the early settlement patterns of the American West were largely comprised of common rangelands because initially, there was an abundance of available land[6]. It wasn't until settlement populations dramatically increased that the supply of rangeland (with good water) became scarce, and subsequently caused the value of land access to increase. Once land values increased, cattlemen had a shared incentive to protect their rights to the rangeland collectively. It was a necessary livelihood strategy. However, when asset value went into decline, the cost of defining and enforcing rights to the rangeland exceeded the benefits. Consequently, the membership in stock growers' associations

[5] For an excellent example of fluctuating property rights corresponding to ephemeral ecological cycles, see (Thomas 1996).

[6] William Cronon describes the irony of how the early New England colonists created a mythology of abundance in their exaggerated descriptions of the New World as being the "land of plenty", which contributed to the enormous immigration movement from Europe and ultimately resulted in land scarcity (Cronon 1992).

also declined. Yet, when water rights became increasingly scarce, the growing demand for water from the mining industry catalyzed an identical pattern of property rights, leading to mining districts, mining associations, mining courts and shortly after, their own mining laws that ultimately defined the law of water rights (Libecap 1996).

As illustrated above, the nature of the property rights claim depends on the nature of the resource captured and any change in the asset value changes the return on resources devoted to property rights questions.

> The higher market value attached to goods with strong ownership rights spurs individuals to seek laws that would strengthen private property rights (Alchian & Allen 1972 in (Anderson et al. 1975:167).

Thus, it is predicted that any increase in productivity from the definition and enforcement of rights will shift the marginal benefit curve (meaning the benefits from the resource will be lower over time) (Anderson et al. 1975:167). In this view, lower transaction costs can increase productivity. However, this case also demonstrates how government regulation and enforcement reduce transaction costs for the individual but shift the burden of these costs on to society. Therefore, a property rights pattern in which the rising transaction costs are carried by society creates a social cost, in Coasean terms.

In summary, the degree of exclusivity over the benefits of an asset is not fixed in time. Rather, it shifts depending on asset value and the cost of securing the benefits from this asset. The higher the degree of exclusivity, the higher the costs, and at some point the costs will exceed the benefits, resulting in inefficiency. The relevance of this argument to the neo-liberal economic model of the "tragedy of the commons" is that if the degree of exclusivity is variable, then so too must be the degree of "ownership" and any associated assumptions about behaviour. This possibility challenges the argument

presented by neo-liberal economists that proposes private property rights can supply exclusive ownership rights without cost. Furthermore, it suggests that at some point, the cost of exclusivity is inefficient and therefore the regime is vulnerable to the "race for fish" pattern characteristic of the "tragedy of the commons". The real question is what degree of exclusivity is necessary for resource users to behave as "owners" and what are the variables in any given property rights regime that can weaken or strengthen exclusivity? Furthermore, what are the transaction costs arising in this property rights regime and who is paying for these costs such as the cost of securing the benefits over the good, monitoring the benefits flows and enforcing the property rights?

2.6 Strong Exclusivity and the Problem of High Transaction Costs

If we consider the above predictions about the exclusivity of "ownership", the next question is whether or not transaction costs arise in the 'tragedy of the commons" model. In other words, can property rights be clearly defined for fisheries resources? Institutional economists have demonstrated that the costs associated with securing and enforcing property rights are related to the attributes of the good in question. Douglas Allen has defined these costs specifically as a larger set of transaction costs, which are "the resources used to establish and maintain property rights. They include the resources used to protect and capture (appropriate without permission) property rights, plus any deadweight costs that result from any potential or real protecting and capturing" (Allen 1991:3). When a good is both variable (changing) and alterable (can be changed without easily being monitored) then cheating becomes possible and transaction costs are positive.

These attributes are useful for comparing different transaction costs between goods and help to explain why a diversity of property management regimes emerge for different natural resources, according to their degree of variability and alterability. This is a particularly important point with reference to the neo-liberal ITQ model of property rights. Many economists describing the efficiency of the ITQ model assume that quota holders will behave as if they have a high degree of exclusivity over the benefits of the fish stock. However, institutional economist Dean Lueck (1995) distinguishes between the benefits that can be captured from the resource stock in its entirety, and the more limited benefits that can be captured from the flow of the resource at a single point in time (Lueck 1995). Using a migratory herd of bison as his example, Lueck argues that securing access rights to the full resource stock, or herd, confers benefits in perpetuity, as the stock will reproduce over time. In contrast, access rights that are limited to a specific location, as the herd migrates across a defined territory, will confer only the benefits of the resource flow at that moment without providing any guarantee of future benefits. Lueck concludes from his research on property rights and transaction costs that the 'path of rent dissipation' depends on whether the benefit captured represents the output from the resource stock or from the resource flow. If only the output flow from the resource stock has been captured, this is called the "rule of capture". In other words the first person to catch the fish keeps the fish (Lueck 1995) and thus derives the benefit of the resource flow, over one economic period of time, without being forced to pay the prohibitive costs of enforcing property rights over the stock. This is synonymous with the "race for fish". In this view, private property rights are not the optimal solution for capturing the output from the resource flow of a stock because of the prohibitive enforcement costs.

However, if the output of the fish stock is captured, this is called the rule of "first possession", and a benefit is captured in perpetuity, resulting in a pattern of property "ownership"[7]. The exact pattern depends on the costs of protecting the benefits from the resource stock and enforcing the claim. Where benefits of the stock are easily secured, there is little incentive for users to work together to collaboratively protect their claim from "outsiders". On the other hand, in cases where benefits of the stock are more difficult and costly to secure, there is a greater incentive for users to work collaboratively to secure their rights jointly. Yet in doing so, they create an internal "rule of capture" dilemma. In these cases, it is predicted that transaction costs can be reduced if individuals will negotiate partnerships with internal joint-claimants in order to capture these benefits equally with little internal cost of enforcement (Allen and Lueck 1992; Lueck 1995). Private property regimes thus typically emerge when the rule of first possession applies to a resource stock and enforcement costs are low. In contrast, common property regimes (meaning collective economic property rights) are predicted to emerge when the cost of capturing and protecting the benefits from a resource stock are high and a strong incentive exists to share the burden of these enforcement costs equally. In some cases, the nature of the resource fluctuates seasonally as in the case of flooding ecosystems and the pattern of property rights changes from private to collective depending on the season and the difficulty of capturing and enforcing benefits (Thomas 1996).

From this discussion, we can predict that if only the output flow from a resource is captured, then the transaction costs of enforcement are too prohibitive for the "rule of first possession" and the "rule of capture" will apply. If the number of users continues to

[7] This assumes that the capture of the stock includes the habitat and other ecosystem services required for full reproductive capacity.

increase, then the "race for fish" will ensue as competition increases. However, if users are limited to a small number and the resource supply is "plenteous" then this regime may be sustainable (Lueck 1995). Similarly, transaction costs will be positive for securing and enforcing the property rights over a fish stock. Over time, the increasing cost of securing and enforcing these rights will be inefficient, as the asset value increases. However, the benefits accrued from the asset flow of the stock will flow over several future time periods, if the resource is not over-exploited. Thus, the pattern of property ownership may be more efficient if joint claimants collaborate to share the transaction costs of capturing and protecting the benefits and contract with one another internally to reduce mutual monitoring costs (Allen 1997; Allen et al. 1993).

2.7 Security of Title and the Dilemmas of Common Pool Resources

As noted above (Section 2.6), transaction costs are present when a good has both attributes of variability and alterability. These characteristics are consistent with what Elinor Ostrom has defined as the dilemmas of all CPRs; notably the dilemmas of subtractability and non-excludability (Ostrom 1990). The problem of subtractability occurs when individual users withdraw resource units from a CPR, such as fisheries, they invariably reduce the availability of resource units (benefits) for every other joint-user. The problem of non-excludability is contiguous to the problem of subtractability; once joint users rely on a resource system, any improvements to the system are available to all users. However, there are positive transaction costs with excluding individuals from receiving the benefits from a good to which they made no positive contribution. This is known as the collective action problem of free-riding (Olson 1965). In this view, the security of legal title to withdraw resource units is meaningless unless every joint-user demonstrates credible commitment to the rules governing how

resource units are appropriated and how the provision of resource units can be maintained. In economic terms, an opportunity for credible commitment arises when the benefits are greater through co-operation than they are through individual action (Muthoo 2000). Moreover, if users do not resolve a collective action problem jointly, then individuals will have little motivation to contribute to the transaction costs for enforcement, and the "race for fish" will likely ensue. In the words of Elinor Ostrom (1990), "if problems associated with the appropriation of subtractable resource units become severe, local appropriators may refuse to undertake provision activities. No appropriation of resource units can occur without a resource system. Without a fair, orderly, and efficient method of allocating resource units, local appropriators have little motivation to contribute to the continued provision of the resource system" (Ostrom 1990:33).

Subsequently, community processes, under certain conditions, can provide a fundamental advantage for organizations that need low transaction cost solutions for mutual monitoring (measuring costs), by providing the institutional stability necessary for reinforcing credible commitment (Taylor and Singleton 1993b)[8]. A large body of literature on social capital defines these processes further (Coleman 1988; Flora 1998; Galjart 1992; Gherardi and Masiero 1990; Putnam 1993). Similarly, community processes can work to undermine institutions that are perceived to be incongruous with their collectively shared identities, norms or interests and in this way erode commitment to the rules governing appropriation[9]. In this way collective action can arise to resolve

[8] Taylor and Singleton (1993:199) identify four characteristics of community that resolve the transaction cost dilemmas associated with free-riding: 1) stability of relations; 2) multiplex relations; 3) direct relations; and 4) shared beliefs and preferences.

[9] There is also a mistaken assumption in much of the common pool resource literature that rural communities are comprised of homogenous value systems. Barrett provides an excellent analysis of dynamic community processes that fluctuate according to shifting dimensions between multiple levels of communal, group and individual organization patterns (Barrett 2000).

transaction cost dilemmas internally or conversely, collective action can create transaction costs by undermining institutional solutions. Economic Sociologists refer to this phenomenon as economic embeddedness, which means the benefits from market exchange are either enhanced or prohibited by social relations (Granovetter 1985; Portes and Sensenbrenner 1993).

However, just as endogenous transaction costs may be mitigated by various types of social institutions, transaction costs can further increase due to exogenous circumstances, or "outsiders", that threaten the security of entitlement. In the context of the "tragedy of the commons", if the institutional rules that govern the property rights regime are easily altered by outside interests, then the expected returns from contributing to the sustainable management of the fish stock will be lowered by outside captors. In this way, collective action problems arise from the competing interests of joint claimants who may work against those individuals or organizations striving to create institutional solutions, especially if government authorities are captured by the power of specific interest groups. Therefore, it is within this arena of competing interests in which institutional change often evolves. Moreover, the institutional solutions that arise to mitigate these conflicting interests largely depend on the organization's ability to mitigate the power of competing interests and the government's ability to supply credible commitment to the institutional rules of the evolving property rights regime. Consequently, the security of title depends on the transaction cost dilemmas created within institutions both endogenously and exogenously and the ability to attain credible commitment at each level of interaction. While this is consistent with Ostrom's (1990) definition of nested institutions, it is more specific to the transaction costs created by the alterability and variability of the benefit flows from the good at each institutional level and the problem of joint-claimancy. Moreover, this

emphasizes the importance of credible commitment at the senior government level, particularly in policies and legislation. If government commitment to a particular property rights regime is strong, then the transaction costs expended by competing interests to capture the resource benefits will likely lessen. This being said, government commitment can also be secured for reasons other than reducing transaction cost dilemmas. Thus the political economy context of government institutions is also relevant for understanding how property rights institutions evolve.

Institutional economists Douglass North and Barry Weingast (North and Weingast 1998) predict that the best way to ensure credible commitment from senior level government is to constrain them to a set of rules that does not permit any leeway for violation. While securing credible commitment from the government is arguably the key for the long duration and stability of property rights, the effect this has on the evolution of institutions capable of resolving the "tragedy of the commons" is largely unmentioned in the property rights literature. Similarly, little attention has been given to the cost of government commitment to a property rights system in which the transaction costs of enforcing these rights are high. Therefore, one hypothesis this thesis explores is that government commitment to a property rights regime with high transaction costs will tend to shift the cost burden to society as a whole; hence the problem of social cost arises.

2.8 Strong Duration of Property Rights and the Dilemma of Transferability

As I have argued above, the duration of secure title depends largely on the ability of joint-users to secure credible commitment to a set of institutional rules both internally and externally. Internally, organizing behaviour has to resolve the dilemmas of subtractability and non-excludability and their associated transaction costs. In cases where asset value is high, and the cost of excluding outsiders is high, new-institutional economists predict that individuals will tend to contract in such a way that they can jointly protect their benefits from outsiders, while maintaining low internal monitoring costs. Thus, it is predicted that joint-contracts will include institutional rules that maintain low measuring costs for mutual monitoring. Typically, these rules are based on equal benefit shares, equal cost contributions and restricted transferability (Cheung 1970). Furthermore, community processes, under certain conditions, can supply low cost monitoring solutions (Taylor et al. 1993b).

However, as argued above, the duration of title is equally dependent on securing the credible commitment from government institutions that will support the internal institutional rules. If this commitment is not secured, then outside interests are equally capable of securing title over the resource benefits. Therefore, it is presumed that the credible commitment from government is an essential factor in securing title and stabilizing the successful resolution of internal institutional dilemmas. However, credible commitment from government usually comes at some social cost that has to be weighed against the social benefits within a specific political arena. Thus, if the benefit stream is secured for some level of optimality (justified by specific policy objectives), then governmental commitment can be justified, particularly if the social cost is warranted by a high level of return.

Yet, at the same time that duration of title is secured with strong governmental commitment, another dilemma is created as the asset value increases. As I have demonstrated, as asset value increases, the transaction costs of protecting the asset value also increases. This would suggest that the benefit of organizing to share the burden of increasing transaction costs is even more necessary, particularly if the problem of increasing social cost is to be avoided. It would also suggest that at some level of equilibrium between marginal costs and marginal benefits, it may be more productive if the competing joint-claimant institutions were to form an alliance and contract between themselves to reduce transaction costs (Larson 2003).

Yet, herein lies the dilemma of transferability inherent in neo-liberal economists' idea of private property rights and their notion of productivity. Just as I have outlined the importance of credible commitment at two institutional levels: endogenous credible commitment and government credible commitment, for strengthening exclusivity, security of title and duration, I also argue that unrestricted transferability can undermine these same attributes by eroding the credibility of commitment at these same two institutional levels, as discussed below. In other words, with transferability the set of individuals who end up with the property rights is different than the previous set who negotiated credible commitment. Thus the new set of individuals may be incompatible with the sharing institution to police the fishery.

2.9 Transferability and the Erosion of Inter-Organizational Credible Commitment

Consider what may happen if transferability is not restricted and a group member's share is sold through the market. The purchaser becomes a new member who is no longer homogenous with the other users (Lueck 1995) and s/he has an additional transaction cost (what they paid for the share) that reduces his/her marginal

benefit compared with every other member. Consequently, the new member introduces heterogeneous costs and benefits to the previously homogeneous group. Yet, the new individual is still expected to contribute equally to the cost of enforcing the joint-property ownership. Furthermore, if they live outside the boundary of the community processes, their behaviour will not be constrained in the same way as group members who live within the community and share a "collective interest". In this case, there is a strong possibility that credible commitment, in which the pay offs are better through co-operating, may not be attained with such low monitoring costs. The existing appropriation rules and methods for mutual monitoring may not be sufficient if they were designed on the assumption that every joint-claimant was receiving equal benefits and expending equal costs. Furthermore, if over time the majority of users are license purchasers and their marginal costs exceed their marginal benefits because of the high prices they paid for a share of the resource benefits, their willingness to resolve the internal "rule of capture" dilemma will be reduced. In this way, a new pattern emerges that is identical to the pattern of over-capitalization, characteristic of the "tragedy of the commons". The resource users will be motivated to "race for fish" in any way that increases their economic advantage through competition rather than co-operation. Moreover, the strength of "ownership" is eroded over time such that heterogeneous resource users (different social origin and cost/benefit ratio) will no longer be in a position to contract with joint-claimants exogenous to their organization. Alliances can't be formed if the internal appropriation rules are not respected and the organization has lost its ability to foster a level of credible commitment internally.

2.10 Transferability and the Erosion of Governmental Credible Commitment

As I have argued, governmental commitment comes at some social cost, in terms of the political power afforded the rights of one interest group over another, and will be presumably justified by some sort of return. However, if over time the social costs continue to exceed the social benefits, as per rising transaction costs, then it is predicted that the governmental commitment will no longer be perceived as being credible. In this case, government may have to renege on its commitment, given that its support is no longer financially justifiable. Consequently, just as government commitment increases the duration of the security of the title and the asset value concurrently, broken government commitment will reduce certainty and property rights will weaken. Following this argument, if transferability leads to higher marginal costs with lower marginal benefits over time, a key hypothesis is that the "race for fish" pattern will likely prevail over time. Thus, transaction costs for monitoring and enforcement will rise and likely increase the social cost of government. Moreover, if government is not prepared to carry this burden and monitoring is insufficient, the "race for fish" will continue undetected, until an ultimate resource collapse. In other words, the transferability of a property right over a benefit from a renewable resource (for the specific purpose of capturing the asset value in market exchange), creates the potential for a perpetual pattern of the "tragedy of the commons". Ultimately, transferability within a CPR regime has the potential to undermine the co-operation necessary for achieving strong exclusivity, when the transaction costs of property rights are considered.

2.11 Co-management Institutional Solutions to the "Tragedy of the Commons"

The literature on fisheries co-management specifically addresses the multiple dilemmas that arise from the joint claimancy inherent to CPRs. In its early stages of

conceptualization, the term co-management was used synonymously with the term co-operation to imply that optimal solutions for resource dilemmas are found through mutually beneficial bargaining outcomes between competing resource users (Pinkerton 1989). Used in this context, the term co-operation means that a balance of power is struck between competing interests. Initially, much of the co-management literature focused largely on resolving conflicts arising from the competing interests between fishermen and government (Berkes 1989a; Berkes, George and Preston 1991; Jentoft 1989). However, as Evelyn Pinkerton (Pinkerton 1988; 2003) has consistently argued, negotiated co-management arrangements resulting in a balance of power will ultimately affect the relationships with all joint claimants.

Her earlier research on co-management arrangements in the States of Alaska and Washington demonstrated that changing the relationship between fishermen and government can also alter the structure of relations between fishermen and fish processors, individual fishermen and fishermen's groups, fishermen and other resource users (Pinkerton 1988) More recently, Pinkerton appealed to fellow fisheries co-management researchers to "rigorously define the conditions under which 'complete' or even adequate co-management can develop and survive" (Pinkerton 2003:62). In a complete co-management arrangement, she argues, the vertical levels of governance are institutionalized and fully nested from the lowest level of operational decision-making to the highest level of policy making. In this way, "decisions made at one level interact with other levels so that there is both policy stability at higher levels of governance and also the capacity to innovate at the lower level" (Pinkerton 2003:62). The level of completeness is further defined by the horizontal linkages at multiple scales of governance including local, regional, provincial and national organizations.

Ultimately, a complete co-management agreement "can radiate out to effect the democratic functioning of civil society itself" (Pinkerton 2003:62).

Similar to the Coasean prediction that bargaining will reduce transaction costs, co-management theory predicts that government will be more likely to play a key partnering role with resource users if the co-management agreement reduces the high cost of conflict between competing interests. In terms of transaction cost analysis, the dilemma of governmental credible commitment will more likely be resolved if the resource users have successfully organized and resolved the dilemma of credible commitment, both within joint-claimant organizations and between organizations. In cases in which there are multiple groups of joint claimants, all competing for government credible commitment, the dilemma of organizational commitment will likely have to be resolved across many organizations.

Following the argument thus far, co-management arrangements are predicted to be most successful when the dilemmas of organizational credible commitment and governmental credible commitment are resolved. However, the resolution of these dilemmas is largely dependent on the transaction costs that arise depending on the attributes of the fishery. In other words, the level of 'completeness' for any co-management agreement, I argue, is largely dependent on the nature of the transaction costs that arise and the subsequent co-operative solutions found to mitigate these costs. The problem of securing credible commitment is a multi-organizational dilemma that will more likely be resolved if collective action can resolve the dilemma of positive transaction costs. Similarly, the dilemma of transferability is a dilemma that arises once the first two dilemmas have been resolved. Ultimately, all three dilemmas will have to be resolved within the co-management agreement in order to prevent the "tragedy of the commons".

2.12 Four Research Propositions

In summary, new-institutional economic theory argues that the degree of exclusivity one has over the benefits of an asset is neither absolute nor without cost. According to transaction cost theory, as the value accrued from the asset increases, the cost of defining and enforcing rights over the benefits from this asset also increases over time. At some point, the marginal benefit from the property right will drop below the marginal cost of protecting the right from other claimants and maintaining a high degree of exclusivity will no longer be economically efficient. Consequently, a dilemma is predicted to arise as the transaction costs of securing the rights eventually exceed the benefits. When this dilemma is applied to Scott Gordon's (1954) predictions on the circumstances that perpetuate the "race for fish", transaction cost theory suggests that the good's attributes of alterability and variability play a large role in shaping the emerging property right pattern. Furthermore, it is predicted that when the good being exchanged is both alterable and variable, transaction costs will be positive and a "rule of capture" will prevail. In other words, the cost of securing rights, monitoring the asset value and enforcing rights over the resource, all play a significant role in shaping the incentives for fishermen to over-fish. Therefore, private property rights may be too costly to enforce depending on the attributes of the fishery.

However, just as Coase (1960) argued that competing users impose a reciprocal cost on one another, high transaction costs between competing fishing groups may create a bargaining situation for similar reasons. In these specific cases, in which competing interests create high transaction costs, fisheries co-management regimes may provide an institutional alternative to the "tragedy of the commons" through a co-operative agreement that secures credible commitment to a set of allocation rules that will be respected at multiple institutional scales. However, the success of the co-

management agreement will ultimately depend on its ability to reduce transaction costs for all joint claimants.

The purpose of this thesis research is to understand the transaction cost dilemmas inherent in the "tragedy of the commons" and to explore the conditions under which fisheries co-management can resolve these dilemmas. The way in which I conduct this inquiry is through the analysis of the evolution of property rights and transaction costs in the Gulf of St. Lawrence snow crab fishery which ultimately lead to the negotiated Area 19 snow crab co-management agreement in 1996. The depth of this analysis will be guided by the following four propositions.

2.12.1 First Proposition: Exclusivity is Neither Fixed nor without Cost

The property right attribute of exclusivity is neither fixed nor is it independent of the asset value of the resource and the costs associated with securing rights, monitoring and enforcing these rights. These costs, called transaction costs, depend on the resource's attributes of alterability and variability. At some point, the marginal benefit from the property right will drop below the marginal cost of protecting the right from other joint-claimants. Moreover, the path of rent dissipation largely depends on whether the benefit captured represents the output from the resource stock or from the resource flow. In the case in which only the resource flow is captured, it is predicted that fishermen will have the incentive to adopt the "rule of capture" property rights regime.

2.12.2 Second Proposition: Governmental Commitment to Security of Title and Duration Leads to Social Costs when Transaction Costs are High

The costs of defining, monitoring and enforcing rights are lowered for individuals who successfully coerce governmental commitment to develop policies and laws that protect their security of title and duration of rights from other joint claimants. However, the transference of these costs will result in social costs over time, particularly as asset value declines and transaction costs increase. Therefore, it is predicted that social costs will increase if conditions of the first proposition are present.

2.12.3 Third Proposition: Social Capital Reduces Transaction Costs and Supplies Credible Commitment

Community processes, under certain conditions, can provide a fundamental advantage for organizations seeking low transaction cost solutions for mutual monitoring. By providing the institutional stability necessary for generating social capital, social relations can supply the necessary means for creating agreements with credible commitment. However, these same social relations can also work to undermine institutions that are perceived to be incongruous with their collective shared identities,

norms or interests and in this way erode commitment to the rules governing resource appropriation. Consequently, collective action can arise to resolve transaction cost dilemmas internally, or conversely, collective action can create transaction cost dilemmas by undermining existing institutions. Therefore, it is predicted that government institutions that support community processes can reduce transaction costs and increase the opportunity for internal and external credible commitment, provided that the conditions of the first and second propositions are not present.

2.12.4 Fourth Proposition: Transferability Increases Transaction Costs and Undermines Credible Commitment

Transaction costs can further increase due to exogenous circumstances or outside interests that threaten the security of entitlement over resource benefits. If the institutional rules that govern the property rights regime are easily altered by the transferability of assets to outside interests, such that the asset value is reduced, than the expected returns from contributing to the sustainable management of the fish stock are lowered. In this way, collective action problems are predicted to arise from competing interests who may work against organizations striving to create institutional solutions, especially if government authorities are captured by the power of these same competing interests. As a result, the sustainability of a resource management regime is predicted to depend largely on the institutions created at each level at which transaction costs arise. More specifically, the security of title over resource benefits depends on the transaction cost dilemmas created within institutions both internally and externally and the ability to attain credible commitment at each level of interaction. Consequently, the attribute of transferability is predicted to lead to higher marginal costs for securing access rights, monitoring asset value and enforcing rights. Therefore, it is predicted that credible commitment at all institutional levels will eventually be undermined by the attribute of transferability.

CHAPTER THREE

3.0 Institutionalized Industrial Capitalism: Understanding How Transaction Costs Arise from Governmental Credible Commitment in the Gulf of St. Lawrence Snow Crab Fishery

3.1 Introduction

In Chapter Two, I developed a theoretical framework for examining the dynamic nature of property rights regimes. I argued that the "race for fish", also called the "rule of capture", is a property right pattern that emerges under various conditions in which transaction cost dilemmas arise. In this way, property rights are neither fixed nor are they absolute. Rather, the *degree of exclusivity* of rights over a good depends on the jointness of the good and the attributes of the good which influence the transaction costs associated with capturing the asset value. In this view, three transaction cost dilemmas are predicted to emerge that shape the pattern of property rights, depending on how these dilemmas are resolved: 1) the dilemma of positive transaction costs; 2) the dilemma of credible commitment; and 3) the dilemma of transferability.

In this chapter, I argue that government support for industrial capitalism post World War II perpetuated high transaction costs as the industrial fishing sector competed for benefits both internally and externally as other Nations competed for the same migratory species. Moreover, the government intervention in the Atlantic groundfish industry, as a result of these transaction costs, resulted in further government action in the development of the Gulf of St. Lawrence Snow Crab fishery, with disastrous effects. Furthermore, I demonstrate how new institutions evolved to mitigate these cascading effects. Yet, despite these institutions, the normative patterns of bureaucracy created a bias towards a specific set of interests and the "race for fish" was perpetuated rather than mitigated.

In this view, the purpose of this chapter is to understand the institutional context in which transaction cost dilemmas emerged in the Gulf of St. Lawrence snow crab fishery. More specifically, the bureaucratic norms of efficiency and productivity, when coupled with the transaction costs of capturing rights over migratory ground fish, inadvertently institutionalized a series of cascading transaction costs within the snow crab fishery. The effects of these transaction costs are explored in this chapter by examining how these dilemmas were transferred and amplified across multiple institutional layers due to the subtractability and non-excludability dilemmas of CPRs. In understanding how these dilemmas were transferred, I emphasize that the role government bureaucrats play in creating credible commitment to a particular property rights is highly influenced by the overarching norms and values institutionalized within bureaucracy. I also explain how government bureaucrats have an alternative option for defining norms of legitimacy based on the principle of protecting the public interest. In this way, civil servants working within a broader normative framework of values, at a local institutional scale, provide a hidden opportunity for introducing new norms of legitimacy capable of resolving fisheries management transaction cost dilemmas.

3.2 Industrial Capitalism: The Institutionalization of Governmental Commitment

The evolution of industrial capitalism in North America developed rapidly after the burst of technological production during the second the World War. Hence, the evolution of government bureaucracy was a necessary precursor for the expansion of modernity (Berger, Berger and Kellner 1973). In order to coordinate the specialized divisions of labour necessary for the rationalization of economy and society, the growth of industrial capitalism created 'a tremendous increase in the importance of professional bureaucrats' (Weber 1968). Moreover, economic sociologist Max Weber

argued that the economic ethics of modern capitalists were situated within a Protestant Ethic originating from the period of reformation, during the sixteenth and seventeenth centuries, in which Calvinism sought separation from the Catholic Church of Rome. In this critical turn of events, Protestant doctrines set a new course entrenched in the burgeoning ideas of individualism and the pursuit of salvation through an isolated connection with God (Giddens 1971). According to Weber, reformation was a critical juncture in the history of economic production. Industrial capitalism flourished with the underlying belief that disciplined production of wealth, generated through hard work and little idleness, became a new normative pattern for the modern entrepreneur.

> Calvinism demands of its believers a coherent and continuous life of discipline, thus eradicating the possibility of repentance and atonement for sin which the Catholic confessionals make possible. The latter effectively sanctions a haphazard attitude to life, since the believer can rely upon the knowledge that priestly intervention can provide release form the consequences of moral lapse (Giddens 1971:129).

In this way, the underlying values and normative behaviour patterns characteristic of industrial capitalism were institutionalized in the bureaucratization of the state, the church, the law and business simultaneously. Both the production of technology and bureaucracy relied on principles of formal rationality, embodied in scientific research and military modes of organization, as well as substantive rationality, embodied in the economic calculations of efficiency and productivity (Giddens 1971). Subsequently, post WWII bureaucratic institutions were designed by individuals operating within a distinct culture of possessive individualism market society, in which norms of rationality superseded other values (Macpherson 1962). Moreover, the formal and substantive principles of rationality created specific bureaucratic norms of legitimacy that standardized employee behaviour and operations throughout the bureaucracy. For example, scientific research was the normative basis for government

to attain *expert knowledge* leading to the legitimacy of government competence, *hierarchical powers of authority* leading to procedures for referrals from local units moving uni-directionally upwards through a chain of command, *standardized operating procedures* leading to rigid parameters for responding to clients, and the notion of *anonymity* leading to the absence of individual accountability (Berger et al. 1973).

In this way, the institutionalization of bureaucracy reinforced a hierarchical paternalistic culture designed for perpetuating and supporting industrial capitalism that was normalized in the state, the law and business institutions. Furthermore, the framework of the modern legal system transformed the traditional pattern of assigning *privileges* to individuals based on paternalistic subjective values, to a new pattern of determining *rights* according to a newly defined legal order (Shaw 1992).

The institutionalization of industrial capitalism in the Canadian fishing industry is most evident in the degree of power attributed to the Minister of Fisheries in the federal *Fisheries Act*. The *degree of exclusivity* of access over fisheries is controlled largely by the "absolute discretion [of the Minister] wherever the exclusive right of fishing does not already exist by law," (Government of Canada 1985a). However, the Act contrasts with the liberal economic rights-based understanding of property, in which individual property is fortified by the legal delineation of private property rights. Rather, the legal principles underlying federal fisheries jurisdiction originate from the *British North American Act*, which emphasized the common property nature of fisheries resources. Consequently, the *Fisheries Act* is premised on the English common law 'public trust' doctrine, which firmly obligates government to protect the larger public interest over individual interests (Loucks, Wilson and Ginter 2003). In this way, a problematic tension emerges within the Department of Fisheries and Oceans between the institutionalized bureaucratic goals of industrial capitalism, which embodies and

normalizes principles of individualism (ergo private interests) and the obligation of the government to protect the "public interests".

Over time, this tension became more and more perceptible in the Canadian fishing industry as government programs were initiated one after another to protect both the interests of industrial capitalists, as well as those interests negatively impacted by capitalist modes of production. Subsequently, the Canadian government carried the burden of transaction costs required to secure capital asset value for large processing firms and the production of new fishing technology such as the offshore fishing trawlers at significant social cost. At the same time, government programs were created to assist those whose interests were negatively impacted by the very same government policies. In this manner, the dual obligation of the federal department of fisheries to private and public interests perpetuated a trend in which the government carried the high transaction cost burden for protecting and enforcing property rights over CPRs for the industrial fishing sector (despite the property rights dilemmas of subtractability and non-excludability). At the same time, the market failure of the industrial fishing sector (further confounded by its incomplete set of property rights) perpetuated a cycle of government subsidies to offset the "externalities" from industrial scale development.

In Coasean terms, the government willingness to carry the burden of the high transaction costs of capturing, protecting and enforcing rights over a resource in which the property rights were incomplete, created a social cost problem (Coase 1960). As I will explain below (Section 3.3), a major contributing factor to the social cost problem was the governmental commitment to an interest group that was justified by a normative value institutionalized within bureaucracy. In other words, government commitment is often secured for reasons other than economic credibility.

3.3 The Problem of Social Cost: Institutionalized Transaction Costs

Sociologists and historians researching the historical pattern of social organization of fishing communities in Canada have well documented the negative impacts of industrialization on society (Apostle and Barrett 1992; Apostle, Barrett, Holm, Jentoft, Mazany, McCay and Mikalsen 1998; Barrett 1992a; Marchak, Guppy and McMullan 1987; Newell and Ommer 1999). However, the lines of tension bureaucrats attempt to navigate between supporting the private interests of industrial firms and those interests of the public, have been somewhat blurred by the distinct ways in which social costs have been framed. For example, government policy analysts have tended to account for the social costs attributed to assisting individual fishermen, plant workers and their communities (Cashin 1993) whereas social scientists have generally focused their research on the social costs of subsidizing the industrial corporate sector (Barrett 1992b; Crowley, McEachern and Jasperse 1993). Yet very little work has been done to synthesize the two systems of accounting for a more holistic analysis of the lines of tension government is attempting to balance.

In addition, many sociologists have explicitly used a Marxist and Weberian analysis of the evolution of Canadian fisheries policy which predicts that bureaucracy is legitimized by the market economy alone (Apostle et al. 1998; McMullan 1987). Yet, Hegel's theory of bureaucracy diverges somewhat from Weber, arguing that bureaucracy is also legitimized by the trust of its constituency (Shaw 1992). Hegel suggests that the prevailing norms under which bureaucrats take political action are created within an instrumental rationality paradigm, but framed by their own wisdom and judgment of what delineates the greater public interest. In this manner, bureaucrats are truly civil servants actively "pursuing undertakings for the common good, adjusting the competing interests of producers and consumers and supervising education crucial

for training individuals to earn an independent living" (Hegel 1976 in ; Shaw 1992:386). Furthermore, Hegel emphasizes the task of bureaucracy is to preserve the legal norms of the state. He argues that just as laws are established and revised through the legal system supporting civil society, the bureaucracy will automatically re-adjust to actualize these evolving civic norms. A scholar of Hegel interprets this revolving process in the following way:

> Norms and circumstances are in an unending process of mutual adjustment because present practices are continuously modified within the framework of norms. It is politics of mediation between civil society and the state (which are relatively autonomous toward each other) through the practical judgment of state officials' handling situations in which norms are challenged or in need of new interpretations (Shaw 1992:387).

Building on Weber's theory of bureaucracy, with the latter points of Hegel, I argue that the transaction cost dilemmas arising in the pre-co-management era of the Gulf of St. Lawrence snow crab fishery originated from the transaction costs resulting from government investment in securing the asset value of the industrialized groundfish sector.

At the same time, many of these dilemmas in the Nova Scotia snow crab fishery were mitigated by government commitment to the inshore small boat sector, as I will demonstrate. Furthermore, I argue that the government responsiveness to civil action processes in the Department of Fisheries and Oceans Gulf Region is largely attributed to what Hegel describes as *phronesis,* meaning practical wisdom, of individual civil servants and their colleagues, in combination with an institutional legitimacy crisis created by the first order transaction cost dilemmas. This legitimacy crisis is further exposed when social movements mobilize and demonstrate their resistance against government institutions, particularly when local government norms of legitimacy are different than those norms of legitimacy institutionalized at a national scale.

Furthermore, government commitment can shift over time, based on newly defined norms and values. Finally, I explore how these factors have contributed to an evolving process of delineating a *high degree of exclusivity* for the Area 19 Snow Crab fishery, creating the institutional environment necessary for co-management and ultimately conservation.

3.4 Industrial Capitalism in the Canadian Groundfish Industry

In the late 1940s and 1950s the trading patterns for North American seafood products shifted from a pre-War European market to a post War Canada-US commodity exchange, driven largely by a campaign for Industrial Capitalism (Apostle et al. 1998; Sinclair 1987a). On the Atlantic coast, the demand for salted groundfish from North America went into decline as markets for frozen fish steadily increased with new technology that was developed during the second World War (Apostle et al. 1998; McMullan 1987). Accordingly, the balance of power shifted from the previously lucrative east coast Schooner fishery (supported by the wealthy merchant class and their suppliers of salted groundfish) to the new class of business elites who led a strong political campaign for subsidizing the development of offshore trawler fleets and industrial freezing plants[10](Sinclair 1987b). The success of the business elite coalition had far-reaching impacts on the life patterns of coastal fishing communities, ultimately resulting in a slow transition from the economic patterns characteristic of occupational pluralism, to those of specialization (Apostle et al. 1992; Barrett 1992a; Ommer 1999; Sinclair 1985). Yet, the effects of centralized industrial capitalism were neither immediate nor obvious. Rather, the enormous social and environmental costs of rural

[10] For more information on the political networks driving this campaign see (Apostle et al. 1998; Kimber 1989).

community de-stability and decline in renewable resources were masked by the periodic spikes of growth, (largely catalyzed by government capital investment) subsequently causing over harvesting, then periods of over supply, leading to subsequent troughs of low market demand. This pattern tended to recur over time as markets fluctuated, creating a pattern Freudenburg has called "the addictive economy" (Freudenburg 1992). However, the effects of industrialization initially seemed to assist rural community development. Small towns flourished during the periods of growth and government assistance programs helped bridge them until the next cycle of expansion. Over time, the industrial capitalism model of production created a normative pattern of government dependency, both within coastal communities and business communities alike.

Ultimately, the government subsidies were intended to mitigate the tremendous fluctuations in foreign market prices. In this way, a two-pronged strategy was adopted by the federal government to capture and secure a high asset value from several groundfish species, including Northern Cod, a migratory fish stock the Canadian fishing industry had to compete for with other rivalrous Nations. The first strategy was to provide marketing assistance programs, largely for processing companies, to bridge them through periods of low foreign market prices. The second strategy was to provide development assistance for subsidizing vessel construction costs and the expansion of processing facilities. In 1944, the *Fisheries Support Act* was passed in Canada's parliament for the purpose of mitigating economic losses due to high fluctuations in market supply and demand trends (Crowley et al. 1993). Subsequently, the Fisheries Prices Support Board (FPSB) was established to implement a deficiency payment program, for ensuring stable prices for fishermen, as well as an inventory financing program to provide an interim market for Canadian

products. The Board had a working fund of $25 million together with 20 personnel (including 9 economists) with several regional advisory committees comprised of "prominent industry members".

In later years, the government passed the *Fisheries Development Act* (Government of Canada 1985b) primarily for providing government assistance for expanding the Canadian offshore trawling fleet. The growing competition from other countries (joint claimants), who were rapidly expanding their offshore groundfish fleets, was countered by expanding Canada's offshore fleet by 50 percent between the years 1963-1967. According to Crowley: "...In 1964 alone, the number increased from 385 to 452 vessels" (Crowley et al. 1993:345). Similar research documents the number of Canadian offshore trawlers increasing from 211 in 1959 to 558 in 1968 (Barrett 1992a). During the fiscal period from 1975-1976, the federal government provided over $44 million dollars to the Groundfish Bridging program as groundfish stocks began to decline and fishing costs subsequently increased (Crowley et al. 1993). However, much of this financial assistance would have likely been under the monopolistic control of the National Sea/Nickerson complex that had merged twenty four fish companies in Atlantic Canada and controlled over 41 percent of the fishing vessel capacity, employed 41 percent of the fish plant work force, and had over 40 percent of the market share in supplying groundfish products (Barrett 1984).

While the growing support for industrialization was evident from the increase in government subsidies for the developing corporate fishing sector, the Canadian government also implemented various price support programs to mitigate market variability in several inshore sectors, including the more traditional salt fish market in Newfoundland (Crowley et al. 1993). In this way, the Canadian government sought to support several interests simultaneously, yet in doing so, they inadvertently

perpetuated the vicious cycle of resource dependency and collapse characteristic of most coastal communities on the east coast and west coast of Canada (Veltmeyer 1990; Warriner 1987). For example, in 1958 the FBSP Board recommended a government program to build community processing stages throughout Newfoundland's outport communities to encourage a greater "uniformity of product and to improve quality" as a means of increasing the market value of salt cod (Crowley et al. 1993:348). While the government funded program increased the number of employment opportunities in the fishing sector, the shift from household-scale commodity production to an industrial-scale production ultimately created a pattern of dependency characterized by a "boom and bust" cycle of over-capitalization and ecosystem collapse (Clapp 1998; Ommer 1999; Warriner 1987).

The perpetual vicious circle characteristic of an industrial capitalist mode of production, contributed to the regional underdevelopment of rural communities throughout Canada[11]. Dependency theorists have documented how the shift to large scale harvesting technology and processing capacity siphoned away the wealth of resources generated from rural communities and invested it within urban centres of production and trade (Clapp 1998; Freudenburg 1992; Veltmeyer 1990; Warriner 1987). Furthermore, as rural economies collapsed, an enormous out-migration of businesses and families began to move from rural communities to urban centres. In this way, a political bias towards an urban constituency was beginning to develop within bureaucratic departments. Subsequently, the rural voice was becoming less audible.

[11] For a detailed account of how these cycles of regional dependency were established see (Sinclair 1985).

3.5 The Emergence of Maritime Social Movements in Resistance to Industrial Capitalism

As fish stocks began to decline from the over-harvesting practices of the industrial groundfish trawlers, processing companies began to merge with one another and monopolize the price setting process as a means of mitigating the cost-price squeeze effect of their declining quantity of raw material (Barrett 1984; Clapp 1998). On Canada's east coast, small scale local fish plants were shutting down and small boat inshore fishermen were faced with a progressively weakening price bargaining position (Williams and Theriault 1990). In 1969, as the economic crisis in rural Nova Scotia continued to deepen, a new social movement of rural community resistance emerged from the coastal community of Canso, Nova Scotia, which ultimately led to the formation of the Maritime Fishermen's Union (MFU) (Williams et al. 1990) Not by any coincidence, an earlier social movement known as the "Co-operative movement", linked also to the "Antigonish Movement", was initiated in the 1930s by local Catholic clergy who sought to achieve rural community self determination through adult education. Father Jimmy Tompkins is credited with assisting fishermen in their pursuit of a legislative Act that would allow them to form co-operatives[12]. In a similar way, Father Moses Coady, notable for initiating the "Antigonish Movement", assisted fishermen and farmers throughout the Maritime provinces to organize marketing co-operatives as a way of increasing their collective bargaining power for fair prices (Alexander 1997).

These movements were particularly successful in French Acadian communities throughout Atlantic Canada, which were predominantly Catholic, and a network of

[12] Reverend Jimmy Tompkins was exiled from St. Francis Xavier University for his radical pursuits in education at a time when Maritime mercantilism was losing its economic footing to Upper Canadian economic centralization. Consequently, he became a practitioner of his beliefs in empowering marginalized rural people through education and played a major role in unionizing miners and fishermen in Nova Scotia (Lotz and Welton 1997).

credit unions and fish plant co-operatives still survive today in many coastal communities. However, it must also be pointed out that the "Antigonish Movement" was not distinguished by lines of language, but more along lines of religion. It originated in the Scottish Catholic community of Antigonish, which was settled by people "united in their monolithic religious expression" (Alexander 1997:31). The Catholic Highland Scots in Antigonish have actively preserved their cultural identity, arguably unlike any other English-speaking community in Canada, by maintaining a strong Catholic presence and an extended cohesive network of kinship ties (Alexander 1997). Furthermore, the Antigonish Movement was based largely on the Catholic views of society as opposed to those of Protestantism. Accordingly, the Roman Catholic Church envisions individuals as being innately bound to their community in their mutual desire to meet one another's needs. In this way, society is perceived to function as an organic body in which its interdependent parts act "for the sake of the whole" (Alexander 1997). Further to this view, the Catholic perception of society emphasized the "right of association which enabled people, in smaller groups within the larger society, to influence decision making" (Alexander 1997:41).

While the relevance of the Antigonish Movement may seem peripheral to the development of the Area 19 snow crab fishery, each of the communities adjacent to this fishery have a history of community owned marketing co-operatives and are all predominantly Catholic communities. Moreover, the local area federal fisheries office is located in the town of Antigonish. Consequently, most of the staff is from the region, if not the town of Antigonish, and they are well integrated within their surrounding community by virtue of their religion and extended family network. Moreover, the level of interconnectedness, meaning the "density of inter-organizational relations among occupants in an organizational field" (Oliver 1991:71), suggests a high level of shared

local values, information and norms of legitimacy. This is consistent with the idea of embeddedness in which economic action is largely socially situated (Granovetter 1985). Similarly, the extensive network of family ties and shared values constitutes a social environment within which trust and trustworthiness generate social capital (Coleman 1990). However, this is not to suggest that these social relations naturally generate conditions for a perfectly egalitarian civil society[13]. Rather, these local values expand the range of interests to which individuals must be accountable. Therefore, local bureaucrats, who are highly integrated within their local community and working within the institutional norms of legitimacy, are not restricted to formal and substantive rationality norms of bureaucracy. Hence, bureaucratic decision-making that is situated within a highly socialized community context may consist of a broader spectrum of values and interests than a more differentiated centralized decision-making process. I elaborate on this hypothesis in later sections of this chapter.

3.6 Crisis in the Groundfish Industry and the Development of the Gulf of St. Lawrence Snow Crab Fishery

In 1965, Canada's share in the northwest Atlantic groundfishery dropped nine per cent from its previous share in 1960. Subsequently, the federal government perceived that foreign competition was capturing greater economic returns at the expense of Canadian capital investment. To regain their losses, the federal and provincial governments jointly expanded their subsidy programs to increase the Canadian economic advantage against foreign fishing. At the same time, several joint-government research experiments, also funded by federal and provincial governments,

[13] Several co-management scholars have framed ideal social relations in community scale decision-making as being necessary norms for civil society discourse. However, little attention has been given to the imbalances of power that exist in communities, particularly embedded communities. Furthermore, there is little analysis done on the mediating role government institutions can play in mitigating these imbalances, once co-management has been institutionalized and norms and values have shared meaning. For an example of this dilemma see (Jentoft and McCay 2003).

were initiated to modernize new and potentially lucrative fisheries such as herring and snow crab. Motivated by the belief that industrial growth led to improved economic development, the federal Fisheries Minister at the time, Hédard Robichaud, launched several additional government programs designed to modernize the Maritime Provinces.

> Hédard Robichaud, the New Brunswick-born federal Minister of Fisheries from 1963 to 1968, spearheaded federal-provincial attempts to industrialize. Programs such as the East Coast herring experiments with Pacific purse seiners, the Newfoundland Resettlement Program, vessel and plant construction, and research and development grants were monuments to federal-provincial cooperation. Robichaud saw them as giving 'practical guidance in the changeover to modern ways and [hedging] the industry against loss of risk capital' (Barrett 1992a:63).

It was within this context of industrialization that the Gulf of St. Lawrence snow crab fishery (*Chionoecetes opilio*), called queen crab or spider crab at the time, began as a government funded experiment to promote growth and development in the Atlantic Canadian fishing industry. In 1965, the Danish seiner *Stella Maris,* originally chartered by the province of Nova Scotia to survey the groundfish off the northwest coast of Cape Breton, landed an incidental catch of 4,578 lbs of queen crabs. Until this time, crabs were commonly taken in commercial fishing gear and usually discarded as "trash" (Watson and Simpson 1969). However, the groundfish industry was showing early signs of decline and the federal government had renewed interest in discovering "new exploratory" fisheries. Subsequently, an 86 ft wooden side dragger, a Danish Seine boat called the *St. Eloi,* was chartered under a joint project between the Department of Fisheries Industrial Development Service and the Nova Scotia Department of Fisheries. The Danish Seine's mission was to assess the crab population distribution off the small French Acadian community of Cheticamp, on the west coast of Cape Breton Island (Deveau and Aucoin 1966; Watson et al. 1969).

The objective of the survey was to sample the range of crab distribution and to experiment with various processing methods. As a result, 12,141 crabs were caught and landed at the Cheticamp Fishermen's Co-operative, where plant workers began experimenting with various processing methods. Field notes from the distribution survey emphasized change in the density of crab throughout the duration of the survey cruises, and suggested that the crabs migrated throughout the year.

> Cruises 1 to 5 were conducted from December 14 to February 10 and would suggest that the time of year has influenced the size of tows. It is realized that the geographical areas have changed during the cruises; however, some of the areas surveyed during the 5th cruise were the same areas covered in earlier cruises and the production was greatly smaller. It is not believed that these areas were completely depleted by fishing activity (Deveau et al. 1966:10).

However, despite this careful notation on seasonal geographical change, it would take several decades before scientists viewed the movement of crab as being significant for evaluating the total crab stock biomass. Rather, initial research focused on different crab fishing areas (CFAs), delineated more by socio-economic factors than ecological boundaries (Figure 1). Furthermore, scientists used the term "stock" for describing the expected stock biomass of each fishing area where, in fact, there was significant migration of crab back and forth between the fishing areas. In this way, the rational norms of bureaucratic efficiency and production were effectively influencing the way in which science was used to generate knowledge and manage the fishery. Moreover, the individual CFAs were managed separately as "stocks" when they were actually all part of one large stock biomass, with various sub populations aggregating in areas of exceptionally good habitat.

Yet despite the conformity of science to the institutional norms of productivity and efficiency, the need for scientific research to legitimize the competence of

government resource management was a key driving force in the development of the snow crab fishery. After the St. Andrews Biological Station in New Brunswick began gathering preliminary biological information on several crab populations throughout the Gulf of St. Lawrence, additional exploratory programs were initiated by the Federal Industrial Service and the three provinces of New Brunswick, Prince Edward Island and Nova Scotia. In this way, each Province jointly invested in the development of the fishery to reduce the transaction costs necessary for securing access to the potential returns from the asset value of snow crab. Subsequently the inter-government commitment to co-operate helped to establish a pattern of access rights based on the distribution of licenses between each of the three provinces. I will expand on this point later in this section.

While the scientific crew on the *St. Eloi* noted their observations of crab movement throughout the year, other scientists were fairly confident that the crabs moved very little. Tagging experiments did not detect any significant geographical change over time, resulting in the assumption that crab migration was not a factor for management considerations. In other words, several scientists and managers believed that heavy exploitation in one area would not impact the crab population in another area (DFO 1982; Watson et al. 1969). As a result, several CFAs were delineated for the management of different fishing sectors. However, the boundaries were based more on the characteristics of the fishing vessels and less on crab biology. For example, Crab Fishing Area 12 was the largest fishing zone and included most of the Gulf of St. Lawrence. Subsequently, the largest fishing vessels, mostly converted groundfish Danish Seiners called the midshore fleet, dominated this CFA. Their captains and crew were typically full time crab fishermen that fished throughout most of the year.

At the end of 1966, 74,306 lbs of queen crab had been harvested and processed as frozen crab meat in three government funded pilot plants located in Cheticamp, N.S., Souris, P.E.I. and Shippegan Gully, N.B. In this same year, the Atlantic Queen Crab Association was established to promote the development of the crab fishery and maintain communication linkages between all interests involved in the industry. In 1967, commercial operators joined the fishery and by the end of that year's fishing season, over 1 million pounds of crab had been landed and 6 plants were engaged in processing crab meat.

Certainly the government industrial development program was proving successful, yet it was not without significant public expenditures. Federal and provincial governments were financing extensive research on the fisheries biology, introducing best harvesting and handling practices, providing research on processing techniques and training, setting up pilot crab processing plants, financing loans for vessels to convert their fishing gear from groundfish to crab, and funding five new exploratory programs to locate new stocks in order to meet the rapidly increasing demand (Watson et al. 1969).

> In 1968, in view of the growing importance of the queen crab fishery in the Atlantic Provinces, a broad program of investigation of this new industry was undertaken by several departments of government. Federal investigations were made by the Industrial Development Service, the Fisheries Research Board and the Halifax Fish Inspection Laboratories. The Provincial Departments of Fisheries of Quebec, New Brunswick, Nova Scotia, Prince Edward Island and the Newfoundland Fisheries Development Authority, on a cost sharing basis with the federal government, launched separate programs of investigation relative to the special interests of each province. (Watson et al. 1969:26)

Furthermore an extensive biological research program was launched by the Federal Fisheries Research Board to study both the biology of the St. Lawrence queen crab and the effects of fishing. Subsequently, three research stations were established to

answer several biological questions that remain relevant in today's scientific research on *Chionoecetes opilio* crab, but are largely unanswered. These questions are listed below:

1. How long does it take crab to grow to a commercially acceptable size?
2. How long do they live?
3. At what size do males and females reach maturity?
4. At what size can a mature male mate successfully?
5. How many times does a female breed and is the fishery leaving enough males capable of fertilizing these females?
6. Are there any extensive seasonal migrations?
7. How large are the stocks and where are they?
8. What catch can be expected when the large old males in a virgin stock have been harvested? Will this catch support a stable fishery?
9. What is the annual rate of exploitation?
10. How is this exploitation affecting the normal life cycle of the crabs?
11. What are the requirements for keeping crabs alive once they are caught?

(Watson et al. 1969:14)

The institutionalization of rational scientific knowledge is illustrated in this lengthy list of research questions that assumes increasing the amount of scientific knowledge available also increases the expert competence in making fisheries management decisions. Accordingly, fisheries scientists were largely responsible for designing the rules for the developing snow crab industry. However, their expert opinion was largely influenced by the normative framework of industrial capitalism. Subsequently, the chief scientist with the highest authority for decision-making was also the farthest removed

from the gathering of information. Accordingly, principles of efficiency and productivity were the administrative priority[14].

By 1969, the commercial interest in the Gulf of St. Lawrence had risen sharply from the few test boat fisheries in 1965 to 77 vessels representing interests from New Brunswick, Prince Edward Island, Quebec, Nova Scotia and Newfoundland. The majority of fishing vessels were converted side draggers, or Danish Seiners, that had shifted to snow crab as a supplement fishery to offset economic losses from the increasingly unprofitable groundfish industry (Watson et al. 1969). The New Brunswick fleet focused much of their fishing effort in the east part of the Bay of Chaleur, whereas the boats from P.E.I. and N.S. fished primarily in the Cheticamp Gully, commonly called "the gully".

Table 3, as seen below, illustrates the distribution of crab landings throughout each province in 1968. Notably there is a range of distribution of landings between provinces, with the New Brunswick fleet accruing the greatest share of landings yet receiving the second lowest price per pound. While the reasons for these discrepancies are difficult to trace definitively, I propose a number of possible explanations.

[14] This view is consistent with those expressed in conversations I've had with my father, Dr. Ron Loucks, who was an oceanographer for ten years with the Bedford Institute of Oceanography from 1964 to 1974. The 'chain of command' decision-making processes used for prioritizing scientific research activities gave very little authority to individual research scientists who were generating the information. Furthermore, scientists tended to operate within a competitive environment in which knowledge was controlled and critiqued. In this view, the ideas put forth regarding the migration of snow crab would likely have been criticized and dismissed if the scientist was not capable of defending his hypothesis. Furthermore, chief scientists would have an administrative role and would likely have been more concerned about the larger funding picture, rather than the individual fishery. In other words, conservation was not the goal of the research institution. Rather, the goal was to finance the research program. Consequently, the issue of crab migration and the delineation of the crab stock was not viewed as a research priority at the time.

Table 3 Gulf of Saint Lawrence Snow Crab Landings and Value by Province (1968)

Province	Number of Vessels	Landings '000 lb	Value '000 dollars	Average Price cents/lb
N.B.	55	7,582	680	8.9
N.S.	3	1,447	145	10.0
Quebec	8	829	82	9.9
P.E.I	8	738	57	7.8
NFLD	3	300	30	n/a
Totals	77	10,896	994	9.1

Source: (Watson et al. 1969)

First, the St. Andrews Biological Station is located in the Province of New Brunswick and was the lead research agency for developing the Gulf of St. Lawrence snow crab fishery. The legitimacy of the scientific research and the value of expert knowledge may have given New Brunswick a priority position in securing access over the newly developed fishery. Second, and more importantly, the Federal Industrial Service financed a large portion of the research which was likely directed towards assisting the fleet of midshore groundfish trawlers. Third, New Brunswick had the largest fleet of midshore groundfish trawlers than any other Maritime Province fishing in the Gulf of St. Lawrence at that time. Yet while the New Brunswick fleet dominated the access rights, the fleet from Nova Scotia was able to secure a higher price per pound. I suggest this may have occurred for three reasons.

First of all, the three licenses in Nova Scotia were held by the Cheticamp Fishermen's Marketing Co-operative, which likely had direct access to markets and could avoid the price loss from the middleman fish buyer. Second, the Nova Scotia fleet was based out of Cheticamp and therefore fished exclusively in the gully, an inshore area adjacent to the western shore of Cape Breton, and now known to be prime habitat for snow crab in the adult stages of its lifecycle. Third, the Nova Scotia fleet was not in competition with any other joint-claimants fishing in this specific territory. Therefore they

did not have the incentive to fish soft-shell crab in the attempt to increase their volume as fast as possible to win the "race for price". The significance of this point will be explained further in the next chapter. Consequently, the quality of crab landed in Cheticamp was of superior market quality[15].

By the early 1970s, investment in the industry was rapidly increasing, yet at the same time, the production capacity was quickly exceeding supply. As new areas were being explored and opened, the number of vessels increased dramatically and effort rose steadily as vessels began to compete for product. However, the pace at which regulatory controls were imposed was significantly slower. As a result of the bureaucratic normative value of scientific expertise, it was the predominant view that it was better to wait until a strong foundation of scientific data was generated, before conservation measures could be justified in constraining economic development. Furthermore, the scientists were well aware that instituting any regulations pre-maturely would be difficult to change once the bureaucratic norm of standardizing regulatory procedures was initiated. In addition, the scientists' practice of publishing authored reports, denied them of the more commonly practiced bureaucratic norm of anonymity. Within this context, it made sense that a scientist would want to wait until he had more information before putting his name on the line. The following quotation illustrates this institutionalized dilemma.

> Conservation measures need to be based on sound knowledge of the crab's life history, the size of the stocks, the effects of fishing on the stocks and the economics of the fishery. Because of the early stages of research on the queen crab and the infancy of the fishery itself, Wilder (1969) has cautioned against the immediate introduction of regulations that may be costly and difficult to regulate, difficult to enforce, may affect the economy of the fishery, may be unnecessary in the light of future research, and may be extremely difficult to subsequently abolish (Watson et al. 1969:44).

[15] This is not an assumption on my part, but a known pattern in the pricing for snow crab fished in the Cheticamp gully.

The above statement highlights the inherent transaction cost dilemma of government commitment to the industrial capitalist paradigm. The bureaucratic norms of efficiency and productivity legitimized the enormous subsidies invested in costs related to securing access rights for an industrial-scale fishing sector. Similarly, the bureaucratic norm of expert scientific research and its link to government competence legitimized the costs required to research and explore new fishing opportunities. However, the norm of protecting the sustainability of the crab population was neither legitimized in this framework nor supported financially. This was particularly true if it was perceived that conservation regulations would constrain the goal of productivity.

Consequently, as the fishery escalated in growth regulatory controls were minimal. Both male and female crabs were harvested, soft shell crabs were heavily discarded and comprised as much as 50 percent of the catch in fishing Area 12 (Watson et al. 1969). Size limits were imposed more by the processing industry's demand for a specific market size, rather than any conservation controls on harvesting. Yet, scientists seemed well aware of the consequences of economic growth escalation and almost expected the resource to peak and collapse. Astoundingly from today's perspective, the legitimacy of economic efficiency and productivity were so normalized within bureaucracy that the legitimacy of conservation was not even considered at the time.

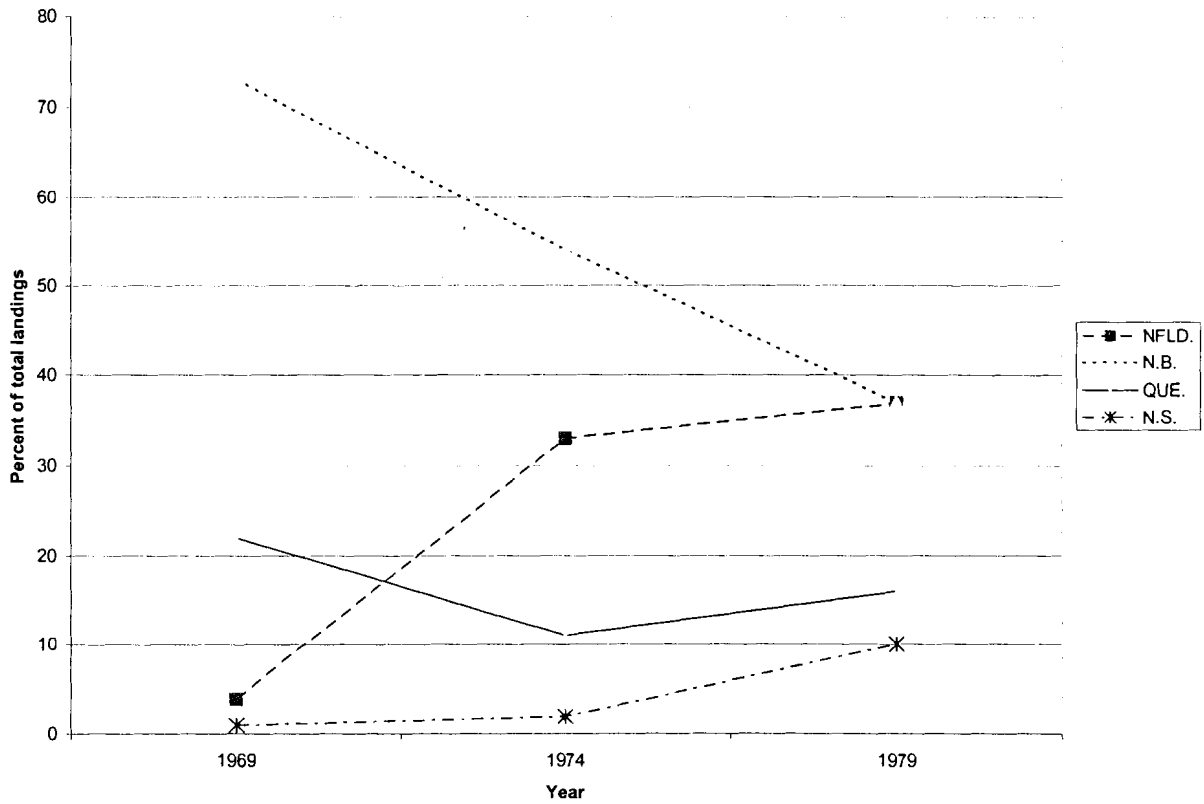
> The financial returns for fishermen and processors are sufficiently attractive that we can expect to see more fishermen, more plants, quickly enter the field, regardless of whether government aid is provided or not. We can expect to see a continuing increase in the means of production until the inevitable happens—a falling off in the supply. The Alaska king crab fishery rose from 10 million lbs. in 1958 to over 150 million in 1966. In 1968 it had declined to 100 million lbs. In Japan, a similar history of rise and fall is apparent. Just when the peak in queen crab landings will be reached, or what will be the level of the sustained yield, no one can say (Watson et al. 1969:28).

The detached bureaucratic attitude that accepted and perpetuated the legitimacy of growth escalation is difficult to understand when considering that the development of the snow crab fishery was largely motivated by the early signs of the Atlantic groundfish economic crisis. Yet this fact serves as an example of the powerful conforming processes created within bureaucratic institutions (Weber 1968). In 1974 the groundfish catches were so low and markets so poor, that the federal government initiated the Groundfish Bridging Program. By 1978 this program was contributing close to $100 million dollars per year to the ground fish industry (Crowley et al. 1993). Certainly these enormous transaction costs would have been a motivating force for Canada and her fellow joint-claimant nations to negotiate an extended jurisdiction to the 200 hundred mile economic zone, especially when considering that these nations had similar views on the benefits of industrial capitalism (Apostle et al. 1998). Subsequently, the federal government launched several additional industrial subsidization programs aimed at maximizing the benefits from the new fishing territory. The number of processing plants in Atlantic Canada rose 73 percent between 1977 and 1987 inclusively. In New Brunswick alone, the number of plants grew from 80 in 1977 to 190 in 1988, for an increase of 137 percent (Hebert 1989).

Similarly, the "growth" mindset driven by government investment in the groundfish industry, expanded rapidly into the snow crab fishery. By 1979, nearly 400 vessels were licensed to crab fishermen from all five provinces in Atlantic Canada and 66 million pounds of crab reached an annual landed value of nearly $20 million dollars. Newfoundland had increased its catch share dramatically since 1969 by expanding its midshore trawler fleet and effectively captured a significant percentage of the New Brunswick's crab landings share (DFO 1982). Figure 3 illustrates how the expansion of the number of vessels significantly shifted the percentage of catch landings distributed

between each of the Atlantic Provinces, from 1969-1979. Furthermore, in one decade, the landings had increased by 98 percent from the landings from the initial fishery and the landed value had increased by over 50 percent of what it was in 1967 (DFO 1982).

Figure 3 Changes in Percent of Snow Crab Landings in the Gulf of St. Lawrence by Province (1969 - 1979)



Between the years of 1974 to 1979, the price per pound of crab rose steadily, perpetuating an increase in the pressure on government to increase the number of new entrants. This pressure was particularly evident in western Cape Breton where several fishing vessels from adjacent fishing communities, licensed to fish in new exploratory zones, began fishing in the gully region despite their lack of clear access rights to do so.

3.7 The Transaction Costs of Protecting Access: The Emergence of an Exclusive Inshore Fishing Zone

In addition, six vessels from New Brunswick began fishing in the same area, and refused to move off the gully when the local groundfish Danish Seiners moved in to fish on the same ocean bottom habitat in October. Ensuing from such resistance, a significant conflict emerged between the Nova Scotia and the New Brunswick fleets. While the dispute was initially framed as a gear conflict between midshore and inshore fishing sectors, it quickly heightened to an issue of defining exclusive access rights based more on regional identity than on gear type. In this way, the Cheticamp fishermen representing both midshore and inshore fishing sectors, united against the midshore mobile fleet from New Brunswick (Roach 1995).

Initially, the Cheticamp fishermen responded to the increased competition from the New Brunswick fleet by demanding more licenses for local inshore fishermen. In response to this pressure, the fisheries manager in the newly created Gulf Region Area office, located in the rural town of Antigonish, Nova Scotia increased the number of licenses in Cheticamp from seven to fourteen in 1978. Each boat was given the same number of traps (125) as the midshore vessel had in Area 12, despite the fact that the Nova Scotia fleet was comprised mainly of smaller inshore boats (Roach 1995). No doubt this was done deliberately as a strategy to compete with the midshore fleet trap for trap.

Conversations with DFO personnel in 2004 confirm there was an unspoken sense of allegiance to the inshore community-based sector as opposed to the industrial sector. The fact that the Cheticamp fishermen did not dispute the encroaching access of vessels from neighbouring communities in Cape Breton indicated a level of willingness to share the resource within the broader community of communities

adjacent to the resource and this impressed the local DFO personnel. Furthermore, there was an unwritten rule that communities closest to the resource had priority of access. This *de facto* rule of adjacency illustrates the influence of localized patterns of norms and values on the local government's perspective on legitimacy. It was known and validated by fishermen and government within the Gulf Region, and sanctions were imposed when this rule was violated.

Consequently, the New Brunswick fleet vehemently opposed the expansion of the Nova Scotia fleet and argued that the new boats should not have the same number of traps as the industrial-scale fleet nor should they have fishing privileges in the same territory as the midshore fleet. No doubt the New Brunswick fleet was wary of Nova Scotia expanding as rapidly as Newfoundland had done and was adopting a protective stance. In an attempt to resolve the dispute, the N.S fishermen agreed to reduce their traps from 125 to 40 per boat, and fish exclusively within the gully region under the condition that the New Brunswick midshore fleet fish outside the local area. This proposed gentlemen's agreement was a gesture of good will. However, during the following spring, the New Brunswick midshore fleet returned to fish the gully and disregarded the informal contract (Roach 1995).

In retaliation, the Cheticamp fishermen heavily lobbied the federal Department of Fisheries and Oceans for an inshore boundary that would legally restrict the New Brunswick fleet from fishing in the gully. This lobby corresponded with the timing of mobilization of the Maritime Fishermen's Union and its use of militant action to pressure government for collective bargaining legislation and secure access rights for inshore fishermen (Williams et al. 1990). Consequently, the request for the exclusive fishing territory was granted in the early 1980s, marking an unusual precedent that created the first exclusive inshore snow crab fishing zone in the Gulf of Saint Lawrence.

Furthermore, this established the northern boundary of what has become the Area 19 snow crab fishing area.

While the evolution of this decision is difficult to piece together with full certainty, the establishment of the boundary proved to be a critical move It demonstrates a tremendous shift in government commitment toward a sector of the fishing industry that was typically considered to be less legitimate than the corporate midshore fleet. According to the institutionalized norms of bureaucracy, the larger mobile vessels from New Brunswick would arguably have had the most legitimacy of the two fleets, in terms of expected norms of efficiency and productivity. Following this line of thinking, it would seem logical that the government would place the access rights of the larger midshore vessels on a higher level of priority than the smaller inshore boats. But this was not the case, despite the normalized views of legitimacy that evidently existed within the bureaucracy.

Considering this pattern anomaly, I offer two reasons that may contribute to our understanding of why such an important decision was made in opposition to what would be expected from the dominant paradigm of the day. First, the timing of the exclusionary boundary corresponded with the time at which Romeo LeBlanc, a French Acadian from New Brunswick, was the federal Minister of Fisheries. Leblanc was known to be a political entrepreneur sympathetic to the small boat inshore fishery. For example in 1976, he banned fishing vessels greater than 100 feet from fishing in the Gulf of Saint Lawrence and in 1978, under significant pressure from the Maritime Fishermen's Union Northumberland local, he banned vessels of more than 50 feet from fishing in the Northumberland Strait. He also re-introduced the historical regions of the Department of Fisheries and Oceans and in 1981 he separated the Gulf Region from other DFO regions that were dominated by the powerful interests of corporate offshore

sectors (Calhoun 1991). In the same year, Leblanc approved the inshore herring co-management agreement in the Bay of Fundy, allowing fishermen more management control and the means to negotiate a higher price with foreign processing vessels (Kearney 1984).

The second reason is related to the principle of subsidiarity, in which the scale of governance shifts to as local a scale of decision-making as is feasible (Jentoft 1999). By establishing a new Gulf Region division of the Department of Fisheries and Oceans, Romeo Leblanc initiated a key institutional change that shifted the structure of norm legitimacy within the federal Department of Fisheries and Oceans. Subsequently a new regional-scale institutional environment was created within DFO that institutionalized a regionally derived set of norms that were distinct from the larger bureaucracy. The Gulf Region was delineated along the Gulf of Saint Lawrence and included parts of the Provinces of New Brunswick, Prince Edward Island and Nova Scotia within its jurisdiction. The head office for this region was located in Moncton, New Brunswick, and the majority of its employees were French Acadian. Similarly, an additional local-scale institution was nested within the regional-scale institution, called the DFO Gulf Nova Scotia local area office and located in Antigonish, Nova Scotia. While the government personnel in the DFO Regional headquarters were primarily French speaking and the personnel in the local Area office were English, they shared a common Catholic religion. In this way, the local value of coastal communities and the principle of adjacency, meaning fishermen residing within communities adjacent to the resource have priority access, was institutionalized within policy at a local-scale and supported both at regional and national institutional scales and ultimately contributed to the legitimacy of the exclusionary zone. Similarly, this principle underlies the policy that residency, home port or area of historical fishing can be used as eligibility criteria when

new or replacement licenses are issued[16]. Consequently, this policy has since been used as a way of legitimizing priority access for fishermen living in communities adjacent to the resource and was a key principle for negotiating the area 19 snow crab co-management agreement.

However, the normative principle of adjacency is not the only rule required for a successful exclusionary zone. In contrast to the success of the Area 19 inshore fleet, the inshore fleet fishing in Area 18 has not experienced the same benefits, despite having many of the same characteristics. I argue that the reasons for this relate to their inability to resolve credible commitment dilemmas, when faced with similar transaction cost dilemmas. I will explain this further, but first outline how the Area 18 fleet evolved. By 1979, snow crab prices hit unprecedented highs which perpetuated the lobbying for increased snow crab licenses. In response, government officials added 13 additional licenses for a total of 27 small inshore boats with access rights exclusively within the inshore zone. Fishing effort was further expanded with a new exploratory zone southwest of Area 19, called Area 18. Initially, 14 new inshore permits were issued, but in 1980, 15 additional permits were issued and the southern boundary for Area 18 was established. However, in an attempt to introduce more equitable sharing rules for the distribution of fishing access between the Atlantic Provinces, the licenses were divided equally between Nova Scotia, Prince Edward Island and New Brunswick. Subsequently, the fleet was mixed in gear sectors and lacked a unifying identity on any socio-geographical level. Furthermore, the Area 18 boundary was drawn arbitrarily,

[16] For example see (DFO 1996a).

without consideration of how its crab population interacted with the crab population in Area 19[17].

Accordingly, the motivation to resolve intra-organizational level collective action dilemmas was lacking. There was insufficient social capital, meaning trust and trustworthiness, upon which users could build as a basis for working out sharing rules. In other words, they lacked the perception that they were better off co-operating with one another. Instead, the "rule of capture" emerged as the dominant property right pattern, despite having individual quotas. Yet this inability to resolve their conflict disputes came at the cost of compromised catch allowances.

Ironically, today we now know that these groups did share a common dilemma, but they did not know it at the time. The snow crab in Area 18 has proven to be a natural nursery area for juvenile stages of snow crab that tend to migrate into Area 19. Hence, the Area 18 fishermen had a significant problem with catching excessive amounts of soft-shelled (immature) crab. However, the "rule of capture" property right pattern became normalized and the fishermen were unable to organize to resolve the dilemma. I will expand upon this later, but first I will illustrate how the "rule of capture" pattern emerged.

The following excerpt from Area 19 working group minutes illustrates how the Area 18 fishing boundary was randomly drawn for the purpose of exploring new fishing areas. Furthermore, once a line was drawn, it could not easily be changed. In this

[17] As I mentioned previously, there was a dispute between scientists regarding the significance of the movement of snow crab. Unfortunately, the decision was made to ignore the initial research that indicated there was significant movement of crab in the vicinity of Area 18. However, scientists today have confirmed that crab migration flows from Area 18 to Area 19 are significant and have since created a protected nursery zone in Area 18. See (CSAS 2004).

manner, the *degree of exclusivity* for Area 18 and Area 19 snow crab fishermen was initially established by an arbitrary line, enforced by DFO.

> D.A. Mackinnon (Area conservation chief) said that in 1980 we had permission to issue new exploratory permits and the new permits could not be issued for an area that was already explored during 1979, so a line was drawn identifying the area explored in 1979 and the new permits had to stay outside of that line when exploring for new crab beds. The Minister then announced that all fishermen holding exploratory permits were to be issued licenses. By this time the new line was already drawn and in place. It was therefore too late to make changes (DFO 1981:4).

In the same working group meeting, it was mentioned that the groundfish seiners had priority of access based on their historical presence. Consequently, the gear conflicts arising from the joint-claimancy resulted in a season closure for area 18 snow crab fishermen. However, the effect of this rule was the reduced incentive for crab fishermen to fish conservatively. Rather, they had the incentive to bargain for increased quotas, as I explain below.

> The chairman then said the snow crab fishermen will have to remember that priority of access will be given to the Danish Seiners, if the fishermen are unable to agree among themselves on measures to prevent gear conflict problems. The seiners have a long historical presence in the area and a large percentage of their cod catches are taken from spots in Area 7 [Area 18] (DFO 1981:6).

This illustrates the collective action dilemmas that emerged from the jointness of ownership and exemplifies the constraints other fisheries imposed, even though each vessel had an individual quota. This collective action dilemma was complicated further by the prohibitive cost of excluding the mobile fleet from Area 18. Subsequently, Area 18 snow crab fishermen bargained for increased quotas in exchange for complying with the closed season rule.

> The committee then reviewed the TAC for Area 7 [Area 18]. The Chairman said the recommended TAC for 1981 is 519 MT. This computes out to 46,000lbs per licensed unit. Several members of the committee expressed

> concern and indeed questioned why Cape Breton and Antigonish counties snow crab fishermen were expected to observe conservation measures in Area 7 [Area 18], when the mobile fleet can operate in that area virtually without restriction. They saw no point in conserving the stocks so the mobile fleet can reap the benefits. As a result of this, Mr. Jack MacIssac and Mr. Robert Myette recommended the per unit quota be increased from 46,000lbs to 80,000 lbs. (DFO 1981:6).

This dialogue illustrates how institutions evolved from transaction cost dilemmas and the bargaining situation that arises when one group feels their capture of benefits is being constrained by another joint-claimant. However, rather than proceeding with a bargaining process in which credible commitment could be attained, the resolution of this dilemma came with the ecological cost of increasing the Total Allowable Catch (TAC) by 855,540 pounds. Furthermore, this dynamic tension between positive transaction costs and credible commitment transpired even when individual quotas were implemented. In other words, despite having a secure access right, the ability of other joint claimants to alter the snow crab population available in Area 18, precluded any motivation to conserve the resource. In this case, the joint claimants were the mobile midshore snow crab fleet and the mobile Danish groundfish seiners. Thus the Area 18 inshore snow crab fishermen were one of several groups of joint claimants who had access to the flow of benefits from the local snow crab stock, rather than exclusive benefits over the stock itself.

In contrast, these dilemmas were common to Area 19 but were resolved by credible commitment at two institutional levels. First, the Danish groundfish seiners and the snow crab fishermen from Cheticamp shared a common transaction cost dilemma of how to protect their interests from the encroaching midshore fleet. Subsequently, they were mutually better off by co-operating to lobby government for the exclusionary zone. In this manner, they were motivated to create credible commitment between

distinct gear sectors and agreed on an operational rule to fish in the gully at different times of the year. In other words, each group had a certain level of trust and trustworthiness upon which they could build to create a sharing rule. While having different interests, the separate gear sectors had a common identity and no doubt would face social consequences if either group reneged on the agreement. In addition, they were both better off by co-operating, so the sharing rule generated a high level of trustworthiness. Furthermore, the success of their solidarity against the midshore fleet was also validated by the regional norm of adjacency. This norm ultimately resulted in the government commitment to create a regulatory measure that prohibited the midshore fleet from fishing in the gully. This represents a change in policy level rules that shifted the transaction cost of enforcement to the government. Ultimately, the solidarity paid off for the fishermen.

While the shift in enforcement costs from organizations to government transfers the cost of enforcement to a social cost, I will demonstrate in the next chapter how these social costs are minimal when compared with the enormous social and ecological costs associated with the transaction costs of supporting the interests of the corporate midshore fleet. Furthermore, these transaction costs associated with securing, monitoring and enforcing economic property rights are typically hidden from economic analysis of efficiency. Therefore, I illustrate the significance of calculating transaction costs when evaluating and comparing the benefits of various property rights regimes.

In summary, the purpose of this chapter was to illustrate the ways in which a system of industrial capitalism, institutionalized by government bureaucracy, has contributed to multi-lateral positive transaction cost dilemmas for the Atlantic Canada fishing industry. Moreover, I argued that these dilemmas were reproduced in the Gulf of St. Lawrence Snow Crab fishery and created significant institutional constraints for

implementing conservation practices. The hierarchy of government decision making, when combined with the normative values of efficiency and productivity, has shaped our use of science and capital and subsequently created enormous social and ecological costs. Furthermore, I demonstrated how new institutions evolve to mitigate these cascading effects when social capital exists as well as different sets of norms and values. I also explained how bureaucrats have an alternative to the industrial principles adopted by government policy that protect private interests. In contrast, bureaucrats can also define norms of legitimacy based on the principle of protecting the public interest. In this way, localized patterns of norms and values of legitimacy present a hidden opportunity for resolving transaction cost dilemmas. In other words, a bureaucracy that operates with a subsidiarity principle, within itself, can reduce transaction costs at a local level, when local government shares norms and values with local resource users.

CHAPTER FOUR

4.0 Confounding Factors of Positive Transaction Cost Dilemmas: The Vicious Cycle of Decline and Collapse in the Gulf of St. Lawrence Snow Crab Fishery

4.1 Introduction

In Chapter Three, I described the institutional context in which multiple transaction cost dilemmas were introduced in the Gulf of St. Lawrence snow crab fishery. In addition, I explained how bureaucratic norms of legitimacy constrained the implementation of conservation practices when based on the implementation of industrial capitalism. Furthermore, I demonstrated how new institutions, based on local community values, evolved at the regional scale and local scale to mitigate these cascading effects. Yet, unless the normative patterns of bureaucracy at the national scale are changed, the legitimization of efficiency and productivity run the risk of catalyzing the "race for fish".

The purpose of this chapter is to shift the focus from the institutional context in which transaction cost dilemmas arise, to the causal outcomes these dilemmas can perpetuate. Looking at the causal relationships that evolve in the snow crab fishery, I demonstrate how the problems of price variability, recruitment variability, transferability and political variability emerged as second order transaction cost dilemmas as a result of bureaucratic norms of efficiency and productivity. Furthermore, I explain how these dilemmas all contributed to create a property rights pattern characteristic of the "rule of capture". Consequently, the Gulf of St. Lawrence snow crab stock went into serious decline in the latter part of the 1980s.

I argue that in understanding this pattern of transaction cost dilemmas, namely how they emerged and under what institutional norms and constraints, we can better

evaluate whether new management regimes have shifted the underlying behavioural pattern that created the initial pattern of decline.

4.2 Early Distinctions between the Mobile Mid-shore and Community-based Inshore Fishing Fleets

By the early 1980s, every Province in Atlantic Canada had fishing vessels harvesting the snow crab. However, the management regimes for each Province were significantly different, primarily because of the distinctions in fleet structure. The Nova Scotia fleet consisted of a high number of small inshore boats that fished a diversity of species throughout the year, including lobster and mackerel, and were based out of coastal homeports adjacent to the Gulf of St. Lawrence. In contrast, the larger fleets from the other three Atlantic Provinces (NB, PEI and NFLD) fished exclusively snow crab using large mid-shore trawlers and a significantly higher number of traps. Another striking difference between the large-scale and the small-scale fleets was that the Nova Scotia fleet was divided into seven separate fishing zones with seasonal openings and catch limits, while the larger fleets fished all year round, traveling extensively throughout the Gulf, catching as many crabs as their traps would allow. The differences in fleet structure and the variation in the distribution of snow crab traps can be seen in Table 4.

While the New Brunswick and Newfoundland fishing fleets were predominantly comprised of large industrial-scale vessels, ranging mostly from 50-70 ft. in length, the Nova Scotia fleet had vessels all under 45 ft. without a single industrial-scale vessel in the Gully fishery. The only other Province with a small boat fleet was Quebec, yet it had an equal portion of its fleet in the mid-shore industrial sector as well.

Table 4 Snow Crab Fleet Structure by Province, Vessel Length and Total Number of Traps (1979)

Vessel Length	N.B.	Quebec	N.S.	Nfld.	Total
<45ft.	-	42	178	5	225
45-49.9 ft.	14	25	-	8	47
50-59.9 ft.	13	11	-	30	54
60-69.9 ft.	47	2	-	8	57
>70ft.	2	3	-	-[18]	5
Total fleet	76	83	178	51	338
Total traps	12,000	6,600	5,400	31,000	55,000

Source: (DFO 1982)

The variation in fleet structure between the Atlantic Provinces had a significant effect on the proportion of total landings caught per Province and the subsequent asset value secured. While Nova Scotia had the largest number of boats fishing crab, the percentage of total catch was significantly lower than Newfoundland, New Brunswick and Quebec due to the significantly lower number of traps[19] (Table 5).

Table 5 Snow Crab Landings by Province 1979 (metric tonnes)

New Brunswick	Quebec	Prince Edward Island	Nova Scotia	Newfoundland
10,950	4,774	453	2,766	11,195

Source: (DFO 1982)

Global market prices for snow crab suddenly dropped throughout the early 1980s, but later rose just as fast as they had declined, in the wake of the collapse of the Alaskan King Crab fishery. As a result, the problem of recruitment over-fishing became a vicious circle in which fishermen became highly motivated to land large quantities of immature pre-moult crab, known as "soft shelled" crab, creating several difficulties for the processing sector.

[18] Crab vessel length was not allowed to exceed 65 feet.

[19] Comparison of trap effort is complicated by the differences in trap shapes and volumes. The Newfoundland trap was conical measuring 4' x 2' x 2' whereas the pots in other provinces were typically 6' x 6'x 2.5' (DFO 1982).

> Since its beginning, this fishery has been beset by problems of quality and marketing. The quality problems result from the landing of soft-shelled crab and the poor handling practices throughout all facets of the industry. The marketing problems stem from the present industrial structure. While there are a large number of relatively small independent processors who sell through a small number of broker/wholesalers, they lack effective coordinating bodies to provide marketing intelligence, planning, consistent quality standards and/or a cohesive pricing and sales policy (DFO 1982:i).

Yet, the incentive to land large volumes of soft-shelled crab was driven largely by localized price competition. In reverse of the cost-price squeeze effect, which typically reduces price locally, a large number of processing companies were experiencing high debt loads from their various government sponsored development loans. Subsequently, they were also experiencing a significant reduction in working capital, which in turn, drove up crab prices as processors competed for securing a steady supply (Barrett 1992b). As the high number of processing plants (desperate for fresh crab) escalated prices, they inadvertently provided an incentive for fishermen to land significant amounts of low quality soft-shelled crab as fast as possible. In this way, "the race for price" was a critical strategy used to capture the high price before the market was "flooded". However, as the quality of crab landings consistently deteriorated with the increased proportion of soft shelled crab catches, prices subsequently dropped and further drove the incentive for fishermen to increase the volume of catch landings. In other words, the system had created an incentive for fishermen to capture profit in one of two ways. If price was high for a short period of time, they had the incentive to land crab quickly before the price dropped, which typically meant shorter trap soak times and therefore higher volumes of soft-shelled crab in the catch landings. However, if price was low, they had the incentive to catch high volumes of crab over time, which also increased the incentive to fish soft-shelled crab to increase volume. In both cases,

the incentive to over-fish was motivated by the "rule of capture" over a flow of benefits from the stock.

Yet despite this problem in the mid-shore fleet, the Cheticamp fishermen were not experiencing this problem with high landings of soft-shelled crab from the inshore fleet. Moreover the Catch per Unit Effort was notably higher than the catch rate in the adjacent fishing Area 12. These are interesting points that I will expand upon further along in this chapter.

4.2.1 The Problem of Price Variability: A Second Order Transaction Cost Dilemma

The soft-shell problem in Area 12 was a factor stemming from a deeper underlying problem perpetuating a highly fluctuating range in prices for snow crab. Canada's expectation for growth and development that came from extending her jurisdiction from 12 miles to 200 miles in 1977 had lasting effects on the growth and expansion of the processing sector in Atlantic Canada. From 1977 to 1988, the number of processing plants increased by 84 percent for the Atlantic Region as a whole. A discussion paper prepared by the DFO economics department in 1989 entitled, "Great Expectations: The Atlantic Fish Processing Sector" (Hebert 1989), outlined a dramatic decline in production value per plant throughout Atlantic Canada. Yet, the report documented that the number of processing plants continued to increase in the late 1980s, despite the declining trend in asset value. In Nova Scotia, from the period of 1977 to 1988, the number of processing plants increased from 169 to 318 and in New Brunswick from 80 to 190 (Hebert 1989). However, the expectations for corresponding increases in total fish landings were never realized. Rather, the average ratio of metric

tonnes per plant in Atlantic Canada, known as "throughput", decreased by 27 percent between 1977 and 1987 (Hebert 1989).

> Except for Quebec and Prince Edward Island there has been a much greater increase in the number of plants than in the total landings. The overall Atlantic figures show that for the period 1977 to 1987 the number of fish processing establishments has increased by 72 percent while for the same period the landings have only increased 26 percent. From this we conclude that the increased supply of raw material is not the motivation for the increase in the number of processing establishments (Hebert 1989:9).

When Hebert compared the value of production for each plant from 1977 to 1987, he found those Provinces which had increased their processing capacity most dramatically also experienced the greatest decline in production value over time (Table 6).

Table 6 Value of Production per Plant, by Province (1977 and 1987)

Province	1977 value of production in '87 dollars ($000)	1987 value of production/plant ($000)	% variation in number of plants 1977 to 1987	% variation in value of production 1977 to 1987
New Brunswick	$4,854	$2,168	123%	-55%
Quebec	$1,250	$2,425	27%	94%
Prince Edward Island	$1,446	$1,661	40%	15%
Nova Scotia	$4,513	$3,113	88%	-31%
Newfoundland	$4,140	$2,903	61%	-30%
Total	$3,702	$2,708	73%	-27%

Source: (Hebert 1989)

However, as Hebert notes, the decline in production value did not alter the increasing trend in the number of processing plants being built. Rather, construction was still booming in 1989 at the time when Hebert was writing his report. Why would the number of processing plants continue to expand if they were not financially viable? Hebert answers this question in the following quotation.

> ...the low cost capital provided by DREE, DRIE, ACOA, ERDA[20] has certainly played a role in the decision to expand or start up. These various

[20] These are all acronyms for various federal and provincial funding agencies established in Atlantic Canada.

> programs review a project proposal on an individual basis and not on a comprehensive industry-wide or regional basis. The question of adequate return on capital and labour has a different slant when considering the importance of these facilities within their communities (Hebert 1989:14).

The government subsidies made available for processing plants through the numerous economic development agencies listed above were legitimized by the federal government as a necessary action to keep people employed in rural coastal communities. This option was viewed as being preferable to alternative forms of government assistance such as unemployment insurance or welfare (DFO 1982). However, in the 1980s, many of the canneries that were processing crab were subject to inspections and subsequently forced to withdraw their plant registrations for reasons of poor health standards and insufficient sanitation. These problems, coupled with the problem of a high debt to asset ratio, (assessed by DFO as 86 per cent on average (DFO 1982), were also contributing to poor product quality and subsequently poor prices for product exports, even though market demand was high (DFO 1982). As a result, federal government officials recommended even more subsidies be made available to upgrade the processing plants, under the condition that "any assistance should be conditional on the operator to maintain high sanitation and operational standards in succeeding years" (DFO 1982:12). Consequently, the high number of subsidized processing plants continued to drive an artificially created demand for supply, with a highly variable price mechanism. In other words, the transaction costs of developing an industrial scale processing industry were initially legitimized by protecting the interests of industrial capitalists on the basis of efficiency and productivity. However, these subsidies persisted past the point of efficiency as a means of protecting the interests of the larger public. In the end, the government subsidies perpetuated the conditions for high price variability which created the incentive for over-

fishing. However, it must be emphasized that it was the norms of industrial capitalism that created the initial path of dependence on these conditions.

4.2.2 The Problem of Transferability: A Second Order Transaction Cost Dilemma

Another set of factors contributing to the incentive for landing high volumes of soft-shell crab in the Gulf of Saint Lawrence Snow Crab fishery relates to the overcapitalization in the New Brunswick mid-shore fishing fleet. This is consistent with conventional neo-liberal economic theory presented in the field of fisheries economics, as I have explained in Chapter Three, in which the asset value is predicted to decline over time as the marginal cost exceeds the marginal benefit as more capital is invested in the race for fish (Anderson 1986). However, resource economists have generally not emphasized the distinction between social costs and private costs as part of the overcapitalization equation. In other words, when government supports the transaction costs of capturing an asset value, the costs of that transaction are born by the public purse. In the case of the New Brunswick mid-shore snow crab fleet, both the provincial and federal government invested significant amounts of capital in the purchase of existing vessels and licenses, at an inflated price, that required enormous quantities of fish to generate enough capital just to pay the financial loans. In this way, the ecological costs of overexploitation were perpetuated by the government investment in the large-scale fleet. Table 7 shows the proportion of public capital invested in the purchase of each vessel, amounting to over 94 percent of the purchase cost.

Table 7 Average Crab Vessel (Core Mobile Fleet) Financing (1982 – 1983)

Financing Profile for Crab Vessel Purchase	$
Federal Government Subsidy	41, 513.00
N.B. Fisheries Loan Board	322, 216.00
Chartered Banks	6, 162.00
Processing Companies	4, 596.00
Personal Financing	12, 631.00
Purchase Value	**387, 118.00**
Average Total Debt at Beginning of 1982	
New Brunswick Loan Board (owing)	199, 615.00
Processing Company (owing)	8, 178.00
Additional Debt Incurred in 1982 (gear purchase)	45, 386.00
Total Debt for 1982	253, 179.00
Total Principle Payments Made in 1982	27, 612.00
Total Interest Payments Made in 1982 (8%)	16, 242.00
Total Debt Balance at End of 1982	209, 325.00
Total Principle Investment (less any subsidies)	391, 014.00

Source: (DFO 1983:4)

In 1977, over 60 percent of the New Brunswick mid-shore large-scale snow crab fleet had been purchased with government loans and development financing (DFO 1983). The timing of the purchase coincides with the large volumes of capital injected into the groundfish industry at the time in which the 200 mile Extended Economic Zone had been negotiated. When considering the fleet had 130 vessels in 1977, rough figures suggest that government invested close to 30 million dollars of public funds in purchasing these vessels. However, what is not appreciated is the actual market value of these vessels versus the purchase price. Table 8 shows the gross earning value of the vessel in 1982. However this is significantly lower than the purchase price. Consequently, over 78 fishermen who sold their vessels in 1977 captured a substantial profit from a common property resource. Yet, the next generation of owners, largely the Canadian public, bore the enormous social and ecological costs that were invested in putting these vessels into the water.

The annual debt load carried by the average crab vessel in 1982 contributed to a significant cost for the enterprise when combined with the operating, maintenance, and labour costs as well as vessel depreciation. Yet, as long as revenues remained high, when these costs are compared with the average gross revenues per boat, the annual return on investment remains between 13.5 and 15 percent, which was considered as an acceptable level for investors to continue re-investing in the fishery.

> For the sample vessels the net balance plus principle and interest payments amounted to $58,511.00 for 1982. The average total investment (less subsidies) was $391,014.00. The overall return on this investment in 1982 is $58,511.00 or 15 percent of the total investment. Some argue that a return should also be earned on subsidies. The total investment with subsidies is $432,527.00 and the rate of return falls to 13.5 percent. This rate of return on investment is considered reasonable by most economists for enterprises in resource related industries such as fisheries (DFO 1983:11).

Table 8 Average Crab Vessel (Core Mobile Fleet) Financial Performance (1982)

	$
Revenues	301, 103.00
Costs	
Operating Costs (fuel, bait, etc)	46, 310.00
Repairs & Maintenance	20, 259.00
Fixed Costs (insurance less interest)	7, 975.00
Labour: Captain	40, 845.00
Labour: Crew	104, 151.00
Depreciation[21]	23, 052.00
Interest payments	16, 242.00
Principle payments	27, 612.00
Total Costs	286, 446.00
Net Balance	**14, 657.00**
Return on Investment (balance plus interest and principle payments)	**58, 511.00**
Rate of Return	**15%**

Source: (DFO 1983:12)

The 1982 financial analysis concluded that the 15 percent Rate of Return was an acceptable level for investors to continue reinvesting in the fishery. However, it is

[21] Depreciation was calculated based on the initial vessel cost and any capital additions. The economic life of wooden vessels less than 65ft. was assumed to be 15 years, while steel and wooden vessels greater than 65ft. have a 20 year life expectancy (DFO 1983).

evident from Table 8 that the actual net revenues were not significantly high after all costs were accounted for. However, this fact is somewhat confounded by the vertical integration of processing companies as demonstrated by a proportion of the financial investment attributed to processing firms. Hence, it is difficult to determine what the interrelationship is between vertical integration and price variability. Yet, what is certain is that as global market prices increased, the Rate of Return increased well beyond the accepted level of 15 percent. In 1983, prices rose significantly, contributing to exceedingly high incomes and an excessive Rate of Return.

In the opinion of DFO economists, the rate of return is calculated over the entire economic life of the investment. Therefore, some years may be high and others may be low, but the overall rate of return must be considered over and above year to year earnings (DFO 1983). In this view, both the federal government and crab license holders had a strong incentive to maintain a limited entry policy rather than expand the fishery to more entrants when prices were high and the total value of the fishery increased. This is an important point. The introduction of limited entry did not necessarily stop the race for fish. Rather, it meant that more revenues were captured by the industrial fleet such that their enterprises did not go bankrupt with public loans unpaid[22].

In contrast to the mid-shore large-scale fleet, the inshore vessels fishing out of homeport communities along the western shores of Cape Breton had a significantly higher return on investment, with significantly less debt. Table 9 illustrates the cost and

[22] Over time, the Area 12 fleet has vehemently fought for its rights of exclusive access, perpetuating a continuous climate of conflict. Initially, government acquiesced to the demands of the powerful interests of the midshore fleet in Area 12. However, these demands have become less legitimate over time, particularly as other interest groups exercise their constitutional rights of access such as the Mi'kmaq people in the court case *Marshall v. Canada*. Subsequently, the bureaucracy has shifted its norms of legitimacy such that principles of resource sharing are now believed to be fundamental to mitigating high levels of social conflict.

benefit profile of a typical inshore snow crab boat, generating 37 percent return on investment on average. Also notable is that this financial return is generated from catching significantly less fish. These figures suggest that in 1982, five inshore small-scale vessels could have fished the same quantity of fish allocated for every one mid-shore large-scale vessel, for two and a half times the profit.

Table 9 Estimated Financial Returns from Average Snow Crab Fishing Vessel in Communities within Area 19 from Margaree to Pleasant Bay (1979)

	$
Gross income from Crab Disbursements	$94,900
- Maintenance	$2,530
- Operations	$7,390
- Fixed costs	$1,070
- Net crew salaries	$54,050
Total	**$65,040**
Depreciation	$2,860
Net Profit	**$27,000**
Invested Capital (including subsidies)	$73,000
Rate of Return	**37%**

Source: (DFO 1982)

A comparison of investment costs and rate of return between the mid-shore fleet and inshore fleet reveals that the inshore fleet is significantly more efficient when looking at costs versus benefits. Moreover, this factor also reveals at least one significant reason why the Area 12 fleet is vehemently opposed to resource sharing with other interest groups; whereas Area 19 has introduced a co-management agreement that includes a sharing formula. The economic debt load of a large-scale fleet carries a social burden as well as an ecological one. In the following section I explain how a lower rate of return on investment may have a causal relationship to recruitment over-fishing when combined with other factors.

4.2.3 The Problem of Recruitment Variability: A Second Order Transaction Cost Dilemma

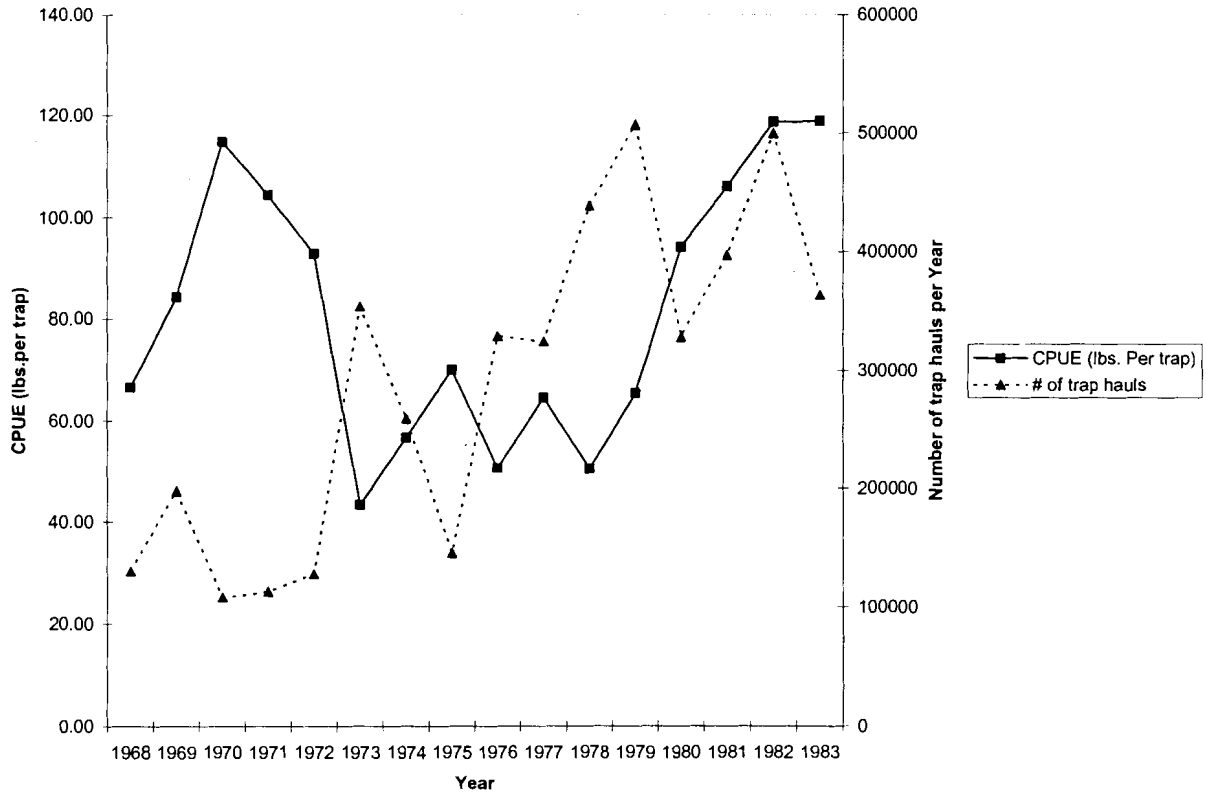
Understanding the way in which price variability and catch rates are linked is somewhat obscured by the uncertainty surrounding our knowledge of the snow crab lifecycle. For example, the reason why the catch rate of soft-shell crab is higher in fishing Area 12 than in the Cheticamp Gully may be attributed to numerous variables such as differences in trap soak times, the time of year of the fishery and the corresponding growth stages. That being said, there is no question that the dramatic increase in the number of vessels competing for crab and price created the incentive to land volumes of fish more rapidly and thus vessels did not spend time moving fishing gear off areas of habitat in which soft-shell crab predominated. An important point to recognize here is that high price variability creates a condition in which fishermen race for price, not just fish. Over time, the practice of catching and discarding soft-shelled crab has a major effect on the recruitment pulse of harvestable crab coming into each new fishing season. Consequently, in the late 1980s the Catch per Unit Effort (CPUE) declined over time as the recruitment pulse weakened each subsequent year of entry into the fishery.

Certainly throughout the 1970s there was a persistent declining trend in the CPUE data for all fleets fishing in the south-western Gulf of St. Lawrence, even while catch landings continued to rise. Biological assessments of the snow crab fishery, at that time, used a series of mathematical equations, called Leslie Analysis, based on data gathered from fishermen's logbooks, tagging studies and commercial catch sampling. Fishermen were given grid-charts and asked to record the grid number corresponding to their fishing area. This data was then used to calculate a weekly average CPUE as well as an estimate of the catchability of the gear. Plotting cumulative catches based on

weekly CPUE averages against the slope of catchability, generated biomass estimates for each fishing area. Scientists then compared these estimates with the previous year to determine any declining or increasing trends in CPUE as compared with any declining or increasing trends in biomass estimates. Scientists then estimated what the annual exploitation rate was per fishing area based on the comparison of catch landings and their estimated biomass. In other words, scientists were assessing the impact of the fishery based primarily on what was being caught, rather than evaluating what was actually left on the ocean bottom to reproduce. Furthermore, the crab fishery was managed primarily by limiting the number of traps per boat. However, fishermen could vary the number of trap hauls significantly as a way of increasing catch landings. Thus the increasing trend in trap hauls was expected to yield an increase in catch landings if the biomass was available. Yet, in the early 1980s (Figure 4) these trends showed a decline in CPUE, a decline in trap hauls and a decline in catch, all indicators that the stock could not sustain the escalating rate at which the crab was being harvested every year. In addition, a growing proportion of the catch landings were comprised of soft-shelled immature crab, another indication that the stock was being over-fished.

> One of the critical problems of the industry is the capture of soft-shell post-moult crab. More soft-shell crab is being caught. It is surmised that this is due to the fact that the average age of individuals in the crab population has been lowered. The older, less frequently moulting crabs have been captured. Problems for the industry are posed by the fact that the crab moulting period varies unpredictably from one year to the next. Although it is yet unconfirmed, it would seem that a high percentage of soft crab culled at sea are lost to the resource from some or all of handling injury, lethal surface water temperature, and predation during the return to the bottom (DFO 1983:7).

Figure 4 Comparison of Catch Rate and Number of Trap Hauls for Gulf St. Lawrence Snow Crab (1968 - 1983)



4.2.4 The Problem of Political Variability: the Dilemma of Governmental Credible Commitment

Fisheries scientists and managers were slow to design a management regime for the snow crab fishery that could keep up with the rapidly increasing growth and expansion of new entrants throughout the 1970s. As explained in Chapter Three, the normative patterns of bureaucratic institutions designed to legitimize industrial capitalism, also constrained the scientific norms that would have otherwise legitimized conservation regulations. However, by 1980, the combination of lower market prices, the high proportion of soft shelled crab landings and numerous problems with marketing and processing standards, nearly forced the Department of Fisheries and Oceans to shut the fishery down (DFO 1982). The transaction cost dilemmas of price variability and recruitment variability were generating significant social and ecological

costs that could no longer be ignored[23]. Subsequently, officials within federal Department of Fisheries and Oceans were beginning to question their own effectiveness. In December 1980, a seminar was held in Quebec City for all snow crab interest groups[24] to discuss new strategies for managing the snow crab fishery and a discussion document summarized the key management principles identified from the forum. Of significant note was the emphasis on the common property nature of the resource and the priority of access for the inshore fishermen living adjacent to the fishery. The following quotation captures these sentiments.

> The fisheries of Canada are a common property resource with ownership vested in the state. Access to the resource, however, has traditionally been reserved, particularly with respect to inshore and sedentary species, for fishermen residing in contiguous areas. Because of the common property nature of the resource, access to it must be regulated by some sort of a licensing system. A controlled entry system, however, does not by itself ensure an equal or fair division of the available supply; hence, fishing effort (size of vessel, number of traps, etc.) must be regulated. Finally, maximization of the returns from the market is dependent upon a discipline which is neither inherent in organization nor imposed by the owner of the resource. ...Fishermen, processors and marketing organizations must share in the operational discipline necessary for the success of the plan (DFO 1982:23).

The participants at the snow crab workshop discussed their views on a new management regime structure. Subsequently a document was prepared that summarized the results of these discussions. It emphasized five main areas of regime change which are listed below:

1. Revised stock assessment methodologies (independent of commercial catches) that would provide a "check" on current methodological assumptions;

---

[23] Resource economists would identify these costs as externalities. However, I argue these costs were endogenous to the industrial capitalist paradigm. Yet, the normalized bureaucracy could not respond under the current institutional framework as the costs were bounded within various departmental divisions. They could not see the problem.

[24] The purpose of the meeting was to lay the groundwork for an integrated management strategy that included all sectors related to the crab fishing industry, including: resource management, harvesting, transporting, processing and marketing/distribution (DFO 1982).

2. Soft shelled catch monitoring;

3. Controlled entry via fishing seasons, no new licenses and an underlying principle of "the preservation of economically viable harvesting units";

4. Reduced processing capacity; and

5. Increased co-operation and power sharing between harvesting, processing and marketing sectors to "establish consistent quality standards and a more cohesive pricing and sales policy to discourage price undercutting among Canadian producers. This could best take place through modifications to the existing structure by giving existing organizations such as the Atlantic Queen Crab Association and The Canadian Association of Fish Exporters an expanded role" (DFO 1982:25).

It was strongly suggested in the report that the twin strategies of limiting licenses and maintaining seasonal openings were the preferable means of controlling harvesting rather than setting Total Allowable Catch quotas that were highly vulnerable to the inability to predict annual recruitment into the snow crab fishery. An equally important recommendation was the inclusion of a specific user group organization in setting pricing policy. Moreover, the document was very specific about cooperating and power sharing with user groups in a manner consistent with the concept of co-management (Pinkerton 1989). Indeed, the proposed management regime marked a significant shift in government thinking.

The participatory seminar, in which fishermen, processors, and marketing organizations were invited to discuss fisheries management policy, was a radical idea at the time. Furthermore, the policy emphasis on traditional access rules for inshore fishermen and the values of fairness and equal division, were not at all consistent with industrial capitalism. However, they were consistent with the federal Liberal government fisheries policies under the leadership of the Minister of Fisheries Romeo LeBlanc. Known as the "Minister of the Fishermen", LeBlanc was the architect of a new direction that invited the participation of fishermen in the policy making process. Sue

Calhoun, in her book on the history of the Maritime Fishermen's Union, quotes LeBlanc as saying:

> The reality struck me very quickly when I became minister, that bureaucrats in the department tended to consult the companies, be it B.C Packers or National Sea, and assume that that was the voice of the fishery (Calhoun 1991:35).

These words help capture the radical thinking Leblanc brought to the Department of Fisheries. Furthermore, this demonstrates the power of influence a political entrepreneur can have upon the norms and values of the bureaucracy, especially if he's the Minister. No doubt Leblanc had a core of like-minded bureaucrats gathered around him, supporting his views and implementing change accordingly. Nevertheless, it was the political power of an innovative politician that initiated the necessary changes in the norms of bureaucratic legitimacy.

In over two periods in office as Fisheries Minister, LeBlanc earned a reputation for favouring the small boat inshore sector as a result of several changes he made to the fishing industry in the Gulf of St. Lawrence. As I have mentioned, in 1981 he re-introduced the historical regions of the Department of Fisheries and Oceans, separating the Gulf Region from the Maritime region, which was heavily influenced by the powerful interests of vertically integrated offshore sectors (Calhoun 1991). In the same year, Leblanc approved the inshore herring co-management agreement in the Bay of Fundy, allowing fishermen more management control and the means to negotiate a higher price with foreign processing vessels (Kearney 1984). Certainly, the bureaucracy was showing signs of change.

In 1982, under Leblanc's second and final term as federal Fisheries Minister, in the interests of introducing limited licensing, the department adopted a policy proposed by the Maritime Fishermen's Union Northumberland Local, known as the "Bonafide

Fishermen's Permit" policy. The details of the policy were designed by lobster fishermen as a way of separating full time professional multi-species fishermen from part-time "moonlighters". Furthermore, it was a strategy for full time fishermen, those who depended on the industry for a livelihood, to secure access to a number of different species licenses within the Gulf Region. In this way, fishermen could maintain a multi-species fishing strategy to mitigate uncertainty when one species was either in decline or prices were poor. As well, the policy restricted the transferability of licenses such that they could not be sold or exchanged outside of the Gulf Region. Furthermore, it provided license eligibility criteria that prevented the vertical integration of fishing licenses into the hands of processing firms.

The policy was not necessarily an easy "sell", as many part time fishermen had a great deal to lose. Yet because it was designed for fishermen, by fishermen and championed by fishermen, it had a tremendous level of legitimacy[25] (Calhoun 1991). This is consistent with the argument that rule compliance is dependent upon having collective rights for participatory decision making (Jentoft 1989; Ostrom 1990). At the same time, it must be noted that from my conversations with DFO personnel I've learned that the acquiescence of the Department of Fisheries and Oceans was largely due to the value alignment between the fishermen, the Gulf Nova Scotia local area resource managers, the Gulf Regional directors and the Minister of Fisheries Romeo LeBlanc. In this way, credible commitment was created, at multiple scales of bureaucratic institutions, to a set of access rights that were conceptualized at the

[25] Fishermen who fit the criteria of a "Bonafide" fisherman either held a Class A lobster license, or made 75 percent of their income from fishing, or earned $15,000.00 from fishing the year before the policy was implemented. Those fishermen who received a Bonafide Fishermen's permit were given privileges that allowed them to transfer individual licenses (attached to a person and not to a boat), hold licenses without using them, and receive priority for new licenses and government programs (Calhoun 1991).

grassroots level. This was possible because of a common thread of norms and values that were distinct from the bureaucracy overall, but legitimized no less.

However, after two terms under Prime Minister Trudeau, the Minister of Fisheries portfolio was transferred from Romeo Leblanc to Pierre DeBane in 1982. As a result, the integrated management regime for snow crab, as envisioned in the 1982 Quebec Meeting, was somewhat compromised by political change. Moreover, the impending federal election in 1984, combined with a decline in the cod fishery and an increase in the price of snow crab, shifted the policy focus to the issue of limited licensing.

By 1983, crab prices began to rise once again, perpetuating the previously identified problems of landing soft-shelled crab, poor handling practices and delays in processing in peak periods of landings. However, fishermen struggling financially from the declining cod fishery were adding to the already increasing numbers of fishermen pressuring the government for snow crab licenses. Their argument was that the wealth of the crab fishery should be shared fairly between all *bonafide fishermen*. Certainly the egalitarian principles of the new policy were broadly appealing to fishermen. The idea of every full-time fisherman having equal opportunity and status within the Gulf Region created what Zucker calls a "contagion of legitimacy" (Zucker 1987). The rules and norms embodied within the policy were felt to be so legitimate they were infectious.

Consequently in 1984, a large number of inshore groundfish fishermen began lobbying government for equal access to snow crab for all *bonafide* fishermen. A groundswell of protests was initiated in anticipation of a federal election, and tactics were adopted to generate the attention of media and politicians. John Hanlon, the current DFO Area Director for Gulf Nova Scotia, was at his first day of work as a fisheries officer in Cheticamp when a truckload of rotten crab was dumped outside the office door (Area Manager 2004). Such an act illustrates how the level of inter-

organizational commitment and government commitment demonstrated in transforming the MFU bonafide license plan into policy, was lost when an option outside the agreement gave the fishermen an economic advantage. The political authority of the federal Fisheries Minister to issue licenses presented an outside option for fishermen to secure their access to a lucrative resource. In this way, they leveraged their power as a voting constituency during an election year, to secure snow crab licenses.

The liberal government succumbed to the promise of constituency support and the Minister of Fisheries, Pierre DeBane, increased the number of snow crab fishing licenses in several fishing areas using the bonafide fishermen's policy as the main criteria for issuing new permits[26]. Furthermore, he introduced individual vessel quotas as an allocation tool for all snow crab fishing areas and Total Allowable Catch limits on an area by area basis for the whole south-western Gulf of St. Lawrence, despite the previous caution expressed by DFO bureaucrats. In DeBane's last month in office as Minister of Fisheries (and what was to be the last crab management plan before a Fall federal election) he announced a "modified" management regime for the Area 12 mid-shore fishery in the middle of the fishing season, throwing aside all caution. The Total Allowable Catch for the mid-shore crab fishery was increased from 24000mt to 26000mt and weekly vessel quotas were increased by 10,000lbs for all vessels. DeBane also authorized a shift to 300 Japanese-style conical style traps as equivalent to 150 conventional rectangular traps which increased the number of allowable traps per vessel.

[26] This is largely the view of fishermen within the communities of Cheticamp and Bay St. Lawrence that did not receive a license at this time because of a vessel size limit restricting their eligibility. Nonetheless, the phenomenon of issuing licenses for gaining political support is not unheard of and is supported by the fact that the increase occurred during an election year.

In a press release, DeBane justified these measures as being necessary "...to provide more flexibility for vessel operation and a more orderly raw material supply to crab processing plants"[27]. He emphasized that the need for individual vessel quotas stemmed from the uncontrolled growth of processing plants, which had increased from 1980 at 24 plants employing 4,000 workers to 39 plants in 1984 employing 8,200.

> The lack of provincial controls on expansion of plant capacity which is a matter of provincial jurisdiction has led to considerable overcapacity in the processing sector...This plan must clearly develop a more effective allocation plan of enterprise allocations or vessel quotas to provide for a more orderly harvesting of the available resource (DFOpress 1984).

In the Spring of 1984, DeBane announced the introduction of 26 new permanent fishing licenses in Area 19 and a shift in the northern boundary to include the fishermen from Bay St. Lawrence, allowing an additional eight licenses from that area to fish in the revised Area 19 boundary. The fishing season was split into two consecutive openings, with the Area 19 fishermen fishing from July 25th to September 15th and the Bay St. Lawrence fishermen fishing from July 29th to September 29th. Each fisherman was allocated 50,000lbs of quota and 20 traps per boat. In area 18, a northern boundary line was created, closing the fishing area to offshore crab vessels, making it an inshore fishery exclusively. Yet, the fishery opening was to be determined by the early testing for the percent of soft-shell crab in the landings. The snow crab working group, which included representatives from the fishing sector as well as processing sector, had collectively decided on a maximum acceptable range of 20 percent soft-shell within the daily catch (DFO 1984) . This rule has proven to be a critical indicator of carrying capacity for the targeted crab population and marks the first conservation-minded rule within the snow crab management regime. However, it must be noted that

the rule was initiated from the processing sector as a strategy to reduce the landings of inferior quality crab.

> The opening will be determined by testing the quality of snow crab for softness and meat yield. 'It has been agreed through our local working group that meat yield must be at least 20 percent before the fishery should be permitted to open' (DFO 1984).

4.3 The Cycle of Decline: Confounding Factors of Variability

The quick fix management solutions adopted in 1984, under significant political pressure to increase the number of new entrants in the Gulf of St. Lawrence snow crab fishery, ultimately perpetuated a serious cycle of resource decline. Despite the introduction of individual vessel quotas for all fishing areas, catch rates dropped significantly between 1984 and 1990. In the southwest Gulf of St. Lawrence mid-shore crab fishing Area 12, catch rates declined by 5.3 percent and the total catch declined by 7 percent between 1984 and 1987. Similarly in the inshore fishing Area 19, catch rates declined by 8 percent between 1985 and 1986 and the biomass estimates declined by 29 percent. Scientists were seeing serious declines in the recruitment pulse and predicted that the fishery would not be sustainable under the 1984 management regime. In the adjacent Area 18, the Total Allowable Catch was reduced by 30 percent and vessel quotas reduced from 80,000lbs to 60,000 lbs.

> Overall reduction in the snow crab catch rates, particularly on Area 18, have led to the need for increased conservation measures in this fishery for 1986. Since 1982, the average catch rate has dropped from 62 to 31 kilograms per trap hauled. The total allowable catch will be reduced by 30 percent from 900 tonnes in 1985 to 626 tonnes in 1986 (DFOpress 1986).

Similarly, in the following year, scientists recommended a new strategy be introduced in Area 19 to mitigate the negative effects of over-fishing. However, as the quotation below illustrates, the opinions of scientists remained somewhat constrained.

> Indications are that current recruitment into the fishery cannot sustain the present levels of fishing pressure. There is a need for a new management strategy in Area 19 (Davidson and Comeau 1987:22).

However, even when the TAC was reduced in Area 18, the catch landings were still composed, on average, of 34.2 percent soft-shelled crab, which resulted in a lower average price for crab (Table 10). Even with individual vessel quotas, and reduced exploitation, the predominance of soft-shelled crab perpetuated the incentive to over-fish and discard the unmarketable crab.

Table 10 Price of Snow Crab for Area 18 and Area 19 (1984 - 1994)

Year	Area 18	Area 19
1984	$0.60	$0.82
1985	$0.60	$0.72
1986	$0.80	$0.97
1987	$1.03	$1.59
1988	$1.03	$1.67
1989	$1.06	$1.06
1990	$0.78	$1.33
1991	$1.03	$1.40
1992	$1.56	$1.62
1993	$2.00	$1.90
1994	$3.00	$3.75

Source: DFO Gulf Nova Scotia Statistics Services

In 1987, continued concern for the health of the crab stock prompted federal fisheries managers to consult with industry for reduced quotas in Areas 12 and 19. The Canadian Atlantic Fisheries Scientific Advisory Committee (CAFSAC) had observed reduced female crab fecundity, an increased proportion of immature males in commercial catches and a decrease in mean CPUE since 1985. In view of these findings, the scientific advice stated that recruitment into the fishery could not sustain the present level of commercial rate of exploitation. Yet, despite these concerns, Area 19 fishermen would not agree to the CAFSAC recommended level of reduction in boat quotas.

> In Area 19, Biologists have expressed strong concerns for the health of the crab stock and have called for quota reductions of 40 percent. Consultations with industry resulted in a compromise position from fishermen who agreed to a reduction of individual boat quotas, from 50,000lbs to 43,000 lbs [14 percent reduction]. This reduction is to be coupled with close monitoring of the fishery for the first two weeks of the season; if it appears healthy, quotas may be restored to the 1986 levels (DFO 1987; DFOpress 1987).

4.4 The Conservation Cost of Outside Bargaining Options: A Third Order Transaction Cost Dilemma

Despite the serious warnings from DFO scientists, the fishing industry was not willing to implement the recommended 40 percent reduction in vessel quotas. Rather, the fishermen debated the legitimacy of the scientific recommendation and lobbied the federal Minister of Fisheries for a 14 percent reduction. Furthermore, they agreed to the reduction under the condition that if monitoring in the first three weeks of the fishery indicated that catch rates were normal, they would be issued their original quota levels. These conditions were agreed to by the Minister of Fisheries, Tom Siddon, who was the third Conservative Party fisheries minister since Brian Mulroney was elected as Prime Minister in 1984. Siddon, who likely wanted to maintain a strong constituency amongst fishermen's organizations, approved a midseason expansion of quotas in Areas 18 and 19 from the reduced levels previously agreed upon. The following quotation illustrates the positive interpretation of the agreement between the fishermen and the federal Minister of Fisheries.

> In 1987, through the Gulf Nova Scotia Snow Crab working group consultations, Area 19 fishermen voluntarily agreed to reduce their individual boat quotas to 43,000 lbs in an attempt to improve the stocks. Catch rates in the first two weeks of the 1988 season have been very good. The increased boat quotas are well within the exploitation levels advised by scientists (DFOpress 1988).

However, the short term solution did little towards the long term protection of the crab population structure. While the fishermen did agree to a one-year decrease in

quotas, it was only a fraction of the recommended quota reduction. Furthermore, the quotas were raised shortly after fishermen began the fishing season as catch rates were unexpectedly high. Over 80 percent of the season's Total Allowable Catch was caught in the first two weeks, causing the fishermen to lobby the Minister once again to increase their quotas to their original amount. This request was granted and the subsequent exploitation rate increased from 52.5 percent to 80.4 percent.

The high catch rates were somewhat surprising for scientists. Some believed that immature crabs moulting to maturity were migrating from the shallow water of Area 18 to the deeper water of Area 19 (Chiasson, DeGrace, Roach and Moriyasu 1988). Yet even if this hypothesis was accurate, the actual production capacity of Area 19 was likely lower than could be sustained by the 1988 exploitation rate, suggesting that the Total Allowable Catch was too high.

> The past history of the fishery shows that this Area [19] may not be able to produce more than around 1200 tonnes. At the present rate of removal, a decrease in the CPUE's may occur in future years as it did between 1984 and 1987. Therefore a TAC of around 1200 tonnes level seems to ensure stabilization of the fishery (Chiasson et al. 1988:10).

Yet, despite these ongoing conservation concerns, the same management regime remained in place in Area 19 for 1989, 1990 and 1991. Meanwhile in Area 12, crab populations collapsed in 1989. High levels of juveniles and soft-shell crab in commercial catches indicated that the commercially fishable biomass was very low, resulting in the closure of the mid-shore Gulf of St. Lawrence snow crab fishery. The short term quick fix solutions such as increasing new entrants and maintaining the status quo exploitation rate did nothing towards resolving the underlying problem of the high catch rate of immature soft-shell crab perpetuated by low prices and high fishing costs. Consequently, the supply of mature crab was over-fished to the point at which

immature crab (white crab) were also being caught and discarded. Over time, these practices had significantly decreased the following year's supply of commercially available biomass.

> CAFSAC advises that the high percentage of white crab results in loss of yield to the fishery and that an additional loss results from the high mortality rate likely associated with the discarding of white crab less than 95mm. Anecdotal information from the fishery indicates that, contrary to previous years, fishermen cannot avoid catching white crab because areas with commercial size hard shell snow crab are few, small, and usually located in marginal areas at the periphery of the traditional snow crab fishing grounds. Considering the likely low abundance of fishable snow crab as indicated by the rapid decline in CPUE and the loss in yield associated with the harvesting of white crab and discarding of undersized white crabs, CAFSAC advises closure of the fishery for the remainder of 1989. CAFSAC reiterates its previous advice that in-coming recruitment is not expected to be large in 1990 and that significant improvements in the commercial fishery should not be expected until 1991 or later (CAFSAC 1989:9).

In summary, the multi-lateral transaction cost dilemmas initiated with the institutionalization of industrial capitalism perpetuated a "rule of capture" pattern of property rights by means of several confounding factors and institutional processes. As I have demonstrated, understanding the institutional context in which transaction cost dilemmas arise, is critical for understanding the subsequent causal outcomes these dilemmas perpetuate. Furthermore, the problems of price variability, recruitment variability, transferability and political variability are second order transaction cost dilemmas that arise as a result of bureaucratic norms of efficiency and productivity. Moreover, these dilemmas all contribute to the tendency of fishermen to over-fish, resulting in the inevitable pattern of decline and collapse.

In understanding the pattern of transaction cost dilemmas, namely how they emerged and under what institutional norms and constraints, we can better evaluate whether new management regimes have shifted the underlying behavioural pattern that created the initial pattern of decline. Similarly, in the next chapter I argue that co-

management presents a significant opportunity for shifting the underlying behaviour patterns that perpetuate the transaction cost dilemmas identified in this chapter. Moreover, I examine the institutional conditions under which co-management has evolved in the Area 19 snow crab fishery and discuss the critical phases of its development.

CHAPTER FIVE

5.0 Creating a Bargaining Situation for Fisheries Co-management: Understanding the Relationship between Transaction Costs, Credible Commitment and Collective Action

5.1 Introduction

In the previous chapter (Section 4.3), I described how transaction cost dilemmas emerged from the institutional norms of industrial capitalism and perpetuated a "rule of capture" pattern of property rights, known as the "race for fish", in the Gulf of St. Lawrence snow crab fishery. I further demonstrated how this pattern evolved from a vicious circle of incentives that ultimately led to a significant decline in the snow crab biomass in the late 1980s (Section 4.4). The problems of price variability, recruitment variability, transferability and political variability created a high level of uncertainty in the control over the valuable snow crab fishery. Consequently, these problems contributed to the tendency of fishermen to overexploit the snow crab, resulting in the inevitable pattern of resource decline.

In the early 1990s, a similar pattern of decline occurred in the Atlantic cod fishery, causing the Canadian public to question the fiscal and scientific competence of the Department of Fisheries and Oceans (DFO). Hence, a legitimacy crisis arose within bureaucracy, creating a window of opportunity for an alternative fisheries management model to be introduced. With the collapse of the Atlantic cod fishery, there existed a new recognition within government of the necessary interdependence between resource managers and resource users. Thus, a new awareness of the world as having a natural state of "turbulence" shifted the normative behaviour pattern of command and control decision-making, towards one in which shared fiscal liability and ecological responsibility was desirable. Corresponding with this shift, resource managers and

policy analysts sought new models for government-industry co-operation. Senior DFO officials were suddenly motivated to examine a new model for "partnering" and apply it to their reformed policy framework.

While the goals and objectives of the new "partnering" model remained consistent with the previous values of efficiency and productivity, the organizational structure of the DFO bureaucracy shifted to more a decentralized decision-making model. This chapter explains the significance of this shift for the evolution of the Area 19 snow crab co-management agreement.

In explaining the evolution of the Area 19 snow crab co-management agreement, I have divided this chapter into two parts. The first part introduces the major theoretical components of a co-management process. More specifically, it explains the characteristics of a strong co-management agreement in which an external and internal bargaining situation arises such that all parties (joint claimants) directly involved in the agreement perceive they are better off co-operating with one another. The second part applies these characteristics to the Area 19 snow crab fishery to explain the emergence of the Area 19 snow crab co-management agreement.

5.2 Part I - Defining Co-management in the Context of Co-operation and Collective Action

Fisheries co-management is generally defined as a formalized process for shared resource management and decision-making that emerges from negotiated agreements between self-governing and state government regimes (Pinkerton 1989; 1992). Such agreements are capable of resolving CPR dilemmas through the design of institutions that build relations of trust and a sense of shared responsibility between resource users and government managers (Berkes et al. 1991). Early conceptualizations of fisheries co-management theory proposed that cooperative agreements occur only under

conditions in which both the resource users and government managers understand their mutual gains from collaboration (Pinkerton 1989). As Pinkerton notes, "by instituting shared decision-making among these actors, co-management systems set up a game in which the pay-offs are greater for cooperation than for opposition and/or competition" (Pinkerton 1989:5).

This definition suggests that even when the incentives for each partner to cooperate are based on very different premises, the advantages of cooperation will make both parties better off than if they remained in opposition. However, the central challenge for creating and maintaining co-operative agreements is the possibility that parties will renege on one another. Consequently, the concept of co-management is inextricably linked to the socialization processes characteristic of local-scale community institutions that govern peaceful social relations (Berkes 1989b). As common property scholars Victoria Edwards and Nathalie Steins (1998) point out, the local context for decision-making redefines the available choices for negotiating rights, "[s]uccessful co-operation depends largely on the response of individual actors, influenced by incentives derived both inside and outside the management regime" (Edwards et al. 1998:8).

In this view, successful co-management is neither common nor easily achieved in all circumstances in which resource users and government managers are interested in "co-operating" with one another. Rather, co-management regimes emerge only under particular conditions in which all parties perceive they are better off adhering to an agreement which supports their mutual interests. Furthermore, the social institutions (both formal and informal) characteristic of highly integrated communities play a significant role in creating these conditions (Ostrom 1992). As such, the theory of co-management is closely tied to the new institutional theory of collective action. Yet, much of the new and developing literature on fisheries co-management misses this

critical distinction (Jentoft 1989; Pomeroy and Berkes 1997; Sen and Nielsen 1997; Townsend 1995). Rather than review this larger body of co-management literature, I will only focus on co-management theory where it is specific to the costs of co-operating.

In light of this weakening of the definition of co-management, this chapter re-situates the meaning of co-management within its roots of collective action theory. More specifically, it re-establishes the definition of co-management in a specific context in which a win-win agreement of co-operation is negotiated and adhered to. Thus, successful co-management regimes resolve the collective action problems associated with opportunistic behaviour. Mancur Olson highlighted this problem in his well-known work, *The Logic of Collective Action* (Olson 1965), in which he proposed that individuals will not act to achieve their common or group interest. Instead, they will make choices that benefit themselves individually at the cost of the larger collective. This dilemma is known as the free-rider problem. Elinor Ostrom explains this problem thus: "whenever one person cannot be excluded from the benefits that others provide, each person is motivated not to contribute to the joint effort, but to free-ride on the efforts of others" (Ostrom 1990:6).

However, alternative models do exist that support the possibility that co-operation can occur. Robert Axelrod analyzed the free rider problem in his book entitled *The Evolution of Cooperation* (Axelrod 1984), in which he applied game theory in the form of the Prisoner's Dilemma, to include a future horizon. He demonstrated the power of reputation resulting from repeated player interactions and their recall of past behaviour. Using a computer generated mathematical model, he was able to compare and contrast thousands of player interaction scenarios, thus concluding that a "tit for tat" strategy consistently had the highest scoring outcome. Furthermore, he concluded that

clusters of players using the "tit for tat" strategy could dominate the pattern of outcomes even in the presence of defectors (free-riders) as long as they had the ability to distinguish who the defectors were. In this way, Axelrod not only provided an alternative theory to Olson's free-rider prediction, he also demonstrated that a mechanism exists to reverse the outcomes where players had already chosen to defect, concluding "the gear wheels of social evolution have a ratchet" (Axelrod 1984:21).

In support of Axelrod's conclusions, Ostrom's work on common property institutions illustrates several examples in which social clusters have created long enduring co-operative organizations based on conditions not considered in Olson's depiction of collective action (Ostrom 1990). Ostrom adds one more variable to the free-rider problem by introducing the cost of enforcing co-operative agreements. In this scenario, the players have to negotiate the shared benefits as well as the shared costs of enforcement as part of the co-operative agreement. Consequently, the agreement will only be ratified by both players if an equitable cost sharing rule is established. Furthermore, the benefits will be mutually optimal if both players enforce the agreement, so long as the benefits are greater than the enforcement costs. However, Ostrom also points out that an external enforcement authority (such as a government agency) can interfere with the internal sharing rules. In the case that government pays for enforcement and monitoring, an outside option is created for lowering enforcement costs by defecting from the internal agreement, but the benefits remain constant (Ostrom 1990). Hence, the free-rider problem is created. This prediction is consistent with the findings of institutional economists Anderson and Hill, whose work I highlighted in Chapter Two (Section 2.5). Furthermore, this prediction is precisely what Coasean theorists define as the problem of social cost (Anderson 2004; Coase 1960). This was

the underlying point Coase was trying to make in his argument that bargaining was a better option than government subsidies or taxes for reducing the transaction costs each party can mutually impose on one another, when each has enforceable property rights.

Ostrom's views are consistent with the Coasean view and bargaining theory, in which the choice to defect from the agreement is known as choosing the "outside option" and occurs when the commitment to the agreement is no longer credible for both parties (Muthoo 2000). Therefore, the bargaining parties must consider the costs and benefits of not coming to an agreement. Similarly, a bargaining situation arises when both players perceive that the benefits from coming to an agreement are positive. However, if conditions change such that the costs of the agreement exceed the benefits, then the agreement is no longer credible (Muthoo 2000). Therefore, one of the major challenges for maintaining the incentive to co-operate is to design the rules of the agreement in such a way that there is high motivation, for all parties, to remain committed to the agreement.

Historical economists examining the political institutions in seventeenth century England emphasize the role that government institutions play in constraining credible commitment. Douglass North and Barry Weingast argue that the greatest barrier to developing economic growth in England, was the inability to constrain the power of the Crown to make unilateral decisions (North et al. 1998). As a consequence of the King's ability to renege on his fiscal commitments, the economy lacked economic stability and market exchange could not be trusted. The instability was largely perpetuated by the King's arbitrary decisions to re-define property rights. His ability to expropriate large tracts of land and accumulate wealth exclusively for the Crown eventually led to civil war. The solution to this commitment problem was found in re-forming parliamentary

decision-making such that wealth holders became joint-decision makers through their representatives in Parliament. In this way, they achieved veto power over the Crown as a means of enforcing compliance.

The problem of agreement compliance is synonymous with the problem of credible commitment and the costs expended to monitor and enforce compliance are equivalent to transaction costs. When considering the compliance problem of the English Crown, North et al. argue that incentives play a critical role in creating a bargain with credible commitment.

> Problems of compliance can be reduced or eliminated when the institutions are carefully chosen so as to match the anticipated incentive problems. Under these circumstances, parties are more likely to enter into and maintain complex bargains that prevent abuse of political control by the state. To succeed in this role, a constitution must arise from the bargaining context between the state and constituents such that its provisions carefully match the potential enforcement problems among the relevant parties. The constitution must be self-enforcing in the sense that the major parties to the bargain must have an incentive to abide by the bargain after it is made (North et al. 1998:137).

Clearly, the compliance problem and the role incentives play in resolving this problem are critical factors for creating enduring co-management agreements. Further to these factors, transaction costs play a critical role in shaping incentives. In Chapter Two (Section 2.6), I illustrated how the marginal benefits from securing and enforcing rights over valuable resources, over time, will decrease as the costs of monitoring and enforcing these rights increase. Consequently, the cost of exclusive ownership is prohibitive, especially when a good is highly alterable and/or variable and the monitoring and enforcement costs are naturally high.

Ironically, in light of the example of England's constitutional reform, the prohibitive costs of private ownership are predicted to create incentives for individual actors to seek government assistance in securing, monitoring and enforcing private property

rights (Anderson et al. 1975). In doing so, prohibitively high transaction costs for exclusive ownership are transformed into social costs. Indeed, this was well demonstrated in Chapters Three (Section 3.3) and Four (Section 3.4) when the Canadian government paid enormous sums of money to secure rights over assets from highly alterable and variable migratory ground fish stocks. I will elaborate on this comment further in the concluding chapter.

The point here is that the willingness to bargain for a co-operative agreement is more likely to increase as transaction costs (outside the bargain) increase. In other words, as the costs of securing exclusive access rights increase, it is predicted that joint claimants will be more willing to co-operate to share these costs and benefits, as long as an outside option does not arise in which the net benefits (benefits minus costs) are higher than those gained from co-operating. Under conditions in which the inside option remains credible, it is in the interests of both parties to negotiate a balanced agreement, in which the costs and benefits are shared (Ostrom 1990). Furthermore, anything that either party can do internally to increase the asset value of the resource or reduce monitoring and enforcement costs will increase their benefits collectively and individually. Likewise, anything done externally to reduce the asset value or increase the costs internally of securing rights, monitoring and enforcement, changes the bargaining situation and threatens the success of the agreement. This was the context in which Ronald Coase made his great contribution to transaction cost theory. The benefits to be gained from co-operating have to be examined by evaluating the benefits and the costs in total (Coase 1960). In this view, when transaction costs are factored into the distribution of benefits from co-operating, our understanding of property rights arrangements changes entirely.

5.2.1 Transaction Costs, Co-management and Community: the Path for Credible Commitment

Social scientists have made a significant contribution to our understanding of how social relationships contribute to the costs of negotiating and enforcing contracts (Granovetter 1985; Portes et al. 1993). Certainly James Coleman's notion of "social capital" has captured the attention of economists as it provides insights into the patterns of social exchange based on a continuum of time in which people have established trust in one another's behaviour within a context where they are motivated to be trustworthy (Coleman 1988). Coleman describes the conditions whereby social capital is generated.

> Social capital is defined by its function. It is not a single entity but a variety of different entities, with two elements in common: they all consist of some aspect of social structures, and they facilitate certain actions of actors – whether persons or corporate actors – within the structure. Like other forms of capital, social capital is productive, making possible the achievement of certain ends that in its absence would not be possible (Coleman 1988:98).

Social historians studying the social interactions of people living in a common place over a long period of time have noted characteristics of social structure that distinguish them as a community (Ommer 1999). In support of this view, political scientists Michael Taylor and Sara Singleton argue that communities fitting the above description possess certain qualities that facilitate low internal transaction costs, especially for monitoring (Taylor et al. 1993b). These qualities include:

1. ***Stability of Relations***: Members of the group believe they will be interacting with one another for a long time. In this way, group membership must be stable and durable.

2. ***Multiplex Relations***: Members of the group interact in multiple ways; their relationship is not based on one narrow sphere of interaction.

3. ***Direct Relations***: Relations are unmediated by government. In this way, the members of the community deal with their common issues with one another without outside intervention.

4. ***Shared Beliefs and Preferences***: Members of the group share common beliefs and preferences beyond the common goal of resolving a collective action problem. This quality is more likely to be present with shared language, culture, religion and economic status (Taylor et al. 1993b:199).

Thus, when a group fulfills all four of these qualities, they are likely living in a common geographical place with a long history of social relationships. In this view, a community social structure is not the same as a community of "interests" such as a common industrial sector or lobby group. Rather, the social structure is much more complex in which multiple types of relationships extend over multiple dimensions such as time and geographical place.

5.2.2 Social Capital and Lower Transaction Costs

Qualities of community social structures based on repeated interactions and multiple cross linkage relationships support Coleman's concept of social capital. Trust and trustworthiness are embedded and created in the social relationships of a community of people who depend on one another for a stable living environment. Taylor and Singleton note specifically how these qualities contribute to lower transaction costs and resolve collective action problems.

> First, search costs are lower in community...because identifying the possibilities of cooperation is easier when the group's membership is stable and when relations are multiplex. Each of these things tends to reduce the uncertainty about other's preferences and hence the uncertainty about the possibilities for mutual gains which is the source of the first kind of transaction costs. Second, bargaining costs are lower in community because shared beliefs and preferences reduce the range over which bargaining must take place, because membership stability makes it easier to conclude agreements and reduces the need for renegotiation, and because multiplex relations provide possibilities for trade-offs which compensate for differences in cooperative gains between parties to the bargain in question. Third and

> most important, monitoring and enforcement costs are reduced to some extent by shared beliefs and preferences but even more by the stability of group membership, the expectation of continuing interaction and the directness and multiplicity of relations (Taylor et al. 1993b:200).

It is these qualities described by Taylor and Singleton (1993b) that make communities a credible partner for government/industry co-management agreements. If we follow the logic of the argument thus far, partners who can decrease the transaction costs in a co-operative agreement inherently increase the overall benefits of the partnership. In this view, provided that an equitable distribution rule is applied, the members of the partnership benefit collectively.

5.2.3 Natural Capital and Lower Transaction Costs

Co-management theory also points to several ways in which community partners can increase the benefits from fishery resources through the protection and restoration of natural capital. Ecological economists have coined the term "natural capital" to refer to the capital stocks and flows of renewable and non-renewable resources. The distinction between natural capital stocks and flows is explained in the quotation below.

> Renewable natural capital is living and active. Ecosystems consist largely of renewable natural capital. Renewable capital continuously maintains and regenerates itself, when left alone, by harvesting solar energy and converting it through photosynthesis to plant mass and thus, eventually, into the rest of the food web. As long as it is intact and the sun shines, renewable natural capital will yield a steady flow of useful goods and services. In that sense, it is essentially unlimited. The volume of the flow, however, is finite. Overuse of renewable natural capital can impair or destroy its ability to regenerate itself and sustain the flow of goods and services we depend on (Prugh 1995:52).

The notion of natural capital is supportive of new institutional economist Dean Lueck's prediction that the costs of capturing benefits from a resource flow eventually will exceed the benefits over time. As explained in Chapter Two (Section 2.6), the finite

volume of a resource *flow* perpetuates a "rule of capture" pattern characteristic of over-harvesting. In contrast, when the benefits from a resource *stock* have been captured and secured, a property ownership pattern emerges and the potential for sustainable stewardship exists. This is consistent with Scott Gordon's (1954) hypothesis that the sustainability of a fisheries management system is largely related to the exclusivity of benefits from a resource stock. However, the definition of natural capital highlights the fact that the exclusive rights over a resource are meaningless unless the flow of goods and services from a renewable resource stock is maintained.

Under the condition that community members have secured access to the benefits from a resource stock in perpetuity (including the infinite flow of goods and services) they have the incentive to protect the habitat "on which the stocks depend for spawning and rearing" (Pinkerton 1989:5). In this manner, both community partners and government partners are positioned in a bargaining situation in which both have a strong incentive to co-operate. From the community's perspective, they can secure control over a resource stock more easily with the commitment of government institutions that formalize their degree of exclusivity. From a government perspective, community partners can lower the transaction costs of internal monitoring and enforcement and at the same time contribute to habitat protection. Consequently, the net benefits from the co-operative partnership are credible.

Pinkerton makes this observation from her research on the Washington State co-management agreement with the western Pacific American Indian tribes. She describes how the government - community relationship is positively reinforcing as the benefits are re-distributed into the community.

> The accomplishments of co-management regimes in which government and users have shared power and responsibility in enhancement or long range stock recovery planning and habitat protection are especially notable in

> producing superior and more efficient management. This is accomplished chiefly by linking the efforts of fishermen as local resource users to the interests of fishermen as long-term users of local habitats and/or residents of a local area in which they have particular fishing interests. Community-based development can result as a secondary goal alongside the goal of improving and protecting the resource, because the benefits of doing that are re-circulated in the community, and the community is brought into the system of perpetuating a positive feedback loop: the more it enhances the fishery, the more it benefits (Pinkerton 1989:12).

In summary, the benefits from community co-management are conditional upon the presence of community social structures in which specific types of relationships evolve and generate social capital. In addition, the benefits from co-management are dependent on the ability of the community to protect the natural capital of the renewable resource stock. In this regard, the community has to have the opportunity to secure access over benefits from a resource stock in perpetuity. Finally, the government agency has to recognize the benefits of co-operating with communities in order to perceive the co-management agreement as being credible.

Yet, as I have explained in previous chapters, the inherent bureaucratic norms that legitimize efficiency and productivity present significant barriers for small-scale community-based fishing enterprises seeking the balance of power required for strong co-management agreements. Consequently, getting to a bargaining stage between communities and government is often a lengthy and complicated process of institutional power building.

5.2.4 Transaction Costs and Collective Action: Strategies for Creating A Community Co-management Bargaining Situation

Pinkerton has argued that attaining the balance of power between government agencies and local resource users is neither possible nor probable unless a number of strategies are used to create a bargaining situation (Pinkerton 1989; 1992). For

example, in her research on the western Washington tribes' co-management process, Pinkerton documented the use of coalitions and issue networks as a power building strategy to create a bargaining situation with a government agency. Through a complex social mobilization strategy, the western Washington tribes in co-operation with environmental organizations were able to increase the transaction costs for the industry and government agency, and subsequently create their incentive to bargain. They achieved this by monitoring the compliance of forestry companies on one hand and on the other they challenged the forestry practices in court to increase the stringency of environmental regulations. Consequently, they forced the timber industry and the government to increase their spending on securing access rights (court litigation costs) and increase their spending on regulatory monitoring. In other words, the benefits for the government from doing business with private industry were diminished as the outside interest groups raised the costs of securing property rights, subsequently changing the terms under which governmental commitment to co-operate with forestry companies was perceived as credible.

Evidently communities within communities are capable of forming alliances and creating external transaction costs for joint claimants not yet willing to negotiate. Yet, in so doing, they too will have to resolve collective action dilemmas both internally and inter-organizationally. I refer again to this point further on in this section.

Recognizing the tremendous shift required to alter the norms of bureaucracy such that co-management can evolve, Pinkerton has identified five developmental stages through which co-management agreements progress towards being fully institutionalized (Pinkerton 1992). These stages are:

1. Adopting a negotiating posture;
2. Conducting negotiations;

3. Producing an agreement;
4. Fully implementing the agreement; and
5. Institutionalizing agreement procedures (Pinkerton 1992:3).

Pinkerton has recorded general findings on enabling conditions, embedded within these stages of development, under which co-management institutions are likely to emerge. Table 11 identifies the conditions particularly relevant to community power building within a bargaining framework. More specifically, they highlight the conditions for co-management related to the bargaining process whereby government and community-based resource users recognize they are better off co-operating with one another.

5.2.5 Barriers to Co-management and the Role of Bio-Regionalism

As demonstrated in Table 11, creating the conditions under which a bargaining situation can arise is perhaps one of the key barriers to successful co-management. Pinkerton's research has demonstrated the major role this initial phase plays in shifting the balance of power.

While the question of how organizations resolve their collective action dilemmas inherent in social mobilization actions and solidarity movements is an important one, I will not attempt to answer it here. Rather, I will highlight a specific concept that is relevant to the issues of multi-organizational co-operation and the barriers to forming government-community alliances.

The problem of how to create the social conditions in which all members have the capacity for co-operation is a critical question for resolving collective action dilemmas at all institutional levels. This was Taylor's and Singleton's (1993b) argument in their

analysis of the multiplicity of community social boundaries. They argued that the common collective interest may be contained and clearly identified by common social boundaries, be they ethnic, linguistic, religious, gender, or economic.

Table 11 Pinkerton's Theoretical Propositions on the Conditions for Developing Fisheries Co-management Regimes[28]

Conditions to Create a Bargaining Situation	Conditions to Contribute to the Bargaining Process	Conditions to Enable Agreement Implementation
Co-management is most likely to develop out of a "real or imagined crisis in stock depletion" (Pinkerton 1989:27).	Co-management is most likely to develop when there is an opportunity for a negotiation process ....(over) afterwards, it may be expanded to other functions (Pinkerton 1989).	In situations of significant power differentials, barriers to implementing co-management agreements may be overcome by demonstrating alignment with the larger public interest (Pinkerton 1992).
Co-management is most likely to develop when [those desiring co-management] increase their legitimacy through a willingness to contribute financially to the rehabilitation of the resource and/or contribute to other management functions (Pinkerton 1989; 1991).	Previous co-management agreements may facilitate reaching a bargaining situation, but may not facilitate negotiating agreement or implementing a new agreement (Pinkerton 1992).	Barriers to implementing a co-management agreement are more easily overcome through alliances of stakeholders, non-government organizations, and agencies with complementary resources, especially when these organizations form issue networks (Pinkerton 1992).
Attaining a balance of power is greater in difficulty in proportion to the power of other parties affected and the extent to which they have captured a government agency (Pinkerton 1992).	Barriers for multi-party negotiations are more easily overcome when common goals shared by local parties are identified and incorporated into the agreement (Pinkerton 1996).	Locally-based decision rules increase the legitimacy of the agreement and the appropriateness for local conditions (Pinkerton 1996).
The political climate and the composition of the courts at the time, may influence the degree to which political action is more effective than court action (Pinkerton 1992; 1993).	An experienced coordinator or mediator can help facilitate a common vision and diffuse positional stances (Pinkerton 1996).	Local bodies that have a clear sense of purpose, are supported financially by the agreement and have a clear mandate to implement the agreement are more likely to continue to co-operate (Pinkerton 1996).
Political leverage can be attained through multiple sources of power, such as courts, legislature, public boards and citizen initiatives at strategic times, creating a spillover effect from one to another (Pinkerton 1992).	Sufficient time spent on discussion and information exchange provides an opportunity for consensus to grow (Pinkerton 1996).	
The existence of new forms of political expression provide an alternative way in which politicians gauge a shift in the public interest (Pinkerton 1993).		
The ability to form issue networks provides a major source of pressure on government norms of legitimacy and offers new models at strategic times of crisis (Pinkerton 1993).		

[28] Adapted for a bargaining context.

Thus, the notion of shared identity is a critical element for stable social relations. Yet, at the same time, an individual's identity can shift and change form depending upon the nature of the social boundary one is identifying with at the time (Barrett 2000). For example, if an individual is aligned with only his/her economic class s/he may exclude many members of his/her family of a different economic class even when they share common religion, language and social values. Consequently, their individual identity and interests are capable of excluding the collective interest. However, other situations can arise such that an individual will align with the collective social boundary that includes shared language, religion, and values. In this way, an individual is equally capable of shifting his/her identity and interests from a sphere of communal interests to one of individual interests, depending on the corresponding social boundary and social consequences of shifting (Cohen 1985). In other words, social boundaries that define communities are dynamic and complex. In this way, individual interests and collective interests sometimes converge and sometimes conflict, depending on the circumstances.

However, one of the most stable boundaries within which all other identities are contained, is the boundary of geography. Thus the community's ecological origin, or bio-regional address, is a significant point of identity confluence. It is at this point that individual interests have an opportunity to converge with the collective interests. When one or more individuals act to protect the ecological boundary within which the social and natural capital of the whole community is contained, then all community members will stand to benefit in some way. Similarly, when individuals or groups outside the community share an interest with the community in protecting the same ecological boundary, their actions can benefit the collective community interest.

The territorial or geographic boundary of a community, in which both social and natural capital are produced, is central to the sustainability of fisheries. Moreover, when a territorial boundary includes a resource *stock* and is protected, the flow of resource benefits is contained within the community, rather than extracted. Consequently, a virtuous cycle of local production is created in which benefits are captured and distributed co-operatively[29].

Lawyer and political economist Michael M'Gonigle and colleagues (M'Gonigle, McLean and Ommer 2000) argue that sustainable fisheries management institutions require a new "territorial ethic" in which the linear centralist decision-making characteristics of bureaucracy are replaced by territorial thinking that includes the causal relationships and linkages between, "all forms of capital - natural and cultural, economic and political - at a local, spatial level" (M'Gonigle et al. 2000:266). The following quotation further illustrates the meaning of a territorial ethic.

> Rather than taking resource production values out of the community, it seeks to maximize them within the community. Rather than imposing knowledge and political controls from outside and above, this approach emphasizes local forms of knowledge and self management. These processes make sense, since ecological and community processes become sustainable only when they work within the stock of natural and social capital to which they have direct and local access. Such re-circulation of capital and resources also allows more easily for a circular system of equity, in which they have direct, local access in which value is shared and spread among a more diverse group of actors. Within the fisheries, this circulation means that local fishers, and Native groups, would gain a stronger voice in decision-making and more power to control directly the processes of allocation, extraction and processing (M'Gonigle et al. 2000:266).

This is not to say that all community members will automatically agree on how to protect the natural capital, nor will they necessarily agree on the distribution of benefits.

---

[29] By the term virtuous, I mean in contrast with the viscous cycle of production characteristic of the industrial model in which the stock of natural capital of a renewable resource is depleted, the cycle of production at the community-territorial scale is synchronized with the volume of flow of goods and services from the resource stock and natural capital is generated.

Certainly this is a complex issue for community-based resource management (Taylor and Wilson 1993a). However, a territorial ethic does point out a common place of interdependency at which diverse interest groups have an opportunity to converge. Furthermore it presents one explanation of why several divergent interest groups created such extensive issue networks, alliances and coalitions with the Pacific American Indian tribes to protect their common watersheds.

In Part II of this chapter, I return to the case study to explain the chain of events that created the bargaining context in which the Area 19 snow crab co-management agreement was negotiated. First I explain how the collapse of the Atlantic cod fishery catalyzed a legitimacy crisis within DFO and created a window of opportunity through which the co-management model was introduced and integrated into government policy. Related to this process, I describe how a broad coalition of interest groups mobilized in solidarity for community-based fisheries management. Their shared interest in protecting coastal communities and their interdependent natural resources galvanized a social movement, creating a significant countervailing force against the historical pattern of bureaucratic centralized decision-making. In this way, the first stage of development in the progression of co-management was initiated.

5. 3 Part II - The Collapse of the Northern Cod and the Shift in Bureaucratic Organizational Structure

By 1993, the Canadian government was dealing with a major crisis in coastal communities throughout Atlantic Canada. On July 2, 1992 federal Fisheries Minister John Crosbie announced the closure of the Atlantic cod fishery due to a dramatic decline in biomass. After the moratorium was announced, a government Task Force was assigned to determine the causal relationship between government policy and

resource decline. The Task Force concluded that management failure was caused by the historical cycle of overdependence, overcapacity, and income instability in the groundfish fishing industry.

> Overcapacity is the logical result of overdependence and pressure on the resource. Too many harvesters use too many boats with too much gear trying to fish to supply too many processing plants by finding and catching too few fish. The results are low and unstable incomes, problems with income assistance, especially unemployment insurance, and generally an unprofitable industry, characterized by persistently underfinanced operations. The net effect exacerbates the problems of overdependence and pressure on the resource. And the cycle continues (Cashin 1993:14).

As pointed out in Chapter Three (Section 3.2), the tendency for government Task Forces to highlight the "over dependency" problem is a response typical of institutionalized bureaucratic norms adopted from the principles of industrial capitalist thinking. The Task Force had a narrow lens of analysis, focused largely on the social cost effects of over-capitalization, whereas a wider lens would have looked at the relationship between government policy and the costs which drive over-capitalization. Ironically, the Cashin Task Force suffered from the same narrow lens of analysis that perpetuated the collapse of the cod fishery in the first place. Consequently, with such a narrowly framed view of how overexploitation was initially created, the Task Force was incapable of explaining the broader causal linkages tied to government norms of legitimacy that perpetuated those dilemmas (Charles 2001; Charles 1992; Finlayson 1994).

Recognizing these limitations, it is understandable that the Cashin Task Force centered its attention on "fleet rationalization" as a means of increasing economic efficiency in the Atlantic ground fish industry. However, without a deeper analysis of the necessary factors contributing to efficiency, the Task Force also ran the risk of

supporting the larger scale industrial fleet and processing sectors, while ignoring the efficiencies of smaller scale operations.

The tendency of government policy to ignore the efficiency of small-scale fisheries is symptomatic of government's general failure to acknowledge the social processes by which coastal communities function. For example, in proposing a new "partnership" with resource users, the Task Force's recommended fleet rationalization policy did not carefully consider the interdependency of social relationships within rural fishing communities. One of the proposed strategies to reduce the groundfish fleet size was to introduce licensing eligibility criteria for professional "core" fishermen. While this proposal was similar in philosophy to the 1984 MFU bonafide fishermen's policy, it was substantially different in process and consequence. The new fleet rationalization proposal recommended a screening process that would give fishermen the authority to exclude fellow fishermen from their own geographical region. Unlike the MFU proposal, in which a set of eligibility criteria was created by fishermen for fishermen within a particular region in which they shared a common interest, the fleet rationalization proposal threatened to create a situation whereby neighbours, friends and relatives from the same community, with a complex pattern of social connections, turned into a factitious group of individuals fighting for their economic survival. The proposal created the promise of exclusive access for those willing to fight their neighbour for it. Consequently, when government introduced the concept of "partnering" with industry for implementing a new fleet rationalization policy, the idea had little legitimacy within the small-scale groundfish sector (Loucks, Charles and Butler 1998).

5.3.1 *Seeking Credibility: The Role of Government-Industry Partnerships*

> A key ingredient to the success of implementing a policy of fishing industry renewal is a real partnership between government and industry. We speak here of a partnership with industry that can give a credible vision of hope for the future (Cashin 1993:39).

The Task Force's recommended shift to government - industry partnerships was a strategy to re-establish government legitimacy by sharing the fiscal burden of efficiency with the fishing industry. The "credible vision of hope" reference is an indication that the Cashin Task Force perceived there to be mutually beneficial pay offs for co-operating with one another. In other words, if industry increased its financial contribution to fisheries management costs, government would, in turn, increase the *degree of exclusivity* for those fleets remaining in the industry through new limited entry policies. In this manner, Cashin's call for fleet renewal beckoned a new level of government-industry partnership to mitigate "planned capacity reduction" (Cashin 1993)[30].

Not surprisingly, the corporate processing sector saw the recommendations of the Cashin Report as an opportunity to legitimize their own interests in capacity reduction. Building on Cashin's arguments to reduce harvesting and processing capacity, a coalition of seafood producers known as the Fisheries Council of Canada (FCC), presented a policy vision that required fundamental changes in the relationship between government and processors, fishermen and processors and processors and

[30] It is interesting to note that the Cashin's report also cautioned against the implementation of ITQs, noting the tradeoffs between security of access to the resource and the possible consequences of increased monitoring and enforcement costs related to various social and environmental externalities. It gave a fairly balanced perspective on the benefits and costs of ITQs. On the benefit side, he acknowledged the advantages of security of access including: the reduction in overcapitalization, the reduction of gluts in the market and an increase in quality of landings and in individual economic return. On the cost side, he noted the potential for under reporting catch, high-grading, discarding and dumping catches. As well, he acknowledged the cost of community economic stability if the catch landings are transferred from coastal communities resulting in the transference of work noting that the, "wider use of unfettered ITQs may lead to dislocation of harvesting and processing activities, as quotas are transferred, thereby transferring work across communities and coastal areas" (1993:59). Furthermore, Cashin perceived that the cost of quota enforcement may become exceedingly complex and therefore more costly than the previous regime.

fishing licenses. They published a "vision" document, promoted it widely, and introduced a number of concepts designed to appeal to the broader public interest as a way of masking private interest principles. For example, the FCC framed their vision as a model of government - license owner "co-management" and emphasized the link between government co-operation and "security of resource access by all participants" (FCC 1994:10). Yet at the same time, they defined co-management to mean "well defined harvesting rights and freedom to link vessels and plants through ownership" (FCC 1994:12).

However, the FCC could not completely conceal their agenda. Their motto "the market can do it better", exposed a desire to remove government from fisheries management and perpetuate deceptive notions of market stability and economic growth, synonymous with the self-interested promise of industrial capitalism. The new generation of capitalists had already benefited financially from previous decades of government subsidies poured into the maritime processing sector and no longer needed the government's invisible hand in establishing their enterprises.

Ironically, the FCC blamed government subsidies for creating a climate of chronic instability, citing overcapitalization as the major cause of the Atlantic cod collapse. Not surprisingly, there was no mention of how the industrial-scale processing companies, all members of the FCC, benefited from the millions of dollars of government subsidies invested in establishing the ground fish processing sector or the equally large sums necessary to buffer the industry from the negative impacts of global market price instability.

> Hundreds of millions of dollars of direct and indirect assistance have poured into the industry since 1974. But rather than attempt to address the roots of the structural weakness and turn the industry into a net contributor to the Canadian economy, successive governments have avoided tough decisions and chosen to let the industry limp from crisis to crisis. This approach reflects implicit faith in resource management, considerable optimism about resource potential and a failure to find alternative sources of employment for the thousands involved (FCC 1994:15).

In this way, the corporate processing sector attempted to de-legitimize the obligation of government bureaucracy to protect the larger public interests over individual interests, by appealing to a new model of public-private partnerships in which the public interests were protected by the generation of economic rent from private property rights, and thus social costs would be minimized.

The FCC vision had strong appeal at a time when government departments were experiencing a serious legitimacy crisis and the competence of bureaucrats to manage public assets in a sustainable manner was in question. The FCC model of fisheries management played upon this failing legitimacy in order to promote its own interests in securing exclusive access rights:

> [We envision] an economically sound, market-driven and self managed industry offering investors secure and stable opportunities, and accountable to Canadians for the health of the resource and capable of making a net contribution to the Canadian economy (FCC 1994:8).

The FCC vision called for a complete re-structuring of the ground fish industry, recommending that managers within DFO adopt a rights-based harvesting regime that would lead to "economically viable units" and permit vertical integration. In this view, it sought to "improve the security of investor access" to the resource by "allowing the market to set the value of fishing rights by allowing that right to be traded freely among economic units" (FCC 1994:8). In their view, every quota holder, be he fisherman or fishing enterprise, held the right to a vessel license without any constraints imposed by

government. Furthermore, social objectives should be removed from fisheries management decision-making. Instead, individual property rights would create a greater incentive for self management, an improved attitude towards resource conservation and improved profitability. Thus, the FCC vision held the alluring promise of generating revenues high enough to contribute to the cost of fisheries management.

> Gaining the security of access to the resource the government and industry can enter into a revenue sharing arrangement (e.g. through a royalty for industry's use of the resource) once the industry is restructured and becomes consistently profitable (FCC 1994:8).

In this manner, the FCC carefully laid the foundation for a bargaining situation in which the pay offs would be mutually credible for government and the corporate fishing fleet and processing sectors. Their vision no doubt captured the imaginations of DFO policy makers at the time, especially given the substantial federal government fiscal deficit and the subsequent commitment of DFO to recover $61.3 million from the fishing industry (Gardner Pinfold Consultants Ltd. 1995). Indeed, government policy makers were proposing a new cost recovery policy that included the principle of partnering as a way of increasing revenues (Gardner Pinfold Consultants Ltd. 1995).

In the Spring of 1995, the Director General of DFO launched the first meeting of the national "partnership working group" at a two day conference held in Halifax Nova Scotia. In his introductory statements, he emphasized the need to change the "traditional role of Federal government" (DFO 1995a). Not surprisingly, the driving forces for change were linked to the Atlantic Groundfish collapse and the Canadian Treasury Board's directive to reduce DFOs budget by $325 million dollars over the next five years (DFO 1995a). In the words of the Director General, "the emphasis on the need for an economically and environmentally sustainable fishery sector coupled with deficit reduction is forcing both government and industry to find more efficient ways of

doing business" (DFO 1995a:1). Evidently, the view of senior DFO policy makers was that co-operation with industry would reduce costs. Therefore, in order to share these costs, the previously centralized command and control hierarchies of bureaucracy would have to change. These views are illustrated in the following quotation:

> In the past, the Department's approach can be characterized as paternalistic. We have assumed exclusive accountability for conservation and resource sustainability and for the attainment of unclear economic and social policy objectives.
>
> We have consulted, but retained ultimate accountability for conservation, and for economic performance of the fleets. This leaves DFO in the unenviable position of being responsible for every perceived failure, and for industry to be able to criticize no matter what their role in the decision-making process.
>
> For all these reasons, we have to change – and the strategy for change is the concept of Partnership.
>
> We have to work to create a new relationship with industry – one that will involve a transfer of authority and delegation of decision-making – and a new definition of roles and responsibilities (DFO 1995a:3).

Certainly the new partnering approach marked a turning point in the way DFO personnel were prepared to negotiate new roles and responsibilities with the fishing industry. However, the economic objectives of efficiency and productivity remained at the forefront of policy reforms. The partnering model explicitly defined the role of government to ensure that "legitimate business interests of the fishery sector are achieved" (DFO 1995a:4). Yet at the same time, the paradoxical role of ensuring "the public interest for conservation and proper management is served" was also stated (DFO 1995a:4). Thus, the same vicious cycle of balancing these paradoxical objectives continued just as it had prior to the Atlantic Groundfish collapse.

Embedded within the proposed DFO partnering policy was a concept in which fees would be set in proportion to the actual cost of management. The rationale was based on, "those who benefit from fisheries management should expect to pay for it"

(Gardner Pinfold Consultants Ltd. 1995). However, as one economic consultant for DFO pointed out, the prohibiting factor in implementing cost recovery is that fishermen have to be able to pay. As such, it was identified that the first step in introducing a cost recovery policy is to introduce economic efficiency objectives:

> ...it would seem, then, that if DFO were interested in moving to a formal cost recovery approach, the first step would be to bring management policy into line with the fiscal objective. In other words, the fisheries should be managed so that efficiency becomes the objective. In practical terms this means attacking the revenue gap from both directions: reducing management costs and increasing net income (ability to pay). Costs could be reduced by placing more responsibility for management in the hands of users (Gardner Pinfold Consultants Ltd. 1995:17).

When considered in their entirety, the new policy reforms for fleet rationalization, cost recovery and government-industry partnerships had the potential to have an enormously negative impact on coastal communities throughout Atlantic Canada, and in particular the small-scale fishing industry sectors. Yet, the FCC's neo-conservative market-based property rights model provided an attractive alternative to achieve the federal government's new policy goals. Consequently, when DFO officials presented their proposed partnering and cost recovery policies to fishermen, the link between "partnering" and maximizing efficiency for cost recovery purposes appeared to be consistent with the vision of the FCC. Furthermore, the proposed Fleet Rationalization Boards presented the threat of enormous social conflict within coastal communities. These combined factors catalyzed an enormous wave of social mobilization in coastal communities throughout Nova Scotia (largely from the small-scale groundfish fishing and community-based processing sectors) to constrain the government from implementing a market-based ITQ fisheries management model (Loucks et al. 1998).

5.3.2 *The Coastal Community Network: A Case of Bio-regional Collective Action*

Over a remarkably short period of time, a large coalition was formed between inshore fishermen organizations, community development organizations, environmental action groups, women's activist groups, and academics. While many of these groups had distinctly different issues with the new DFO policy reforms, they were united in their concern for the sustainability of coastal communities and coastal fisheries throughout Atlantic Canada. Furthermore they were also united in their common ideological perception that the FCC vision of vertically integrated property rights threatened the economic and ecological future of coastal communities. This solidarity was further galvanized through the Coastal Community Network (CCN), an initiative of the Extension Department at St. Francis Xavier University[31].

The CCN was organized through a province-wide board of community representatives who were, in many cases, elected by their local coastal community members to sit at the table and speak on behalf of their communities. Together, these representatives organized a series of workshops and forums throughout Nova Scotia to debate and discuss the principles of an alternative model to individual property rights known as co-management.

The workshops were well attended by fishermen, community activists, environmentalists, academics and included a number of officials from DFO (CCN 1994; 1995). Designed much like a retreat, the workshops lasted two days, meals were provided and discussion groups were well facilitated to be fully participatory. A level playing field was created in which different points of view were exchanged, new ideas were generated and new levels of understanding were created among many of the

[31] As previously mentioned (Section 3.5), this department was originally founded by the Catholic Priest Moses Coady who is commonly credited for leading the "Antigonish Movement" in the 1930s.

attendees. In this way, the community-based movement fostered a climate for change at a deeper personal level. This equalized exchange is consistent with many of the elements of Habermas' theory of communicative action and his definition of 'intersubjectivity'. Political scientist David Schlosberg describes the meaning of this term:

> Intersubjectivity is for Habermas, a shared understanding or a 'background knowledge'. But it is also the reciprocal relationship necessary to form these understandings. Communicative actors 'relate simultaneously to something in the one objective world, something in their common social world and something in each's own subjective world'. Habermas distinguishes between taking positions and responding to one another, and a higher-level intersubjectivity where participants internalize the expressed attitudes and experience of one another (Schlosberg 1995:299).

This is not to say that everyone agreed with one another at the end of the workshop. Yet, an important transference of understanding was felt to have taken place. Fishermen had an opportunity to express their more circular and holistic views on sustainable fishing. Similarly, fisheries managers and scientists were able to explain the complexity of choosing an allocation strategy that would protect the resource from over-fishing. Still, the workshops contributed to many significant outcomes, one of which was the opportunity for bureaucrats within DFO to gather more information on the concept of co-management and compare it with the Departmental views on "partnering". More importantly, these workshops helped to galvanize a common interest amongst coastal community groups (from both the east coast and west coast of Canada) and catalyzed a longer term collective action movement against the proposed

partnering amendments to the Fisheries Act, later developed by the DFO Partnership Working Group[32].

One of the major changes proposed in the DFO partnering concept was to amend the Fisheries Act such that DFO could enter legally binding agreements with select fishing industry groups and thus fetter the fisheries Minister's "absolute discretion to issue licenses" (Savoie et al. 1998:15). In this way, partnering agreements could become a "collaborative agreement between representative parties working towards common goals, having specified and joint rights and roles, and being accountable for well defined responsibilities and commitments" (DFO 1995b:3). By making security of access the cornerstone piece from which partnering would evolve, government officials believed that the historical pattern of industry lobbying for increased access would decease. The following quotation from a DFO "update" on the partnering approach highlights this perspective.

> Under the current regime, fleet sectors generally compete with one another, resulting in little incentive for sectors to compromise. Individually, sectors prefer to lobby the government in hopes that DFO will make decisions that favour their interests. Often the issue and decisions are political, social, or economic in nature rather than for conservation.
>
> The lack of responsibility and accountability and associated stewardship of the resource makes it easier for them not to co-operate or compromise. Fleet sectors continually lobby government to gain a higher share of the annual quota to satisfy their balance sheets. This almost always results in actions which have a negative impact on our resources. DFO is blamed when things don't seem right. Often, the response by DFO satisfies few.
>
> Partnerships with industry have the potential to start changing this. (DFO 1995b:1)

[32] This collective action movement against the partnering provisions in the Fisheries Act grew in force between the years of 1995 and 1998, resulting in a Partnering Panel Review process (Savoie, Filteau and Gallaugher 1998).

The scenario outlined above is consistent with the problem of political variability discussed in Chapter Four (Section 4.2.4). Moreover, it is precisely the same problem of compliance described earlier in this chapter (Section 5.2) with North and Weingast's example of how the English Crown, and the uncertainty of his actions, created market instability. Similar to North and Weingast's conclusions (1998), DFO policy analysts discerned the need for constitutional rules to create incentives which would bind the fishing industry and the State, to a common commitment to a sustainable fishery.

However, North and Weingast were clear in their view that to succeed, a constitution must arise between the state and its constituents. In their words, "a constitution must arise from the bargaining context between the state and constituents such that its provisions carefully match the potential enforcement problems among the relevant parties. The constitution must be self-enforcing in the sense that the major parties to the bargain must have an incentive to abide by the bargain after it is made" (North et al. 1998:137).

Yet, the proposed partnering provisions excluded coastal community constituents from the designated "industry group" (DFO 1995b). Consequently, they undervalued the prohibitive cost of exclusive ownership, especially under conditions in which joint claimants can increase either the alterability or variability of the good. In the next section, I explain how the collective action of community interests increased the transaction costs of securing exclusive ownership rights for the existing Area 19 snow crab fishermen. Ironically, the community collective action created a bargaining situation more aligned with North and Weingast's recommended bargain between the state and its constituents. Thus, a co-management bargaining situation emerged in which co-operation was possible amongst all major parties and included the community's interests.

5.3.3 Creating a Co-management Bargaining Situation in the Area 19 Snow Crab Fishery: The Role of Community in Creating Collective Action

The causal linkages between the CCN and the Area 19 snow crab fishery run in two parallel directions. As mentioned above, the CCN workshops provided an opportunity for community groups to join together in support of a broader set of community interests not being discussed within DFO policy circles. Similarly, several members of the CCN who were representatives of communities along the western shore of Cape Breton, had an opportunity to gather support for their struggle against DFO exclusionary partnering policies (CCN 1994; 1995).

While many families in western Cape Breton were hit hard by the economic instability caused by ground fish collapse and plant closures, others who had access to the lucrative Area 19 snow crab fishery were doing reasonably well. Consequently, wealth discrepancy was becoming more visible in many communities adjacent to the Area 19 snow crab fishery, creating an increased level of social tension within families and among neighbours. In response to this local-scale fishery crisis, several community organizers, together with academics and fishermen's organizations, collaborated to pressure DFO to increase the distribution of Area 19 snow crab licenses.

It is important to emphasize the significant negative economic impacts the cod fishery collapse had on coastal communities in Atlantic Canada. Most of the communities along the western shore of Cape Breton are small with less than 500 people. Cheticamp, the largest community on that shore, is triple that size. In 1993, the Cheticamp Fish Co-operative closed down after sixty years of operation. The community struggled to keep the plant open by converting from ground fish to crab processing, but eventually 300 plant workers, who were mostly women, were laid off. An operator of a small grocery store in Cheticamp told me that he lost 40 percent of his

economic base as a result of the plant closure. He also mentioned that in the year after the cod moratorium was implemented, "half the youth seemed to leave...you know...we'll never get them back".

The impact had a ripple effect throughout the entire community, consistent with communities all over Atlantic Canada experiencing the effects of being dislocated from their livelihoods.

> Communities as a whole experience tremendous change when a resource sector is in decline or a large employer leaves town. The community-wide impacts are both observable and specific (such as loss of spending power, and reduced populations) and intangible (such as general apathy, shock and anger). The permanent closure of a facility or an industry is a crushing shock to a community. Many will believe that the town is dying or becoming extinct. This feeling will be more evident and the closure more severe and disruptive if it occurs in a mature (been around for a long period of time) community (Bruce 1996:42).

Consequently, a larger issue emerged for those communities adjacent to the Area 19 snow crab zone, even for families who were not dependent on the ground fish industry, regarding the "distributive justice" of coastal community resource allocations (Neis and Morris 2000). A common theme in my discussions with fishermen and their wives from Northern Cape Breton was the story of their children fighting with other children from more "well-off" families at school over the issues of family status and wealth. For example, many snow crab fishermen displayed their wealth through the purchase of new trucks and recreational all terrain vehicles. New vehicles became status symbols within the communities that distinguished those who were "well-off" from those who were struggling.

This tension is illustrated in the following quotation from a fisherman who has a lobster license and joined the Gulf of Nova Scotia Bonafide Fishermen's Coalition to increase his opportunity to secure benefits from the Area 19 snow crab fishery:

> Funny how the same people who have licenses now don't seem to remember. I guess money makes you forget. My wife says she's not sure having a crab license would be a good thing. We wouldn't be any happier...we have our health. I think that kind of money makes you greedy. This way we still look out for each other, we can live with our neighbours and feel good about ourselves. We found a way to spread the money around a bit more and I think that's a good thing.
>
> Sometimes it gets me though, when I see those big-shots show off their big new $60,000 trucks. One guy...he made me a little angry...here I am...I love to hike and hunt and camp in the woods. I love the outdoors, it's my hobby. Well here's this guy who has never stepped one foot into the woods in his life and he's got a brand new four wheel drive truck and a brand new four wheeler strapped in the back... and he's driving up and down the town...just driving, just showing off! I guess I just have to ignore it. But it makes me mad, especially when these guys are crying on the radio when the lobster fishing is poor. You'd think they were going hungry or something. But the rest of us who fish lobster and don't have a crab license...you don't hear us whining to the public. It's disgraceful.

This quotation illustrates the dilemmas stratified economic wealth can create in rural communities. However, many fishermen I spoke with (crab license and non-license holders alike) also pointed out that much of the wealth from the snow crab fishery was still circulating between families and the community at large so the distinction of classes was neither absolute nor definitive. Admittedly, when you drive through the community of Cheticamp, there is a distinct level of social order being maintained that is evident from the well-kept homes, the immaculate yards and the freshly painted fishing boats.

There is an equally important element of class structure missing in Cheticamp and in adjacent French Acadian communities that is otherwise typical of most rural towns in Nova Scotia. In these Acadian communities you will not find the "poor" part of town. This is not to say that every home is of equal material value and that community norms are purely egalitarian. However, there is an obvious lack of poverty despite apparent wealth discrepancies. This is an important point to emphasize, as other social scientists have written about the "social elites" of the Area 19 snow crab fishery (Davis

and Bailey 1996) without considering the social embeddedness of patterns of wealth distribution created through close kinship ties.

For many people living in remote coastal communities along the western shore of Cape Breton, the incentives to help one another are influenced by deeper issues of collective identity and cultural survival. Many of these families are united in solidarity across several social boundaries that are threatened by outside interests. As a result, they have a strong sense of the need to support one another and in so doing, complex relationships based on mutual trust and reciprocity are generated. Such complex relationships are often the underlying foundation necessary for generating social capital in a community. For example, several fishermen with whom I spoke were able to recount one story or another that illustrated their underlying sense of support for their family and neighbours, despite being on different sides of the issue of snow crab license access. In one case, a fisherman with 18 snow crab traps told the story of how his new boat began to take on water and was sinking when several lobster fishermen without snow crab licenses came to his rescue. Since that time, he has felt a strong obligation to reciprocate their efforts by pooling his fishing license with temporary permit holders. In another case, a fisherman who is quite vocal in his opposition to the wealth discrepancy between existing snow crab license holders and temporary permit holders, also holds a level of respect for these same fishermen for the assistance they once provided when he was most in need of it.

However, this level of social cohesion is not to say that the communities adjacent to the Area 19 snow crab fishery are fully homogeneous. Rather, there are two distinct cultures that converge within the Area 19 snow crab fishery. Three of the six coastal communities adjacent to the Area 19 snow crab fishing zone with a French Acadian culture are: Grand Etang, Cheticamp and Cheticamp Island. The other three

communities have a strong Gaelic Scottish cultural heritage: Margaree, Pleasant Bay and Bay St. Lawrence (Figure 1). While these communities have distinct cultural roots and identities, the common element they all share is that their language and culture have long been under threat from outside influences and government agencies[33]. More specifically, all of these communities have experienced the destabilizing effects of government policies that divide families. Consequently, they have also gained a level of wisdom and forbearance that has helped them survive periods of social crisis.

5.3.4 Protecting Community Interests: Resisting Economic Differentiation

It was in the context of protecting their collective community interest that a group of women in the small Cape Breton community of Bay St. Lawrence, responded to the destabilizing effects of the collapsed Atlantic cod fishery. In July 1993 they initiated a harbour blockade against the fishermen who had Area 19 snow crab licenses in their community. This resistance was symbolic of a long history of government policies imposed upon the community that served to divide several generations of family relations and create inequitable wealth stratification within the Mackinnon-Fraser clan. Responding to yet another threat to family relations, the community joined together in solidarity and launched a social protest against DFO, demanding an increase in the

[33] In 1985 the communities of Cheticamp, Grand Etang and Cheticamp Island experienced a great divide between those families who wanted their children to learn English and French in local schools and those who wanted to protect their distinct Acadian culture by learning exclusively in French. The conflict is now referred to as the "Acadian School Crisis" and has taken a number of years for families to heal from. Furthermore, it heightened the awareness of how outside threats to the Acadian culture can destabilize family relationships. Many Acadian fishermen I interviewed referred to this crisis and seemed aware of the consequences of family conflict. Consequently they tried to avoid it by "helping out where we can".

Similarly, the Community of Bay St. Lawrence experienced a terrible community divide when government policies were created to re-locate a specific kinship group from their traditional community of Black Point in the 1970s. Subsequently, a CBC documentary was done on this story and portrayed the family as "backward" people with a lack of education. The documentary in combination with the relocation had a significantly damaging effect of attaching a specific stigma to this family in which they resisted against, but consequently stopped speaking their Gaelic language. Moreover, many of their kinship group disassociated themselves from the clan as an attempt to regain their sense of social status and legitimacy. See (Cox 1997).

number of Area 19 snow crab licenses. This movement rapidly spread throughout the French Acadian and Gaelic Scottish communities adjacent to the Area 19 snow crab fishing boundary and effectively led to a temporary closure of the Area 19 snow crab fishery in 1993 (Cox 1997)[34].

Over the next two years, the small locally defined Bay St. Lawrence social movement evolved to become the larger, regionally defined, Gulf of Nova Scotia Bonafide Fishermen's Coalition[35]. Initially, the Bay St. Lawrence social movement included a local group of lobster fishermen and their wives, many of whom were members of a province-wide women's social action group known as the "Nova Scotia Women's FishNet". This action group was closely involved with the Coastal Community Network (CCN) and had the support of several University academics from the head office of Women's FishNet located in Halifax, Nova Scotia. One of the main organizers of the Bay St. Lawrence node of the Women's FishNet was an American academic who had settled with her children and husband (who was a lobster fisherman) in Bay St. Lawrence during the American-Vietnam War in the mid 1960s. It is difficult to say for certain if the Bay St. Lawrence social movement would have evolved into a larger coalition without the presence of this particular individual. However, what is evident is that her high level of education, together with her writing skills and a history of social activism, helped to launch an effective campaign against the proposed DFO partnering policy and the exclusivity of the Area 19 snow crab licenses. For example, she helped to organize a local "peoples' theatre group" that created a parody on the capitalist origin of DFO fisheries policy. This had the intended

[34] Lori Cox in her PhD thesis documents the kinship ties of the Mackinnon-Fraser clan and points out their family relations in the communities of Margaree and Pleasant Bay. This lineage is significant for understanding the degree of social integration within these Gaelic Scottish communities (Cox 1997).
[35] Hereafter referred to as the Gulf Bonafide Coalition.

effect of attracting media attention to the small community, who framed the action as a community fighting back for equitable rights in the fishing industry. In doing so, the collective action of the Bay St,. Lawrence group increased the public pressure on DFO to expand the sharing of the Area 19 snow crab[36]. Furthermore, this action played a critical role in catalyzing a larger social movement with the mobilization of several fishing organizations, both from inside and outside the boundaries of Area 19.

However, once the social movement gathered momentum, it was neither formalized nor was it particularly well organized. Rather, each Coalition member organization wrote letters to DFO independently of one another, in support of increased Area 19 snow crab allocation sharing. At the same time, these individual organizations were also participants in the larger *adhoc* coalition they called the "Gulf Bonafide Fisherman's Coalition". The advantage of this strategy was it created a broad political constituency of fishermen who collectively pressured the federal Fisheries Minister for license policy changes. However, the disadvantage of aligning solely with the broadly defined identity of the Gulf Bonafide Coalition, which included fishermen from the entire Nova Scotia Gulf Region, was the loss of the *defacto* community adjacency rights for those fishermen living within the Area 19 snow crab boundary. Therefore, each fishing organization lobbied the government independently to meet their own interests, using their own organizational name, as well, they lobbied collectively by signing on to Gulf Bonafide Coalition letters. Thus, the Area 18 snow crab fishermen supported the Gulf Bonafide Coalition, but wrote letters to the Minister of Fisheries in support of their own interests in accessing Area 19 snow crab. Similarly, the Area 19 bonafide fishermen

[36] I am aware of these events from personal experience. I was also a member of the Nova Scotia Women's FishNet from 1993 to 1995.

(without snow crab licenses) wrote letters to DFO in support of their own interests in increasing the number of Area 19 license holders.

In this way, the Gulf Bonafide Coalition was able to build upon the collective interests of increased sharing, yet at the same time, it could lobby for the interests of individual fishing organizations. For example, the Gulf Bonafide Coalition argued that the snow crab fishery was disproportionately benefiting a few and consequently generating enormous economic discrepancies within their communities, while equally qualified professional fishermen struggled financially. However, one of the main leaders of the Gulf Bonafide Coalition also represented the interests of the Area 19 bonafide fishermen without snow crab licenses. Therefore, one lobbying strategy he used was to write a letter to the Minister of Fisheries in support of the narrow interests of the Area 19 bonafide fishermen (without snow crab licenses), using the broader Gulf Bonafide Coalition identity. In this way, the Gulf Bonafide Coalition attempted to create a bargaining situation with the state and using a broader political constituency of fishermen. Similar to North and Weingast's (1998) notion of how to secure credible governmental commitment using a large public constituency (Section 4.2.2), the Gulf Bonafide Coalition used their collective political power to legitimize their broader collective interests at the regional level, as well as their more narrowly defined community interests, at the fishing area level. Furthermore, they used their collective identity as "bonafide fishermen" in reference to the historical success of the 1984 Bonafide fishermen's policy, the origin of which was explained in Chapter Four (Section 4.2.4).

In a letter written to the then federal Fisheries Minister, Ross Reid, the Gulf Bonafide Coalition echoed the 1984 bonafide fishermen's policy as a way of validating an equitable quota sharing strategy among all professional fishermen in the Area 19

district. The letter outlined a new allocation plan to re-distribute the existing 74 Area 19 snow crab licenses (each with 50,000 lbs of quota) among the 189 eligible bonafide fishermen in Area 19. Were this plan followed, the re-distribution of benefits would reduce the quota to 22,000lbs for every license holder and lower the number of traps from 20 to 8 per license. The authors made a strong case that this was consistent with the principle of equality among fishermen who met specific criteria for professional status. Furthermore, they emphasized that under the current licensing system the large discrepancy of wealth was widening the gap between fishermen, despite their shared professional status. The following excerpt from the letter illustrates how the Gulf Bonafide Coalition emphasized the traditional egalitarian quality of a fishermen's status in their community and the corresponding principle associated with the "Bonafide Fisherman" status.

> Before the crab licensing policy was implemented by DFO in the 1970s, there was a certain equality of opportunity here. If a person was willing to work hard, they were able to make a living for their family. Fishing did not make anyone in the community rich but no one in our community was homeless or hungry. All this is changing. In an area where there are approximately 189 bonafide fishermen, there are only 74 crab licenses, These 74 fishermen have a 50,000 pound quota at the market value ranging from $1.75 to $4.30 per pound. At this point the majority of bonafide fishermen in the area are barely able to make a living while a handful of others have been issued licenses that enable them to make as much as $100, 000 in as little as seven days. This is more than the salary of the Minister of Fisheries or the Prime Minister herself! (Gulf Bonafide Coalition 1993:1).

By implying that the egalitarian principle of equal access rights was associated with the "Bonafide Fisherman" license policy, the Gulf Bonafide Coalition attempted to use their political power to negotiate a new sharing rule with the Fisheries Minister. As explained in Chapter Four (Section 4.2.4) there existed a series of precedent cases, in the DFO Gulf Region, in which the Fisheries Minister had implemented new allocation rules in response to a strong

political constituency. Similarly, the Gulf Bonafide Coalition represented a powerful political constituency whose proposal threatened to create a bargaining situation that excluded the interests of the Area 19 snow crab fishermen. Consequently, the Area 19 Snow Crab fishermen were highly motivated to increase their efforts in protecting their high degree of exclusivity over the benefits from the Area 19 snow crab fishery.

5.3.5 The Area 19 Snow Crab Fishermen: Protecting Individual Interests with Economic and Ecological Boundaries of Legitimacy

As the above quotation illustrates (Section 5.3.4), the legitimacy of the Area 19 snow crab license holders was challenged by an alleged incongruity with the principle of equal status associated with the Bonafide Fisherman's policy. However, one reason why the wealth of the Area 19 snow crab fishermen could be calculated in this manner was that the local Area DFO resource managers used an equal sharing principle, consistent with the Bonafide Fisherman's policy, to divide the Total Allowable Catch into equal size license quotas (50,000lbs). Hence, the earning power for every license holder was relatively transparent if one knew the number of pounds per quota and the price per pound. As a result, the crab fishermen could not hide their wealth through market anonymity.

Yet at the same time, the distribution of wealth through family relations was invisible to the broader public located outside their local communities. Hence, many fishermen with snow crab licenses felt they were being unfairly depicted by the Gulf Bonafide Coalition, particularly since they had agreed to introduce 15 new snow crab licenses in the previous year, including three First Nation Mi'kmaq communal licenses. However, media and academics in support of the Gulf Bonafide Coalition failed to

acknowledge the evidence of a historical willingness to share the snow crab (Davis et al. 1996). Furthermore, the Area 19 snow crab fishermen felt the Gulf Bonafide Coalition was largely being co-opted by the interests of the Area 18 snow crab fishermen (who had also joined the Gulf Bonafide Coalition) who wanted access to the Area 19 fishing zone.

Contrary to the perception of media and academics, most fishermen with snow crab licenses in Area 19 agreed that bonafide professional status fishermen should have access to the Area 19 snow crab under the following three conditions:

1. The estimated harvestable biomass increased;
2. The quota for an existing Area 19 crab license remained at 50,000lbs; and
3. The fishermen lived within the communities adjacent to Area 19.

Furthermore, Area 19 snow crab license holders demonstrated their support for sharing according to these criteria by signing the Gulf Bonafide Coalition's petition to increase the number of Area 19 snow crab licenses subject to these conditions. However, several snow crab fishermen who signed the petition expressed the opinion that the Gulf Bonafide Coalition misrepresented the conditions under which they signed the petition by using their signatures without explaining the context in which they agreed to the sharing principle. As I will explain in Chapter Six, this action created a sense of betrayal amongst the existing license holders that later influenced the bargaining process.

The point here is that Area 19 snow crab fishermen felt that the Bonafide Fisherman's policy was important to maintain equal status among fishermen throughout the Gulf Region. However, they also believed that Bonafide Fishermen who lived in communities adjacent to the resource should have priority access rights. In this way, they were consistent with their long standing views about protecting the ecological

boundary for the communities adjacent to the resource. As mentioned in Chapter Four, this *de facto* rule of adjacency was commonly supported by fishermen in the Gulf Region in the 1980s. Yet over time, as resources became increasingly scarce, fishermen from communities outside the Area 19 zone began to align their interests with fishermen sharing the common Gulf regional boundary, as stipulated in the Gulf Bonafide Fisherman's policy. In doing so, they legitimized their access rights to *all* fisheries within the Gulf Region boundary, irrespective of the smaller community boundaries that were legitimized by the adjacency principle. This was particularly evident in the case of the Area 18 snow crab fishermen, who increased their lobby efforts to access to the Area 19 snow crab fishing zone, once the biomass began to decline in their own fishing area. I expand upon this briefly in the next section and explain the significant role this conflict played in catalyzing the formalization of the Area 19 Snow Crab Fishermen's Association.

5.3.6 Resisting Threats from Outsider's and Insider's: The Factors Contributing to the Organization of Area 19 Snow Crab Fishermen

By the late 1980s, DFO scientists were beginning to see a pattern in the migration of age cohorts of snow crab leaving Area 18 and entering Area 19. This finding led them to conclude that Area 18 was actually a nursery area for Area 19 and part of the same fish stock (Davidson et al. 1987). In a crab working group meeting, held in January 1992, DFO scientists announced a significant increase in the harvestable biomass within Area 19, but only a small increase in Area 18. They concluded their presentation by saying there was no biological evidence to support a boundary line between the two fishing areas (DFO 1992b). However, they emphasized that a nursery area boundary line should be considered to protect the juvenile crab population from

being harvested as by-catch. In other words, the harvestable snow crab available in Area 18 was a flow from the natural capital stock in Area 19.

Table 12 Four Allocation Scenarios for Areas 18 and 19 (1992)

	Management Structure	Allocation	Area 18		Area 19	
			Licenses	lbs/License	Licenses	lbs/License
Scenario 1	• No change in management structure • No change in number of licenses	• Increase Area 19 TAC by 500 metric tonnes	27	@ 55,000 lbs (no change)	59	@ 68,683 (increase of 18,683 lbs.)
Scenario 2	• No change in management structure	• No change in amount of quota per license • Increase Area 19 TAC by 500 metric tonnes and increase of 22 license holders	27	@ 55,000 lbs	81	@ 50,000
Scenario 3	• Shift boundary between Area 18 and 19 south to protect juvenile snow crab population • Close Area 18 • All licenses and new permits will now fish in Area 19 • Area 18 and 19 fishermen fish in the same zone with the same quotas	• Allocate 5,000lbs. of Area 18 IQs to temporary permit holders	NO ACTIVITY PERMANENT NURSERY AREA		86	@ 50,000
					25 Temporary Permits	@ 50,000
Scenario 4	• Same as Scenario 3	• Reduce quota of existing license holders by 5,000lbs	NO ACTIVITY PERMANENT NURSERY AREA		86	@ 45,000
					35 Temporary Permits	@ 45,000

And in order to protect the stock, juveniles migrating into Area 18 needed to be protected. After the scientific presentation, local Area DFO managers from Antigonish presented four allocation scenarios for the fishermen to consider (DFO 1992c). These are summarized in Table 12.

In response to the four scenarios, the Area 18 fishermen supported scenario 3 where the boundary between Area 18 and Area 19 would be removed, a nursery boundary would be created and quota allocations would remain the same.

However, the Area 19 snow crab fishermen were vehemently opposed to the increase in fishing effort that this scenario would have on the Cheticamp gully and were afraid of the consequences of losing the boundary line that protected their exclusive access to this lucrative fishing area. In response, they formalized their organization by registering the Area 19 Snow Crab Fishermen's Association in September 1994. In doing so, they elected a president whose role was to chair every meeting (and has been elected every year since the Association's inception) and adopted a board of directors governance structure to manage the Association (Area 19 Snow Crab Fisherman's Association 2003). Initially, the board of directors had equal representation from fishermen living in each of the six communities adjacent to Area 19 snow crab fishing zone and fishermen who had purchased their license and lived outside the Area 19 boundary. However, as the Association became more engaged in conflict, the board structure changed to reflect the interests of a particular group. I will expand on this in Chapter Six.

5.3.7 Support for the Area 19 Snow Crab Fisherman's Association: the Principle of Adjacency and the Legitimacy of Protecting Natural Capital

The Area 19 Snow Crab Fisherman's Association's first task was to prepare a carefully constructed argument against the removal of the Area 18/Area 19 boundary line. They did so by focusing on the point that the combined Total Allowable Catch (TAC) for Area 18 and Area 19 would not maintain a consistent distribution pattern of fishing effort. Rather, they predicted that Area 18 fishermen would encroach upon the

traditional fishing area of Area 19 fishermen. The combined effect of the increased TAC and fishing effort on the Cheticamp gully would lead to ecological and financial disaster for the communities adjacent to the fishery.

> Over the years, including the late 1980s, biologists have recommended TACs between 1,000 and 1,200 metric tonnes (mt). If new permits are added and the line removed, the crab removals from Area 19 would approach 2,300 mt. This outrageous amount would certainly wipe the fishery out resulting in the cancellation of the permits and a drastic reduction in the TAC. The fishermen who fish out of the ports in Area 19 and the communities within the area would suffer tremendous financial losses because of an influx of fishing effort from outside the local area. Such a result would not only be unfair and unnecessary but would contradict a basic fisheries management principle. Many inshore management zones are set up to ensure that the benefits of the resource can go to the people who live adjacent to it. ...If the line between Areas 18 and 19 were removed there is no doubt in anyone's mind that the Area 18 fishermen will end up fishing in Area 19. That is why the Area 18 fishermen want the line dropped. With licenses going from 59 to 86 (Area 19 + Area 18) and quotas staying at 50,000 pounds, the removal of crabs in Area 19 would increase to approximately 1,950 mt without adding any new permits. That level of removal would certainly empty the pool of hard shell crabs [from the gully] (Area 19 Snow Crab Fisherman's Association 1993:1).

In contrast to the four scenarios proposed by DFO, the Association proposed the Area 18 and 19 boundary remain and the 15 new Area 19 permits be issued only to fishermen with home ports adjacent to the Area 19 snow crab fishing zone. Furthermore, they emphasized their willingness to share was based on a consistent principle of adjacency.

> The crab fishermen in Area 19 are not greedy and we do not want to just keep all the crab for ourselves. In 1989 we requested that 5 new licenses be added to our area, but DFO did not issue them. Again in 1992 we are prepared to welcome new fishermen into this fishery. We suggest that boat quotas remain at 50,000 pounds. for both old licenses and new permits. We hope that the resource will stay strong so that these new permits can become new licenses. We strongly feel these new licenses should go to fishermen from our communities. When the fishery in Area 18 expanded in 1988, the non-licensed fishermen from our area did not participate in the draw and the same principle should apply in 1992. If new licenses are to be added in Area 18 they should go to fishermen in that region, and if new

licenses are to be added in Area 19 they should go fishermen from our ports (Area 19 Snow Crab Fishermen's Association 1992:2).

The presentation from the Association carried a significant level of legitimacy with the DFO managers and scientists. From the managers' perspective, their argument was fair-minded and historically accurate. Furthermore, the final page of the Association's document contained signatures of support from all 59 license holders in Area 19. This suggested that DFO would have unanimous support from the Area 19 fishermen if they implemented the Association's plan as opposed to divided support and subsequent ongoing allocation conflicts. In the view of DFO scientists, the Association had raised a valid point about the likely effects of concentrated fishing effort on the Cheticamp gully that had not been previously considered. As a result, DFO conceded that increasing the TAC and the number of license holders while removing the Area 18 and Area 19 boundary may threaten the structure of the Area 19 snow crab population (DFO 1992a).

Consequently, the DFO Gulf Nova Scotia Area managers recommended that the Minister of Fisheries approve a new management plan based largely on the Area 19 proposal to maintain the boundary line and increase the number of permits by 15 in Area 19. They also specified a set of eligibility criteria that respected the adjacency principle and excluded access to fisherman not from home ports within the Area 19 boundary. Moreover, the managers went one step farther to demonstrate their support of the adjacency principle by including three new permits for First Nation communities whose band reserves were within the Area 19 boundary (DFO 1992a)[37].

[37] This action demonstrates a significant level of principled decision-making and highlights how the local Area DFO managers had institutionalized this principle since it occurred before the 1999 Supreme Court's *Marshall* Decision in which the Mi'kmaq and Maliseet treaty rights over fisheries resources have subsequently been exercised.

However, DFO's plan did come at some cost. From an ecological perspective, the plan did not provide any incentive for Area 18 fishermen to protect a nursery area within their fishing zone. Consequently, the juvenile crab population did not receive protection until 2003, when the Area 18 licenses were transferred to Area 12 and a nursery zone was established. From a social perspective, the plan provided a high degree of exclusivity for the Area 19 snow crab fishermen. In an attempt to raise the political consequences of such exclusivity, in June of that year, over 400 fishermen protested outside the DFO area office in Antigonish. Clerical and administrative staff people were sent home and Area 18 fishermen occupied the DFO offices. Their main issue was that the eligibility criteria for the new Area 19 permits excluded Area 18 fishermen, yet it included three First Nation communities. In this way, the attempt to undermine the legitimacy of the principle of adjacency and remove the Area 18 and Area 19 boundary took on a racist tone.

It was in this context in 1993, that the Area 19 snow crab fishermen became opposed to increasing the number of snow crab licenses, while at the same time, the Gulf Bonafide Coalition grew in both its size and power. Thus, while the Area 19 Snow Crab Fisherman's Association was willing to consider sharing the snow crab allocation with fishermen from adjacent communities within the Area 19 shoreline boundary, the Association was also wary that many of the members of the Gulf Bonafide Coalition were fishermen from Area 18. In this way, the Area 19 snow crab fishermen were being threatened by forces both from outside and inside their community-territorial boundary.

5.3.8 *Collective Action in Cheticamp: the 1994 Blockade*

In 1994, the pressure to increase the number of Area 19 snow crab licenses rose to a significant level when the Gulf Bonafide Coalition organized a large community protest throughout several fishing communities located within the Area 19 boundary. Over 600 participants blockaded the entrances to home port harbours along the western Cape Breton coast (DFO 1994a). All marine traffic was shut down, including snow crab fishing boats, the ferry to Les Iles de la Madeline and all whale watching tours. The Gulf Bonafide Coalition's demands are summarized in the following letter that was faxed to the Antigonish DFO Area office on July 17, 1994. What is interesting about this letter is that it is written by the leader of the original Bay St. Lawrence social movement and appeals specifically to the legitimacy of access rights for fishermen living within communities adjacent to the Area 19 snow crab fishery. Furthermore, it illustrates the feeling of "last resort" that catalyzed a subset of individuals from the community to pursue a collective solution to their common economic troubles.

> Concerning the blockades in Area 19, we believe that it is time that the people understood what we are fighting for. First of all, we are not against the fishermen that already have a crab license and we do not want to take their licenses away from them. All we want is a small share of their fishery. Enough for us to survive as well. Why is it that only a few should benefit from this multi-million dollar resource? By giving our small fishermen a small piece of the industry, everyone stands to benefit. More licenses mean more fishermen at work, more fishermen helpers, more work for off-loading crews, more plant workers and more money in our communities. All this means less people going on Family Assistance. We do not want to go on welfare or Family Assistance, we want to work. Many of us had only 9 weeks fishing during our Lobster season which means that we do not have enough insurable weeks to apply for unemployment. Even if we did have our 12 weeks we still would not be able to apply until November 1st because they are fishing stamps and they are only good to apply at that time. So, therefore, from June 30 to approximately the first week in December, we have nothing to live on. Do you think that anyone can survive 5-6 months with no income what so ever?
>
> In the past years, we used to fish for ground fish but with the closure of the gulf we are no longer permitted to do so. We are allowed to catch 10 ground

> fish per day for personal use and we are not permitted to sell them. What are we supposed to live on? We can't survive on ten fish per day. As far as the fishermen's package they have been talking about, there is not one small fisherman that has been approved for the package as of yet. It is not in three or four months from now that we need something, it is now! How can we survive with no U.I.C., no ground fish, no support package. We need a piece of the crab industry. What are we going to do about house mortgages, our electric bills, our everyday living expenses. Do you think that the Banks and Creditors will accept our ten cod per day as payments, I don't think so. We need support from our governments and most of all we need the support from our communities. We are at a point now that we have nothing else to lose so we'll stand our ground (or shall I say water) and fight for our right to survive (Bonafide Fishermen's Coalition 1994:1).

The blockade lasted for several days until a court injunction was obtained to end the protest. In an attempt to stabilize the social unrest, DFO officials met with eight representatives of the Gulf Bonafide Coalition and agreed to facilitate a meeting with the Area 19 Snow Crab Fishermen's Association Board of Directors to discuss the issue of allocation sharing. However, the Gulf Bonafide Coalition had attracted a great deal of media attention in support of their case[38]. Consequently, they were successful at arranging a meeting with the new federal Fisheries Minister, Brian Tobin.

During this meeting, the Gulf Bonafide Coalition presented the petitions signed by many of the existing Area 19 snow crab license holders who supported an increase in the number of snow crab licenses[39]. While this action politically legitimized their cause by demonstrating a strong constituency of support to the Minister, it also jeopardized their bargaining position with the Area 19 Snow Crab Fishermen's Association. For example, many of the Area 19 snow crab fishermen signed the petition with the understanding that the existing quotas would remain at 50,000 pounds per license. Hence, this implied that the Area 19 snow crab fishermen were agreeable to sharing as

[38] For a summary of the blockade event and media quotations see for example (Davis et al. 1996).
[39] However, as I mentioned above (Section 5.3.5), they did not include the three criteria for sharing that were stipulated by the Area 19 snow crab license holders.

long as the biomass increased to support additional license holders. However, this understanding was not explained to the federal Fisheries Minister.

As a result of the meeting, the Minister directed the DFO Gulf Region and Gulf Nova Scotia local Area managers to explore new options for sharing the Area 19 snow crab allocation. However, the directive of the Minister was met with significant resistance from the Area 19 Snow Crab Fishermen's Association. In the Spring of 1995, a series of Snow Crab Working Group meetings were held with snow crab fishermen from Area 18 and Area 19, as well as fishermen (without snow crab licenses) from the Gulf Bonafide Coalition, to discuss proposals from the licensed and unlicensed fishermen for a new Area 19 snow crab management plan. Two main outcomes resulted from those meetings that are significant to the evolution of the Area 19 snow crab co-management agreement. First, the resource managers from the DFO Gulf Nova Scotia local Area office in Antigonish, clearly defined their guiding principles for managing the snow crab fishery. These principles were identified as:

1. Assure conservation needs are met; and
2. Share the resource with the maximum number of fishers possible without compromising principle number one (DFO 1994b).

The second significant outcome from the meetings was a 1995 proposed DFO management plan in which elements from the proposals from Area 19 licensed and unlicensed fishermen were combined. However, the result was a compromise that neither party was satisfied with. In other words, the proposal did not benefit either party enough to motivate co-operation. Consequently, the Area 19 Snow Crab Fishermen initiated a significant level of resistance to the proposed plan.

5.3.9 The Relationship between Collective Action, Transaction Costs and the Desire to Negotiate a Co-management Agreement

The proposed 1995 DFO Area 19 Snow Crab management plan recommended that the 15 permits issued in 1992 become full licenses and outlined a sharing plan in which individual vessel quotas would be reduced over time towards a specific cap limit. This provided an opportunity to increase the number of new licenses over time without causing pressure to increase the TAC. From the perspective of the unlicensed fishermen, this was an inadequate level of sharing since it helped too few fishermen far too slowly. From the perspective of the licensed fishermen, the plan created far too much uncertainty around the reduction of individual quotas. Furthermore, one of the directors of the Area 19 Snow Crab Fishermen's Association was an "outsider" who had purchased his snow crab license and lived within the Gulf Nova Scotia region, but not within the six communities adjacent to the Area 19 snow crab fishing boundary. Consequently, his individual interests were distinctly different than those of the fishermen whose interests were more integrated within their communities. For example, several Area 19 snow crab fishermen had inherited their licenses from their fathers and had complex sharing arrangements with their siblings. In this way, their own interests were inextricably linked with the interests of their kinship ties. In other words, if their brothers or sisters could gain access to a license, the benefits would have a ripple affect throughout the entire family and community. Furthermore, the increase in licenses would support the economic production of the community as a whole and simultaneously support the production of cultural capital necessary for resisting outside influences.

However, the "outsider's" interests were neither bound by a deeper sense of cultural identity nor were they linked to a history of cultural survival, in which meeting

the needs of the collective interest was a necessary act of resistance. Furthermore, he legitimized his exclusion argument by framing it within the rationality of economic efficiency. The following quotation from a letter to the Minister, written by this individual, illustrates this perspective. Moreover, it contrasts with the first official submission from the Area 19 Snow Crab Fishermen's Association, in which the principle of adjacency was emphasized.

> The reasons for the DFO to undertake such a readjustment of this fishery are incomprehensible from a fisheries management perspective, are totally at variance with management strategies in other snow crab fishing areas, are highly discriminatory and are directly at cross purposes to statements of the Minister, the FRCC and the Cashin Report. In short, the pilot plan is totally unacceptable to the licensed fishermen in Area 19....The question of economics in the snow crab fishery in Area 19 is demonstrated by the relative fiscal health of the license holders. Crab prices have risen sharply in the last two years largely as a result of factors outside the control of Canadian fisheries management...Thus a fortuitous combination of events has led to a windfall gain for the licensed crab operator which is as likely to be a transient as a permanent phenomenon. Detractors and malcontents speak as if this improvement in the earnings is a bad thing but it is noteworthy that few fisheries in these troubled times have been able to afford participants a decent living, a return on investment and the ability of new entrants (through the purchase of existing licenses at free market values) to have reasonable prospects of amortizing their investment over time as well as promoting the creation of equity over the long haul. No other inshore fishery achieves these results in a similar fashion. In addition, crab fishermen tend to be tax payers to a greater extent than their fellow fishermen who are tax takers much more heavily dependent on UIC. DFO efforts to degrade the livelihood of the existing crab fishermen can only be based on capricious social engineering and spurious interpretation of the alleged benefits of employment and earnings redistribution (Area 19 Snow Crab Fishermen's Association 1994:2).

In view of this new threat, the members of the Area 19 Snow Crab Fishermen's Association voted to increase their user fees to $2000 dollars per individual, hired a lawyer to advise them on how to protect their access rights and contracted an independent economic study in preparation of defending their present income levels (Beaton 1999). Evidently the transaction costs of lobbying against the new

management plan were an indication of how serious a threat the Gulf Bonafide Coalition had become. However, there was an inherent difference in views among the snow crab licenses holders. Many of the fishermen living within the Area 19 boundary had relatives without licenses who were lobbying for increased access. In addition, the majority of the license holders had either inherited their licenses from family members or had received them in 1984 when a large number of fishermen collectively protested against DFO and the bonafide fishermen's policy was subsequently implemented. Either way, they were benefiting financially from the actions of others and felt an obligation to reciprocate.

In contrast, the fishermen who had purchased their licenses tended to be from outside communities and didn't have the same sense of obligation towards their extended family relations. Moreover, the transaction cost of purchasing a license imposed a significant financial debt that many of the insider fishermen did not have to consider. Consequently, there was a complex mixture of support for sharing within the Association that was largely unexpressed because of the influence of the "outsiders" who had purchased their licenses and their perceived economic legitimacy[40]. For example, one of the "outsiders" had the ability to articulate an economic argument that legitimized the economic disengagement from the social interdependency of community relations. The economic rationality of "amortizing their investment over time as well as promoting the creation of equity over the long haul" provided an argument that benefited every individual license holder by stabilizing their individual security of access in the face of uncertain vessel quota reductions. Moreover, this mixed view

[40] This was confirmed through several conversations I had with fishermen who are members of the Area 19 Snow Crab Fishermen's Executive Committee but did not purchase their licenses. Furthermore, the concept of sharing between bonafide fishermen was further legitimized because 45 percent of the existing fishermen obtained their licenses in 1984 after their protest for increased licenses for Bonafide fishermen. Another 45 percent either had their licenses previously or inherited their licenses and only 10 percent had purchased their licenses.

towards sharing was further suppressed as the Association initiated various strategies to stabilize their security of access by joining in solidarity against the interests of the Area 18 fishermen who were supporting the Gulf Bonafide Coalition.

The Area 19 Snow Crab Association's first strategy was to meet with the Fisheries Minister and have their lawyer challenge the legitimacy of the Gulf Bonafide Coalition's sharing proposal with a threat to initiate a course of legal action. The legal arguments emphasized three main issues that seriously challenged the legitimacy of the Department's proposed management plan based on the Department's own policy goals. The first issue was the question of DFO's conservation goals. The lawyer challenged the principle of license expansion at a time when the Atlantic licensing policy review process was advocating limited entry and fleet reduction based on conservation requirements. The second issue concerned the goal of economic efficiency and the need for secure income viability. However, a third issue implied that DFO had a *de facto* obligation which prohibited the government from reducing the future income flow of a license holder who had purchased their license on the market. The argument stated that since DFO had introduced Individual Transferable Quotas they had, *de facto*, created an expectation that they were committed to stabilizing the security of the individuals' income stream (DFO files). Furthermore, the argument questioned the legality of DFO adopting a management principle based on "sharing". The following quotation illustrates the caustic tone the lawyer used in arguing this point. Moreover it highlights the neo-liberal economic ideology that government has no role in constraining the free flow of market-based distribution.

> Since when has sharing been a component of a free market in a democratic society? How many fisheries managers would give up 30 percent of their employment income so that a fisherman could "share" their job? Fishermen note that each manager's job is no more of a right than a privilege. A privilege, which regardless of ones investment of money and effort, can be

> extinguished by one thoughtless decision maker. It is the crab fishermen's contention that to formulate a policy around issues of "sharing" a commercial enterprise is patently ridiculous and not amenable to debate (Area 19 Snow Crab Fishermen's Association 1994:2).

Each one of the legal arguments outlined above carried a significant amount of weight within the department, particularly the latter (Area Manager 2004). This is evident in the following quotation from an internal briefing note in which specific attention is given to the possible reaction of a license holder who may have purchased their license.

> There is one particular question which the group raised to the Minister which may require some legal advice. In the last couple of years a number of licenses have been transferred from one fisher to another. The transfer price from one fisher to another could be as high as $130,000.00. A fisher who would have recently purchased a license will react to any move by the Minister to concede to redistribute quotas from current levels (50,000 lbs) to lower levels (DFO 1993:1).

After meeting with the Fisheries Minister, the Association's lawyer arranged a meeting between several senior level DFO officials and the Association's Board of Director's. She also invited the DFO Gulf Region Area managers. However, her letter of invitation suggested that they were being invited only as a courtesy. Her strategy was to increase the bargaining power of the Association by going over the heads of the local DFO Area managers and negotiating with senior bureaucrats. This point highlights the fact that the lawyer perceived it was the local DFO Area managers who were enforcing the adjacency principle and the corresponding sharing rules. However, one of the key points made at this meeting by a senior DFO official, was that the Association had to deal with the conflict in their communities and no amount of litigation with DFO

was going to stabilize the level of social disharmony between families[41]. Moreover, many of the DFO personnel attending the meeting were also on the national DFO partnering committee and proposed that the Association consider the opportunity to negotiate a new long term management plan through a co-management process. Consequently, the Association's Board of Directors agreed to negotiate a co-management agreement.

Several DFO personnel at this meeting believe that the comment made about the risk of ongoing social conflict played a significant role in motivating the Area 19 snow Crab Fisherman's Association to negotiate a co-management agreement with DFO rather than to pursue legal action. As I have mentioned, the Association's Board of Directors represented a mixture of views on the principle of sharing. Evidently, the instability of social conflict created a bargaining opportunity in which the fishermen agreed that they were better off co-operating with DFO and negotiating a sharing formula rather than risk the unknown cost of continued social unrest. Furthermore, the meeting with senior DFO officials demonstrated a level of inter-organizational solidarity within the Department that reduced the chance of the Association to negotiate a better deal through outside options. In this manner, a bargaining situation was created in which both players perceived that they were better off co-operating with one another. While the Gulf Bonafide Coalition was not part of this decision, I will explain in Chapter Six how their interests were incorporated into the Area 19 snow crab co-management agreement.

In Summary, the conditions under which a bargaining situation was created for negotiating the Area 19 Snow Crab co-management agreement were linked to the high

[41] This notable comment was mentioned to me by a DFO official who attended this meeting. Apparently this was the turning point at which the Association decided against litigation in favour of choosing to negotiate a co-management agreement.

level of social crisis in the ground fish industry, but not entirely. I have identified four main contributing conditions that were directly related to the collapse of the Atlantic cod stock:

1. The stock collapse created an internal legitimacy crisis within the Department of Fisheries and Oceans. Consequently their previous norms, characteristic of command and control hierarchies, were no longer acceptable. However, their rationalities were somewhat the same. The focus on economic efficiency remained at the senior level, while their views on how to achieve this goal shifted to a collaborative partnering model, rather than the previous chain of command decision-making model.

2. The Fisheries Council of Canada presented a model for economic efficiency that was clearly at the cost of small-scale fishermen and coastal communities' control over fisheries resources. This created a broad and common threat on a coast-wide scale which helped to galvanize the collective action of many interest groups based within this broad bio-regional boundary.

3. The new "Fleet Rationalization" policy introduced a model of shared decision making between DFO and resource users that threatened to cut communities apart. By focusing on economic eligibility, gear sectors, and geographic communities, the proposed model threatened to slice-up rural communities according to economic legitimacy criteria. It created an enormous challenge for communities to resolve the problem themselves. Consequently, fishermen representing small-scale fleets and processors, quickly joined the Coastal Community Network and mobilized a coastal community-based management movement. This larger movement also galvanized smaller social resistance movements such as the one in the Bay St. Lawrence community.

4. The ground fish crisis created a level of economic tension within the Gaelic Scottish coastal community of Bay St. Lawrence, to which a group of women responded by organizing a local blockade against their own Area 19 snow crab fishermen. This action symbolized a level of frustration with the lack of distributive justice in DFO licensing policy and spread in a "contagion of legitimacy" (Zucker 1987). Consequently a larger Gulf Bonafide Coalition was formed across broader lines of social and geographic boundaries and created a credible political constituency.

The four conditions presented above are all contributing factors towards creating a bargaining situation, largely because they threatened to change the external transaction costs for the Area 19 fishermen. Similar to the 1984 strategy that was

adopted by fishermen to increase the number of snow crab licenses, the pressure tactics relied largely on the power of the Fisheries Minister to issue new licenses. However, the government fiscal crisis related to the cod fishery collapse also shifted the internal transaction cost situation. Thus, the Minister's incentive to increase his political constituency was no longer a credible action on its own. Rather, user groups had to demonstrate their ability to contribute financially as well as politically. In this regard, the Area 19 Snow Crab Fisherman's Association had more credibility than the Gulf Bonafide Coalition.

Yet, the incentive to form the Association was created through other circumstances. The following list highlights the main conditions for the formation of the Area 19 Snow Crab Association:

1. The Area 18 Snow Crab fishery was confined to a fishing area that was a rearing habitat for juveniles rather than a feeding ground for mature males. Consequently, their fishable biomass was largely dependent on the migratory pattern of adult males moving from Area 19. In this way they had access rights over a flow from a resource stock.

2. The proposal to remove the Area 18 and Area 19 boundary would have re-aligned the fishery along the biological stock of Area 19, thus the problem of capturing excessive soft-shell crab in Area 18 would be avoided and the entire population would be more productive. However, this proposal was not credible for the Area 19 snow crab fishermen. Particularly since it would inevitably decrease catch per unit effort, increase gear crowding and subsequently cause over-exploitation of a small stock. In the interest of protecting the Area 19 boundary and their exclusive access over the Cheticamp Gully, the Area 19 fishermen formed the Area 19 Snow Crab Fishermen's Association.

All of the first four conditions are consistent with Pinkerton's conditions for creating a bargaining situation for negotiating co-management (Section 5.2.5). However the two closely related conditions which motivated the formation of the Area 19 Snow Crab Fisherman's Association are new. Therefore, I am proposing that an

additional and necessary condition for creating a bargaining situation exists in this case study that can be more generally applied.

My findings in this case suggest that the partnering organization must be community-based and have secure access over the natural capital of a resource *stock*. When these two conditions are met, the asset value of the resource continues over time, rather than over one economic period. Therefore, the community-based group has an incentive to organize to protect, monitor and enforce their degree of exclusivity over the benefits from the resource. Furthermore, as their asset value increases, their reciprocal cost on other joint claimants also increases, such that a bargaining situation arises.

For example, in the case of the Washington State Indian tribes, the 1974 decision in *U.S. v. Washington*, popularly known as the "Boldt decision", marked a turning point in the assertion of the original North American Indian treaty rights over Pacific Salmon. This decision, based on two phases of litigation spanning over seven years, not only secured the right to access and withdrawal salmon, but also recognized that these rights could only be realized with the additional right to protect habitat. Consequently, the Boldt decision (Phase I) and the later Phase II decision, granted the Washington State tribes joint rights to 50 percent of a *flow* from various salmon stocks as well as rights over the reproductive capacity of the spawning salmon *stocks*[42]. Furthermore, Judge Boldt recognized the problem of joint claimancy and mandated that the tribes have a right to participate in the harvest planning and regulation of salmon. In this way,

[42] The argument I'm trying to make is that the right to protect habitat combined with the right of access and withdrawal, is adding a degree of exclusion such that the contribution to improved management will benefit the stock and thus the benefits will be accrued to the Washington Tribes, as long as they can exercise their right to 50 percent of the salmon. This shifts the property rights from a rule of capture to a rule of first possession, which they share with other joint claimants. See Ebbin (2002) for a thorough discussion on how the Washington tribes have created an institutional fit with the complexities of stock migration patterns.

the state could not allocate the resource disproportionately to other interests (Cohen 1989; Ebbin 2002; Pinkerton 2003; Singleton 1998). Consequently, a bargaining situation for negotiating co-management between the Washington tribes and the state was created.

In Cosean terms, securing access over a resource *stock* creates a very different pattern of reciprocal transaction costs than that which is created from securing access over a *flow*. As explained in Chapter Two (Section 2.5) the transaction costs associated with defining and enforcing property rights motivate bargaining behaviour between joint claimants because of the reciprocal costs they can mutually impose for re-allocating scarce resources. Similarly, the value of the asset being secured also plays a role in motivating groups or individuals to increase their efforts in securing access over these resources. However, securing access over a *flow* only results in securing the benefits of that *flow* over one economic time period. Therefore, in a situation in which multiple joint claimants are securing access over a common *flow*, a mutual transaction cost problem is created from the dilemma of subtractability, in which all joint claimants are withdrawing from the same *flow* and consequently altering the resource. Therefore a common strategy is to increase the rate of securing access to that *flow* which ultimately leads to a rule of capture, or the "race for fish". In the case of the Area 18 snow crab fishermen, they used additional strategies to increase their access rights over the *flow* such as lobbying for rights over an increase in catch size (quota) and extended rights over the *stock* (Area 19).

In contrast, the Area 19 Snow Crab Fishermen's Association had already secured a **high degree of exclusive access** over a resource *stock* from which the benefits flow **continuously over time**, with the provision that the reproductive capacity of the *stock* is protected. Therefore, the Area 19 snow crab fishermen were highly motivated to

organize themselves into a more powerful fishing Association in order to protect and enforce their rights over the Area 19 snow crab. Building on their legitimacy as fishermen from communities adjacent to the resource and demonstrating their concern for the conservation of the resource, they secured the credible commitment of DFO and successfully excluded the Area 18 snow crab fishermen from accessing the Area 19 snow crab.

However, the Gulf Bonafide Coalition used their broadly based political constituency (representing the interests of many fishermen within the Gulf region) in combination with their ties to a smaller group of fishermen that had the legitimacy of community adjacency (the Area 19 bonafide fishermen without snow crab licenses) to secure the support of the federal Fisheries Minister. Furthermore, the geographic boundary of Area 19 included the complex social relationships characteristic of highly integrated communities in which all bonafide fishermen living in Area 19 (snow crab license holders and non-license holders alike) were embedded. Thus, the reciprocal transaction costs of capturing, securing and enforcing property rights existed at a very personal level, which extended to families and communities, and to the broader political level. Families were in conflict and the communities within the Area 19 boundary were in upheaval. In this way, the Gulf Bonafide Coalition successfully created a bargaining situation by increasing their reciprocal cost effect on the Area 19 snow crab fishermen. Accordingly, the Association perceived that they were better off co-operating with the Department of Fisheries and Oceans, rather than risk the continued level of community conflict and chance an outside bargain being made between the Gulf Bonafide Coalition and the Fisheries Minister.

This is a significant point in the context of discerning who the credible co-management partners are and how a bargaining situation is both created and

maintained. In the next chapter, I describe the co-management negotiation process and the mechanisms used to create a three-way credible commitment, despite the conflict between the Gulf Bonafide Coalition and the Area 19 Snow Crab Fishermen's Association.

CHAPTER SIX

6.0 Negotiating and Implementing the 1996 Area 19 Snow Crab Co-management Agreement: The Rules of a Multi-scale Co-operative Fisheries Management Regime

6.1 Introduction

In Chapter Five I explained the context in which an external and internal bargaining situation arises such that negotiating parties perceive they are better off co-operating with one another than remaining in conflict. I further argued that the conditions necessary to implement co-management included:

1. Community social structures located within a geographic boundary where specific types of relationships evolved and generated social capital;
2. The opportunity to secure access over benefits from a resource stock (rather than a resource flow); and
3. A government agency which recognized the benefits of co-operating with a community organization and perceived that the co-management agreement as being credible.

At the conclusion of Chapter Five, I also noted that the group largely responsible for creating the bargaining situation, the Gulf Bonafide Coalition, was not the major co-management bargaining partner. Rather, the Area 19 Co-management Agreement was negotiated between DFO and the Area 19 Snow Crab Fisherman's Association.

In this chapter, I describe the bargaining process used to negotiate the first snow crab co-management agreement in 1996. Of particular importance was the emergence of a new collaborative governance structure that facilitated a shift from the traditional centralized and bureaucratic command and control decision-making process to one in which decision-making was more holistic and responsive to local scale fisheries management issues. Thus, despite their absence from the bargaining table, the interests of the Area 19 bonafide fishermen (without snow crab licenses) were

represented in the negotiating process. With DFO representing their interests, the interests of the coastal community constituents were represented in the co-management agreement. Consequently, the social capital generated within the communities adjacent to crab fishing Area 19 helped to facilitate an informal (*de facto*) sharing strategy such that all three negotiating parties (the Area 19 Snow Crab Fishermen's Association, the Area 19 bonafide fishermen without snow crab licenses and DFO) recognized they were better off co-operating within the Area 19 snow crab co-management agreement.

6.2 The Area 19 Snow Crab Fishery Co-management Bargaining Process

In 1995, members of the DFO co-management committee agreed to pilot a new policy framework for implementing a co-management agreement in the Area 19 snow crab fishery. On a national level, the DFO fisheries co-management principles included the following elements:

1. Environmental Sustainability - conservation is the paramount priority;
2. Priority for aboriginal food, social and ceremonial fishing;
3. Economical viability – a smaller fishery, where participants are able to earn a livelihood without government subsidy; and
4. Self-reliance, resilience and a capacity among fish harvesters to self-adjust – a fishery made up of a core group of professional, full-time harvesters (DFO 1999:2).

Evidently, the Atlantic cod fishery crisis significantly influenced the policy principles endorsed within the Departmental co-management framework. As outlined in the previous chapter, policy recommendations made in the Cashin Report (Cashin 1993) on conservation, cost recovery, fleet rationalization and the professionalization of fishermen were embedded in DFO's national co-management goals and objectives.

Consequently, from the beginning, the co-management bargaining process was laden with a mandate that highly constrained the flexibility for negotiated outcomes. However, the new co-management framework also provided a mechanism to transfer partial authority of the Fisheries Minister (without fettering his full authority) to local-area decision-makers, contingent on fulfilling these national goals. In doing so, the transfer of authority created an unprecedented opportunity to change the organizational structure, within a specific branch of DFO, from a rigid linear thinking and centralized command and control system of decision-making, to a more flexible innovative and integrated model. Moreover, the decentralization of decision-making authority to the DFO Gulf Nova Scotia Area managers, who then vested decision-making power in the Area 19 Snow Crab Fishermen's Association, by way of the co-management negotiation process, satisfied the necessary criterion for the co-management principle of subsidiarity. Sociologist and co-management scholar, Svein Jentoft (2003), argues that the subsidiarity principle is necessary for the institutionalization of effective co-management agreements, "this principle states that management authority should be vested at the lowest possible organization" (Jentoft 2003:4). When the principle of subsidiarity is adopted, a significant shift in decision-making power occurs and a new institution is predicted to emerge in which the level of co-operation increases and conflict decreases (Jentoft 2003; McCay and Jentoft 1996).

Consistent with the principle of subsidiarity, the new emerging co-management institution in the Area 19 snow crab fishery was shaped by the initial approval of the Fisheries Minister to transfer his decision-making authority to a Departmental negotiating team. Consequently, a new governance structure was created within DFO for the specific purpose of negotiating the Area 19 snow crab co-management agreement. The Departmental negotiating team included representatives from national,

regional and local area offices. More importantly, the DFO Gulf Nova Scotia Area fisheries manager, located in Antigonish, was appointed as the team leader and given the authority to negotiate on behalf of the Fisheries Minister (Area Manager 2004). This action marked a significant shift from the traditional chain of command decision-making in which the Minister, located in Ottawa, had ultimate power to negotiate license allocations. In contrast, the new governance structure shifted government decision-making authority to the most local scale of fisheries management, both institutionally and geographically. As a result, decision-making within the Area 19 co-management agreement negotiation process was consistent with the principle of subsidiarity. Thus the localized decision-making was more responsive and innovative than historical decision-making processes, managed at the national scale, as highlighted in Chapters Four and Five. In this chapter I focus on this localized creativity. More specifically, I explain the conditions under which the Area 19 co-management agreement was negotiated to create a three-way credible agreement between DFO, the Area 19 Snow crab Fisherman's Association and the Area 19 bonafide fishermen without snow crab licenses.

6.3 The DFO Co-management Negotiation Team: Creating a New Culture of Bureaucracy

The members of the DFO negotiating team conducted themselves as a unified group, in which their individual expertise was shared and communicated freely to support the negotiation process, as a whole. Such an approach, based on team communication and horizontal power sharing, marked a significant improvement upon the traditional bureaucratic power hierarchy, historically based on values of scientific rationalism embedded within the paradigm of industrial capitalism. By flattening the hierarchy of power and linking DFO personnel both vertically (regional and national)

and horizontally across their Departmental disciplines (science, enforcement, and management) the team drew upon their collective practical experience and responded more creatively to a broader range of issues than usually attempted in DFO policy[43].

Central to the team's collaborative approach was a sense of collective responsibility which replaced the more prevalent sense of anonymity that often existed throughout the Department. In various conversations with members of this negotiation team in 2004, it was said that the negotiation process was challenging but felt meaningful. Each person genuinely cared about the outcome of the agreement and vested his/her energy in creating solutions to dilemmas as they arose. When these accounts are contrasted with the institutional dilemma fisheries scientists faced in the late 1960s, and their subsequent detachment from the fisheries management regime, the importance of the collaborative model for generating sustainable resource management policies is better understood. In Chapter Three (Section 3.4), I explained how the pattern of hierarchical decision-making, common in post World War II government institutions, contributed to the legitimacy of efficiency and productivity policies at the cost of conservation policies, and cultivated an attitude of apathy amongst bureaucrats. Furthermore, the "growth" mindset that was perpetuated by the industrial capital economic model and institutionalized within bureaucracy, in many cases, resulted in the expansion of fishing fleets at great economic cost for the Canadian government and ecological cost for fish populations.

However, the DFO co-management negotiation team is an example of internal government collaboration and commitment that contrasts with traditional control patterns characteristic of a centralized hierarchical and bureaucratic decision-making

[43] The DFO negotiation team members included national policy analysts, regional fisheries managers, regional scientists, the regional chief of conservation and the local fisheries managers.

model. Moreover, the relationships that were created through this process represent a divergence from the industrialized model of bureaucracy in which government personnel are compartmentalized into distinct divisions with little to no inter-departmental communication between them (Berger et al. 1973). This new and emerging culture of collaboration has subsequently created long enduring relationships between DFO negotiating team members who continue to foster new innovations in fisheries management through their collective decision-making networks.

In this view, the Area 19 snow crab co-management agreement bargaining process played a major role in creating a new social structure within DFO in which social relationships were created and the problems associated with social differentiation avoided. Within a collaborative decision-making framework, bureaucrats could relate to one another and build trust on the basis of their shared experience. Furthermore, the team approach fostered a new bureaucratic culture in which government employees could pool their knowledge and generate a more holistic analysis of fisheries management. The way in which this dynamic inter-play of communication evolved and created social capital amongst DFO bureaucrats is explained below.

6.4 Shared Experience, Communicative Action and the Eclipse of Bureaucratic Values

The improved level of internal governmental communication played an important role in transforming the bureaucratic culture at DFO. As I mentioned in Chapter Five (Section 5.3.2) the theory of communicative action tells us that the process of exchanging life world experiences through sincere communication processes can nurture a form of inter-subjectivity (Habermas 1987; Schlosberg 1995). Consistent with

this theory, the level of support for the principle of adjacency amongst the DFO negotiation team members suggests that a sharing of life world experience occurred.

The DFO local area managers had a very clear vision of the importance of the adjacency principle for delineating access rules and designing eligibility criteria. As I outlined in Chapters Three, Four and Five the adjacency principle had a long history of implementation as an informal (*de facto*) allocation rule in the Gulf Nova Scotia Region and was used consistently in the evolution of access rules for the Area 19 snow crab fishery. Not surprisingly, the two local area managers on the DFO negotiating team have strong views on the significance of this principle. From the perspective of the Senior Manager (also the DFO negotiating Team Leader), the adjacency principle is fundamental to the long term sustainability of the resource. He strongly believes that fishermen and the families who depend on the fishery for their livelihood will do the best they can to protect the resource, provided they are small-scale enterprises (as compared to industrial scale) and that they can make a livelihood from fishing. His views on the adjacency principle are rooted in personal experience from living within fishing communities:

> I have learned from experience that fishermen generally do the right thing, once you are able to remove them from the allocation argument. I've also learned that a fisheries manager needs to follow a few key principles consistently over time. I've long believed in the principle of adjacency...it's those people who live right next to the fishery who have the most to lose if it disappears. However, I've also learned from experience that when a fisherman comes into my office with a new idea, I listen. Every idea has some potential if you look at it as an opportunity. If I've looked at it from every angle and it doesn't seem to work, I call back the fisherman and explain my perspective. I've never known a fisherman to argue after we've talked it through. There is an underlying level of respect that comes from a willingness to listen. Fishing companies are a different issue. I know grown men who have fished on company ground fish draggers who will cry when they tell you how much fish they destroyed every day they worked. They are ashamed of the food that they wasted and they are ashamed that they felt so helpless to do anything about it. They were told to dump the fish ...and they

> felt they had to do it. I don't agree with this way of fishing and I don't think that corporate fisheries serve the public interest in any way.
>
> Fishing can be a very good living and a very good way of life. In the Christian way of thinking, our fishermen provide a service, they provide food and they give something back to their community. Food, employment and dollars circulate round and round, providing something for everyone. I see our role [as civil servants] to ensure that the resource is protected, number one. And number two, I see our role as ensuring that the benefits from the fishery are distributed as broadly as possible as long as fishermen can make a decent living (Area Manager 2004).

Without doubt, the personal experience of living in a rural fishing community plays a strong role in shaping the values and beliefs of the DFO local area manager. Through the co-management bargaining process, his beliefs and values became incorporated into a new bureaucratic world view that valued the adjacency of small-scale community-based fleets. As this view became more and more accepted by the negotiating team as a group, the view partially eclipsed an old bureaucratic world view in which industrial scale economic efficiency and production were most valued. In the new bureaucratic world view, coastal communities adjacent to the resource play an important role in stewarding the resource and protecting its sustainability from outside interests. Further to this view, provided that the sustainability of the resource is not compromised, the distribution of benefits from the adjacent resource should be maximized as benefits increase.

Evidence of this eclipse of bureaucratic views can be found in the new and emerging types of allocation principles that are slowly penetrating policy discussions among senior levels of bureaucracy through the networks of the DFO negotiating team members. For example, the principle of owner/operator license eligibility criteria and the principle of adjacency are both mentioned as key decision rules for the Atlantic Fisheries Policy Review process, initiated several years ago (Area Manager 2004; Fisheries and Oceans Canada 2001). Moreover, Senior DFO bureaucrats have

subsequently played a role in protecting the Area 19 co-management agreement internally, for nearly ten years, by helping to institutionalize the agreement's objective to maximize the distribution of benefits within the communities adjacent to Area 19. While this objective is not reflective of national policy priorities for conservation and cost recovery, it is nonetheless respected and legitimized because of the wide base of support the agreement has internally within the Department. Moreover, the principle of adjacency demonstrates how the principle of subsidiarity, in which decision-making authority is transferred to the lowest organization, has become institutionalized in the Area 19 snow crab co-management agreement.

It is significant that the DFO local area manager had the responsibility of being the team leader of the DFO negotiation team, since it was his strong belief in the adjacency principle which became the essential link between national policy and local policy objectives. As a result, a new level of meaning has been attributed to the adjacency of coastal communities to their natural resources and legitimized through the Area 19 snow crab co-management agreement. DFO personnel operating at national and regional institutional levels, who previously were removed from local area fisheries management issues, are able to see the interdependency of individuals and their community relationships from the perspective of a DFO local area manager. This is not to suggest that their world view shifted from the legitimacy of individuals to an opposite view in which personal identities are collapsed into the collective; rather DFO personnel could see in a new way how the individual and the community are two sides of the same coin and must be understood in terms of each other. Moreover, DFO personnel were able to internalize this understanding within their shared experience as members of the DFO negotiating team and together they were able to create a new bureaucratic culture of meaning and collective decision-making that respected the value of coastal

communities. This is not to say that the "old" bureaucratic culture has been entirely eclipsed. Rather, a new culture exists in conflict with the old culture and the tension between these views is perceptible within the Department (Area Manager 2004).

6.5 Negotiating a Co-management Agreement with Credible Commitment

In addition to the collaborative bureaucratic culture created throughout the negotiations, another factor that shaped the bargaining process, and final co-management agreement, was the determination of the DFO team to negotiate a strong agreement with credible commitment; one in which all parties felt that the payoffs from co-operating were mutually beneficial. In their attempt to achieve this goal, the DFO negotiating team made two critical decisions. First, they chose to negotiate solely with the Area 19 Snow Crab Association rather than include the Area 19 members (without snow crab licenses) of the Gulf Bonafide Coalition. DFO negotiators claim that the level of mistrust and tension was so high between specific leaders of the Gulf Bonafide Coalition and the Area 19 Snow Crab Fisherman's Association that there was little hope that either side would perceive they were better off co-operating with one another (Area Manager 2004). Furthermore, the DFO negotiating team believed there was a strong possibility that either party would veto the process, at the cost of not coming to an agreement. Rather than risk this possibility, the DFO negotiating team opted to represent the interests of the Area 19 members of the Gulf Bonafide Coalition and maintain communication with them throughout the process. Consequently, one of the key objectives of the negotiating team was to institutionalize a shared responsibility between DFO and the Association to maximize the distribution of benefits, when the value of snow crab increased (either the snow crab biomass or price of crab increased). As a result, one of DFO's non-negotiable terms for the new co-

management agreement was that it had to include a sharing formula for re-distributing the benefits from the fishery such that every bonafide fisherman in Area 19 received some economic benefit as the value of the snow crab fishery increased. In this way, the DFO negotiating team insisted that the fishery be examined within the broader frame of "benefit" flows instead of the narrow frame of quota allocations. Thus a sharing formula was adopted as a mechanism to re-distribute economic benefits as a product of price and harvestable biomass. In this way the sharing formula avoided the problem of price variability associated with conventional quota fisheries in which the fixed quota perpetuated a 'race for price'. As explained in Chapter Four (Section 4.2.1) the conditions under which prices fluctuate in a fishery often motivate fishermen to land their catches as fast as possible as a method of avoiding an eventual decline in price. One condition which reduces price value is an increase in competition (perpetuated by an increase in the number of fishing vessels) to land catches early in the season when prices are typically higher, creating an eventual market "glut" and subsequent lower price. For this reason, fishermen often increase their number of trap hauls by reducing their trap soak times and increase their Catch Per Unit Effort (CPUE). However, one consequence of this behaviour is the tendency to capture more soft-shell (immature) crab in their traps. As explained in Chapter Four (Section 4.3) this behaviour over time leads to a vicious circle of recruitment over-fishing and price decline, resulting in a declining trend in the total value of the fishery. However the Area 19 sharing formula, through specific and explicitly defined sharing rules, avoids the conditions under which the dilemma of price variability is created, as I explain later in this chapter.

The second critical decision of the DFO negotiating team was a commitment to follow an interest-based negotiation process. Instead of quickly establishing negotiation power positions that risked a winner-loser outcome, they opted to create the possibility

for a win-win outcome using a consensus decision-making process based on the following four principles of interest-based negotiations.

1. Separate the people from the problem;
2. Focus on interests, not positions;
3. Generate a variety of possibilities before deciding what to do; and
4. Insist that the result be based on some objective standard (Fisher and Ury 1991:10).

The purpose of this chapter is to discuss how the bargaining process resulted in a credible agreement. Therefore, I will not go into depth about how the interest-based negotiation process was implemented. Rather, I will briefly mention the operational rules that were agreed upon for developing the negotiation process and focus mainly on the range of interests that were represented at the negotiation table. More specifically, I will outline how these various interests related to one another and created an array of opportunities and constraints for the co-management agreement. Following that, I will explain how solutions were found to mitigate these constraints to produce a final "Points of Agreement" document that was successfully approved by all parties.

6.6 Rules for Open Communication and the Expression of Multiple Interests

The interest-based negotiation framework provided an opportunity for the Area 19 Snow Crab Fisherman's Association and the DFO negotiating team to collectively agree on how they were going to co-operate. In this manner, a model of joint-decision-making was adopted from the beginning, in which a level playing field was created and a strong working relationship based on respectful communication was established. Together, the negotiating teams formulated a social contract which stipulated the following rules:

1. No formal minutes would be kept; instead, a final points of agreement would be submitted for consultation and approval by other interested parties and the final approval of the Minister was required;

2. Full disclosure and transparency of information brought to the negotiation table (no secret bottom line);

3. No ideas presented at the table were to be dismissed or devalued;

4. Everything said at the negotiation meetings was said in confidentiality and not to be repeated outside the room;

5. Both parties had full authority to negotiate the terms of the co-management agreement;

6. Parties could caucus in another room to re-group in solidarity;

7. Points of common interest would be built upon and the most contentious points deferred until a substantial body of the agreement was formed;

8. Number of meetings required for a negotiated agreement would not be limited by cost or time lines (they would take as much time as necessary);

9. DFO team negotiated on behalf of a wider community interest;

10. DFO team negotiated within the context of the existing legislation; and

11. Proposed changes resulting from consultations would be returned to the negotiation table (DFO 1996d).

Another important strategy adopted by the DFO negotiating team was the use of active listening. While this principle was not explicitly identified in the above social contract, the team leader initiated this approach by asking the Association for their wish list of interests to be met by the co-management agreement. In response, the Association expressed their desire for increased management authority and their interest in setting the annual fishing exploitation rate, as a starting point for the bargaining process.

Historically, the setting of the annual exploitation rate was the exclusive responsibility of DFO fisheries scientists and managers. The process typically

depended on scientists to estimate the available harvestable biomass within a particular Crab Fishing Area and relied on their expertise to suggest what percentage of that biomass should be included within the Total Allowable Catch. Thus the request of the Association to set the exploitation rate caused a reflexive reaction amongst many of the DFO team members to respond negatively. However, before anyone could respond out loud, the DFO negotiating Team Leader called a caucus meeting at which time he argued how their approval of such a request would send a strong signal to the fishermen that the DFO negotiating team was ready to listen and share a significant level of management responsibility with the Area 19 Snow Crab Fisherman's Association (Area Manager 2004). Following their caucus, the DFO team returned to the meeting and agreed to seriously consider the Association's request. As a result, the bargaining process took on a new collaborative spirit as the Area 19 Snow Crab Fisherman's Association rose to the challenge of sharing the responsibility for resolving the various fisheries management issues inherent to creating a credible co-management agreement.

6.6.1 The Interests of the DFO Negotiating Team

Building on the initial expression of interest from the Association to set the exploitation rate, the negotiating parties then worked on the national DFO policy requirements for conservation. More specifically, they examined a series of checks and balances that would provide the necessary scientific research and monitoring to protect the population recruitment of the Area 19 snow crab fishery. One innovation that emerged from this dialogue was the soft-shell snow crab protocol for monitoring the percentage of immature crab in daily catches. The objective of the protocol was to provide an early warning system that would trigger a closure of the fishery if the

incidence of immature crab exceeded 20 percent of the daily catch over a 48 hour time period. In order to implement this protocol, the Association agreed to finance an at-sea observer program with daily soft-shell crab reporting to the DFO snow crab science division.

Another equally valuable outcome from this dialogue on soft-shell monitoring was the opportunity for scientists to explain their methodology for determining the state of the crab stocks in Area 19 and in the larger Gulf of St. Lawrence. Under the supervision of their chief crab scientist, the DFO crab science division had developed a new statistical method, called Kriging, for estimating the spatial distribution and density of various population age cohorts, and determining the available biomass of a specific age cohort based on their specific carapace width (Hebert, E.Wade, Grace, Hebert, Biron and Moryiasu 1997). This was an essential advancement in the science that provided a basis for estimating the biomass of the recruiting population as well as the harvestable population (mature male crab over 95mm carapace width) (Loch, Moriyasau and Jones 1995). Furthermore, the methodology made sense to the fishermen as it acknowledged and verified the same spatial distribution patterns that they experienced when fishing snow crab. More specifically, the clusters of mature crab in the Cheticamp Gully were evident from the coloured density maps the scientists produced using the Kriging method. This congruence of world views helped to mutually validate the legitimacy of the scientists and the fishermen and subsequently motivated the Association to pay for the scientific surveys as one component of their co-management responsibility. The Association also agreed to pay the costs of enforcing the Area 19 boundary and share the costs of monitoring regulation compliance. These costs are outlined in Table 13 below. The point here is that the convergence of world views in combination with the willingness of the DFO negotiating team to share a

significant level of fisheries management decision-making, helped to motivate the Area 19 Snow Crab Fisherman's Association to share the costs of co-management. More specifically, the Association agreed to finance the components of the agreement that were most meaningful for them as fishermen.

Table 13 highlights how the costs for co-management were divided equally between the department and the Association, resulting in a 50/50 division rule. In addition to sharing the costs for managing and enforcing the Area 19 snow crab fishery, the Association also agreed to carry the responsibility for contracting a local dockside quota monitoring company to assure DFO that fishermen were complying with their license quota limit. This 50/50 sharing rule is consistent with Ostrom's (1990) prediction that when the costs of enforcement are included with the estimated benefits, an equal sharing rule will prevent the collective action problem of free-riding, as explained in Chapter Five (Section 5.2). However, it's important to emphasize that the willingness of the Association to adopt a 50/50 sharing rule was largely motivated by the congruency of the scientists' and the fishermen's world views on the spatial distribution of the snow crab.

Furthermore, many of the Association's concessions to share the costs of co-management were conditional upon the sharing formula that was yet to be decided. In an attempt to minimize the impact of the sharing formula on existing benefit flows from the Area 19 snow crab fishery, the Association's lawyer argued that the government interest in increasing the distribution of benefits was in conflict with their interest in maintaining the economic viability of independent professional fishermen.

Table 13 Area 19 Snow Crab Co-Management Proposed Funding Sharing (1997)

Item	Description	DFO Contribution	Industry Contribution
SCIENCE			
Science Salaries		$ 32,274	
Science Operations		$ 6,219	
Science Equipment		$ 3,190	
Science Surveys			$ 42,665
Science Data Entry			$ 7,040
Science Other		$ 1,472	
TOTAL SCIENCE COSTS		**$ 43,155 (a)**	**$ 49,705 (d)**
ENFORCEMENT			
Fishery Officer	375 hours	$ 9,000	
Overtime Hours	25 hours	$ 900	
Fishery Officer (Outside Area)	150 hours	$ 3,600	
Overtime Hours	60 hours	$ 2,040	
Patrol Boat	156 hours	$ 11,559	
Fishery Officer	75 hours	$ 1,800	
Overtime Hours	35 hours	$ 1,190	
Patrol Boat	84 hours	$ 6,224	
Fishery Officer	52.2 hours	$ 1,260	
Overtime Hours	21.5 hours	$ 731	
At Sea Observers			$ 32,000
Fixed Wing Patrol	15 hours		$ 18,000
Fishery Officer	20 hours	$ 480	
TOTAL ENFORCEMENT COSTS		**$ 38,748 (b)**	**$ 49,000 (e)**
MANAGEMENT			
Management and Administration		$ 18,330	
TOTAL MANAGEMENT COSTS		**$ 18,330 (c)**	
GRAND TOTALS		**$ 100,269 (a+b+c)**	**$ 99,705 (d+e)**
% CONTRIBUTION		**50 %**	**50 %**

Source: (DFO 1996b)

This argument is consistent with the commonly held position that establishing individual property rights will generate enough economic rent to support the costs of managing and enforcing the fishing regime (Pearse 1981). Further to this argument, the Association claimed that in order for their fishermen to be viable and pay for the shared costs of co-management, the sharing formula would have to be negotiated according to the financial costs and revenues of the existing Area 19 snow crab license holders. In other words, the Association wanted their economic rights protected at a specific income level. Furthermore, they justified this income level on the basis of the estimated transaction costs of enforcing their rights. In support of their argument, they presented

an economic study of the Area 19 snow crab fishermen they had contracted independently of DFO economists. The major finding of the economic study was that a large percentage of Area 19 snow crab fishermen could not afford to share their quota, claiming they had serious financial problems. I discuss this study below, but first, for purposes of making a comparison, I present the results of a DFO economic analysis of the average financial performance of an Area 19 snow crab fishing vessel.

As illustrated in Table 14, the DFO economic analysis outlined the average costs and revenues for the average snow crab fisherman without including the costs and revenues of the total package of fishing licenses typically held by a bonafide fisherman in the Gulf Region. This is indicative of the single species management approach used within the Department that failed to view fishermen as occupational pluralists, working throughout the year within various fisheries and, historically, in other non-fishing activities.

In addition, the analysis neglected to include a depreciation value attributed to an aging vessel or any invested capital required for purchasing licenses. However, that being noted, there were only five license purchases since the implementation of the individual transferable quota system in 1984. Furthermore, there was a significantly high level of homogeneity in the types of licenses each fishermen had as well as the average age and length of their boats. Therefore, the DFO economist was fairly comfortable with expressing the cost analysis figures as an average.

Table 14 Average Financial Performance of an Area 19 Snow Crab Fishing Enterprise (1992)

	Items	Costs ($)
Variable Costs	• Fuel	3,282
	• Bait	1,721
	• Employment/Workers' Insurance	697
	• Other	382
	Subtotal	**$ 6,082 (a)**
Repairs and Maintenance Costs	• Hull	2,047
	• Engine	1,067
	• Deck Equipment	822
	• Electronic Equipment	540
	• Facilities	945
	Subtotal	**$ 5,421 (b)**
Net Gear Costs	• Gear Purchases	2,986
	• Gear Repairs	910
	Subtotal	**$ 3,896 (c)**
Fixed Costs	• Marine Insurance	2,130
	• Vehicle	2,085
	• Wharf Fees	175
	• Fees	937
	• Dockside Monitoring	503
	• Other	765
	Subtotal	**$ 6,595 (d)**
Financial Costs (Interest and Capital)		**$ 10,178 (e)**
Labour Costs		**$ 39,489 (f)**
	Total Costs (a+b+c+d+e+f)	**$ 72,201 (g)**
Total Revenue		**$ 132,146 (h)**
	Net Return on Enterprise (h-g)	**$ 59,945**

Source: DFO Gulf Region Economic Services 1992

In contrast, the economic study provided by the Area 19 Snow Crab Fisherman's Association highlighted three distinct categories of fishermen with a corresponding difference between their costs and revenues. However, when the actual suite of licenses was examined for each Area 19 snow crab fisherman, these three distinct categories of fishermen did not actually exist. Rather, the majority of snow crab fishermen (42 out of 59) had at their snow crab license as well as a lobster license and several types of groundfish licenses. For example, in Table 15, I identify the suggested categories, as outlined in the economic study, and the corresponding number of fishermen that actually fit into these distinct categories.

Table 15 Comparison of Area 19 Snow Crab Fishermen's License Categories

Distinct Financial Categories According to Association's Economic Study[44]		
Fishermen with Crab and Lobster Licenses Only	Fishermen with Crab and Ground fish licenses only	Fishermen with Crab, Ground fish and Lobster licenses
Actual Number of Fishermen in each category		
0	1	42
Actual Numbers and Assemblage of Licenses for fishermen in this Category		
A. crab, lobster, herring, mackerel	A. crab, ground fish, mackerel, swordfish, squid	A. crab, ground fish, lobster, mackerel, squid, tuna, swordfish
3	2	8
B. crab, lobster, herring. mackerel, squid	B. crab, ground fish, mackerel, squid	B.crab, lobster, ground fish
1	2	2
C. crab, lobster, herring, mackerel, tuna	C. crab, ground fish, mackerel, swordfish	C. crab, ground fish, lobster, mackerel, herring
1	1	10
D. crab only	D. crab, ground fish, mackerel	D. crab, ground fish, lobster, mackerel, squid
1 (Pictou Landing Band)	1	7
E. crab, lobster, mackerel, scallops, squid,	E. crab, ground fish, squid	E. crab, lobster, ground fish, mackerel, herring, smelts
1	1 (Wagmatcook Band)	3
F. crab, lobster, smelts, scallops, blue fin tuna, swordfish	F. crab, ground fish, mackerel, swordfish	F. crab, lobster, ground fish, mackerel
1	1	2
		G. crab, lobster, ground fish, smelts, swordfish
		2
		H. crab, ground fish, lobster, mackerel, herring, swordfish
		5
		I. crab, lobster, ground fish, eels, smelts, scallops, squid, mackerel, swordfish, gaspereau
		3

Source: (DFO Gulf Region Licensing Statistics 1995)

What is most striking about Table 15 is its contrast to the findings of the Association's economic study. For example the economic study discussed a category of fishermen, with lower economic viability, who had only lobster and snow crab licenses. However, in my own research, I did not find any fishermen that fit into this category. Furthermore, the majority of snow crab fishermen have at least a snow crab license, a lobster license and a groundfish licenses. The significance of Table 15 is that

[44] These categories were taken directly from the Association's economic study. However I do not have their permission to cite the exact title or consultant who completed this study.

it demonstrates that 98 percent of the Area 19 snow crab fishermen had a diversity of fishing licenses and were not completely dependent on the snow crab for their livelihood. Therefore, the claim of the independent economic study that the Area 19 snow crab fishermen could not afford to share their snow crab allocation based on their distinct categories of licenses was largely untrue. Moreover, Table 15 further demonstrates the pluralistic strategy, typical of many inshore community-based fishing enterprises, in which an assemblage of licenses is held by individual fishermen and fished year-round as a way to reduce the dependence on any one fishery and spreading-out costs and revenues over time.

When considering the Association's study of the costs and revenues for the category of fishermen with crab, lobster and ground fish licenses, the figures are fairly close to those within the DFO economic analysis. However, the Association's study concluded that the Area 19 snow crab fishermen generally fit somewhere within three distinct financial categories depending on their assemblage of licenses and their level of financial debt. Table 16 lists these categories and their associated characteristics. What is particularly important in defining these categories is that once one removes the characteristics that are not descriptive of any of the Area 19 snow crab fishermen (see italics in Table 16), the remaining factors that distinguish the group with the "serious financial problem" versus the group that are "reasonably O.K" are whether they recently purchased their license and/or boat and their current asset to debt ratio.

Table 16 Categorization by Financial Circumstances

Category of Financial Circumstances	Characteristics of Fishermen in this Category
Group 1. "Reasonably O.K."	a) They have been fishing crab a long time
	b) They have been fishing lobster a long time
	c) They were not heavily dependent on ground fish
	d) They have always kept their licenses and not sold them
	e) They have paid off all their major debts
	f) Their boat does not need replacement in the immediate future
Group 2. "Only O.K. for the Short Term"	a) Most have been fishing crab for a long time
	b) Most have a lobster license
	c) Ground fish may have been important for some but not all
	d) Their debt load is not excessive at present
	e) Their boat may need replacing within the next few years
Group 3. "Serious Problem Right Now"	a) Some have fished crab for a long time
	b) Some have only recently purchased their crab license
	c) Most do not have a lobster license
	d) Many were very dependent on ground fish
	e) Some have had no choice but to replace their boat recently
	f) All have a heavy debt load, many with banks, with the interest floating with the prime rate.

Source: (Area 19 Snow Crab Fisherman's Association Independent Economic Study 1994, see footnote)

This would suggest that the transferability of licenses, especially when market prices were paid, contributed to economic inefficiency. However, the vast majority of Area 19 snow crab fishermen neither paid for their licenses nor transferred their licenses. While a few transfers did occur, a review of the license holders in Table 17 who purchased their licenses prior to 1995 indicates that the last transaction took place in 1991. Furthermore, the transfer occurred between family members and was not likely to have been a business transaction involving the bank (Table 17).

Table 17 Area 19 Crab License Transfer Dates and Characteristics (1983 - 1994)

Year	Sold Outside Area 19 Homeports	Licenses already in Possession of Purchaser	Description of Transaction	Purchase Price
1983-88	No recorded transfers			
1989	Yes	Lobster, herring, mackerel	Business	$130,000
1989	No	Lobster, groundfish, mackerel, herring,	Family	N/A
1990	No	Lobster, herring, groundfish, mackerel	Family	N/A
1991	No	Groundfish, squid, mackerel	Family	N/A
1991	No	Lobster, groundfish, squid, mackerel	Family	N/A

Source: (DFO Gulf Nova Scotia Licensing Statistics)

In contrast to these family exchanges, the only conventional business transaction was in the case in which a snow crab license was sold to a fisherman with a homeport outside of the Area 19 boundary, but within the Gulf Nova Scotia Region. Not surprisingly, it was this same "outsider" who initiated the increase in the Association's membership fees in order to hire a lawyer to fight the Gulf Bonafide Coalition's license sharing proposal. This same individual subsequently became an influential board member of the Association who strongly supported the concept of market transferability and was opposed to the idea of increased allocation sharing. Similarly, four of the six Area 19 Snow Crab Association's Board of Directors who negotiated the co-management agreement did not have the full assemblage of licenses characteristic of the majority (71 percent) of Area 19 snow crab fishermen. These findings suggest that five of the six Association's Board of Director's may have had a higher debt ratio to asset value than the majority of the Area 19 snow crab fishermen. While more research is required to further validate this claim, it does suggest that those individuals most willing to put the required work into creating co-management agreements may be motivated by individual interests rather than those interests that are representative of the organization as a whole. Following this argument, the Association's board of director's vested interest in protecting their current benefits differed from other Area 19

snow crab fishermen who had more assets by comparison. In other words, the rational economic efficiency argument used to by the Association to justify the exclusion of other bonafide fishermen from accessing the Area 19 snow crab fishery was largely unfounded. Moreover, the prediction made by liberal economic theorists that licenses will transfer from the less efficient owners to more efficient owners within an Individual Transferable Quota system is not demonstrated in this case. Rather, the Association's independent economic study pointed out that the purchase of fishing licenses was one plausible cause for fishermen to have a "serious financial problem". This finding demonstrates that the transferability of licenses contributes to the problem of declining asset value as the transaction costs of securing a property right rise with the inflated price of the license compared with the revenues generated from the license. Moreover, this illustrates a central point of this thesis. The heterogeneity between license holders who purchase their licenses and those who inherit their licenses creates internal competition, as well as external competition, such that the "race for fish" is expressed as a desire to prohibit increased sharing.

In this view, the Association's interest in co-management was largely driven by their interest in further securing their property rights over an asset with high transaction costs, despite it being an Individual Vessel Quota. What is so interesting about this finding is that it points out that the existing property rights regime was not a complete property rights system, otherwise the Association would not have been motivated to negotiate the co-management agreement. Moreover, the high cost of securing a snow crab Individual Vessel Quota fishing license, when compared with the actual value from fishing snow crab, was only cost efficient if the license could be sold again. However, if the license was not sold, the transaction costs of securing the asset value (the cost of purchasing the license) exceeded the benefits from fishing. As I demonstrate in the

next section, the attribute of transferability and its associated costs, factored into how the Area 19 Snow Crab Fisherman's Association negotiated their interests in the final co-management agreement.

6.6.2 The Interests of the Area 19 Snow Crab Fisherman's Association Negotiating Team

The costs and revenues for the average Area 19 snow crab fisherman was a significant focal point of discussion between the negotiation teams. In order to identify the existing benefits of the Area 19 snow crab license holders and their capacity for sharing the costs of co-management, these figures had to be calculated. Once these figures were agreed upon, the negotiation teams could then examine the issue of allocation sharing within the context of co-management and the current estimated biomass of snow crab and price per pound. In this way, the dialogue shifted from looking at pounds of individual quota to looking at individual benefits from the license.

The Association was very clear on their need for securing their benefits before a sharing formula could be negotiated. However, as discussions continued, it became evident that the members of the Association's negotiating team were also interested in a broader set of benefits than just the landed value of the snow crab per license. Individually, each member of the Association's negotiating team had a different interest. One member, the "outsider", wanted to convert the vessel quota system into an individual transferable trap share system as a means of increasing the generation of rent from the sale of trap shares. As I mentioned above, this individual had purchased his license and had a vested interest in offsetting the costs of transferability.

Another member feared that an increase in sharing would also increase the number of traps in the fishery and thus the competition over the most productive fishing areas (number of traps on the ocean bottom) would also increase. Therefore, this

individual wanted a fixed number of traps in the fishery, even when the sharing formula was activated. Yet, another member wanted to ensure that at least 50 percent of the bonafide fishermen in Area 19 were issued licenses so that the Association could claim that the majority of bonafide fishermen in Area 19 had snow crab fishing licenses. Collectively, all members wanted a mechanism through which each fisherman would pay equally for the cost of co-management.

It was in this rubric of individual and collective interests that the DFO negotiating team had to carefully consider how they could meet the Association's interests as well as the Area 19 bonafide fishermen's (without snow crab licenses) interests of allocation sharing and still create a win-win co-management agreement. I'll briefly describe how they achieved this by looking separately at each of the above interests within the context of constraints and opportunities for sharing with all Area 19 bonafide fishermen.

6.6.3 Individual Transferable Trap Shares

The idea of individual trap shares was introduced by the "outsider" Board Member who had purchased his license and lived outside the Area 19 boundary. Increasing the divisibility of the quota share would have the effect of increasing the overall asset value of the license through the sale of each trap share separately. As asset value increased, having smaller trap shares would theoretically maintain an affordable supply for the market demand. However, the DFO negotiating team did not view transferability as being congruent with the broader interests of sharing. Rather, their objective was to expand the distribution of benefits, not create a mechanism for their conglomeration. Yet, at the same time, the trap share system had some appeal as an allocation tool. One dilemma with the vessel quotas was that fishermen typically focused on maintaining their 50,000lbs per license. In this view, they had historically constrained

scientists from lowering the TAC, as I described in Chapter Four (Section 4.2.4) when the Area 18 snow crab fishermen consistently resisted scientific recommendations to reduce their quota. Furthermore, the fishermen could not see beyond the 50,000lbs per license to developing a more creative sharing rule. In their view, the resource could only be shared in terms of how many more licenses could be issued with 50,000lbs of quota attached. Conversely, the trap share system provided a creative solution for both of these dilemmas, as long as the transferability of trap shares was constrained. In this way, the two teams explored how to implement the trap share system to achieve both individual and collective interests. This is further explained below.

6.6.4 A Fixed Number of Traps

One of the main barriers to increasing the number of licenses in Area 19, aside from the finite availability of a harvestable biomass, was the gear crowding issue over the Cheticamp Gully. Existing license holders have a range of methods for circulating the placement of their crab traps until they find the densely packed fishing "hole". Fishermen strongly believe that the mature male crabs aggregate in feeding holes and, once found, they can fish these holes for days with very little soft-shell crab in the catch composition. However, in order to fish this way they also need the flexibility of having a wide range of ocean bottom over which to search and place their traps. Yet, as the number of licenses increases, the number of traps competing for their placement on the ocean floor also increases. Consequently, the fishermen's searching strategy is compromised as competition for ocean bottom increases and their chances of finding the "hole" are reduced. In this view, the idea of fixing a ceiling on the number of traps was an attempt to prevent the problem of gear over-crowding from occurring.

The DFO negotiating team considered this suggestion in combination with the trap share idea and explored ways in which the 1995 allocation could be divided using a fixed number of trap shares. They did this by considering the idea of creating a majority of bonafide fishermen as Area 19 license holders, as I explain below.

6.6.5 A Majority Representation of Legitimate Interests

The Association saw the benefit in having over 50 percent of the Area 19 bonafide fishermen as Area 19 license holders as a way of shifting the political legitimacy of the Gulf Bonafide Coalition. It was felt that one reason why the Gulf Bonafide Coalition had gained such a strong power position with the Fisheries Minister was because of their claim to represent the majority of bonafide fishermen in Area 19, thus creating a credible political constituency. Following this line of thinking, it was in the opinion of the Association's negotiation team that if the licenses were increased to include just enough to tip the balance of bonafide fishermen, the power of the legitimacy of the Gulf Bonafide Coalition would shift to the Area 19 Snow Crab Fisherman's Association. In this way, the existing license holders became motivated to reduce their individual allocations to create just enough new licenses to offset the balance of representation of bonafide fishermen within Area 19. They achieved this through the following calculation:

1. 1995 snow crab landed value = $13,320,000
2. 59 licenses with 20 traps + 15 temporary permits with 20 traps = 1480 traps
3. $13,320,000 ÷1480 = $9000 per trap share
4. Change status of 15 temporary permits to 15 new licenses
5. 59 licenses + 15 licenses = 74 licenses with 20 traps (with 50,000lbs of quota per license, or 2500 lbs per trap)
6. Each license donates 2 traps (5000 lbs of quota, valued at $18,000) for new licenses
7. 74 x 2 = 148 new trap shares
8. Number of Bonafide fishermen in Area 19 as of 1995 was 184
9. 184 ÷ 2 = 92 as a minimum number of licenses required for a balance of power
10. 148 trap shares ÷ 4 traps = 37 new licenses
11. Total number of licenses = 111

12.74 licenses with 18 trap shares
13.37 licenses with 4 trap shares
14.1480 trap shares x $9000 = $13,320,000 (DFO 1996b)

6.6.6 The Fair Distribution of Co-management Fees

DFO's choice to negotiate solely with the Area 19 Snow Crab Fisherman's Association sent a strong signal to the Area 19 fishermen that they had no outside bargaining options with DFO through other fishermen's organizations. This has been a crucial element for maintaining a strong co-management agreement with credible commitment for both DFO and the Area 19 Snow Crab Fisherman's Association. For the Association, it has helped resolve a long standing dilemma of how to ensure that every fisherman contributes equally and fairly to the costs of running a strong fishermen's organization. For DFO, it has ensured that the organization takes full responsibility for meeting its financial commitment to sharing the cost of co-management. Initially, this was achieved by giving the Association the responsibility for issuing the regulatory trap tags for fishermen in return for their co-management fees which were paid as an equal percentage on each trap share held by a license holder. Now the fees are converted into percentage and taken off the TAC before the fishery opens. This allows the Association to negotiate a higher price for the sale of the quota and it resolves the dilemma of how to distribute the costs for co-management in an equal and fair way.

However, the Association's view of equality and fairness was somewhat narrowed by their organizational interest in maintaining a dominant voice in decision-making. For example, they created a membership voting rule that attributed one vote per trap share. Consequently, the voting power of the Association's members was highly skewed in favour of the majority vote of license holders with 18 trap shares. Furthermore, as I explain below, the proposed system for sharing any surplus was based on issuing

temporary permits rather than licenses. Consequently, the fishermen with temporary permits did not have any voting rights and their views were not formally represented in the Association. In this way, the voice of the new licenses and permit holders was significantly quieted.

6.7 Protecting the Interests of the Area 19 Bonafide Fishermen: the Constraints and Opportunities

The DFO negotiating team was careful to consider each of the above interests, as presented by the Association, in light of protecting the interests of the broader group of Area 19 bonafide fishermen without snow crab licenses. However, DFO team was also careful not to cross an unspoken line of respect for the Association's ability to deal with its own organizational dilemmas and broader community issues. Therefore, the DFO negotiating team did not question the Association's decision to institutionalize a voting rule based on trap shares. However, they did not agree to enforce the Association's membership fees. Instead, it was agreed that the cost of co-management would remain transparent and separate from the costs of maintaining the Area 19 Snow Crab Fisherman's Association. The decision helped to build some level of trust in the co-management agreement for the 4 trap fishermen and the temporary permit holders, despite their objections to the Association's voting rules.

It was also the view of the DFO team that their objective was to reduce the level of social conflict within the communities adjacent to the Area 19 fishing boundary, through institutionalizing a sharing formula; one in which the distribution of future benefits of the crab fishery would be maximized when either the harvestable biomass or the price was to increase. However, they also knew that any additional sharing had to benefit the bonafide fishermen within Area 19 (without snow crab licenses) equally. Otherwise, the

sharing formula would likely create more conflict if those who benefited were seen by the larger community as being free riders on the collective action of the Gulf Bonafide Coalition. In this view, the DFO negotiating team proposed that the asset benefits accrued from the 1995 snow crab fishery ($13,320,000) be used as a ceiling value for securing the interests of the proposed 111 license owners. Subsequently, any benefits exceeding this value would be considered as a sharing surplus and be split equally between the license holders and a pool of temporary permit holders. Furthermore, every bonafide fisherman that fished from a homeport within the Area 19 boundary would receive a temporary permit and would subsequently receive an equal proportion of the "surplus" quota.

Further to the proposed sharing plan, the DFO negotiating team presented several conditions under which the Association's interests could be met without compromising the interests of the larger group of Area 19 bonafide fishermen. The first condition was a series of transfer rules to constrain the accumulation of quota and reduce the incentive to transfer trap shares outside the Area 19 boundary.

6.7.1 Trap Transfer Rules

1. No license can have more than 26 traps and no less than 4 traps. Traps can be pooled on to one license but not exceeding 26.

2. The number of licenses must be fixed at 111 (no more, no less) and any new license holder can not have a history of holding a crab license. Therefore, if an 18 trap share license holder sells traps from that license, the last 4 traps on that license have to be transferred to a bonafide fisherman with no previous history of holding a crab license.

3. No one person can hold more than one crab license.

4. The trap shares are fixed at 1480. Therefore, in years of a sharing surplus, the temporary permits will either have to wait until traps are available or pool their quota with a license holder (DFO 1996b).

In summary, the trap transfer rules constrain the transferability of licenses such that the number of license holders and licenses must remain at 111, with some configuration of traps less than or equal to 26 and greater than or equal to 4. Moreover, there are no more than 1480 traps that can be used or exchanged, thus the effort of fishing is held constant despite the transferability of traps.

6.7.2 Eligibility Criteria

The second condition, stipulated by DFO, was that the eligibility criteria for the new licenses and permits be exclusive to bonafide fishermen with home ports within the boundary of Area 19 and that they include three First Nation communities with a historical connection to the Area 19 region. They negotiated this on the basis of the historical precedence of the adjacency principle in combination with the bonafide licensing policy. Thus, the eligibility criteria, in combination with the trap transfer rules, significantly restricted the market for purchasing trap shares and consequently constrained trap transferability.

In view of these interests and conditions presented, the two negotiating teams worked together to define a document that highlighted their common "Points of Agreement". The main elements of this document are highlighted below and formed the backbone of a five year integrated fisheries management plan, called the 1996 Area 19 Snow Crab Co-management Agreement (DFO 1996b).

6.8 The Final Points of Agreement

In the final "Points of Agreement" document, the 56 existing snow crab licenses were increased to 74 licenses with 18 traps each and a new category of license holder was created for 37 licenses with 4 traps each. In addition, a new

sharing arrangement, based on a trigger value that could be tripped by either an increase in biomass or price, was adopted to allow 74 temporary permit holders to share a portion of the increase that would be divided equally between them. Furthermore, the following management rules were agreed upon:

1. The Area 19 Snow Crab Fisherman's Association will pay an equal portion of the management and enforcement costs of the fishery.

2. A maximum number of 1480 trap shares will be established that will be transferable. Each trap will represent 0.07 percent of the annual Total Allowable Catch. Participants will not be allowed to accumulate more than 26 trap shares per license or 1.82 percent of the TAC. The total number of licenses must remain at 111 and the last four trap shares must be sold to an individual has not previously had a snow crab license.

3. The 20 percent soft shell snow crab protocol will be implemented and if exceeded, the fishery will be closed.

4. The Area 19 Snow Crab Association will set the exploitation rate within the range of 40 to 50 percent of the estimated harvestable biomass. Any rate above or below this will require the consent of DFO.

5. The fishery will open only after the spring snow crab mating season (DFO 1996c).

While the Association accepted DFO's trap transfer rules and eligibility criteria for implementing the "Points of Agreement", in return, they wanted some assurance from DFO that they were now fully engaged management partners. They emphasized a new role for the Association in gathering scientific data and wanted full access to the information DFO had available. For example, they wanted access to any data collected from the at-sea-observer program and scientific data sampling surveys. Furthermore, they wanted to play a larger role in managing enforcement patrols on the boundary between Area 12 and Area 19, and even proposed paying for supplementary boundary protection.

Essentially, the bargaining process became a transitional period in which the fishermen who negotiated the agreement shifted their roles from a narrow sphere of protecting individual self interest to a broader sphere of protecting a broader collective interest. Initially, the members of the Association's negotiation team were largely engaged in a fight to protect their individual economic property rights. However, once they were assured that their benefits would be reasonably protected through the co-management agreement; they began to take on a larger role of responsibility for the sustainable management of the Area 19 snow crab fishery. Certainly their actions were to their individual advantage as well, but not exclusively. Rather, they began discussing new strategies for reducing the incidence of soft-shell crab such as a modified trap design. As another example, they shifted their attention from the fight between fishermen living in communities *within* the boundary of Area 19, to the larger issue of protecting the snow crab from interests *outside* the Area 19 fishing boundary. In this way, their individual interests became more aligned with protecting the interests of the larger collective of fishermen within Area 19, from both a social and ecological perspective. The important point here is that this new sense of responsibility emerged once the Association realized that they were better off co-operating with their fellow joint-claimants, the bonafide fishermen in Area 19 without snow crab licenses, in order to secure the interests of the larger collective as well as their own. Furthermore, this transformation happened largely because the government managers insisted that the Association share the responsibility for their communities' well being.

6.9 Credible Commitment and the 1996 Area 19 Snow Crab Co-management Agreement

As already mentioned in this chapter (Section 6.6.1), the DFO negotiation team wanted a strong co-operative co-management agreement in which all parties perceived that they were better off with the terms of the agreement than without. In bargaining theory, a co-operative agreement is one that is credible. Accordingly, two elements that must be present in a credible agreement are: the agreement must be efficient, and the distribution of benefits must be advantageous in some way (Muthoo 2000). In other words, the cost of bargaining must not exceed the benefit from bargaining and the distribution of benefits must be better inside the agreement than from any outside option. For example, if an individual made a financial investment in a long bargaining process without coming to an agreement, that would be an inefficient use of their resources. In these terms, the Area 19 snow crab co-management agreement was efficient. All key interest groups agreed to approve the agreement with very little revisions. One main reason why this occurred was because the distribution of benefits between the parties was better inside the agreement than from any outside option. I explain this point further in the next section.

6.9.1 Governmental Credible Commitment

The credibility of the co-management agreement for the DFO negotiating team depended on satisfying the objectives at three institutional levels: the national-scale co-management policy objectives, the Gulf Nova Scotia regional-scale bonafide fishermen eligibility criteria, and the local area-scale adjacency principle. The national DFO policy cost sharing objective was met through an equal division of the costs for managing and enforcing the fishery. Similarly, the national policy objective of institutionalizing

conservation was met through the soft-shell protocol, the timing of the seasonal opening and the limited range within which the exploitation rate could be set. The regional objective for a professional group of resource users was met through the existing bonafide fishermen's licensing policy that had previously been institutionalized within the DFO Gulf region, as explained in Chapter Four. Finally, the DFO Gulf Nova Scotia informal (*de facto*) policy of adjacency and its associated sharing principle was institutionalized through the eligibility rules for new licenses and the surplus sharing formula.

6.9.2 Organizational Credible Commitment

For the Area 19 Snow Crab Fisherman's Association, the proposed co-management agreement provided a set of rules that protected the economic rights of existing license holders. The rules not only secured their baseline benefits according to their earnings in 1995, but also reduced cost uncertainty by way of their negotiated share of enforcement costs. The baseline benefit was equivalent to $162,000 (18 traps x $9000 per trap share) which was viewed by most fishermen as a significant gain when compared to the threat of the Gulf Bonafide Coalition's proposal that would have reduced their allocation to 22,000 lbs per license and resulted in total revenues of $79,200. When the estimated costs are subtracted from this figure ($79,200 - $72, 201 = $6,999) (Table 13), the Gulf Bonafide Coalition's proposal would have reduced the earnings of the individual Area 19 snow crab license holder by as much as $155,000, which would have made the snow crab licenses unviable economically and certainly would have prohibited the cost sharing of fisheries management and enforcement costs. If this had been the case, the national policy objectives of partnering would not have been met and a social cost would have been created as government carried the

costs of enforcement. Considering local social costs, the fixed trap rule protected the CPUE of the existing fishermen and the proportional payment scheme eliminated the problem of free-riders (the problem in which only some fishermen pay enforcement costs). In other words, the Area 19 snow crab fishermen were better off with the co-management agreement. Furthermore, the fixed baseline of benefits, as determined by the sharing formula, mitigated the problem of price variability that typically emerged when the number of licenses increased in the fishery and caused a competitive 'race for price'.

6.9.3 Territorial Community Credible Commitment

While the benefits of the agreement for the DFO negotiating team and the Area 19 Snow Crab Fisherman's Association are fairly comprehensible, the degree of credibility the agreement contained for the Area 19 bonafide fishermen (without snow crab licenses) is more complex. Initially, the Area 19 bonafide fishermen's group was comprised of fishermen who had bonafide status without snow crab licenses, but lived exclusively within the geographic boundary of Area 19. Thus, the shoreline boundary of crab fishing Area 19 became the initial socio-political boundary used in their proposal for allocating 22,000 lbs of snow crab per license for every bonafide fisherman living within the Crab Fishing Area 19. Evidently it was in their best interest to provide an equal sharing rule for all bonafide fishermen, living within Area 19, without any stratified hierarchy between the license holders. However, over time the Gulf Bonafide Coalition grew in size and political strength as they expanded the socio-political boundary to include all Gulf Region bonafide fishermen, including the Area 18 snow crab fishermen and non-snow crab fishermen. As a result of this expansion, the broader Coalition

wanted the eligibility criteria for any new licenses to be inclusive of all Gulf Region bonafide fishermen (within Nova Scotia).

Yet, the adjacency principle adopted and enforced by the DFO negotiating team provided a direct benefit for all bonafide fishermen living exclusively within the Area 19 boundary. Furthermore, the Area 19 bonafide fishermen (without snow crab licenses) were also lobster fishermen who were already organized to deal with issues in the lobster fishery. As I mentioned in Chapter Four, part of the bonafide licensing criteria required that fishermen have a lobster license to be eligible for professional status. Consequently, these bonafide fishermen already had an existing level of social capital, as a community of interest and from their community of place, given their shared experience as lobster fishermen as well as their shared home ports within Area 19, and in many cases, shared family ties. Moreover, they were members of the same community social structures as the Area 19 snow crab fishermen. As explained in Chapter Five (Section 5.2.2), the multiplex relationships characteristic of many rural communities creates multiple identities that can reduce transaction costs through inter-connected networks that generate social capital. Consequently, the Area 19 bonafide fishermen (without snow crab licenses) felt they were better off negotiating the approval of the proposed 'points of agreement' within the territorial boundary of their local community identity, which was separate from that of the Gulf Bonafide Coalition. Accordingly, they broke away from the larger Coalition and negotiated their approval of the "points of the agreement" based on their own informal strategy designed to protect the interests of all Area 19 bonafide fishermen, non snow crab license holders. I explain this alternative distribution strategy in the next section of this chapter. Obviously this choice to proceed as a unified group within Area 19 was consistent with the adjacency principle and protected their interests as fishermen within the boundary of Area 19.

6.10 Protecting the Collective Interest: the Dilemma of Transferability

In Chapter Four (Section 4.2.1) I argued that the attribute of transferability for the licenses and vessel quotas in the midshore snow crab fleet created an inflated purchase price which contributed to the over-capitalization and subsequently lower rate of return on investment in the Area 12 snow crab fishery. Certainly the same problem could occur in Area 19 since current license values, as of July 2004, exceeded $80,000 per trap share, amounting to a value close to $1.5 million for an individual 18 trap-share license. Evidently from the Association's economic study, previously discussed in this chapter (Section 6.7) the problem of debt to asset ratio for existing snow crab fishermen was amplified by the inflated purchase price for licenses That being said, the immediate problem of transferability for the Area 19 bonafide fishermen (without snow crab licenses) was not the debt from purchasing the license. Rather, the problem was preventing the sale of the license in the first place.

The attribute of transferability creates a potential rise in asset value that can, over time, exceed the actual value from fishing the license. In this way, a collective action problem arises for individuals who want to share the license for the purpose of fishing. This can occur when the pay-offs from co-operating decrease as the asset value from selling the license increases. In other words, if the asset value of the license from selling it surpasses the value from fishing it, any agreement to share the license would also be at risk. One option considered by the leaders of the Area 19 bonafide fishermen (without snow crab licenses), was to pool the proposed 37 new 4 trap-share snow crab licenses (as per the "points of agreement") into a co-operative organization and re-distribute the benefits to every eligible fisherman. However, this option had been previously tried by another organization, and presented several problems as the asset

value from the sale of the quota increased (Leblanc 2001b). Over time, fishermen had concerns with the accountability of the distribution of benefits and proposed that they might be better off selling the quota since they weren't fishing it individually. Learning from this experience, the leaders of the Area 19 bonafide fishermen (without snow crab licenses) looked at the option of arranging sharing agreements, in the form of a contract, between smaller groups of fishermen who knew each other well and trusted one another.

The sharing agreements gave the fishermen the flexibility of choosing to fish the license together or individually, provided that the costs and benefits were distributed equally. The accountability of such an arrangement was costless due to the symmetry of knowledge between the partners. Thus the alterability of the contract was reduced and transaction costs for enforcing the agreement were low to none. Each fisherman could easily monitor the costs and revenues of their partners since they were all lobster fishermen and had similar boat costs, fuel costs and bait costs. In addition, the information required to calculate revenues was costless since the number of trap shares on the license was fixed, the quota percentage of each trap share was available from DFO, and the price per pound was common knowledge. In this way, a certain level of trustworthiness was easily re-enforced. However, the dilemma of transferability required an additional level of re-enforcement as a deterrent from breaking the agreement. As a way of addressing this problem, the fishermen signed legal contracts that formalized their partnership with one another, and outlined the sharing rules in terms of their legal obligations to one another while prohibiting the sale of the license without the agreement of all three partners.

These types of contracts, known as "trust agreements" were often used in other fishing regions (mainly in southwest Nova Scotia) between fishermen and processing

companies as a back door method of securing benefits over fishery assets, when the economic property rights of companies were otherwise constrained by owner operator license regulations. However, in this case, the trust agreements were being used in an opposite manner as a means of prohibiting the transfer of the license, as a way of securing economic rights for the marginalized bonafide fishermen. One of the terms of the contract was that no partner could sell, assign or lease his interest in the partnership without the written consent of the other three partners. In addition, if any one partner received an additional allocation within Area 19, any earnings from this allocation would benefit the partnership, not the individual. Consequently the sharing plan divided the assets (revenues minus expenses) from the 36 licenses and the 74 temporary permits equally among 99 fishermen through 33 contract agreements. Within each agreement, two permit holders contracted with a 4 trap-share license holder, and they shared their combined profits from these licenses. In this way, 99 fishermen out of the total 111 Area 19 bonafide fishermen (without snow crab licenses) were able to create an equal distribution of benefits from the proposed co-management agreement. This represented over 90 percent of the bonafide fishermen without snow crab licenses in Area 19.

One of the immediate benefits from signing the informal (*de facto*) contract agreement was that every Area 19 bonafide fisherman received some economic return from the snow crab fishery every year, regardless of the sharing formula being triggered. As I explained earlier in this chapter (Section 6.6.5) according to the sharing formula the temporary permit holders would only receive an allocation after the value of the fishery surpassed a specific value. Evidently, this presented a high level of uncertainty for any fisherman willing to invest in the fishery, particularly when economic certainty was low in the groundfish industry. In contrast, the certainty of benefits from

the collective sharing strategy gave something to every bonafide fisherman in the community, every year. However, the cost of signing the partnership contract was the forfeited opportunity of receiving an individual license and the ability to sell that license. Yet, in the words of one key fisherman from Cheticamp who orchestrated the plan, "it didn't take much to convince them of the idea: everyone got something from it and nobody was better off than anybody else". When I asked this same individual how he thought of the sharing idea, he replied:

> I come from a family of 17 children and I've spent all my life figuring out how to divide the pie fairly. In our family, whoever divides the pie gets the last piece. Well, if I was going to be stuck with the last piece, I wanted it to be the same as everyone else's.

This quotation exemplifies how socially integrated and interdependent people are when living within their social experience of family life and the corresponding rules of social conduct. As explained in Chapter Five (Section 5.2.2) the multiplex relationships characteristic of a strong community social structure can potentially facilitate a long term sense of reciprocity required for social capital. In these words lie the solution to most collective action problems; treat others as you would have them treat you. When this rule is institutionalized throughout the community, the transaction costs of sharing benefits can be significantly reduced. The alterability and variability of a good being exchanged is reduced by the embedded social contract of reciprocity.

In Table 18 the costs of the informal (*de facto*) 4 trap-share/temporary permit contract, for each partner, are compared with the costs of the formal (*de jure*) 18 trap-share license, 4 trap-share license and temporary permit. As illustrated in Table 18, the cost of the informal contracts provided three major ways in which costs were reduced:

1. All costs were split equally three ways between the contract partners ;
2. Labour was shared among the partners and not paid for with wages ; and

3. Vessel costs were kept to a minimum by using the cheapest vessel available among the partners (Buchanan 2001).

Table 18 Comparison of Annual Costs for Various Trap-Share Licenses, Temporary Permits and Temporary Permit Contracts

	18 trap-Share License ($)	4 Trap-Share License ($)	Temporary Permit[45] ($)	4 Trap-Share/Temporary Permit Contract ($)
Variable Costs[46]				
Fuel	3 282	720	720	240
Bait	1 721	1 650	1 650	550
UIC	697	697	697	697
Other	382	382	382	382
Maintenance Costs				
Hull	2 047	2047	2047	682
Engine	1 067	1067	1067	355
Deck Equipment	822	822	822	274
Electronic Equipment	540	540	540	180
Facilities	945	945	945	315
Gear Expenses				
Traps	2 986	873	873	291
Buoys	910	123	123	41
Hydraulic Hauler & Boom		4 500	4 500	1 500
Buoys		123	123	41
Rope		428	428	142
Fixed Costs				
Insurance	2 130	2 130	2 130	710
Vehicle	2 085	2 085	2 085	2 085
Wharf Fees	175	175	175	58
License Fees	937	234	234	78
Dockside Monitoring	503	503	503	167
Other	765			
Co-management Costs	1 216	270	No cost in 1995 agreement	90
Financial Costs (average vessel loan payment per year)	10 718	10 718	10 718	(vessel with zero loan payments used)
Labour Costs	39 489	5 000	5 000	(shared labour without wage cost)
Total Costs	**$73 417**	**$36 033**	**$35 763**	**$8 791**

Source: (DFO Gulf Region Economics Branch statistics 1995, DFO Gulf Region economic analysis of start-up costs for new entrants to the Area 19 snow crab fishery 1994, DFO Gulf Region Economic Profile of Area 19 snow crab fishermen 1992, DFO Gulf Nova Scotia Licensing Statistics 1995, Interviews with Fishermen 2001).

While the costs of the informal 4 trap/temporary permit contracts are significantly less than the costs of the 4 trap-share license, the contracts alone were not enough to

[45] The Temporary permit would only have these costs when the sharing formula was triggered due to a surplus in value above the baseline figure. Furthermore, these fishing costs assume that the surplus is high enough to issue 4 traps per temporary permit holder.

[46] Based on an average of 12.5 fishing days for the 18 trap-share license and 20 fishing days for a 4-trap-share license.

make the partnership a profitable enterprise. In Table 19, Table 20, Table 21 and Table 22[47], a comparison of costs, revenues and net benefits for each license category demonstrate that the revenues were less than the costs, during the first three years of the co-management agreement, for both the formal 4 trap-share license and the informal 4 trap-share/temporary permit contract. However, it is also notable that the net benefits from the informal 4 trap-share/temporary permit contract were significantly higher than those of the formal 4 trap-share license. Moreover, Table 23 clearly demonstrates how the temporary permit holder would not have received any benefit from the fishery until 2000, were it not for the informal 4 trap-share/temporary permit contract agreements.

Table 19 Costs, Revenues and Net Benefits for 18 Trap-share License (1996 – 2000)

	1996 ($)	1997 ($)	1998 ($)	1999 ($)	2000 ($)
Co-management Costs	1,216	1,627	1,857	1,944	2,316
Operational Costs	72,201	73,358	74,529	75,722	76,933
Revenues	108,048	85,488	83,828	145,399	223,904
Net Benefits	34,631	10,503	7, 442	67,733	144,655

Source: (Area 19 co-management Joint Project Agreements for 1996, 1997, 1998, 1999, 2000, DFO Gulf Region Economics Branch Statistics for Area 19 snow crab fishery 1995, DFO Gulf Nova Scotia License Statistics and Quota Monitoring reports for 1996, 1997, 1998, 1999, 2000).

[47] Tables 18, 19, 20 and 21 assume an estimated rate of inflation of 1.6 percent per year.

Table 20 Costs, Revenues and Net Benefits for 4 Trap-share License (1996 – 2000)

	1996 ($)	1997 ($)	1998 ($)	1999 ($)	2000 ($)
Co-management Costs	270	361	412	432	514
Operational Costs	35,763	30,266	30,314	30,363	30,411
Revenues	24,012	18,988	18,626	32,309	49,755
Net Benefits	- 12,021	- 11,639	- 12,100	1,514	18,830

Source: (Area 19 co-management Joint Project Agreements for 1996, 1997, 1998, 1999, 2000, DFO Gulf Region Economics Branch Statistics for Area 19 snow crab fishery 1995, DFO Gulf Nova Scotia License Statistics and Quota Monitoring reports for 1996, 1997, 1998, 1999, 2000).

Table 21 Costs, Revenues and Net Benefits for Temporary Permit (1996 – 2000)

	1996 ($)	1997 ($)	1998 ($)	1999 ($)	2000 ($)
Co-management Costs	0	0	0	0	0
Operational Costs	0	0	0	0	35,529
Revenues	0	0	0	0	62,346
Net Benefits	0	0	0	0	26,817

Source: (Area 19 co-management Joint Project Agreements for 1996, 1997, 1998, 1999, 2000, DFO Gulf Region Economics Branch Statistics for Area 19 snow crab fishery 1995, DFO Gulf Nova Scotia License Statistics and Quota Monitoring reports for 1996, 1997, 1998, 1999, 2000).

Table 22 Costs, Revenues and Net Benefits for 4 Trap-share/Temporary Permit Contract (1996 - 2000)

	1996 ($)	1997 ($)	1998 ($)	1999 ($)	2000 ($)
Co-management Costs	90	120	137	144	171
Operational Costs	8,791	6,598	6,969	6,981	6,992
Revenues	8,004	6,331	6,209	10,769	58,150
Net Benefits	- 877	- 387	- 897	3,644	50,987

Source: (Area 19 co-management Joint Project Agreements for 1996, 1997, 1998, 1999, 2000, DFO Gulf Region Economics Branch Statistics for Area 19 snow crab fishery 1995, DFO Gulf Nova Scotia License Statistics and Quota Monitoring reports for 1996, 1997, 1998, 1999, 2000).

Also worth highlighting are the rising costs of co-management over time, which are mainly attributed to rising enforcement costs to protect the Area 19 boundary from outside fishing vessels (Leblanc 2001a). As explained in Chapter Two (Section 2.2),

the rise in transaction costs as asset value increases over time is predictable. Furthermore, it is predicted that when transaction costs increase, individuals will be motivated to contract to reduce transaction costs in order to increase their benefits. In the next section I explain how this occurs in the Area 19 snow crab fishery in the form of license pooling.

6.11 Social Capital and Reduced Transaction Costs: The Case of License Pooling

As demonstrated in the four Tables above (Table 19, Table 20, Table 21 and Table 22) the net benefits from the informal 4 trap/temporary permit contracts, as a strategy to reduce costs, were not by themselves sufficient for generating economic profit. Accordingly, costs were further reduced, in many communities, through an additional institutional layer of sharing rules called license pooling. Moreover, these license pooling agreements were formalized in the Area 19 co-management agreement through a set of specific rules (established after the first year the agreement was approved) and were administered by the DFO Gulf Nova Scotia licensing branch in Antigonish. The rules included the following specifications:

1. Every license holder pooling their license had to be aboard the registered vessel; and
2. The license pooling vessel had to be registered with the names of all pooling license holders 24 hours before the fishery opening (MacArthur 2001).

Table 23 Total Number of 18 Trap-share license, 4 Trap-share License and Temporary Permit Participants per Home Port in License Pooling Agreements (1997 – 2000)

	1997		1998		1999		2000		
Home Port ↓ / License Pooling Agree't →	18 Trap	4 Trap	18 Trap	4 Trap	18 Trap	4 Trap	18 Trap	4 Trap	Temp
Bay St. Lawrence	4	11	3	9	3	9	4	8	13
Pleasant Bay	1	3	1	3	1	3	1	3	13
Cheticamp (& Grand Etang)	4	9	2	7	1	5	1	5	15
Margaree Harbour	3	5	3	5	2	5	1	4	8
Afton First Nation	1	2	1	2	1	2	1	2	0
Wagmatcook First Nation	1	2	1	2	1	2	1	2	2
Pictou Landing	1	2	1	2	1	2	1	2	0
Totals	**15**	**34**	**12**	**30**	**10**	**28**	**10**	**26**	**51**

Source: (DFO Gulf Nova Scotia, Licensing Branch, License Pooling Data Base, 1997, 1998, 1999, 2000).

Table 23 shows the total number of license holders and temporary permit holders who formally registered for license pooling agreements between the years of 1997 and 2000, under the terms of the 1996 Area 19 snow crab co-management agreement. However, what must be remembered is that the 4 trap-share licenses that formally registered with DFO are actually the informal 4 trap-share/temporary permit contracts. In other words, the contract holders reduced their costs further by pooling their licenses with other 4 trap-share contract holders or with 18 trap-share license holders. An interesting declining trend can be seen, over time, in the number of license pooling agreements, particularly in 2000 when revenues were significantly higher than previous years. This supports the prediction that the willingness to contract may increase when transaction costs exceed the benefits from the resource. Whereas, when benefits increase, the willingness to contract may decline. However, even when revenues were high in 2000, at least 26 (of the 30 in total) 4 trap-share/temporary permit contracts were still participating in license pooling agreements. This

demonstrates an interesting case in which the fishermen have used their social relationships to create an economic exchange with little cost to the second contract agreement (the first contract is the informal 4 trap-share/temporary permit contract and the second is the license pooling agreement) yet with high financial return from sharing. For example, in the case in which a formal 18 trap-share license holder pools their license with an informal 4 trap-share/temporary permit contract holder, the registered license holder (for the informal contract) has to be on board the same vessel with the 18 trap-share holder. Consequently, the 18 trap-share license holder works out a sharing arrangement with the registered 4 trap-share license holder (who is actually in partnership with 2 other temporary permit holders) whereby the labour, the traps and the revenue from the quota of the 4 trap-share license holder are compensated, minus the vessel costs and the additional 18 traps provided by the 18 trap-share license holder.

However, conversations with fishermen who participate in such agreements reveal that many fishermen pool with their brother or father who have either inherited their snow crab license at no cost or received their license when so many were issued in 1984. Therefore, they feel an obligation to share the benefits of the 18 traps at no cost to the 4 trap license holder and often waive the vessel costs as well. While the exact figures on cost savings are difficult to ascertain, these sharing arrangements between family members may be a plausible explanation for the continued license pooling in 2000, even when revenues are significantly higher than costs.

Similarly, the second license pooling option adopted by the Area 19 bonafide fishermen (without snow crab licenses), is to pool with one or two additional 4 trap-share/temporary permit contract holders. In this way, they pool their quota, their number of traps and their labour onto one vessel and divide the costs and revenues

equally. With this strategy, fishermen can pool their traps and their quota onto one vessel and reduce their number of days of fishing.

Another unanticipated benefit from the license pooling agreements was that significantly fewer fishing vessels were on the water than would otherwise be the case if every license holder had a fishing vessel. This reduction is illustrated in Table 24. As a result, the pooling of licenses had the benefit of reducing monitoring costs both internally and externally. Internally, the fishermen pooling together monitor one another to ensure there is not an excessive amount of soft-shell crab being fished. Otherwise they would all suffer the consequences of the decline in next year's biomass. Externally, the DFO conservation and enforcement officers had fewer on board vessel patrol checks and therefore fewer hours were required for that activity. Similarly, the number of enforcement dockside monitoring checks is lower with the reduced number of vessels.

Table 24 Number of Fishermen Pooling with Reduced Number of Fishing Vessels

Year	Number of Fishermen Pooling	Number of Fishing Vessels
1996	44	21
1997	42	20
1998	35	17
1999	31	15
2000	77	33

Source: (DFO Gulf Region Licensing Statistics).

As predicted, while the total transaction costs of co-management (the cost of securing access, monitoring and enforcement) increased over time as asset value increased, they were also lowered at an individual level through the social relationships among fishermen within Area 19 who were capable of building on an existing level of social capital to generate a new distribution tool in the form of the informal (*de facto*) 4 trap-share/temporary permit contracts. Furthermore, their shared social boundaries of

place, gear sector, economic sector, kinship ties, ethnicity, culture and religion all played a role in creating a level of trust and trustworthiness such that the alterability and variability of the fishing license contract was minimal and transaction costs were low as a consequence. Using the combination of the license pooling option and the trap sharing contracts, the Area 19 bonafide fishermen were able to make a profit from the new licenses issued through the Area 19 snow crab co-management agreement. Furthermore, the *de facto* sharing contracts played a fundamental role in making the Area 19 snow crab co-management agreement credible. In contrast, the formal 4 trap-share licenses, as negotiated in the Area 19 co-management agreement, would predictably have created a collective action dilemma among the Area 19 bonafide fishermen as the costs from the years 1996 to 2000 would have exceeded the benefits, resulting in significant economic losses (see Table 19 and 20 for a comparison of costs). Were this the case, it is likely that the Area 19 bonafide fishermen with 4 trap licenses would have had the incentive to either over-fish or misreport their catches as a way of making up for lost revenues. In other words, the co-management agreement would not have been credible or sustainable. Moreover, the conditions would have been created under which the "race for fish" is predicted to occur.

In summary, the credible commitment of all three major interest groups (the Department of Fisheries and Oceans, the Area 19 Snow Crab Fisherman's Association and the Area 19 bonafide fishermen without snow crab licenses) was evidently a key factor in the successful implementation of the Area 19 snow crab co-management agreement. Furthermore, as explained in Chapter Five (Sections 5.2.2 and 5.2.3), the geographic boundary of Area 19 in which the majority of fishermen lived, was an essential social boundary containing strong community social structures in which a confluence of interests existed. Undoubtedly, as demonstrated by the high level of

social capital within these communities, as the Area 19 Snow Crab Fisherman's Association made the transition from protecting their individual interests to protecting the larger interests of those fishermen within the Area 19 boundary, they were capable of taking on a new level of resource management responsibility for the resource and for the communities within Area 19. Similarly, the high level of social capital within this social geographic boundary was an essential factor for implementing the *de facto* sharing system and resolving a potentially challenging collective action problem. Furthermore, this *de facto* sharing system facilitated immediate returns and reduced the economic risk of the temporary fishermen and subsequent social unrest. However, it must also be noted that it was the DFO Gulf Nova Scotia local area manager, who insisted on institutionalizing the adjacency principle, which secured this common geographic boundary. Whereas the Area 19 bonafide fishermen (without snow crab licenses) were initially drawn to join the larger Gulf Bonafide Coalition, and in doing, so they shifted the alignment of their social boundaries to a powerful lobby group, yet one in which social capital was less likely to be generated. For the fishermen in the Area 19 Snow Crab Fisherman's Association, the tendency was to align with the social boundary of high economic status which legitimized exclusivity by notions of economic efficiency. Whereas in the Gulf Bonafide Coalition, the tendency was to align with the bonafide fishermen status, which legitimized the principle of equal distribution, but was institutionalized at the Gulf Nova Scotia social geographic boundary, which included the length of the northern shore of Nova Scotia.

Evidently, the role of the DFO Gulf Nova Scotia local area manager was central to the success of creating a credible agreement. He was a key player not only within the social geographic boundary of Area 19, but also within the Departmental bureaucracy. However, this individual would not have had this opportunity were it not for the

subsidiarity of authority, necessary for co-management, in which the partial transfer Ministerial authority facilitated localized decision-making. Furthermore, a new governance model was created that facilitated a flattened hierarchy within the DFO, in the form of the DFO negotiation team. Consequently, the co-management bargaining process was based on principles of equal power sharing and respect. Moreover, the principles of adjacency and sharing were institutionalized with the co-management agreement and the dilemma of transferability was avoided. Yet, as I emphasized above, the opportunity to contract with one another and subsequently reduce transaction costs was an essential condition for making the sharing formula work. Moreover, the way in which transaction costs were reduced was largely through the social capital generated by the social networks (collective action), characteristic of the well integrated social structures previously established in the communities adjacent to Crab Fishing Area 19. Finally, the foundation for the co-management agreement was based on the historical socio-political processes under which the exclusive inshore boundary of Area 19 was created. And most importantly, this exclusive boundary included the productive habitat of the Cheticamp Gully, in which a sub-stock population of Gulf of St. Lawrence snow crab seems to flourish.

In this way, the Area 19 fishing boundary included a *stock*, rather than just the *flow* from the stock. As explained in Chapter Two (Section 2.6), this condition is predicted to play a critical role in shaping the evolution of the pattern of property rights. More importantly, this condition also explains why a collective property rights solution, such as that which evolved in the Area 19 Snow Crab Co-management Agreement, is an effective arrangement for resolving the transaction costs dilemmas that arise as joint claimants attempt to capture benefits from a CPR. However, this case study also

demonstrates that preventing the 'tragedy of the commons' requires a complexity of institutional conditions, evolved over time, to resolve these transaction costs dilemmas.

With specific reference to co-management theory, the findings from this analysis support Pinkerton's theoretical propositions on the conditions for developing fisheries management regimes, examined in Chapter Five (Section 5.2.4). Yet, because these conditions are more specific in their application to the co-management negotiation and implementation processes, they should be considered as new additions to co-management theory.

6.12 Conditions Contributing to the Bargaining Process

1. *Authority:*
   A co-management bargaining process will more likely be successful if local scale government representatives have the authority to negotiate the co-management agreement, provided that this authority is influenced by and accountable to the social values and experience of living in a rural coastal community.

2. *Integrated Negotiation Team:*
   A bargaining process will more likely succeed if supported by an integrated negotiation team representing experience from all government institutional levels and departmental branches relevant to fisheries management.

3. *Geography:*
   The agreement will more likely be successful if the negotiating parties, in the fishery, share a common social and geographic boundary that is aligned with the resource *stock* (rather than just the *flow* from the stock). Furthermore, the agreement will more likely be credible if the constraints and opportunities of benefits, for all negotiating parties, are aligned with the socio geographic community boundary. This is relevant for eligibility criteria and the transfer of assets.

4. *Negotiation process:*
   The agreement will more likely be credible if negotiations consider the interests of all joint claimants. Furthermore all costs and benefits, including transaction costs, should be evaluated from the perspective of the agreement, as well as, other outside options.

5. *Sharing Mechanisms:*
   The agreement will more likely be credible if mechanisms are used to determine equitable sharing rules wherever transaction cost dilemmas arise.

In this way the distribution of costs and benefits at multiple institutional levels should be considered.

6.13 Conditions Enabling Agreement Implementation

1. *Geography:*
   The agreement will more likely be implemented without social conflict if the interests of all parties within the social geographic boundary are considered. Furthermore, if informal (*de facto*) rules arise, and transaction costs are reduced, these should be facilitated and not constrained.

2. *Transferability:*
   The agreement will more likely remain a strong agreement if sharing solutions are created such that the asset value grows from protecting the resource and reducing transaction costs. Furthermore, the agreement will more likely remain credible if transferability is constrained.

As I have demonstrated in this chapter, the inter-relationship between transaction costs, credible commitment and collective action play a critical role in creating the conditions under which fisheries co-management arrangements emerge. Yet, as I have also illustrated, this inter-relationship is complex. Furthermore, the nature of this inter-relationship is continually in flux such that the internal and external conditions in which a bargaining situation was initially created, are likely to change. Accordingly, the conditions under which the commitment is credible are also likely to change. Given this dynamic complexity, the continued implementation and institutionalization of the Area 19 snow crab co-management agreement is truly remarkable and significant. In almost ten years since it was negotiated, the agreement continues to be perceived by all parties as credible and thus the commitment to it continues.

Yet, this is not to say the terms of the agreement have remained just as it was first negotiated. Rather, all three major components that I have discussed here: transaction costs, credible commitment and collective action have all fluctuated according to various sources of variability. However, what has remained stable is the bargaining process by which the co-management agreement can be re-examined and re-

negotiated. Consequently, new bargaining situations are continually emerging in the Area 19 snow crab co-management agreement. For example, the 1996 co-management agreement was re-negotiated in 2001. In anticipation of this new negotiation process, the Area 19 temporary snow crab permit holders joined collectively to lobby the federal Fisheries Minister to increase the proportion of sharing in the sharing formula. Their efforts were successful and a new sharing formula was designed with the principle of "more sharing more often".

More recently, the scientific estimate of the available harvestable biomass of snow crab in Area 19 was significantly miscalculated, resulting in a significant over estimate of the Total Allowable Catch for the 2004 snow crab fishing season. This miscalculation, when combined by the temporary permit harvesting rules in the Area 19 co-management agreement, resulted in the majority of temporary permit holders without any quota to fish with. In contrast, the existing 18 trap holders were able to catch all their assigned quota and reaped record profits.

Given the history of social conflict in Area 19 and the demonstrated ability to organize collectively to protest inequitable resource distribution, it was predicted that social conflict would increase and the temporary permit holders would lobby the federal Fisheries Minister to intervene in the co-management agreement. Yet the predictable outcomes did not happen. Rather, the co-management partners immediately initiated a negotiation process and the terms of the agreement have been since changed to prevent this scenario from being repeated. This recent example of dynamic flux demonstrates the adaptability of a long term co-management agreement in which the bargaining process has been institutionalized and the terms of the agreement are continually being redefined in order to maintain credible commitment for all parties

involved. When this is achieved over time, a *high degree of exclusivity* is maintained, provided that the asset value remains high and the transaction costs are mitigated.

In the next and concluding chapter, I will re-address the four research propositions outlined in Chapter Two (Section 2.12) and summarize the findings of this thesis that demonstrate how co-management agreements, under certain conditions, can resolve the transaction cost dilemmas inherent to the "tragedy of the commons". Furthermore, I explain how a simplistic understanding of property rights that neglects the complex and inextricable link between social and economic behaviour, such as that presented by neo-liberal economic theory, does not do enough to explain how the "tragedy of the commons" is both created and avoided.

CHAPTER SEVEN

7.0 Conclusions

7.1 Introduction

I have explored two central research questions throughout this thesis. The first considers the institutional dilemmas arising in the Gulf of St. Lawrence snow crab fishery which correspond to the pattern of property rights under which the "tragedy of the commons" is predicted to occur. The second question asks under what conditions fisheries co-management institutions, specifically in the Area 19 snow crab co-management agreement, can resolve these dilemmas. In Chapter Two (Section 5.2), I introduced the institutional dilemma inherent to Garret Hardin's "tragedy of the commons" in which a zero sum game occurs when the "commons" is overexploited by self-interested sheep herders (Hardin 1968). When the same behaviour is situated within a fisheries commons, the "race for fish" is predicted to occur. From a neo-liberal economic perspective, this race can be prevented with the implementation of complete property rights in which the following four attributes are present:

1. **Exclusivity**: Protects the right holder from the interference of others who can otherwise capture the flow of benefits from the fish stock.
2. **Duration**: Reduces the uncertainty of access rights and ensures that the right holders will benefit in the future from their investment in the present.
3. **Security of Title**: Reduces the vulnerability of ownership title to the rights of the resource being challenged by other resource users.
4. **Transferability:** Maximizes the value of time and capital by allowing the license to be sold in the free market.

In the neo-liberal view, private property rights are predicted to provide the means by which individuals satisfy their wants through the personal self interest stake they

have in the efficiency and optimal use of the resources to which they have rights. Furthermore, the neo-liberal economic theory of capitalism claims that communal rights discourage personal effort since no one person is accountable for the effective management of the resource. Conversely, within a private property rights regime, it is predicted that every individual owner has something to gain if the resource is managed well and something to lose if it is not. Therefore, it is predicted that individual property rights provide appropriate incentives for fishermen to fish in a sustainable manner.

However, new institutional economic theorists argue that the degree of exclusivity one has over the benefits of an asset is neither absolute nor without cost. According to transaction cost theory, over time as the value accrued from the asset increases, the cost of defining and enforcing rights over the benefit from this asset also increases. Hence, at some future point, the marginal benefit an individual receives from the property right will drop below the marginal cost of protecting that right from other claimants. Therefore, the cost of maintaining a high degree of exclusivity will no longer be economically efficient for the property claimant. Consequently, a dilemma is predicted to arise as the transaction costs of securing the rights eventually exceed the benefits. When this dilemma is applied to Scott Gordon's (Gordon 1954) predictions on the circumstances that perpetuate the "race for fish" , transaction cost theory suggests that the fishery's attributes of alterability and variability will play a large role in shaping the emerging property rights pattern. Similarly, the theory predicts that when a good is both alterable and variable, transaction costs will be positive and a "rule of capture" will prevail. In other words, the cost of securing rights, monitoring the asset value and enforcing rights over the resource plays a significant role in shaping the incentives to over-exploit the fishery.

After situating the tragedy of the commons dilemma within a new institutional economic framework in Chapter Two, I outlined four thesis research propositions to be explored through the lenses of transaction cost analysis, social theory, political science, and co-management theory. These four propositions are listed below:

1. **First Proposition:** Exclusivity is neither fixed nor without cost;
2. **Second Proposition:** Governmental commitment to security of title and duration leads to social costs when transaction costs are positive;
3. **Third Proposition:** Social capital reduces transaction costs and supplies credible commitment; and
4. **Fourth Proposition:** Transferability increases transaction costs and undermines credible commitment.

Using these four research propositions to scope my analysis, I examined the evolution of the institutions inextricably linked to the emergence of the 1996 Area 19 Snow Crab Co-management Agreement. In this way, I endeavoured to explore how institutional dilemmas inherent to the "tragedy of the commons" model emerged in the development of the snow crab fishery and were resolved by fisheries co-management institutions. In this concluding chapter, I summarize the findings of my research according to each of the four aforementioned research propositions. In addition, I draw together my insights on what these findings contribute more broadly to the co-management literature and what they suggest for new research directions.

7.1.1 First Proposition: Exclusivity is Neither Fixed nor Without Cost

This first proposition suggests that the property right attribute of exclusivity is neither fixed nor is it independent of the asset value of the resource and the costs associated with securing rights, monitoring and enforcing these rights. Rather, the rise and fall of these costs, called transaction costs, depend on the resource's attributes of alterability and variability. Therefore, at some point in time, as asset value rises the

marginal benefit from the property right will drop below the marginal cost of protecting the right from other joint-claimants. Thus it is predicted that rent dissipation is inevitable at some point in time

Moreover, the path of rent dissipation largely depends on whether the benefit captured represents the output from the resource stock or from the resource flow. In the case in which only the resource flow is captured, it is predicted that fishermen will have the incentive to adopt the "rule of capture" property rights regime.

One of the main findings of this thesis is that the degree of exclusivity any individual or group has over the asset value of a fishery changes over time as joint claimants compete for the same asset benefits. Likewise, the process of securing this degree of exclusivity over a fishery comes with a cost. Certainly the cost of exclusivity was demonstrated in Chapter Three (Section 3.3), in which I discussed the exorbitant government expenditures required to secure access rights over the highly migratory Atlantic ground fishery. Similarly, the cost of securing rights over this fishery supports the proposition that rent dissipation increases when benefits are captured from the resource flow, rather than from the resource stock. Evidently, the financial investment made by the Canadian government to negotiate the Extended Economic Zone and subsidize the capitalization of a larger industrial ground fish fleet, was believed to be a necessary cost to capture the benefits from a transboundary migratory fishery. Yet, despite these large expenditures, the migratory nature of the fishery and the competition from other industrialized nations fishing on the same resource flow caused the transaction costs to increase, while the asset value decreased and the biomass stock declined. Consequently, the "race for fish" became the predominant fishing strategy of the industrial ground fish fleet, at great ecological, economic and social cost.

A similar pattern can be seen in the evolution of the mid-shore Gulf of St. Lawrence snow crab fishery. In Chapter Four (Sections 4.2.1, 4.2.2, 4.2.3, and 4.2.4), I argued that transaction cost dilemmas emerged within the industrial scale Area 12 snow crab fishery according to multiple sources of variability. This finding demonstrated that even under conditions in which fishing vessels have individual vessel quotas with access to a resource stock, they do not necessarily have a high degree of exclusivity. Rather, the degree of exclusivity is largely dependent on the ability of other joint claimants to intervene, or capture, the benefit stream from the resource. Evidently, the individual rights attributed to individual transferable quotas are not sufficient to resolve the collective action dilemmas that are inherent in CPR management.

Conversely, the inshore Area 19 snow crab fishery, based primarily on a local stock situated within the Cheticamp Gully, demonstrates that the attributes of alterability and variability are reduced when a group of fishermen have access to a resource stock as well as the capacity to exclude joint claimants outside their group, from intervening on their benefit stream. Hence, the investment made to secure access from outside joint claimants contributed to a high degree of exclusivity. Furthermore, this investment was offset by the flow of benefits in perpetuity, as opposed to a flow of benefits over one economic time period. Therefore, these fishermen had a strong incentive to protect the natural capital of the crab stock and were highly motivated to organize themselves and jointly contribute to the cost of securing and enforcing their access rights against intervening joint claimants.

However, another finding related to this proposition, suggests that the path of rent dissipation also depends on the underlying norms and values of bureaucracy that subsidize the transaction costs to capture the benefits from a highly alterable and variable resource. Furthermore, the norms and values inherent in a government

bureaucracy designed to facilitate industrial capitalism have the unintended effect of perpetuating variability. The government investment in the highly alterable (several other countries were investing in harvesting the same ground fish stocks) and variable (the migratory nature and mixed species of the stock) ground fishery, when combined with the industrial scale of economic production and corresponding price variability, further motivated the ground fish industry to adopt a "rule of capture" property rights regime, in which the "race for fish" was the dominant fishing strategy.

Further to this finding, the bureaucratic norms and values adopted from the principles of industrial capitalism were linked to the development of the Gulf of St. Lawrence snow crab fishery as a way for government to secure its financial assets from the industrial ground fish industry. Hence, the tendency of government to subsidize transaction costs in support of industrial capitalism created a vicious circle in which they were motivated to pay the financial cost to develop a new snow crab fishery for the ground fish fleet, as a means to generate return on their initial financial investment. Yet, as I demonstrated in Chapter Four (Section 4.3.2), the government investment in the industrial Area 12 snow crab fleet led to further rent dissipation, particularly as the norms and values of bureaucracy perpetuated further transaction cost dilemmas as a result of price variability, recruitment variability, political variability and quota transferability. Consequently, the industrial snow crab fleet was motivated to adopt a fishing strategy that alternated between the "race for price" and the "race for fish". When combined, both strategies resulted in the harvest and discard of high volumes of juvenile crab, which resulted in recruitment over-fishing as demonstrated in Chapter Four (Section 4.3).

In contrast, the localized norms and values of government managers who lived and worked within the social boundaries of the rural community of Antigonish supported

a *de facto* exclusion rule, known as the adjacency principle, which facilitated an alternative property rights regime. Furthermore, the *de facto* adjacency principle was used consistently by local DFO area managers such that an exclusionary boundary was eventually created around the productive snow crab habitat (thus creating a sub-stock), known as the Cheticamp Gully, and later called fishing Area 19. Similarly, the local area fishing license eligibility criteria for the Area 19 snow crab fishery consistently excluded fishermen who lived outside communities adjacent to the fishery. Hence, competition from joint claimants in Area 19 was effectively reduced with the support of government regulations. This factor played a significant role in motivating the small-scale Area 19 snow crab fishermen to adopt a fishing strategy that was both economically viable and ecologically sustainable.

Even so, the Area 19 snow crab fishermen's high degree of exclusivity was not long lasting. Rather, circumstances changed in 1984 and again in 1992 and 1994, when fishermen who were previously excluded from the Area 19 snow crab fishery experienced a decline in other fisheries and became motivated to capture benefits from the lucrative snow crab fishery. Evidently, the degree of exclusivity enjoyed by the Area 19 snow crab fishermen was largely affected by the ability of outside joint claimants to alter their benefit stream. As I demonstrated in Chapters Four, Five and Six, the degree of exclusivity any individual or group can maintain over the asset value of a CPR, is largely influenced through political processes in which the transaction costs of maintaining the high degree of exclusivity (for a politician such as the Fisheries Minister) exceed the benefits received. Consequently, the degree of exclusivity any individual or group has over the asset value of a fishery is likely to change over time as circumstances change and joint claimants successfully intervene on the benefit streams from the resource.

However, in Chapter Six (Section 6.9), I argued that the Area 19 Snow Crab Agreement demonstrated one way in which a high degree of exclusivity can be maintained over time, provided there is credible commitment secured from the joint claimants who can most successfully intervene upon the benefit stream from the resource. Furthermore, a high degree of exclusivity can be maintained within a co-management regime, following the principle of subsidiarity, under the conditions that the agreement incorporates the adjacency principle (i.e. the agreement includes institutional mechanisms to secure access rights over the natural capital from a resource stock and the distribution of benefits are shared between the intervening joint claimants within a specified geographical boundary).

7.1.2 Second Proposition: Governmental Commitment to Security of Title and Duration Leads to Social Costs when Transaction Costs are Positive

This second proposition suggests that the costs of defining, monitoring and enforcing rights are lowered for individuals who successfully coerce governmental commitment to develop policies and laws that protect their security of title and duration of rights from other joint claimants.

However, the transference of these costs will result in social costs over time, particularly as asset value declines and transaction costs increase. Therefore, it is predicted that social costs will increase if conditions of the first proposition are present. Consistent with the first proposition, the Canadian government's commitment to support the development of the industrial ground fish industry was linked to the norms and values of post World War II government bureaucracy. At this time, the principles of bureaucracy were closely tied to the efficiency and productivity principles of industrial capitalism. Hence, the DFO bureaucracy was initially designed to implement an

industrial fisheries model and the costs to define, monitor and enforce rights over fisheries resources were assumed to be part of the government mandate.

However, as demonstrated in Chapters Three (Section 3.4) the Canadian public carried the burden of these costs, particularly the people living in rural coastal communities. The industrial capitalist scale of production perpetuated a highly variable boom-bust rural community economy, in which the lucrative assets from the ground fish industry were transferred from rural areas to urban centres. Consequently, a culture of government dependency was created and perpetuated by bureaucratic norms and values that continued to support industrial capitalism. Hence, the social costs of supporting rural fishing communities continued to increase along with the rising transaction costs of the industrial ground fish industry.

Not surprisingly, as the ground fish stocks continued to be over-fished, their asset value declined while transaction costs increased. Eventually this resulted in a fiscal crisis within DFO. However, the bureaucratic norms and values, in which the principles of industrial capitalism were embedded, were slow to change. As I explained in Chapter Five (Section 5.3.1), new federal fisheries policies for cost recovery, fleet rationalization and limited entry were designed with the same values that perpetuated the collapse of the Atlantic cod fishery in the first place. In other words, the federal government's commitment to an industrial capital model became culturally embedded within the values of DFO. However, the industrial capitalist norms of bureaucracy such as the command and control hierarchy of decision-making, were radically changed with the new concept of government-industry "partnering".

Not surprisingly, the Fisheries Council of Canada (FCC) was keen on the new notion of partnering and their proposal for a vertically integrated private property rights regime, in which the government secured exclusive access rights to individual

corporate interests, was an obvious alignment of values based on the rationality of economic efficiency and production. This was particularly true since it was also the FCC's vision that the fishing industry would pay for the costs of fisheries management. Yet, the social mobilization of the Coastal Communities Network (CCN), and its allied organizations, challenged the legitimacy of the FCC's private property rights model on the basis of the social and ecological costs it would inevitably impose upon rural coastal communities. In addition, the local Bay St. Lawrence social movement was initiated as an offshoot of the larger community-based movement and helped launch the Gulf Bonafide Coalition. In later years, this same community-based fisheries management social movement successfully vetoed the proposed *Fisheries Act* reforms that were designed to confer the absolute decision-making authority of the Fisheries Minister to the new partnering agreement legislation.

Consequently, the co-management framework used in the Area 19 snow crab agreement was designed without the new partnering legislation and conferred the negotiating authority to the local Area DFO manager who adopted a team approach, based on a horizontal (multiple departmental divisions) model of collaboration. Using this new model, a negotiation process was designed in which a level of respect and mutual trust was generated among DFO personnel and between government and industry. Hence an innovative "points of agreement" document was developed using consensus decision-making. Furthermore, the transfer of negotiation authority to the DFO Gulf Nova Scotia local Area office, institutionalized the co-management principle of subsidiarity (decision-making occurs closest to the resource). Consequently, the negotiation process contained a multi-tiered list of criteria for credible governmental commitment which corresponded to each institutional layer of governmental decision-making within DFO. For example, at the national level, the agreement had to

demonstrate a substantial level of cost sharing and contain conservation objectives. At the Gulf Regional level, the regulatory rules had to be congruent with the Gulf Nova Scotia bonafide fishermen's policy (owner operator regulations and core fishermen eligibility criteria). Finally, at the local Gulf Nova Scotia local Area governmental level, the agreement had to respect the principle of adjacency, meaning those fishermen living in communities adjacent to the fishery had priority access rights. In this way, the Area 19 snow crab co-management agreement inadvertently adopted the co-management principle of subsidiarity such that the decision-making process was transferred to the institutional level closest to the resource. Furthermore, this institutional level included all bonafide fishermen living within the boundaries of Area 19, thereby creating a confluence of social and geographic boundaries in which social capital could be generated. As demonstrated in Chapter Six, (Section 6.9.3) it was this community-based social capital that largely made a three-way credible commitment possible, such that transaction costs were lowered while the asset value remained high.

In this view, the shift of governmental credible commitment to a community-based institutional decision-making model suggests that a radical shift in bureaucratic norms and values must have occurred in order for the Area 19 Snow Crab co-management Agreement to have been negotiated in the first place. As I argued in Chapter Three (Sections 3.3 and 3.4), the mandate of DFO is comprised of a paradox in which the tension between private and public interests is continually polarized among government bureaucrats. Following this argument, in Chapters Five (Section 5.3.7) and Six (Section 6.4), I demonstrated that another cultural value system exists within bureaucracy in which civil servants feel that they are entrusted with the responsibility to protect the public interest in their management of common property fisheries resources. Hence,

when the Atlantic cod fishery collapsed and the competence of government bureaucrats to protect public interest was questioned, national polices shifted to include conservation values together with economic efficiency values. In this way, a new opportunity arose to emphasize the public interests in new models of public private partnerships

As I explained in Chapter Five (Section 5.3.1), the proposed partnering model represented an important opportunity for change. More specifically, the new model for shared responsibility and accountability required a fundamental shift in the hierarchical power structure of government such that a new collaborative decision-making process could be implemented. Thus, as a new holistic model of bureaucratic decision-making took form, the historical government norms and values began to shift among the DFO team members assigned to negotiate the Area 19 co-management agreement. Consequently, narrowly defined national policies based on conservation and economic efficiency were expanded to more broadly include values of community benefits and the importance of social well-being.

The resulting collaborative decision-making process played an essential role in facilitating the design of several innovative fisheries management institutional rules within the Area 19 snow crab co-management agreement. In particular, the sharing formula was one of the key innovations that reduced the social costs of securing the title and increased the duration of access for Area 19 snow crab fishermen. The formula was designed to broaden the distribution of benefits amongst all bonafide fishermen within the Area 19 boundary as the asset value of the snow crab resource increased. In this way, the existing snow crab fishermen could maintain their economic viability, support the transaction costs of monitoring and enforcement, and still share the resource when the asset value increased. Thus, the Area 19 co-management

agreement created a mechanism in which private and public interests could both be met and social costs significantly reduced.

However, I also demonstrated in Chapter Six (Sections 6.9 and 6.10) that the formula by itself was not fully capable of reducing transaction costs. Rather, the *de facto* 4-trap/temporary permit contracts, in combination with the license pooling option, were major components of the agreement that reduced transaction costs and increased the distribution of benefits from the snow crab fishery. Hence, the community processes in which the traits of trust and trustworthiness were nurtured, called social capital, also played a fundamental role in reducing the transaction costs and the related social costs that secure title inevitably creates.

Therefore, one of the key findings of this research is that social costs arise when the transaction costs of secure title and duration are positive and are transferred to the government. Furthermore, social costs arise when the transaction costs of secure title and duration are positive and continue to increase as a result of social conflict. However, co-management arrangements can resolve these social cost problems under the following nine conditions:

1. The co-management agreement is based on principle of subsidiarity, such that the agreement is negotiated at the institutional level closest to the resource;

2. The co-management agreement negotiation process adopts the adjacency principle such that fishermen living in nearby communities have access rights to the natural capital of the resource stock to which they are adjacent;

3. The co-management agreement provides the institutional mechanisms necessary to exclude individuals outside the boundary of adjacent communities;

4. Local values of social well-being are respected and the distribution of benefits is regarded as an essential component of the adjacency principle;

5. Sufficient levels of social capital exist within the community to implement low transaction cost sharing mechanisms;

6. Collaborative decision-making methods are used to negotiate the co-management agreement;

7. All negotiating parties seek an agreement with credible commitment for all intervening joint claimants;

8. Joint claimants share the responsibility for the transaction costs of the agreement in proportion to the benefits received; and

9. Narrow interests of individuals are met while simultaneously meeting the broader interests of the collective.

7.1.3 Third Proposition: Social Capital Reduces Transaction Costs and Supplies Credible Commitment

The third proposition argues that community processes, under certain conditions, can provide a fundamental advantage for organizations seeking low transaction cost solutions for mutual monitoring. By providing the institutional stability necessary to generate social capital, social relations can supply the necessary means to create agreements with credible commitment.

However, these same social relations can also work to undermine institutions that are perceived to be incongruous with their collective shared identities, norms or interests and in this way erode commitment to the rules governing resource appropriation. Consequently, collective action can arise to resolve transaction cost dilemmas internally, or conversely, collective action can create transaction cost dilemmas by undermining existing institutions. Therefore, it is predicted that government institutions which support community processes can reduce transaction costs and increase the opportunity for internal and external credible commitment, provided that the transaction cost dilemmas of the first and second propositions are resolved.

Another major finding from this research is that community processes, in which social capital is generated, play a critical role in reducing transaction costs and

resolving collective action problems. In Chapter Six (Section 6.11), I demonstrated how the community-based *de facto* sharing contracts not only reduced transaction costs of each 4-trap license within the Area 19 co-management agreement, they also resolved the collective action problem of free-riding by equally distributing the benefits of the thirty-seven new Area 19 snow crab licenses. Furthermore, these contracts provided a mechanism to distribute benefits immediately, whereas the official Area 19 co-management agreement sharing formula would only have become active three years after it was implemented. Therefore, these contracts were essential for the credible commitment of the Area 19 bonafide fishermen who were originally without snow crab licenses.

However, as I explained in Chapter Five (Section 5.2.2), the ability of fishermen to design an alternative sharing institution was largely due to the multiplicity of social relations in their French Acadian and Scottish Gael communities, where a confluence of shared interests, identities and values generated the traits of trust and trustworthiness. In other words, these communities already contained the social characteristics and processes necessary to generate social capital. Hence, these integrated social relationships had the effect of reducing the variability and alterability of the 4-trap/temporary permit sharing contracts.

Yet, the social conflict between the Area 19 snow crab fishermen and the bonafide fishermen (without snow crab licenses) living in communities adjacent to the Area 19 fishing zone, represented a division of social identities based on economic status. Hence, the same community processes that can generate social capital and collective action can also erode social relationships by similar means. Therefore, social conflict can result in a high level of social upheaval within closely knit communities.

In order to address this, DFO resource managers helped mitigate community-level social conflict by insisting that the Area 19 snow crab fishermen share the responsibility with government to meet their communities' interests to share the Area 19 snow crab allocation with the bonafide fishermen in Area 19 (without snow crab licenses). In doing so, there were two critical factors in the role that the government managers played in supporting the interests of the communities in Area 19. First, the DFO managers' consistent use of the adjacency principle over the previous years created a precedent for adopting snow crab license eligibility criteria exclusively for fishermen living within the communities within the Area 19 boundary. This facilitated an over-arching identity of geographical place that included both the Area 19 snow crab fishermen and the Area 19 bonafide fishermen, but excluded Area 18 snow crab fishermen who were viewed as rivals by Area 19 snow crab fishermen. Second, the DFO Gulf Nova Scotia local area manager (acting as DFO's negotiating team leader) was able to convey the value of the adjacency principle among the members of the DFO negotiating team. Consequently, the negotiating team had the internal departmental support necessary to engage the Area 19 snow crab fishermen in a collaborative negotiating process in which both individual interests and community interests were respected.

In summary, this research identified the following six conditions under which government institutions support community processes that reduce transaction costs and supply credible commitment:

1. The adjacency principle is adopted by government resource managers as a consistent principle to delineate fishing boundaries and eligibility criteria;
2. The scale of the fishing boundary (adopted by the adjacency principle) is defined by a resource *stock* from which natural capital is generated, rather than a resource *flow*;

3. The social boundary is delineated according to an over-arching geographical identity that links the interests of conflicting groups with their shared resource and shared community boundaries;

4. A collaborative government team representing all aspects of fisheries management negotiates the co-management agreement;

5. Local government fisheries managers who are respected by fishermen and understand the complexity of local community dynamics have a leadership role within the negotiating team; and

6. The government negotiating team ensures all interests of the major intervening joint claimants are respected and included in the negotiation process.

7.1.4 Fourth Proposition: Transferability Increases Transaction Costs and Undermines Credible Commitment

The fourth proposition states that transaction costs can further increase due to exogenous circumstances or outside interests that threaten the security of entitlement over resource benefits. If the institutional rules that govern the property rights regime are easily altered by the transferability of access rights to outside interests, such that the asset value is reduced, than the expected returns from contributing to the sustainable management of the fish stock are lowered.

In this way, collective action problems are predicted to arise from competing interests who may work against organizations striving to create institutional solutions, especially if government authorities are captured by the power of competing interests. As a result, the sustainability of a resource management regime is predicted to depend largely on the institutions created at each level at which transaction costs arise. More specifically, the security of title over resource benefits depends on the transaction cost dilemmas created within institutions both internally and externally and the ability to attain credible commitment at each level of interaction. Consequently, the attribute of transferability is predicted to lead to higher marginal costs to secure access rights, monitor asset values and enforcement rights. Therefore, it is predicted that credible

commitment at all institutional levels will eventually be undermined by the attribute of transferability.

In Chapter Two (Section 2.4), I explained that the neo-liberal economic argument for individual property rights focuses largely on the attribute of transferability as a means to increase economic efficiency and asset value. However, one of the findings from this research is that in the case of the mid-shore snow crab fleet in Area 12 (which was based on an individual vessel quota management system) the market price of the license was not reflective of the earning capacity of the license. Consequently, fishermen paid exceedingly high costs to secure their access rights, yet their return on investment was often very low. Furthermore, the investment capital necessary to purchase these vessel quotas was so high that the mid-shore fleet was largely financed by government loans and processing companies. Hence, the incentive to over-fish was inextricably linked to the over-capitalization of the mid-shore snow crab industrial fishing fleet, which in turn was driven in part by license transferability and the resulting market for access. Therefore, the attribute of transferability contributed to the same over-capitalization dilemma that Scott Gordon described as the primary reason why fishermen participate in the "race for fish" (Gordon 1954).

Conversely, the small-scale Area 19 inshore fleet operated at an extremely high rate of economic return on investment. Furthermore, the inshore vessels were not heavily dependent on government loans nor were they indebted to processing companies. One of the major differences between the mid-shore fleet and the inshore fleet was the latter's lower capital investment. Furthermore, the vast majority of the inshore fleet had neither sold nor purchased their licenses. Rather, these licenses were either transferred within families or kept by the original license holders. Consequently,

the majority of the Area 19 snow crab fishermen did not overcapitalize in their fishing enterprises and were operating with significant profits.

This finding suggests that the attribute of transferability reduces the total asset value of the fishing license, when the transaction costs of the capital investment necessary to purchase the license (at an inflated market price) is considered. The neo-liberal prediction that licenses will be transferred through the market according to principles of economic efficiency has not been demonstrated in this research. Moreover, the accessibility of capital to over-invest in the purchase of a license has demonstrated that the attribute of transferability creates an unintended path of rent dissipation that may potentially lead to over-capitalization.

Further to this finding, this research has also revealed that the attribute of transferability has the potential to undermine community-based institutional solutions to resolve collective action dilemmas. As I explained in Chapter Five (Section 5.2), the collective action problem of "free-riding" arises when individuals can benefit from the collective action of others, but their contribution cannot be differentiated without monitoring and enforcement. Hence, an internal transaction cost dilemma arises if the costs of monitoring and enforcement exceed the benefits from collective action.

In Chapter Six (Sections 6.10 and 6.11), I explained how the Area 19 bonafide fishermen (without snow crab licenses) were able to resolve this dilemma through the design of the 4-trap/temporary permit contract and their use of license pooling to lower operational costs. However, I also explained that this *de facto* sharing mechanism was largely successful because of the existing level of social capital that reduced the costs of monitoring and enforcing the sharing rules. In other words, the sharing contracts created a situation in which the pay-offs from co-operation were equally beneficial for every contract share holder. However, the attribute of transferability was a significant

loop-hole that had to be removed from the institutional arrangement in order for the contract to be perceived as trustworthy. Hence, the attribute of transferability threatened to create three major free-rider problems.

The first and most obvious free rider problem, in this case, was that the individual fisherman whose name was on the license could have sold the license for a substantial profit (unofficial reports suggested the market price was approximately $200,000 in 1994). Therefore, the willingness of the Area 19 bonafide fishermen to participate in the *de facto* arrangement depended heavily on their ability to constrain transferability. Consequently, the legality of the civil contract, when combined with its historical reputation as a binding "trust" agreement, assured the fishermen that the transferability of the license was sufficiently prohibited.

The second free rider problem of transferability was related to the low transaction costs for monitoring and enforcement of the *de facto* sharing contract. As I explained in Chapter Five (Section 5.2.2), the community processes of social exchange that generate social capital are largely related to a multiplicity of social relations, shared identities and interests. Hence, a fisherman's long-term reputation for being trustworthy was a necessary prerequisite to participate in the sharing arrangement. Furthermore, the shared identity of being a lobster fisherman from the same community facilitated a low-cost monitoring and enforcement system, in which the costs and benefits from the license were equally divided with a high level of assurance. However, the attribute of transferability facilitates an opportunity for an outsider to intervene in the benefit stream from the sharing contract, without having the same reputation of being trustworthy or the same social boundaries that generate the characteristic of being trustworthy. Hence, the costs of monitoring and enforcement are increased as additional measures are required to assure that assets are fairly divided. Consequently, the sharing contract

included the consensus rule that if one partner wanted to break the contract, the other two could either buy his share or agree on a new share holder partner.

The third free rider problem of transferability, that has the potential to reduce the credible commitment of the co-management agreement, is related to the first finding that the over-investment in purchasing a license leads to rent dissipation. In Chapter Six (Section 6.11), I demonstrated that the net benefits from the *de facto* 4-trap/temporary permit contracts exceeded the net benefits of the proposed *de jure* 4-trap licenses, when the operating costs and transaction costs were subtracted from revenues. Furthermore, the Area 19 bonafide fishermen (without snow crab licenses) were able to increase their net benefits through the license pooling arrangements between the 4-trap/temporary permit contract holders and the 18-trap license holders. Many of these arrangements were based on family kinship ties and had the significant economic benefit of not requiring any up-front capital investment costs in operating gear or vessel maintenance costs. Similarly, the majority of these families had not sold or purchased their licenses, but had handed them down to other family members. Consequently, many of the families who were profiting from the snow crab fishery participated in the license pooling agreements in order to reduce the operating costs for members of their own family. Hence, these arrangements helped maintain low transaction costs and increased the asset value of the 4-trap/termporary permit contract holders.

However, one of the main problems with transferability is that the asset value of the license continues to increase over time at an inflated market price. Therefore, the temptation to sell the license grows as the license value exceeds its earning value. Yet, once this license is sold outside the family, the numerous benefit streams that the license supports within the family and larger community will be terminated.

Consequently, the related *de facto* sharing institutions will no longer be credible and the highly integrated system will predictably unravel.

This finding suggests that the attribute of transferability may actually threaten a very credible system of managing property rights through family inheritance. Furthermore, it presents a case in which the attribute of transferability is not necessarily conducive to economic efficiency. Rather, it is those families who have kept their individual transferable vessel quotas who arguably demonstrate a high level of economic efficiency. Moreover, this case demonstrates how capital flowing according to social relations may be more efficient (given the lower transaction costs for monitoring and enforcement) than capital flowing through the market system. However, the validity of this finding was not the focus of this thesis and needs to be further researched.

7.2 Broader Applications to Co-management Theory

This thesis has successfully demonstrated how the Area 19 co-management agreement evolved from a number of conditions that were generated by the dynamic inter-relationship between transaction costs, credible commitment and collective action. Furthermore, this thesis has explained how these elements interact to create a bargaining situation such that a co-management agreement, among all joint claimants who can impose reciprocal transaction costs, can be successfully negotiated. In this view, co-management theory must be understood within the context of co-operation and collective action theory. Certainly this necessary link has been suggested by maritime anthropologist Evelyn Pinkerton. In addition, co-management theory must be understood within the context of transaction costs, as argued by political scientist Sara Singleton. However, the inter-relationship between co-management theory, collective

action theory and transaction cost theory has not been made in the co-management literature until now. Therefore this thesis makes a contribution to the literature and further develops co-management theory, in its demonstration of the theoretical inter-linkages between collective action, transaction cost analysis and co-management.

In addition to the specific conditions this research identifies as being necessary for creating a co-management bargaining situation, conducting a successful negotiation process and implementing an agreement, the following general co-management principles have broader application. In addition to the existing principle of subsidiarity, which has already been noted in the literature (Jentoft 1996), these three principles have been demonstrated as necessary elements for successful co-management regimes.

1. The Principle of Adjacency;
2. The Principle of Mutual Trust and Respect; and
3. The Principle of Credible Commitment.

7.2.1 The Principle of Adjacency

As demonstrated in the evolution of the Area 19 snow crab co-management agreement, the principle of adjacency was an operational rule that secured access of the snow crab fishery to those communities adjacent to the resource. This was an essential rule from which the high degree of exclusivity for the Area 19 snow crab fishermen evolved. Were it not for the implementation of this adjacency principle, the exclusionary inshore boundary would not have been implemented, nor would the license eligibility criteria have excluded fishermen who lived in communities outside the Area 19 shoreline boundary. However, the success of this principle was largely attributed to the corresponding snow crab habitat boundary known as the "Cheticamp

Gully". In later years, scientists recognized the significance of this area and realized that crabs migrated into the Gully in order to feed. Consequently, the Area 19 snow crab fishermen had a high degree of exclusivity over a resource stock, within the confines of the Gully, such that the natural capital of the snow crab population in Area 19 could be protected. Thus, the benefit flows from the Gully stock could be secured with an exclusive boundary, where as the Area 18 snow crab fishermen could only secure one economic time period of benefits because the crab migrated.

Another facet of the adjacency principle was the confluence of social and geographic boundaries within which social capital was generated. As explained in Chapter Six (Section 6.11) the multi-plex relationships, which already existed in the coastal communities adjacent to the Area 19 snow crab fishery, played an essential role in reducing transaction costs and increasing benefits, both individually and collectively. Hence credible commitment was secured from all parties within the Area 19 snow crab co-management agreement.

Following the argument of this research, the principle of adjacency is a critical factor in creating successful co-management regimes. However, for the principle of adjacency to be operationalized, a community-territorial boundary must be created within which social capital is generated and natural capital is protected.

7.2.2 The Principle of Mutual Trust and Respect

One of the more subtle, but no less important, findings of this research was the affect of the Department of Fisheries and Oceans' shift to a "partnering" decision-making model. The collaborative model required a significant attitudinal shift within bureaucracy. Prior to the shift, DFO bureaucrats were anonymous participants in a hierarchy of paternal command and control. However, the "partnering" model required a

levelling of power and responsibility, not only between government and industry, but also among bureaucrats themselves. In this way, a collaborative model was developed based on mutual respect. Interest-based negotiation tools were used and principles for conducting a fair and transparent process were developed. Over time, the collaborative negotiation process created a sense of trust among all its participants. While this level of trust is difficult to measure and its existence can not easily be quantified, it is nonetheless a critical element of how this agreement was successfully negotiated and why this agreement continues to be negotiated over time, as external and internal conditions change over the years.

7.2.3 The Principle of Credible Commitment

This thesis has argued that the definition of co-management must be re-situated within the theory of collective action. In so doing, the conditions under which cooperation arises are understood as a bargaining situation such that both parties are mutually better off by co-operating and neither party reneges on their commitment to the agreement. According to collective action theory, one of the necessary conditions to avoid a broken commitment, called free riding, is that the benefits and costs from co-operating are shared equally. However, transaction cost theory, building on Ronald Coase's concept of reciprocally imposed transaction costs, argues that a bargaining situation is created because of the costs that are mutually imposed by joint claimants. Therefore, a number of possible outcomes from contracting or co-operating exist, depending on the transaction costs that are imposed from *not* negotiating an agreement. In other words, the commitment of each joint claimant to honour the co-operative agreement depends on whether they are better off with the agreement or without it. Hence the agreement is credible when the benefits from the agreement

exceed the benefits minus the transaction costs of not negotiating the agreement. The significance of this argument is that not all transaction costs are equal. Therefore, credible commitment is conditional on the external and internal bargaining situation and the mutually imposed transaction costs. For this reason, the Area 19 snow crab co-management agreement may not seem equitable if one broadly applies the equal sharing rule that is suggested by collective action theory as a viable solution to arising collective action dilemmas. For example, the Area 19 snow crab allocation was not divided equally among all area 19 bonafide fishermen as proposed by the Gulf Bonafide Coalition.

However, if one applies the equal sharing rule at each institutional layer at which transaction costs are mutually imposed, one will see this sharing rule *is* consistently applied in the Area 19 snow crab co-management agreement. For example, at the national policy level, the credible commitment of the Fisheries Minister required a significant level of cost recovery from the snow crab fishery. Thus a 50/50 cost sharing rule was negotiated between DFO and the Area 19 Snow Crab Fisherman's Association. At the DFO Gulf Regional level, the locally derived bonafide fisherman's policy was implemented such that 50 percent of the Area 19 bonafide fishermen had permanent licenses and 50 percent had temporary permits, thus an equal sharing rule was arguably implemented. At the Gulf Nova Scotia local Area level, the sharing formula was crafted with the principle that all Area 19 bonafide fishermen without permanent snow crab licenses received an equal portion of the snow crab allocation, under certain conditions. At the Area 19 Snow Crab Fisherman's Association level, all permanent license holders had to pay equally for co-management costs in proportion to their trap shares. At the trap-share/temporary permit contract level, all partners shared their benefits and costs equally.

The significance of this finding is that co-management agreements are more likely to be successful if a bargaining situation is first created and the mutually imposed transaction costs are resolved at each institutional level with an equal sharing rule such that the commitment of all joint claimants (those who impose transaction costs) to co-operate is credible.

7.3 Directions for Future Research

The findings of this thesis demonstrate the applicability of new institutional economic theory to the research questions inherent to CPR dilemmas. More specifically, the analytical tools of transaction cost theory, collective action theory and co-management theory, when used in combination, provide a useful analytical framework for researching institutional solutions to the dilemmas inherent to the "tragedy of the commons".

However, the choices made in scoping the research parameters of this thesis have left many institutional economic research questions unanswered in the Area 19 snow crab co-management case study. Like any dynamic pattern in life, the circumstances under which the Area 19 snow crab co-management agreement was originally negotiated have changed. Since the first agreement was signed in 1996, two major events have transpired that require further research. The first event was the re-negotiation of the Area 19 snow crab agreement in 2001 in which a new sharing formula was designed to fulfill the objective of "more sharing more often". Furthermore, the rules for license pooling were also changed through an industry and government negotiation process without considering the impact these changes would have on the *de facto* sharing contracts. Yet, despite these oversights, the temporary trap share permit holders found other institutional means of adapting to the new agreement.

Given these institutional adaptations, further research is required to explore why the trap sharing contracts were not considered in the new 2001 negotiation and how the temporary permit holders adapted to make the agreement credible, despite their exclusion from the negotiation process. Furthermore, the role that families play in the distribution of capital needs to be examined more closely in light of the findings of this research. More specifically, the transaction costs of market transferability need to be investigated in the context of social capital and the resolution of collective action dilemmas. For example, how do the transaction costs of exclusion and transferability compare when considered in the context of a closely knit community? How is the community acting to exclude outside threats such as inshore oil and gas development? How does the transferability of licenses impact this community sentiment of exclusion? Are people torn between the option of selling their licenses for profit and the uncertainty of keeping their licenses when the resource may be under threat as a result of oil and gas development?

The latter question is linked to the second major event in the Area 19 snow crab fishery. As mentioned in Chapter Six, in the summer of 2004, the scientific stock assessment over-estimated the available harvestable biomass for the Total Allowable Catch in excess of 2000 metric tonnes. Consequently, the sharing formula was improperly calculated and a large proportion of the temporary permit holders did not receive an allocation of snow crab, while the existing fleet of 18-trap holders received an extremely high allocation as well as high prices because of the misestimate of the supply. Given the history of social conflict in the Area 19 snow crab fishery resulting from the discrepancy of wealth between the 18-trap fleet and the 4-trap and temporary permit holders, it was expected that the credibility of the co-management agreement would be seriously questioned by the temporary permit holders and a high level of

social conflict would ensue. Moreover, it was expected that the Fisheries Minister would be brought in to resolve the dispute. However, the expected social conflict was never realized. Rather, the level of social capital generated over the years through the co-management agreement process, played a large role in facilitating new institutional options to resolve the collective action problem resulting from a scientific error.

Evidently, the institutionalization of the Area 19 snow crab co-management agreement played a strong role in mitigating social conflict and maintaining incentives to protect the sustainability of the snow crab resource. However, this case study presents a rich level of complexity requiring further research to understand exactly what elements of the co-management agreement continue to change and how these changes affect the conditions under which a bargaining situation is created and credible commitment is maintained. Furthermore, this research is particularly important when the Area 19 case study is compared and contrasted with Area 18 and Area 12 snow crab fisheries, in which all attempts to negotiate co-management agreements have failed.

Further research is also required to document how the institutionalization process evolved since the 1996 Area 19 snow crab agreement was negotiated and how the co-management agreement has mitigated external threats such as oil and gas, and internal threats such as collective action problems catalyzed by scientific uncertainty. Furthermore, additional research is required to explore the link between the negative impact of seismic testing (the method used to explore future oil and gas availability) on the Area 19 snow crab population and the scientific miscalculation of harvestable biomass. Exploring this question through the lens of transaction cost analysis may reveal an interesting link between the economic, social and ecological costs of non-

renewable resource exploration when compared with the benefits of renewable resources.

In conclusion, this thesis has charted new research directions in the examination of property rights institutions, particularly in the evolution of credible co-management agreements. Moreover, it has provided an original approach to understanding the linkages between transaction costs, credible commitment and collective action and the economic incentives that either lead to or avoid the "tragedy of the commons". This thesis has also demonstrated an original analysis which pieces together the necessary elements over time, for understanding the complexity of how conditions arise under which institutions capable of resolving the dilemmas inherent to the "tragedy of the commons" are created. Further, it has provided a strong foundation on which future research agendas can be built to advance our understanding of sustainable fisheries management institutions.

REFERENCES

AHPRC, and CCN. 2003. "Painting the Landscape of Rural Nova Scotia." Pp. 105. Halifax, Nova Scotia: Atlantic Health Promotion Research Centre, Dalhousie University and the Coastal Communities Network.

Alexander, Anne. 1997. *The Antigonish Movement: Moses Coady and Adult Education.* Toronto: Thompson Educational Publishing Inc.

Allen, Douglas. 1991. "What are Transaction Costs?" *Research in Law Economics* 14:1-18.

—. 1997. "Property Rights, Transaction Costs and Coase: One More Time." Pp. 105-118 in *Coasean Economics: Law and Economics and the New Institutional Economics*, edited by Steven Medema. Dordrecht: Kluwer Academic Publishers.

Allen, Douglas, and Dean Lueck. 1992. "Contract Choice in Modern Agriculture: Cash Rent versus Crop Share." *Journal of Law and Economics* xxxv:397-426.

—. 1993. "Transaction Costs and the Design of Cropshare Contracts." *RAND Journal of Economics* 24:78-99.

Anderson, Lee G. 1986. *The Economics of Fisheries Management - Revised and Enlarged Edition.* Baltimore: The Johns Hopkins University Press.

Anderson, Terry L. 2004. "Donning Coarse-Coloured Glasses: A Property Rights View of Natural Resource Economics." *The Australian Journal of Agriculture and Resource Economics* 48:445-462.

Anderson, Terry L., and P.J. Hill. 1975. "The Evolution of Property Rights: A Study of the American West." *Journal of Law and Economics* 18:163-179.

Apostle, Richard, and Gene Barrett (Eds.). 1992. *Emptying Their Nets: Small Capital and Rural Industrialization in the Nova Scotia Fishing Industry.* Toronto: University of Toronto Press.

Apostle, Richard, Gene Barrett, Petter Holm, Svein Jentoft, Leigh Mazany, Bonnie McCay, and Knut Mikalsen. 1998. *Community, State, and Market on the North*

Atlantic Rim: Challenges to Modernity in the Fisheries. Toronto: University of Toronto Press.

Area 19 Snow Crab Fisherman's Association. 1993. "Letter to Gulf Nova Scotia Area Manager - Area 18 and 19 Boundary Removal."

—. 2003. "By-laws of the Area 19 Snow Crab Fisherman's Association."

Area 19 Snow Crab Fishermen's Association. 1992. "A Plan in Protest of the Removal of the Area 18 and 19 Fishing Boundary." Pleasant Bay, Nova Scotia.

—. 1994. "A Legal Brief Concerning the Pilot Project Proposed for the Area 19 Crab Fishery."

Area Manager. 2004. "Personal Communication." October 2004.

Arnason, Ragnar. 1998. "Ecological Fisheries Management Using Individual Transferable Share Quotas." *Ecological Applications* 8:S151-S159.

Axelrod, R. 1984. *The Evolution of Cooperation*. New York: Basic Books.

Bailey, Connor, and Svein Jentoft. 1990. "Hard Choices in Fisheries Development." *Marine Policy* July 1990:333-344.

Barrett, Gene. 1984. "Capital and State in Atlantic Canada: The Structural Context of Fisheries Policy Between 1939 and 1977." Pp. 77-104 in *Atlantic Fisheries and Coastal Communities: Fisheries Decision-Making Case Studies*, edited by Cynthia Lamson and Arthur Hanson. Halifax: Dalhousie Ocean Studies Programme.

—. 1992a. "Post-war Development." Pp. 393 in *Emptying Their Nets: Small Capital Rural Industrialization in the Nova Scotia Fishing Industry*, edited by Richard Apostle and Gene Barrett. Toronto: University of Toronto Press.

—. 2000. "Solidarity and Exclusion: the Paradox of Rural Community." in *World Congress, International Rural Sociology Association*. Rio Janeiro, Brazil.

Barrett, Kevin J. 1992b. "Financial Characteristics: 1974-1984." Pp. 393 in *Emptying Their Nets: Small Capital and Rural Industrialization in the Nova Scotia Fishing Industry*, edited by Richard Apostle and Gene Barrett. Toronto: Toronto University Press.

Barzel, Yoram. 1997. *Economic Analysis of Property Rights*. Cambridge: Cambridge University Press.

Beaton, Stuart J. 1999. "Co-management in the Snow Crab Fishery." Pp. 6 in *3rd International Lobster Congress, South Australian Rock Lobster Advisory Council* http://www.rocklobster.org.au. Australia.

Berger, Peter, Birgitte Berger, and Hansfried Kellner. 1973. *The Homeless Mind: Modernisation and Consciousness*. New York: Random House.

Berkes, Fikret. 1985a. "The Common Property Resource Problem and the Creation of Limited Property Rights." *Human Ecology* 13:187-208.

—. 1985b. "Fishermen and 'The Tragedy of the Commons'." *Environmental Conservation* 12:199-206.

—. 1986. "Local-level Management and the Commons Problem: A Comparative Study of Turkish Coastal Fisheries." *Marine Policy* 1986:215-229.

—. 1989a. "Co-Management and the James Bay Agreement." Pp. 181-208 in *Co-operative Management of Local Fisheries: New Directions for Improved Management and Community Development*, edited by Evelyn Pinkerton. Vancouver: University of British Columbia Press.

— (Ed.). 1989b. *Common Property Resources: Ecology and Community-Based Sustainable Development*. London: Belhaven Press.

Berkes, Fikret, P. George, and R.J. Preston. 1991. "Co-management: The Evolution in Theory and Practice of the Joint Administration of Living Resources." *Alternatives* 18:12-18.

Bonafide Fishermen's Coalition. 1994. "Letter to DFO on the Reasons for the Area 19 Harbours Blockade."

Bromley, Daniel W. (Ed.). 1982. *Making the Commons Work: Theory, Practice, and Policy*. San Francisco: Institute for Contemporary Studies.

—. 1992a. "The Commons, Common Property, and Environmental Policy." *Environmental and Resource Economics* 2:1-17.

—. 1992b. "The Commons, Property, and Common-Property Regimes." Pp. 3-16 in *Making the Commons Work: Theory, Practice, and Policy*, edited by Daniel W. Bromley. San Francisco: Institute for Contemporary Studies.

Brubaker, Elizabeth. 1996. "Beyond Quotas: Private Property Solutions to Overfishing." in *Fish or Cut Bait! The Case for Individual Transferable Quotas in the Salmon Fishery of British Columbia.*

Bruce, David. 1996. "Coastal Communities in Crisis: Issues and Impacts." Pp. 55. Sackville, New Brunswick: Rural and Small Town Programme, Mount Allison University.

Buchanan, John. 2001. "Personal Communication." August 14, 2001.

Buck, Susan J. 1989. "Cultural Theory and Management of Common Property Resources." *Human Ecology* 17:101-116.

CAFSAC. 1989. "In-Season Advice on Snow Crab in the Southwestern Gulf of St. Lawrence." Pp. 9. Moncton, New Brunswick: Canadian Atlantic Fisheries Scientific Advisory Committee.

Calhoun, Sue. 1991. *A Word to Say: The Story of the Maritime Fishermen's Union.* Halifax: Nimbus Publishing Ltd.

Cashin, Robert. 1993. "Charting a New Course: Towards the Fishery of the Future." Pp. 135. Ottawa: DFO Communications Directorate.

CCN. 1994. "Coastal Communities Network: Shaping the Future Fishery: St. Ann's Workshop."

—. 1995. "Coastal Communities Network: Shaping the Future Fishery." Cornwallis Workshop: Coastal Communities Network.

Charles, Anthony. 2001. *Sustainable Fisheries Systems*. Osney Mead, Oxford: Blackwell Science Ltd.

Charles, Anthony T. 1992. "Canadian Fisheries Policies: Paradigms and Policy." in *Canadian Ocean Law and Policy*, edited by David VanderZwaag. Toronto: Butterworths.

Cheung, Stephen N.S. 1970. "The Structure of a Contract and the Theory of a Non-Exclusive Resource." *Journal of Law and Economics* 18:49-70.

Chiasson, Yvon, Pierre DeGrace, Greg Roach, and Mikio Moriyasu. 1988. "Review of the Snow Crab *(Chionoecetes opilio)* Resource in Western Cape Breton Island (Areas 18 and 19) for 1988." Pp. 29. Moncton, New Brunswick: Department of Fisheries and Oceans, Gulf Region, Science Branch.

Ciriacy-Wantrup, S.V., and R.C. Bishop. 1975. ""Common Property" as a Concept in Natural Resource Policy." *Natural Resources Journal* 15:713-727.

Clapp, R.A. 1998. "The Resource Cycle in Forestry and Fishing." *The Canadian Geographer* 42:129-144.

Coase, R. H. 1960. "The Problem of Social Cost." *The Journal of Law and Economics* 3:1-44.

Cohen, A.P. 1985. *The Symbolic Construction of Community*. London: Routledge.

Cohen, Fay G. 1989. "Treaty Indian Tribes and Washington State: The Evolution of Tribal Involvement in Fisheries Management in the U.S. Pacific Northwest." Pp. 37-48 in *Co-operative Management of Local Fisheries: New Directions for Improved Management and Community Development*, edited by Evelyn Pinkerton. Vancouver: University of British Columbia Press.

Coleman, James. 1988. "Social Capital in the Creation of Human Capital." *American Journal of Sociology* 94:S95-S120.

—. 1990. *Foundations of Social Theory*. Cambridge: The Belknap Press of Harvard University Press.

Copes, P. 1996. "Adverse Impacts of Individual Quota Systems on Conservation and Fish Harvest Productivity." Pp. 15. Vancouver, BC: Institute of Fisheries Analysis, Simon Fraser University.

—. 1999. "The Threat of ITQs to Fisheries Conservation and to Artesinal Fishing Rights in Chile." Pp. 22. Vancouver, BC: Institute of Fisheries Analysis, Simon Fraser University.

Cox, Lori Vitalie. 1997. "Engineered Consent: The Relocation of Black Point, a Small Gaelic Fishing Community in Northern Cape Breton Island." Pp. 450 in *Faculty of Graduate Studies*. Halifax: Dalhousie University.

Cronon, William. 1992. *Changes in the Land: Indians, Colonists and the Ecology of New England*. New York: Hill and Wang.

Crowley, R. W., B. McEachern, and R. Jasperse. 1993. "A Review of Federal Assistance to the Canadian Fishing Industry, 1945-1990." in *Perspectives on Canadian marine Fisheries Management*, edited by L. S. Parsons and W. H. Lear. Ottawa: National Research Council of Canada and Department of Fisheries and Oceans.

CSAS. 2004. "Proceedings of the Peer Review of Snow Crab Stock in the Southern Gulf of St. Lawrence, Gulf Region." Moncton, New Brunswick: University of Quebec.

Dahlman, Carl. 1979. "The Problem of Externality." *The Journal of Law and Economics* 22:141-162.

Daly, Herman E., and John B. Cobb. 1994. *For the Common Good: Redirecting the Economy Toward Community, the Environment and a Sustainable Future.* Boston: Beacon Press.

Davidson, Kevin, and Michel Comeau. 1987. "An Overview of Catch, Effort and Biological Trends for the 1986 Snow Crab, *Chionoecetes opilio*, Fisheries Area 18 and 19, Western Cape Breton Island." Pp. 35. Moncton, New Brunswick: Canadian Atlantic Fisheries Scientific Advisory Committee.

Davis, Anthony, and Conner Bailey. 1996. "Common in Custom, Uncommon in Advantage: Common Property, Local Elites, and Alternative Approaches to Fisheries Management." *Society and Natural Resources* 9:251-265.

Deveau, I.E., and J.W. Aucoin. 1966. "Spider Crab Explorations in Gulf of St. Lawrence, December 1965 to February 1966." Pp. 21. Ottawa: Canada Department of Fisheries Industrial Development Service.

Dewees, Christopher M. 1998. "Effects of Individual Quota Systems on New Zealand and British Columbia Fisheries." *Ecological Applications* 8:S133-S138.

DFO. 1981. "Snow Crab Working Group Minutes." Sydney, Nova Scotia.

—. 1982. "Atlantic Snow Crab Fishery in the 1980's: A Discussion Paper." Pp. 46. Ottawa: Department of Fisheries and Oceans.

—. 1983. "An Economic Assessment of the New Brunswick Crab Fleet -1982." Pp. 10: Department of Fisheries and Oceans.

—. 1984. "Area 7 Management Plan." Gulf Region Area Office.

—. 1987. "1987 Cape Breton Inshore Snow Crab Management Plan." in *News Release*. Halifax.

—. 1992a. "Memorandum for the Minister: Inshore Crab Fishing Areas 18 and 19."

—. 1992b. "Minutes of the Snow Crab Working Group." Port Hawkesbury: Nautical Institute.

—. 1992c. "Snow Crab Working Group Meeting."

—. 1993. "Briefing Note from Regional Director General Gulf Region to Assistant Deputy Minister of Operations Re: Minister's Meeting with Area 19 Snow Crab Association."

—. 1994a. "Briefing Note for Minister Re: Follow-up Meeting to Harbour Blockades in Area 19 Snow Crab Fishery."

—. 1994b. "Summary of the Positions of the Area 18 and Area 19 Fishermen Presented to the Department During the March 1994 Snow Crab Seminar."

—. 1995a. "Partnership Working Group Meeting." National DFO Working Group.

—. 1995b. "Update on DFO's Partnering Approach." DFO Partnering Working Group.

—. 1996a. *Commercial Fisheries Licensing Policy for Eastern Canada*. Ottawa, Ontario: Communications Directorate, Fisheries and Oceans Canada.

—. 1996b. "Integrated Fisheries Management Plan: Area 19 Snow Crab 1996-2001." Moncton, New Brunswick: Gulf Fisheries, Maritime Region.

—. 1996c. "Points of Agreement - Internal Document June 1996."

—. 1996d. "Reflections on a Co-management Negotiation Process." DFO Area 19 Co-management Negotiation Team.

—. 1999. "Framework and Guidelines for Implementing the Co-management Approach Volume I: Context, Concept and Principles." Pp. 20: Department of Fisheries and Oceans.

DFOpress. 1984. "Modifications to Management Plan for Offshore Crab Fishery." in *DFO News Release*.

—. 1986. "Cape Breton Inshore Snow Crab Fishery Management Plan Announced." in *DFO News Release*. Moncton.

—. 1987. "Cape Breton Inshore Snow Crab Management Plan." in *DFO News Release*. Moncton.

—. 1988. "1988 Cape Breton Inshore Management Plan." in *DFO News Release*. Moncton.

Ebbin, Syma A. 2002. "Enhanced fit through institutional interplay in the Pacific Northwest Salmon co-management regime." *Marine Policy* 26:253-259.

Edwards, Steven F. 1994. "Ownership of Renewable Ocean Resources." *Marine Resource Economics* 9:253-273.

Edwards, Victoria, and Nathalie Steins. 1998. "The Role of Contextual Factors in Common Pool Resource Analysis." in *Crossing Boundaries*, edited by Panel for the International Association for the Study of Common Property. Simon Fraser University: International Association for the Study of Common Property.

FCC. 1994. "Building a Fishery that Works: A Vision for the Atlantic Fisheries." Pp. 45. Ottawa: Fisheries Council of Canada.

Feeny, D., F. Berkes, B.J. McCay, and J.M. Acheson. 1990. "The Tragedy of the Commons: Twenty-Two Years Later." *Human Ecology* 18:1-19.

Finlayson, Alan Christopher. 1994. *Fishing for Truth: A Sociological Analysis of Northern Cod Stock Assessments from 1977-1990.* St. John's: Institute of Social and Economic Research, Memorial University of Newfoundland.

Fisher, R., and W. Ury. 1991. *Getting to Yes: Negotiating Agreement Without Giving In.* Toronto: Penguin Books.

Fisheries and Oceans Canada. 2001. "The Management of Fisheries on Canada's Atlantic Coast: A Discussion Document on Policy Direction and Principles." Pp. 69: Atlantic Fisheries Policy Review.

Flora, J.L. 1998. "Social Capital and Communities of Place." *Rural Sociology* 63:481-506.

Freudenburg, William R. 1992. "Addictive Economies: Extractive Industries and Vulnerable Localities in a Changing World Economy." *Rural Sociology* 57:305-332.

Galjart, Benno. 1992. "Co-operation as Pooling." *Sociologia Ruralis* 32:389-407.

Gardner Pinfold Consultants Ltd. 1995. "Impact of Proposed User Fees in the Atlantic Fisheries, prepared by Gardner Pinfold Consulting Economists Ltd." Pp. 35: Department of Fisheries and Oceans Canada.

Gherardi, Silvia, and Attilio Masiero. 1990. "Solidarity as a Networking Skill and a Trust Relation: Its implications for Cooperative Development." *Economic and Industrial Democracy* 11:553-574.

Giddens, Anthony. 1971. *Capitalism and Modern Social Theory: An Analysis of the Writings of Marx, Durkheim and Max Weber*. Cambridge University Press.

Gordon, Scott. 1954. "The Economic Theory of a Common Property Resource: The Fishery." *Journal of Political Economy* 62:124-142.

Government of Canada. 1985a. "Fisheries Act (R.S. 1985, c. F-14) http://laws.justice.gc.ca/en/F-14/index.html."

—. 1985b. "Fisheries Development Act (R.S. 1985, c. F-21) http://laws.justice.gc.ca/en/F-21/index.html."

Granovetter, Mark. 1985. "Economic Action and Social Structure: The Problem of Embeddedness." *American Journal of Sociology* 91:481-510.

Gulf Bonafide Coalition. 1993. "Letter from Area 19 Bonafide Fishermen to the Honourable Ross Reid, Minister of Fisheries."

Habermas, Jurgen. 1987. *The Theory of Communicative Action, Lifeworld and System: A Critique of Functionalist Reason*. Boston: Beacon Press.

Hanna, Susan S. 1990. "The Eighteenth Century English Commons: A Model for Ocean Management." *Ocean and Shoreline* 14:155-172.

Hardin, G. 1968. "The Tragedy of the Commons." *Science* 162:1243-1248.

Hebert, Lousie. 1989. "Great Expectations: The Atlantic Fish Processing Sector." Pp. 15. Moncton, New Brunswick: Program Coordination and Economics, Department of Fisheries and Oceans.

Hebert, M.E., E.Wade, P. De Grace, A. Hebert, M Biron, and M. Moryiasu. 1997. "1997 Assessment of Snow Crab *Chionoecetes opilio* stock in the southern Gulf of St. Lawrence." Pp. 63. Moncton, New Brunswick: Science Branch, Maritimes Region, Department of Fisheries and Oceans.

Hegel, George W.F. 1976. *Philosophy of Right.* Oxford: Oxford University Press.

Hollings, C.S., and Gary K. Meffe. 1996. "Command and Control and the Pathology of Natural Resource Management." *Conservation Biology* 10:328-337.

Holton, Robert J. 1992. *Economy and Society.* London: Routledge.

Jentoft, Svein. 1989. "Fisheries Co-Management: Delegating Government Responsibility to Fishermen's Organizations." *Marine Policy* 1989:137-154.

—. 1999. "Healthy Fishing Communities: An Important Component of Healthy Fish Stocks." *Fisheries* 24:28-29.

—. 2003. "Co-management - The Way Forward." Pp. 324 in *The Fisheries Co-management Experience: Accomplishments, Challenges and Prospects*, edited by Douglas Clyde Wilson, Jesper Raakjaer Nielson, and Poul Degnbol. Dordrecht: Kluwer Academic Publishers.

Jentoft, Svein, and Bonnie McCay. 2003. "The Place of Civil Society in Fisheries Management: A Research Agenda for Fisheries Co-management." Pp. 324 in *The Fisheries Co-management Experience: Accomplishments, Challenges and Prospects*, edited by Douglas Clyde Wilson, Jesper Raakjaer Nielson, and Poul Degnbol. Dordrecht: Kluwer Academic Publishers.

Kearney, John F. 1984. "The Transformation of The Bay of Fundy Herring Fisheries 1976-1978: An Experiment in Fishermen-Government Co-Management." Pp. 165-203 in *Fisheries and Coastal Communities: Fisheries Decision-making Case Studies*, edited by C. Lamson and A. Hanson. Halifax: Institute for Resources and Environmental Studies, Dalhousie University.

Kimber, Stephen. 1989. *Net Profits: The Story of National Sea.* Halifax: Nimbus Publishing.

Larson, Soren. 2003. "Promoting Aboriginal Territoriality Through Interethnic Alliances: The Case of the Cheslatta T'en in Northern British Columbia." *Human Organization* 62:74-84.

Leblanc, Arthur. 2001a. "Conservation and Protection, Area Manager."

Leblanc, Leonard. 2001b. "Personal Communication." July 18, 2001.

Libecap, Gary D. 1996. "Economic Variables and the Development of the Law: the Case of Western Mineral Rights." Pp. 355 in *Empirical Studies in Institutional Change*, edited by Lee J. Alston, Thrainn Eggertsson, and Douglass C. North. U.K: Cambridge University Press.

Lindner, R.K., H.F. Campbell, and G.F. Bevin. 1992. "Rent Generation During the Transition to a Managed Fishery: The Case of the New Zealand ITQ System." *Marine Resource Economics* 7:229-248.

Loch, James S., Mikio Moriyasau, and James B. Jones. 1995. "An Improved Link Between Industry, Management and Science: A Case History of the Southern Gulf of St. Lawrence Snow Crab Fishery." *Aquatic Living Resources* 8:253-265.

Lotz, Jim, and Michael R. Welton. 1997. *Father Jimmy: Life and Times of Jimmy Tompkins*. Wreck Cove, Cape Breton Island: Breton Books.

Loucks, L., T. Charles, and M. Butler (Eds.). 1998. *Managing Our Fisheries, Managing Ourselves*. Halifax, N.S.: Gorsebrook Research Institute for Atlantic Canada Studies.

Loucks, Laura, Jim Wilson, and Jay Ginter. 2003. "Experience with Fisheries Co-management in North America." Pp. 324 in *The Fisheries Co-management Experience*, edited by Douglas Wilson, Jesper Raakjer Nielson, and Poul Degnbol. Dordrecht: Kluwer Academic Publishers.

Lueck, Dean. 1995. "The Rule of First Possession and the Design of the Law." *Journal of Law and Economics* 38:393-436.

MacArthur, Barbara. 2001. "personal communication." Department of Fisheries and Oceans, Antigonish Area Office.

Macpherson, C. B. 1962. *The Political Theory of Possessive Individualism*. London: Oxford University Press.

Marchak, Patricia, Neil Guppy, and John McMullan (Eds.). 1987. *Uncommon Property: the Fishing and Fish Processing Industries in British Columbia*. New York: Methuen.

Maurstad, Anita. 1992. "Closing the Commons - Opening the "Tragedy": Regulating North-Norwegian Small-Scale Fishing." Pp. 18 in *3rd Common Property Conference of the International Association for the Study of Common Property*. Washington, D.C.

McCay, Bonnie J. 1995. "Social and Ecological Implications of ITQs: An Overview." *Ocean and Coastal Management* 28:3-22.

McCay, Bonnie J., and James M. Acheson. 1987. "Human Ecology of the Commons." Pp. 1-34 in *The Question of the Commons: The Culture and Ecology of Communal Resources*, edited by B.J. McCay and J.M. Acheson. Tuscon: University of Arizona Press.

McCay, Bonnie J., C.F. Creed, A.C. Finlayson, R. Apostle, and K. Mikalsen. 1995. "Individual Transferable Quotas (ITQs) in Canadian and U.S. Fisheries." *Ocean and Coastal Management* 28:85-115.

McCay, Bonnie, and Svein Jentoft. 1996. "From the Bottom Up: Participatory Issues in Fisheries Management." *Society and Natural Resources* 9:237-250.

McMullan, John. 1987. "State, Capital and the B.C. Salmon-Fishing Industry." Pp. 390 in *UnCommon Property: The Fishing and Fish-Processing Industries in British Columbia*, edited by Patricia Marchak, Neil Guppy, and John McMullan. Toronto: Methuen.

M'Gonigle, Michael, Jana McLean, and Rosemary Ommer. 2000. "Power and Place: Towards a Territorial Ethic." Pp. 304 in *Just Fish: Ethics and Canadian Marine Fisheries*, edited by Harold Coward, Rosemary Ommer, and Tony Pitcher. St. John's Newfoundland: Institute of Social and Economic Research, Memorial University.

Muthoo, Abhinay. 2000. "A Non-Technical Introduction to Bargaining Theory." *World Economics* 1:145-166.

Neis, Barbara, and Melanie Morris. 2000. "Creative, Ecosystem, and Distributive Justice and Newfoundland's Capelin Fisheries." in *Just Fish: Ethics and Canadian Marine Fisheries*, edited by Harold Coward, Rosemary Ommer, and Tony Pitcher.

Newell, Dianne, and Rosemary Ommer (Eds.). 1999. *Fishing Places, Fishing People: Traditions and Issues in Canadian Small-Scale Fisheries*. Toronto: University of Toronto Press.

North, Douglass C. 1992. "Institutions and Economic Theory." *American Economist*:3-6.

North, Douglass, and Barry Weingast. 1998. "Constitutions and Commitment: the Evolution of Institutions Governing Public Choice in Seventeenth-century England." in *Empirical Studies in Institutional Change*, edited by Lee Alston, Thrainn Eggerstsson, and Douglass North. United Kingdom: Cambridge University Press.

Oliver, Christine. 1991. "Strategic Responses to Institutional Processes." *The Academy of Management Review* 16:145-179.

Olson, Mancur. 1965. *The Logic of Collective Action. Public Goods and the Theory of Groups*. Cambridge, Massachusetts: Harvard University Press.

Ommer, Rosemary E. 1999. "Rosie's Cove: Settlement Morphology, History, Economy, and Culture in a Newfoundland Outport." Pp. 374 in *Fishing Places, Fishing People: Traditions and Issues in Canadian Small-Scale Fisheries*, edited by Dianne Newell and Rosemary E. Ommer. Toronto: University of Toronto Press.

Ostrom, Elinor. 1990. *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge, UK: Cambridge University Press.

—. 1992. *Crafting Institutions for Self-Governing Irrigation Systems*. San Francisco: Institute for Contemporary Studies.

Pearse, Peter H. 1981. "Fishing Rights, Regulations and Revenues." *Marine Policy* 1981:135-146.

—. 1988. "Property Rights and the Development of Natural Resource Policies in Canada." *Canadian Public Policy* 14:307-320.

—. 1994. "Fishing Rights and Fishing Policy: The Development of Property Rights as Instruments of Fisheries Management." Pp. 76-91 in *The State of the World's Fishing Resources*, edited by Clyde W. Voigtlandes. Oxford: IBH Publishing.

Pinkerton, Evelyn. 1988. "Cooperative Management of Local Fisheries: A Route to Development." Pp. 257-273 in *Production and Autonomy: Anthropological Studies and Critiques of Development*, edited by John W. Bennett and John R. Brown: University Press of America and the Society for Economic Anthropology.

—. 1989. "Introduction: Attaining Better Fisheries Management Through Co-Management: Prospects, Problems, and Propositions." Pp. 3-33 in *Co-operative Management of Local Fisheries: New Directions for Improved Management and Community Development*, edited by Evelyn Pinkerton. Vancouver: University of British Columbia Press.

—. 1991. "Locally Based Water Quality Planning: Contributions to Fish Habitat Protection." *Canadian Journal of Fisheries and Aquatic Sciences* 48:1326-1333.

—. 1992. "Translating Legal Rights into Management Practice: Overcoming Barriers to the Exercise of Co-Management." *Human Organization* 51:330-341.

—. 1993. "Co-management Efforts as Social Movements." *Alternatives* 19:35-38.

—. 1996. "The Contribution of Watershed-Based Multi-Party Co-Management Agreements to Dispute Resolution: The Skeena Watershed Committee." *Environments* 23:51-68.

—. 2003. "Toward Specifity in Complexity: Understanding Co-management from a Social Science Perspective." Pp. 319 in *The Fisheries Co-management Experience: Accomplishments, Challenges and Prospects*, edited by Douglas Clyde Wilson, Jesper Raakjaer Nielson, and Paul Degnbol. London: Kluwer.

Polanyi, Karl. 1944. *The Great Transformation*. New York: Farrar, Straus & Giroux.

Pomeroy, R.S., and R. Berkes. 1997. "Two to Tango: The Role of Government in Fisheries Co-management." *Marine Policy* 21:465-480.

Portes, Alejandro, and Julia Sensenbrenner. 1993. "Embeddedness and Immigration: Notes on the Social Determinants of Economic Action." *American Journal of Sociology* 98:320-350.

Prugh, Thomas. 1995. *Natural Capital and Human Economic Survival*. Solomons, MD: International Society for Ecological Economics.

Putnam, Robert D. 1993. "The Prosperous Community: Social Capital and Public Life." *The American Prospect* 13.

Roach, Greg. 1995. "A History of the Area 19 Snow Crab Fishery." Pp. 23. Halifax: Nova Scotia Department of Fisheries.

Savoie, Donald J., Gabriel Filteau, and Patricia Gallaugher. 1998. "Partnering the Fishery: Report of the Panel Studying Partnering." Pp. 24: Fisheries and Oceans Canada.

Schlosberg, David. 1995. "Communicative Action in Practice: Intersubjectivity and New Social Movements." *Political Studies* XLIII:291-311.

Schumpter, J. 1954. *A History of Economic Analysis*. New York: Oxford University Press.

Scott, Anthony. 1955. "The Fishery: The Objectives of Sole Ownership." *Journal of Political Economy* 63:116-124.

—. 1988. "Development of Property in the Fishery." *Marine Resource Economics* 5:289-311.

—. 1996. "The ITQ as a Property Right: Where it Came From, How it Works, and Where it is Going." Pp. 31-98 in *Taking Ownership: Property Rights and Fishery Management on the Atlantic Coast*, edited by Brian Lee Crowley. Halifax: Atlantic Institute for Market Studies.

—. 2000. "Introducing Property in Fisheries Management." in *FishRights 99*, edited by Ross Shotten. Fremantle, Western Australia: Food and Agriculture Organization of the United Nations.

Sen, Sevaly, and Jesper Raakjoer Nielsen. 1997. "Commentary on "Fisheries Co-Management: A Comparative Analysis"." *Marine Policy* 21:545-546.

Shaw, Carl K.Y. 1992. "Hegel's Theory of Modern Bureaucracy." *American Political Science Review* 86:381-389.

Sinclair, Peter R. 1985. *From Traps to Draggers*. St. John's, Newfoundland: Institute of Social and Economic Research.

—. 1987a. *State Intervention and the Newfoundland Fisheries*. Aldershot England: Avebuty Gower Publishing Company Limited.

—. 1987b. "Towards freezer plants and deep sea draggers: Newfoundland's fisheries policy under commission of government." Pp. 155 in *State Intervention and the Newfoundland Fisheries*. Aldershot England: Avebury Gower Publishing Company Limited.

Singleton, Sara. 1998. *Constructing Cooperation: The Evolution of Institutions of Comanagement*. Ann Arbor: The University of Michigan Press.

Statistics Canada. 2002. "Canadian Census 1986 and 1996 Profile Tables." http://datacentre.chass.utoronto.caproxy.lib.sfu.ca.cgi-bin/census/retrieve_census-1986da.

Taylor, D., and J. Wilson. 1993a. "Ending the Watershed Battles: BC Forest Communities Seek Peace Through Local Control." *Environments* 22:93-101.

Taylor, Michael, and Sara Singleton. 1993b. "The Communal Resource: Transaction Costs and the Solution of Collective Action Problems." *Politics and Society* 21:195-214.

Thomas, David H. L. 1996. "Fisheries Tenure in an African Floodplain Village and the Implications for Management." *Human Ecology* 24:287-313.

Tietenberg, Tom. 1988. "Renewable Common-Property Resources: Fisheries." Pp. 257-279 in *Environmental and Natural Resource Economics*, edited by Tom Tietenberg: Scott, Foresman and Company, USA.

Toennies, Ferdinand. 1967. *Community and Society*. Ann Arbor Michigan: Michigan State University Press.

Townsend, Ralph E. 1995. "Fisheries Self-Governance: Corporate or Cooperative Structures?" *Marine Policy* 19:39-45.

Turner, Stephen P. 1996. "Introduction: Social Theory and Sociology." Pp. 1-16 in *Social Theory and Sociology: The Classics and Beyond*, edited by Stephen P. Turner. Cambridge: Blackwell.

Veltmeyer, Henry. 1990. "The Restructuring of Capital and the Regional Problem." Pp. 270 in *Restructuring and Resistance: Perspectives from Atlantic Canada*, edited by Bryant Fairley, Colin Leys, and James Sacouman. Toronto: Garamond Press.

Warriner, Keith. 1987. "Regionalism, Dependence, and the B.C. Fisheries: Historical Development and Recent Trends." Pp. 402 in *UnCommon Property: The Fishing and Fish-Processing Industries in British Columbia*, edited by Patricia Marchak, Neil Guppy, and John McMullan. Toronto: Methuen.

Watson, J., and S.L Simpson. 1969. "The Queen Crab Industry in the Atlantic Provinces." Pp. 52. Ottawa: Industrial Development Branch, Fisheries Service, Department of Fisheries and Forestry.

Weber, Max. 1968. *Economy and Society, Volume 1*. New York.

Weinstein, Martin S. 2000. "Pieces of the Puzzle: Solutions for Community-Based Fisheries Management from Native Canadians, Japanese Cooperatives and Common Property Researchers." *The Georgetown International Environmental Law Review* 12:375-412.

Wilder, D.G. 1969. "Conservation of the Queen Crab." Pp. 5: Department of Fisheries, Industrial Development Service.

Williams, Rick, and Gilles Theriault. 1990. "Crisis and Response: Underdevelopment in the Fishery and the Evolution of the Maritimes Fishermen's Union." Pp. 270 in *Restructuring and Resistance: Perspectives from Atlantic Canada*, edited by Bryant Fairley, Colin Leys, and James Sacouman. Toronto: Garamond Press.

Yin, R. 1994. *Case Study Research: Design and Methods*. Thousand Oaks, CA: Sage Publishing.

Zucker, L.G. 1987. "Institutional Theories of Organization." *Annual Review of Sociology* 13:443-464.