BERTH RIGHTS: INFORMAL PROPERTY RIGHTS IN A NOVA SCOTIA LOBSTER FISHERY

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ABSTRACT

This paper examines the system of informal property rights in the lobster fishery in eastern Nova Scotia. The lobster berth system is characterized by gentlemen's agreements which have been passed down through generations of fish harvesters. The system was established by eighteenth century Scottish settlers with the division of land and was imposed on the marine environment when the fishing industry became prosperous. The system is founded on the principle of respect and regard for the rights of other harvesters in the system. This sense of obligation to others is what has let the system survive the decades. Many harvesters within the berth system believe the existence of such private property rights is what has enabled the lobster stocks in the area to continue to grow while other lobster stocks near-by have declined. This paper outlines the structure and division of the berth system while exploring its use as a successful conservation tool. This idea is discussed in the paper with relation to historical data on lobster landings in the surrounding areas and biological principles that influence stock productivity. The paper concludes with the argument that the system should be given more attention by Fisheries and Oceans Canada as a successful system of Fisheries Management.

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SECTION 1.0: INTRODUCTION

The shores of Antigonish County come alive in the spring with fishing activity. Driving along the winding rural roads, you see men and women out in their yards mending lobster gear and painting boats and buoys bright colours. These bright coloured buoys will soon be floating on the deep blue waters of St. George's Bay and attached to lobster trap lines which enable fish harvesters to haul back their traps which are placed on the ocean bottom during the lobster season. Morristown and Cape George are two such communities where this yearly activity is so familiar. The scenery along the coastline is breathtaking with its unobstructed view of beaches and cliffs jutting into the inviting depths of the Bay. Aside from their beauty, these areas are home to a unique system of informal property rights in the lobster fishing industry.

From Ballantyne's Cove, the northern tip of Antigonish County, to the coast of Antigonish Harbour, exists a usufruct system of informal fishing rights; a system which allows some fish harvesters to profit from a fishing area which is legally common property. Old property lines of Scottish settlers extend past the shoreline and into St. George's Bay to form boundaries for fish harvesters. The lines are invisible to the sea life beneath the water's surface, but to the fish harvesters whose livelihood depends on the bounty of the sea, the lines are set in stone and are delineated by land references like a stone, fence line or trees.

The lobster fishery in the southern Gulf of St. Lawrence (sGSL) has been the mainstay for inshore fishermen since 1985 due to increasing lobster catches and decreases in quotas or stock size of other species. The season in Lobster Fishing Area (LFA) 26A runs for a two month period starting May 1st and ending June 30th every season. Lobster landings in LFA 26A account for approximately 80% of the value of the fishing industry for the Southern Gulf area. There

have been many ecological factors scientists have attributed to the success of the lobster fishery in some of the areas within LFA 26A. There is also the existence of a unique set of informal property rights which exists in the areas of Ballantyne's Cove Wharf (Cape George, Antigonish) and Cribbon's Point Wharf (Morristown, Antigonish) (Figure 1.1 and 1.2).

This system of informal property rights has been in existence since the start of the lobster fishery in the area. Local fish harvesters believe the berth system has been and will continue to be a vital tool in managing their lobster fishery.

This paper will describe the lobster fishery in the southern Gulf of St. Lawrence and show how the value of this fishery is vital to the industry. A description of the lobster berth system, how the system came to exist, how the berths are divided among the harvesters, and how they were acquired will also be discussed. Next, the paper will outline how the berth system is regulated, how fish harvesters in the area view the system, implications to the Tragedy of the Commons, biological mechanisms that connect the system to stock productivity, and outline some threats to the system.

The paper will then focus on the level of involvement Fisheries and Oceans Canada has with the berth system, suggest ways Fisheries and Oceans Canada could enforce the berth system and provide an example of how this can be accomplished through comparison of the Nova Scotian Sea Urchin Fishery. Examination of some of the difficulties Fisheries and Oceans would have with the formal implementation and enforcement of the berth system will then be presented.

The paper concludes with an outline of the benefits of the berth system, a summary of the threats to the system and provides support for the socio-economic importance of preserving lobster berths.

(Source: Canada Maps 2011)

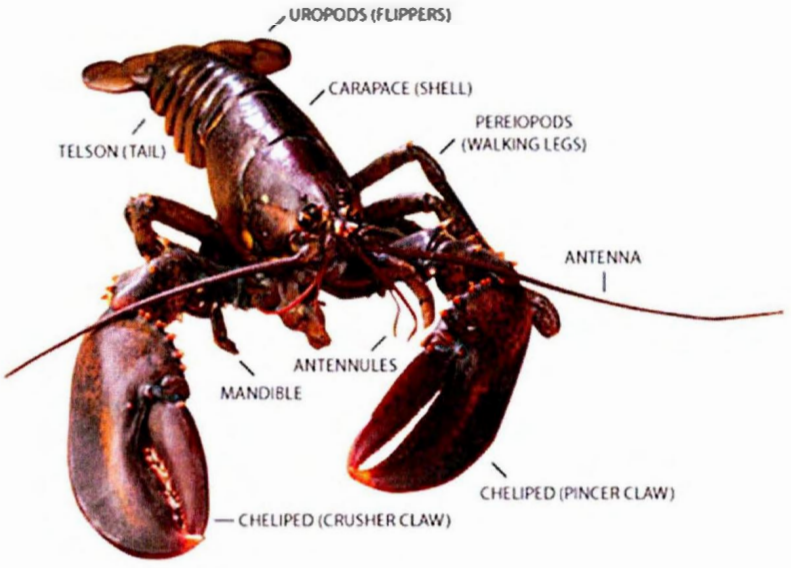
FIGURE 1.1: MAP OF EASTERN CANADA

(Source: Service NS Canada 2011)

FIGURE 1.2: MAP OF ST. GEORGE'S BAY, ANTIGONISH, NOVA SCOTIA

1.1: BIOLOGY OF THE LOBSTER

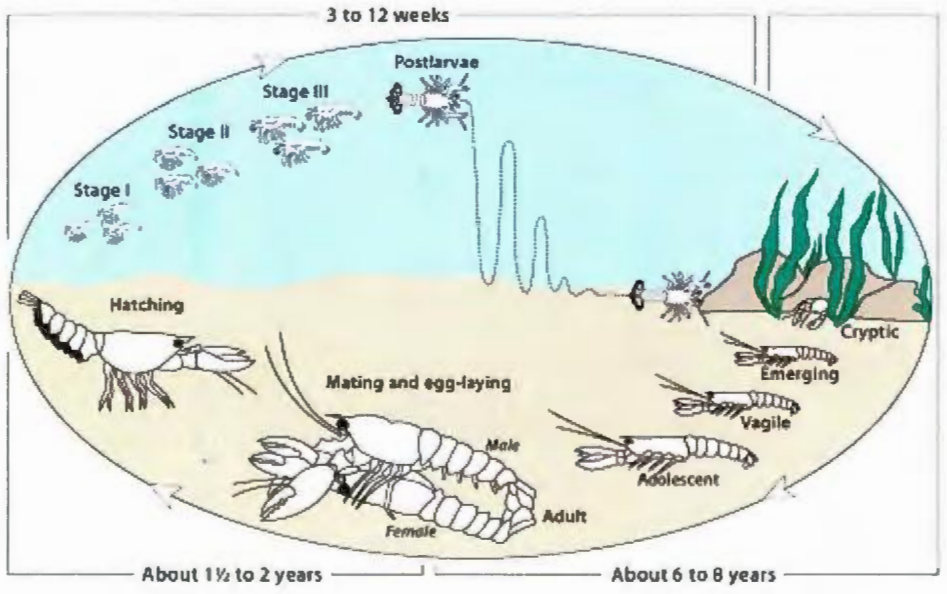
The American Lobster, *Homarus americanus*, is an Anthropod from the order Decapoda (Figure 1.3). As the name suggests, this crustaceous invertebrate has five pairs of appendages, or walking legs. The first pair of walking legs is modified to form the large ripper and crusher claws. These claws are used for defence against predators and to capture live and decaying prey for food. These claws are very powerful and are used to tear their prey apart for consumption.



(Source: The Culinary Institute of America 2011)
FIGURE 1.3: DIAGRAM OF *HOMARUS AMERICANUS*

The lobster has a long muscular abdomen and a tail with a series of swimmerets on the underside of the abdomen. The first pair of swimmerets on the male is modified to form the reproductive organ. Lobsters are generally only able to mate after the female has gone through the molting phase. During this time, the female is soft enough for the male to insert his reproductive organs and deposit the spermatophores into the female's seminal receptacle (Cobb 1976 and Ennis 1986). The female can store the spermatophores for up to 15 months after mating, until she is

ready to reproduce (Cobb 1976). When ready to reproduce, the female will release her eggs, which will pass through the seminal receptacle and become fertilized. During the egg extrusion process, eggs are attached to the pleoopods on the underside of the females tail by egg stocks (attachments). Egg stocks are formed when the females beating pleopods partially pulls off the sticky outer egg layer so it can contact and connect to the pleopods and other eggs. After attachment, the sticky material changes form and becomes a durable bond capable of securing the eggs to the underside of the lobster's tail for many months (Goudeau et al. 1987). Freshly fertilized eggs are very black in colour. The colour will change as the eggs grow on the female's abdomen over the 9 to 10 month gestational period (Figure 1.4). When ready to hatch, the eggs are usually an orange-red colour.



(Source: St. Lawrence Global Observatory 2011)

FIGURE 1.4: DIAGRAM OF THE REPORDUCTIVE CYCLE OF THE AMERICAN LOBSTER

During the first year of life, lobsters can molt up to 10 times to reach a size of approximately 1 to 1.5 inches (25 - 37mm). As lobsters get older, they will not molt as often. Lobsters in the 70mm–90mm size range will molt once per year (Aiken 1973). The average growth increment

for a lobster in the 400-500 gram range (large canner - small market) is an increase of 15% in length and 50% in weight with each molt (Aiken 1980). Older, larger lobsters may only molt every few years. Lobsters in the Southern Gulf take approximately 6 years to reach commercial size, which is average for the species at approximately 6-7 years. Frequency of reproduction for female lobsters varies along with molting. When conditions are optimal and the lobsters are younger, they may reproduce annually when the molt. Once females become larger and older, there may be several years between reproducing (Factor 1995).

1.2: LOBSTER FISHERY IN THE SOUTHERN GULF OF ST. LAWRENCE

The lobster fishery in Nova Scotia (including LFAs 23, 24, 25, 26A, 26B – see Figure 1.5) is a lucrative fishery that has seen a slow decline in landings since its record high in 1991, but still remains well above the long-term average. In 2011, license holders in the Southern Gulf with landings of approximately 39,250 t at a value of over $373 million (Fisheries and Oceans 2013).

(Source: Fisheries and Oceans 2001)

FIGURE 1.5: LOBSTER FISHING AREAS (LFAs) IN THE SOUTHERN GULF OF ST. LAWRENCE

In LFA 26A, there are 749 license holders. In 2005, landings for the area were 3,172 mt (DFO 2007). Average incomes for fish harvesters in the area for 2001 were $66,000/year. In Cribbon's Point, average income in 2000 for both berth owners and common grounds fishermen was $115,000 for the year; average income in 2011 for the same area was just over $83,000. In the 1990's, income from lobster fishing rose to just over 80% of all small boat fishing income in the area (DFO 2000). In 2008, lobster landings in Nova Scotia reached a value of $365,580,000 which represented 54% of the total value of commercial species in the province (DFO 2011). Other important species include snow crab, scallops, cod, hake, herring, and bluefin tuna. In Cribbon's Point and Ballantyne's Cove, where the lobster berths exist, landings showed a steady increase from the early 80s until the early 90s. They have remained relatively stable ever since, with several high landing years experienced in Cribbon's Point from 2002- 2006 (DFO 2012).

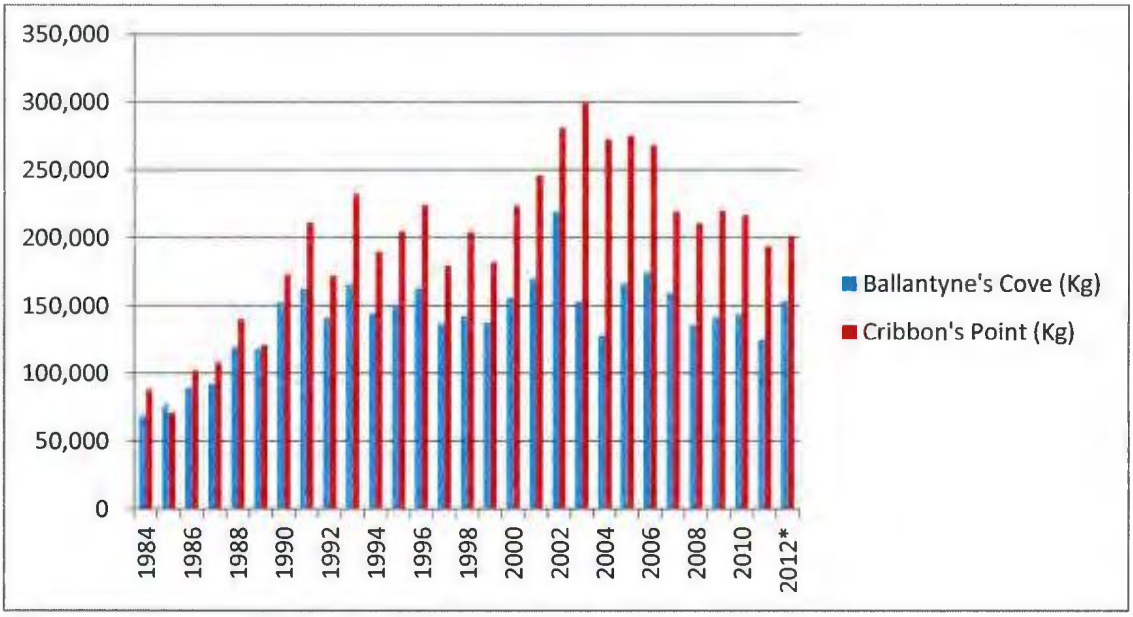
Increased landings in the area can be attributed to improving ecological conditions. These include increased water temperatures which lead to faster growth and active breeding cycles for lobsters. Also, the decrease in groundfish populations could be an attributing factor. It is widely believed that groundfish populations feed on juvenile lobsters and the decline in these populations could mean lobster stocks are benefiting from their decline (Davis et al. 2004).

The lobster fishery is heavily regulated in Canada. Fisheries and Oceans Canada has been developing a system for regulating the lobster fishery for the past 130 years. These management measures include a limit on season length, trap limits (ranging from 250 to 300 traps per license in the Southern Gulf), size limits, the non-removal of egg bearing (berried) females, and in some areas,

	Ballantyne's Cove		Cribbon's Point	
Year	Weight (Kg)	Value ($)	Weight (Kg)	Value ($)
1984	68,737	275,622	87,908	358,102
1985	76,053	402,301	70,826	380,567
1986	88,910	461,368	102,378	540,840
1987	92,091	569,762	108,375	670,365
1988	118,492	664,234	140,198	789,493
1989	117,634	633,204	120,628	647,737
1990	152,264	525,993	173,127	602,084
1991	162,111	769,324	211,180	1,008,376
1992	140,924	980,029	171,925	1,172,495
1993	165,237	1,111,863	232,310	1,541,624
1994	144,311	1,183,954	189,687	1,544,286
1995	149,932	1,510,905	204,423	2,075,053
1996	162,597	1,514,731	224,212	2,036,941
1997	136,728	1,382,562	179,318	1,833,951
1998	142,257	1,379,039	204,023	1,978,748
1999	137,524	1,571,055	181,835	2,091,597
2000	155,722	1,715,592	223,277	2,486,891
2001	169,228	2,168,942	246,131	3,175,643
2002	219,051	2,801,606	281,298	3,602,654
2003	152,877	1,977,629	299,059	3,834,618
2004	128,113	1,531,436	272,634	3,270,919
2005	165,982	2,236,480	275,395	3,715,268
2006	174,261	2,110,227	268,314	3,248,189
2007	159,262	2,112,811	219,265	2,887,847
2008	135,324	1,454,130	210,622	2,170,284
2009	141,732	1,150,444	219,799	1,789,095
2010	143,854	1,150,227	216,867	1,754,353
2011	124,572	1,222,621	193,912	1,916,561
2012*	152,943	1,575,156	201,215	2,067,835

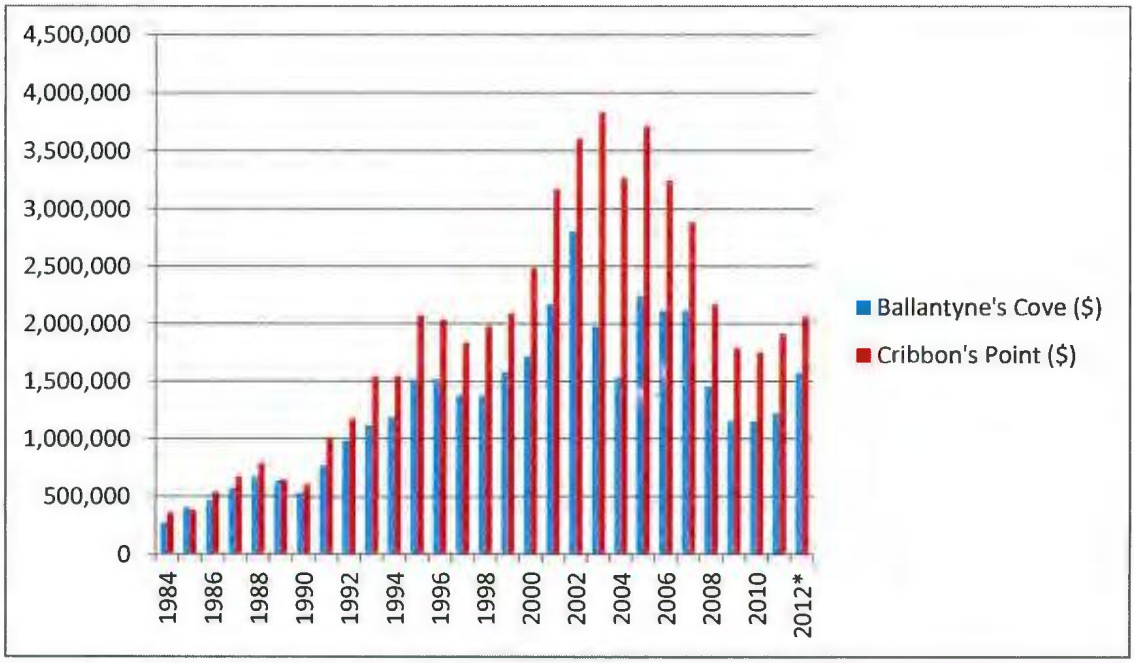
(Source: DFO) *Data for 2012 is preliminary data

TABLE 1.1: LOBSTER LANDINGS IN BALLANTYNE'S COVE AND CRIBBON'S POINT WHARF 1984 TO 2012 BY WEIGHT(KG) AND VALUE($)



(Source: DFO)

FIGURE 1.6: LOBSTER LANDINGS (Kg) IN BALLANTYNE'S COVE AND CRIBBON'S POINT WHARF FROM 1984 TO2002



(Source: DFO)

FIGURE 1.7: LOBSTER LANDINGS ($) IN BALLANTYNE'S COVE AND CRIBBON'S POINT WHARF FROM 1984 TO 2002

the non-removal of large females of a certain size window, escape vents to allow small lobsters to exit the trap, and biodegradable panels to prevent ghost fishing when traps are lost.

The inshore lobster fishery is an owner/operator system where the license holder must be present on the boat to fish his/her license. Each owner/operator usually employs one crew member during the season, but in some instances employ two crew members. Lobsters are generally found on hard or broken bottom (rocky rather than muddy or sandy) and these substrates are targeted when harvesters set their traps.

Conservation measures have been increasing in the past decade due to the economic importance of the industry. Many of these conservation measures have the end goal of increasing the number of egg bearing females in the population and allowing more of the stock to reach the age of sexual maturity. According to Comeau and LeBreton, the size at which 50% of the female lobsters in the eastern portion of LFA 26A reach sexual maturity is 73mm carapace length which is very close to the minimum legal carapace length of 72mm enforced by Fisheries and Oceans in the area (Comeau and LeBreton 2010). In 2001, the minimum legal size of lobsters in the area was 67.5mm which resulted in many more lobsters being taken from the ocean well before they had been given the opportunity to reproduce for the stock. In fishing areas where the minimum carapace size is even greater than LFA 26A, scientists have seen rates of 74% of the female population reaching maturity before growing to a legal harvestable size (Comeau and LeBreton 2010). Trap limits in LFA 26A lobster fishery were reduced from a maximum of 300 traps to a maximum of 275 traps in 2008.

SECTION 2.0: THE LOBSTER BERTH SYSTEM[1]

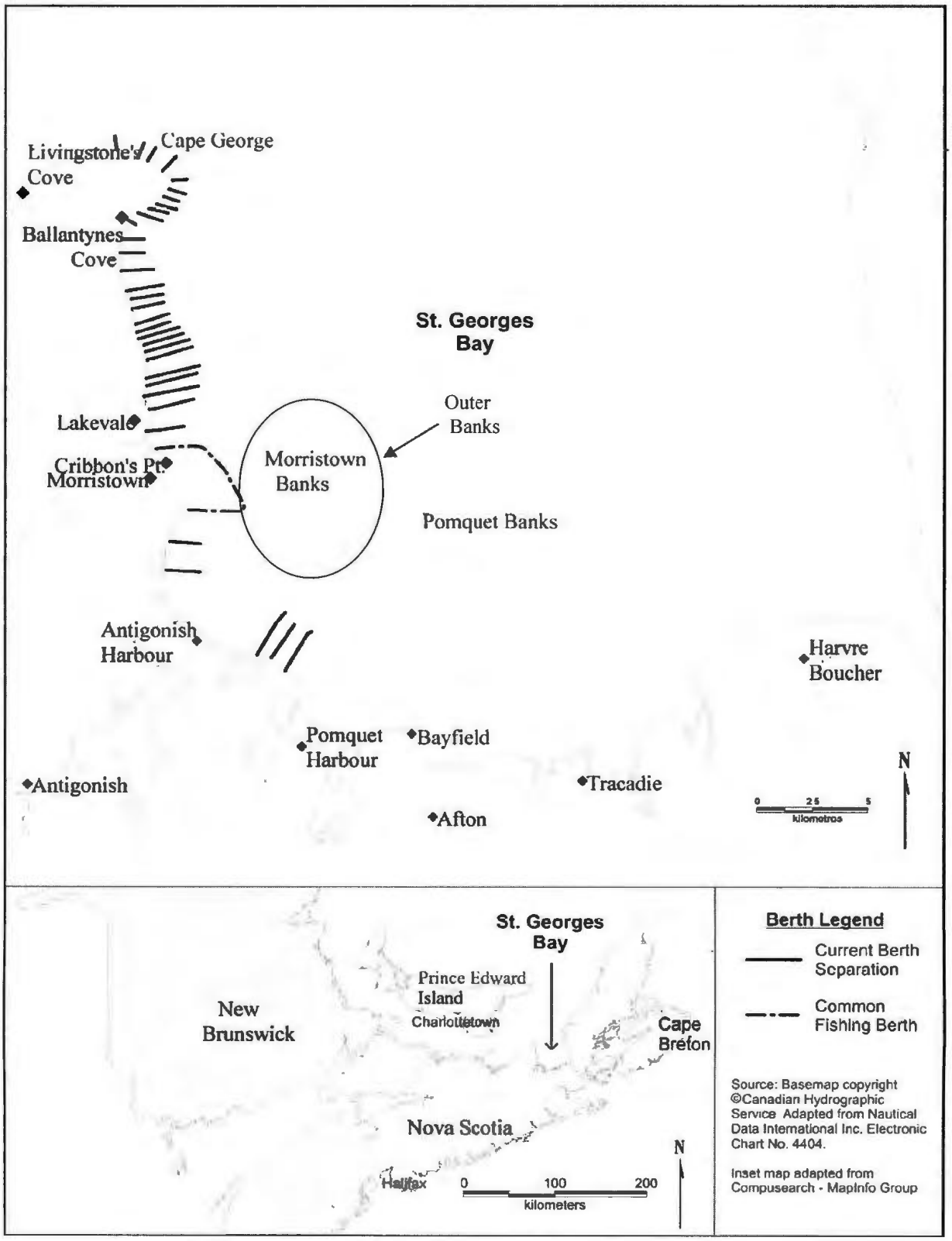
SECTION 2.1: HISTORY OF LOBSTER BERTHS

The berth system is the division of areas closest to shore into berths where individual fishermen have exclusive rights to the lobster fishery (Figure 2.1). These areas or berths are extensions of land boundaries from family farms and are generally small, family controlled fishing areas. Berths run from the shoreline out to the edge of lobster bottom, usually within 1 mile from the shoreline. There is no legal basis for the berth system and rather runs off a system of a gentlemen's agreement.

The origin of the berth system came from the Scottish settlers who landed in the area around the late eighteenth century. Although fishing was not of significant importance to early settlers, who saw themselves as farmers, fishing did take place in small scale for local and household consumption (Grant 1961). By the mid-nineteenth century, immigration had effectively ended and the area around Cape George was settled.

The importance of fishing within the communities of Cape George and Morristown did not show itself until around 1871 (Davis and Wagner 2003). When looking at a census for the area completed in 1861, there were very few individuals who claimed any fishing activity. There were no households which claimed the production of quintals of fish (1 quintal = 112 lbs). In 1871, fishing was much more predominant with 1158 quintals of fish produced in Cape George

[1] Much of the information of the lobster berth system comes from personal experience from living in the community and fishing within the berth system. The lobster berth I fished with my father belonged to my maternal grandfather, then my mother's brother, and finally my father.



Source (Davis and Wagner 2004)

FIGURE 2.1: DIVISION OF LOBSTER BERTHS IN LFA 26A

and 133 quintals being produced in Morristown. The increase in number of quintals produced coincides with the lobster canning industry in the area. The ability to can lobsters for market made it much more feasible and economically attractive for harvesters to increase their fishing efforts.

Early fishing practices were very primitive. Most fishing was conducted with nets from the shore, usually with the aid of a small row boat or open ended skiff (Davis and Wagner 2003).

This fishing practice for groundfish and pelagic fish is most likely what laid the foundation for the development of lobster berths (fishing from the shore fronting the property of the family farm).

Many lobster berths in Cribbon's Point and Ballantyne's Cove are still fished by descendants of the original settlers. In some instances, fishing berths have been passed down through 5 generations, unbroken by outsiders to the system (Davis and Wagner 2003).

One of the main features of the berth system is that fish harvesters must have continued use of the area in order to keep it. If a harvester decided not to fish within their area, others will enter into the berth and set their traps without being thought of as breaking the system. Only one individual is known to have lost their berth by neglecting to fish in the area for several years (Davis and Wagner 2003).

2.2: DIVISION OF LOBSTER BERTHS (Figure 2.1)

Of the 48 fish harvesters fishing from Cribbon's Point and Ballantyne's Cove, 29 fish exclusively in individual berths. Also, 2 brothers share a common berth which had one time

been one large berth. The remainder of the fish harvesters fish in what is called the outside banks, depicted in fig 2.1 as the Morristown Banks. Those who fish on the outside banks also fish an inside common grounds berth (which is identified on fig 2.1 as the area outlined with the series of dashes and dots).

Although the outside banks are considered a common fishing zone fished by many harvesters, there are traditional areas where each common grounds harvester sets their gear annually. These traditional areas or zones are respected by each common grounds harvester and there is little movement or encroachment within the zones each year. This is best described geographically; each fish harvester in the outside banks sets their traps in a general location: the northern portion of the banks, the southern portion or eastern/western portions. All fish harvesters that fish the banks know who has traditionally set their traps in the geographical areas and respects those boundaries. Generally the system consists of a harvester placing 50 to 60 traps in a particular area, usually in strings of 6 to 8 traps. The areas in which harvesters set their traps will vary slightly during the season as they test the bottom for the best fishing ground. Nevertheless, these areas remain exclusive to particular harvesters.

The inside common berth is shared by those fish harvesters from Cribbon's Point Wharf who do not fish an exclusive berth. It is also self-regulated by those who fish the area. Each year, harvesters decide how many traps they will each set in this area. They use the gentlemen's agreement model and each adheres to this number. An exception may be made however, if a fish harvester is having a particularly poor year. The other harvesters may agree to let him set more traps in the inside common ground to increase his years catch.

Although there are a few exceptions, those who fish an inside individual berth are not permitted to fish the outside banks. The few exceptions include harvesters who fish a relatively small berth. These fish harvesters have traditionally fished the inside boundaries of the outside banks.

2.3: ACQUISITION OF A BERTH

Berths are acquired in several different ways. Information obtained by Davis and Wagner (2003) shows that of the eighteen berths for which they have information, eleven had been acquired through inheritance, five had been purchased and two were acquired by sons-in-law. The final berth was acquired from a retiring fish harvester.

Currently, the most common way to obtain a berth is to purchase a fishing license from an individual who fishes a berth. In the berth system, fish harvesters respect that the berth will be fished by the new fish harvester upon the sale of a license. Current fish harvesters plan to sell, or give their licenses and berths to their sons.

The berth system is well-known throughout the area. Most harvesters are long-time residents of the community. There are only a few exceptions where licenses were sold to non-community members. These licenses are not fished out of a berth; they are fished on the outside common grounds. There were no issues with these particular harvesters being integrated into the area and none challenged the existing system.

2.4: REGULATION OF THE BERTH SYSTEM

The berth system is not regulated by the usual body of enforcement for the fishing industry. That is, Fisheries and Oceans Canada does not recognize the berth system as a formal structure. Rather, Fisheries and Oceans would have to support those harvesters who violated the berth system. This is because under the terms and conditions of each lobster license within LFA 26A, each fish harvester has the right to fish anywhere within the boundaries of LFA 26A. This means each harvester has the right to fish from the Northumberland Strait, along St. George's Bay, down to the Strait of Canso (Figure 1.5). This includes the areas along the Northumberland Strait (coast of Prince Edward Island) which are encompassed by LFA 26A.

The fact that the regulating body does not enforce the berth system does not mean the system does not work. In fact, the berth system has been enforced in the area for several decades quite successfully. Enforcement takes place in the form of gentlemen's agreements which are reinforced at the start of every fishing season.

These gentlemen's agreements have proven to be as strong as the law in the area. Fish harvesters take these agreements very seriously and when someone breaks the agreement by moving in on another harvester's territory, there are several methods used to deal with the individual. Firstly, those who break the agreement are spoken to and the importance of maintaining the system will be reinforced. If that individual persists with setting gear in another fish harvester's berth, then he/she may have their traps moved, cut or destroyed. When these measures are unsuccessful in getting the message across, physical confrontation would be the most likely result. The fish harvesters who use these methods to control the berth system are in actual fact the ones breaking the law. It is not an illegal act under the fisheries regulations to set gear in another harvesters

berth. It is, however, illegal to handle other harvesters fishing gear and partake in physical violence. These fish harvesters breaking the law could be charged under the fisheries act or in the civil courts.

With that said, the berth system does allow for some movement within the system. If a harvester decides to test the waters, so to speak, and place gear in an area which he/she does not traditionally fish, he/ she may be permitted to do so. That is, if the actions of that individual are not seen by others to be affecting the success of those already fishing in the area. The regulation of the berth system is highly based on the discretion of those involved.

One may argue that this could cause the system to break down, however, this encroachment by one fish harvester into another fish harvester's territory is only permitted on the boundaries of a berth or in the inside common berth area. This movement is generally only permitted when the harvesters who have traditionally fished in the area are having a successful season. If the season has been poor and the profit margins are small, the encroachment would not be permitted.

2.5: VIEWS OF FISH HARVESTERS

Fish harvesters within the berth system view the berth system as an excellent tool to regulate the fishery. In areas where the berth system does not exist, there is a high level of animosity between harvesters. Each year, there are problems with fish harvesters crossing each other's gear either intentionally or by accident. When this crossing of gear persists, the situation often leads to heated verbal confrontation, the cutting of gear, and in some cases, physical violence. Although these forms of conflict exist within the berth system, harvesters do not feel they are as serious in nature nor do they occur as often as in the open fishery.

Fish harvesters in the berth area have a sense of fair play. According to harvesters fishing in the berth system, warm spring temperatures will reap the benefits of a higher catch for those fishing inside berths; colder springs will result in the outside bank yielding higher catches for the season. Lobsters will also have some movement between the inside fishing grounds and the outside banks throughout the two month fishing season. This movement of lobsters between the inside and outside areas follows temperature changes and depth gradients throughout the season. Movement is largely dependent upon wind and weather conditions throughout the season; strong northern winds will create waves that will mix the lower water gradients with the surface water, causing the surface to get cooler and the water on the floor of St. George's Bay to warm up a few degrees. Although an actual study has not been completed for the area, interviews with harvesters in the area have supported a common claim that lobsters prefer deeper water at water temperatures of around freezing (0 ^{o}C), shallow water at water temperatures around 4.4 ^{o}C and will start to head for deeper water once water temperatures reach the 8.9-10 ^{o}C range.

In most other fishing areas, fish harvesters will move their gear according to where the lobsters are abundant (Miller et al. 2006). In the berth system, the inside berth fish harvesters are not permitted to move and the outside banks fishermen are limited on the amount of gear they can bring inside by the size of the inside common berth. Inside berth harvesters are not permitted to move their gear to the outside banks when the fishing is most abundant on the banks and then move inside when the lobsters are abundant inshore. An unfair advantage would be created if this movement was permitted within the system.

Fish harvesters in the berth system also have a sense of respect for others fishing in the area. The gentlemen's agreement, used as a regulation tool is successful due to this mutual respect the

harvesters have. Fish harvesters interviewed stated that without this sense of obligation and regard for the rights of others within the system, the whole arrangement would fall apart.

As a conservation measure, fish harvesters feel this system could be responsible for the success of the lobster stocks in the area. It is known that the inside grounds are breeding grounds and nursery areas for lobster. By restricting access to these areas close to shore, as each harvester can only place 275 traps within their berth, the fish harvesters believe they are allowing the lobster stocks to have a better survival rate. These lobsters which are reared in the inside grounds could then migrate out to the outside banks and provide harvesters in those areas with a bountiful catch.

2.6: THREATS TO THE BERTH SYSTEM[2]

The biggest threat to the berth system in the lobster fishery in St. George's Bay is the problems with recruitment of new fish harvesters into the fishery. As I have already stated, the lobster fishery in the Southern Gulf has historically been a family-centered industry. The majority of those currently fishing are descendants of fishing families and have been raised in an atmosphere where fishing is more than an occupation; it is a way of life.

In present day, there are many barriers for new entrants into the fishery. Fathers are very reluctant to encourage their children to take up fishing as a living. They would rather see their children enrolled in University or a technical program due to the uncertainty in the fishery and the expense of buying a license; although the fishery has been lucrative since the 1980's, income

[2] Information on prices of recent licenses sold in berth areas was obtained through conversations with those selling and purchasing the licenses. The information was provided on the basis of anonymity and as such the dates and values are ranges rather than exact.

is very much dictated by price and the American dollar – as the value of US dollar decreases, so does the demand for Canadian lobsters.

The problem with new recruitment into the fishery is compounded by the increasing costs. Lobster licenses in Cribbon's Point sold for approximately $350,000 in 2002. In 2011-2012 two additional licenses in Cribbon's Point sold for approximately $250,000 and $300,000. None of these licenses have a berth associated with the license. This is a tremendous expense to incur in an industry which relies on a natural resource subject to a level of uncertainty each year.

Of these licenses, none were sold to the children of the harvester, although each harvester had children who had fished with them at one point in time. Two of the three lobster licenses recently sold were because the harvesters wanted to retire. The third license was sold due to financial reasons as the license had been fished by a husband and wife who have divorced[3]. All three licenses were sold to people who have a family tie to the fishery in Cribbon's Point and understand the berth system. One is a brother-in-law of a harvester, one is the son of a harvester currently fishing and the third new harvester has two brothers who fish in Cribbon's Point.

Of the individuals who currently own a fishing license in Richmond and Guysborough Counties, areas in close proximity to Cape George and Cribbon's Point, 85% report having fathers who have or had fished and almost 80% report their father's father fished for their living (SRSF 2001). This familial connection is quite similar in Cape George and Cribbon's Point. Family connections in the fishery and the passing down of licenses and berths may be what is keeping the berth system alive and strong. If this changes and outsiders enter into the system who do not

[3] Information obtained from the two harvesters selling the license.

respect or believe in the benefits berths provide to harvesters, there could be a real threat to the success of lobster berths in the future.

Added to this is the entrance of Aboriginal groups into the fishery. The Marshall decision has given priority to Aboriginals in the fishing industry (R. v. Marshall 1999). The Canadian government paid large sums of money to buy out non-Aboriginal fish harvesters in order to make capacity within the lobster fishery for Aboriginal groups. This involvement of the government increased the selling price of lobster licenses, as the government was willing to pay more for a license. This inflated price made it more difficult for new entrants to join the fishery. It is important to note that in the past few years, the price of lobster licenses has decreased in some areas.

The entrance of Aboriginals into the fishery and increased selling prices of lobster licenses has made it much more attractive to current harvesters to sell outside of the family. Fish harvesters do not want to see their children enter into the fishery with such a large debt from the purchase of a license. This is because they may not be able to make a sufficient living fishing while paying back the large capital investment.

In most cases, a father cannot just give a license to his son or daughter because the revenue from selling the license is needed as a retirement fund[4]. Government pensions are not sufficient to supporting retiring fish harvesters, and unless they have invested money privately over their career, many harvesters will not have any additional pension. If the license was given to a child, that child would then most likely become responsible for supporting his or her parents financially.

[4] Information obtained through interviews with fish harvesters; the question was posed as follows: "Who will take over your gear, would you like to pass the license onto your children when you are ready to retire?"

This increased debt load new fish harvesters are incurring in order to enter the industry could jeopardize the berth system. The new entrants to the fishery would have external pressures from financial institutions to service their debts. This could lead some to flex their legal right to fish in the best fishing areas regardless of the berth system.

SECTION 3.0: ECONOMIC & BIOLOGICAL CONSIDERATIONS OF THE BERTH SYSTEM

3.1: ECONOMIC AND BIOLOGICAL BENEFITS OF THE BERTH SYSTEM

Only one harvester fishes a berth; as a result, the maximum trap number fished within the berth is 275. Once catch rates slow down, many harvesters respond by fishing less (4-5 days a week rather than 6) so that expenses are minimized as catches decline. In contrast, if there was competitive fishing within the berth, multiple fishermen would be fishing the same areas looking for areas of higher stock. As catches decline, some will tend to fish more gear in the productive areas in order to increase their share of the catch; until catches decline in one area and they are forced to move their gear around to find more productive areas to fish. Also in a competitive scenario, new fishermen may come in to check out the already-depleted grounds, leading to further depletion of the stock. Given these fishing patterns, it would be expected that the exploitation rate would be lower in a single harvester berth relative to fishing bottom subjected to a competitive fishery The lower exploitation rate would have the benefit of allowing more lobsters in this area to reach a larger size before they are commercially harvested. The theory is with reduced fishing effort, there will be more legal-sized lobsters left on the bottom after each lobster season. This will lead to the lobsters in the area reaching a larger size each year they remain in the ocean. As noted in section 1.1, annual molting will result in a 400 gram canner lobster that is not caught in the fishery growing to become a market lobster weighing approximately 600 grams which will be available to the fishery in the next year.

The end result will be that the average weight of each lobster recruiting into the fishery will be higher, leading to what is known as increased yield/recruit.

In addition to the increase in yield/recruit, allowing more lobsters to grow to a larger size would allow more of them to mature and reproduce, leading to increased egg production and a higher recruitment factor for all surrounding areas. The increase in eggs/recruit would be beneficial to the surrounding areas due to spatial dispersion during the multiple stages of larval growth in the lobster's life cycle (Figure 1.4). Tides in the area would disperse some of these larvae to the surrounding lobster areas for settlement on the bottom and subsequent growth into a harvestable size (Miller 1997).

Under the theory stated above, statistical analysis of berth and non-berth ports would show the berth ports would produce a higher percentage of markets in the overall catch. This is because the lower exploitation rate would lead to increased survival of legal size lobsters each season. These lobsters would then have the ability to molt into the larger size class of markets between fishing seasons.

Analysis of reported lobster landings from 2003-2012* (Tables 3.1, 3.2 and Figure 3.1) shows that there is a higher percentage of canners caught in the berth ports in comparison to similar non-berth ports in the St. George's Bay area. The three non-berth ports were chosen for comparison against the berth ports due to close proximity to Ballentyne's Cove and Cribbon's Point. Bottom conditions are similar in these 5 areas chosen for analysis and catch rates have shown similar increases and decreases over the period.

			ners	% Markets			%	
2003	156,757.98	180,277.97	46.51	53.49	303,746.96	355,565.96	46.07	53.93
2004	132,551.02	149,889.49	46.93	53.07	285,089.00	315,965.02	47.43	52.57
2005	176,895.97	189,032.01	48.34	51.66	270,397.96	336,743.99	44.54	55.46
2006	171,639.02	212,540.99	44.68	55.32	256,578.02	334,953.01	43.38	56.62
2007	163,635.95	187,476.01	46.61	53.39	207,486.99	275,909.00	42.92	57.08
2008	140,085.96	158,252.99	46.96	53.04	196,579.98	247,919.98	44.22	55.78
2009	140,164.02	172,301.01	44.86	55.14	216,952.01	267,620.94	44.77	55.23
2010	139,175.52	177,969.00	43.88	56.12	203,833.04	274,276.96	42.63	57.37
2011	122,655.58	151,979.38	44.66	55.34	186,805.99	240,695.67	43.70	56.30
2012	129,417.98	207,762.99	38.38	61.62	175,847.01	267,755.95	39.64	60.36

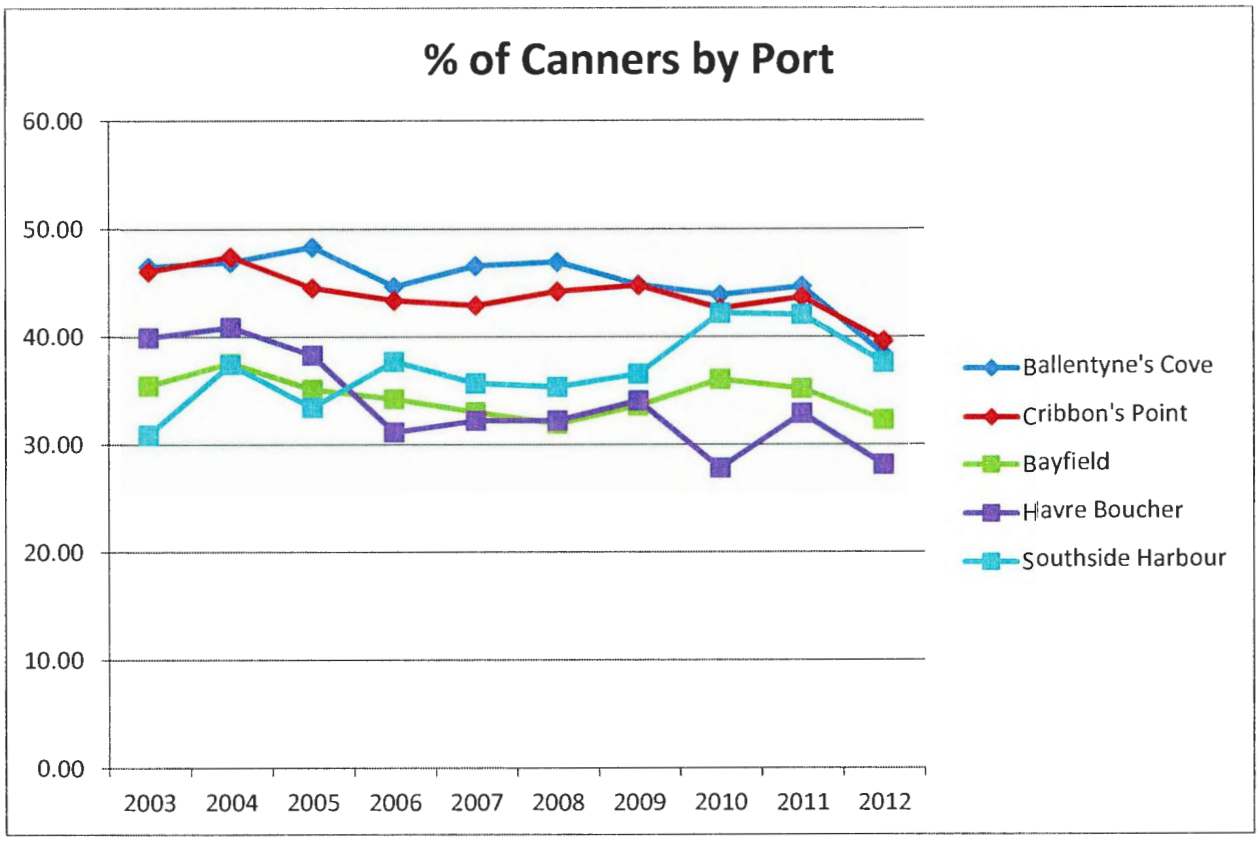
Source (DFO 2012)

TABLE 3.1: LOBSTER CATCHES FOR BERTH AREAS IN LFA 26A

2003	83,848.00	152,568.48	35.47	64.53	52,876.00	79,505.00	39.94	60.06	30,558.01	68,304.50	30.91	69.09
2004	73,970.02	122,892.99	37.57	62.43	45,535.03	65,827.99	40.89	59.11	22,496.99	37,581.99	37.45	62.55
2005	73,285.01	135,180.99	35.15	64.85	38,211.02	61,534.49	38.31	61.69	28,902.01	57,462.02	33.47	66.53
2006	85,906.02	164,835.02	34.26	65.74	29,973.99	66,204.99	31.16	68.84	43,660.02	72,088.98	37.72	62.28
2007	65,295.03	132,420.02	33.02	66.98	21,141.03	44,440.00	32.24	67.76	31,871.02	57,371.01	35.71	64.29
2008	57,555.99	122,524.97	31.96	68.04	33,942.02	71,261.01	32.26	67.74	23,298.00	42,572.99	35.37	64.63
2009	68,815.02	135,792.02	33.63	66.37	34,107.02	65,891.01	34.11	65.89	30,203.00	52,361.00	36.58	63.42
2010	73,541.49	130,348.01	36.07	63.93	18,772.99	48,671.00	27.83	72.17	33,209.99	45,489.99	42.20	57.80
2011	88,609.50	162,996.42	35.22	64.78	37,961.00	77,396.52	32.91	67.09	38,518.28	53,070.59	42.06	57.94
2012	35,324.01	73,962.00	32.32	67.68	25,288.00	64,532.00	28.15	71.85	18,454.00	30,619.01	37.61	62.39

Source (DFO 2012)

TABLE 3.2: LOBSTER CATCHES FOR NON-BERTH AREAS IN LFA 26A



Source (DFO 2012)

FIGURE 3.1: PERCENTAGE OF CANNERS BY PORT – COMPARISON OF BERTH AND NON-BERTH PORTS

The catch analysis did not show the results anticipated in the theory of lower exploitation rate yielding larger lobsters in the catch, which would in turn result in higher yield/recruit and egg/recruit. Additional information may provide some insight or explanation. Of the 25 harvesters in Cribbon's Point and 23 harvesters in Ballentyne's Cove, only 29 fish exclusively in berths. The remaining 19 harvesters are fishing on the outside banks. Interviews with harvesters in the berth area report that their percentage of markets is larger than the harvesters who fish mostly in the outside berth areas. The rocky ledges present along the shore provide prime real estate to the market size lobsters. Although unable to provide exact information on individual catch rates, one buyer has confirmed that the percentage of markets for the berth harvesters is greater than that of the non-berth harvesters in Cribbon's Point and Ballentyne's Cove. This

anecdotal information presents a possibility but it does not fully explain the outcome of the analysis as the influence of the catch from berth harvesters should have influenced the overall results from the berth ports. More precise at sea sampling of berth and non-berth catch rates specifically designed to get detailed size distributions and effort data over a season may provide a more detailed picture of the population structure, how it changes over time throughout the season and whether or not the differences between berth and non-berth areas have the potential to impact exploitation rates. This type of sampling could also analyze the catch data for number of ovigerous (berried) females in the inside berth areas vs. the outside banks to determine if the conditions in the berths are more favourable to spawning stock. It is also possible that the effort levels within the berths remain higher than what would be needed to have a measureable impact on exploitation rates. Catch per trap hauls may be better within berth areas, but the overall harvest from the berth area may not be lowered enough to alter yield per recruit and egg per recruit values. Detailed at-sea sampling may shed some light on this question as well.

A noted economic benefit of the lobster berth system would be on an individual's overall fishing expenses. Each berth holder would have lower fishing costs due to reduced competition, less travel time and less fuel consumption because they are able to set their gear in one location rather than sounding around for good lobster bottom and competing with traps set by other harvesters. In berth areas, fish harvesters have the option to slow down their fishing activities when the prices are low during glut periods in the season and fish harder when prices are high. This would allow harvesters to save "their" lobsters for later in the season when catch numbers are declining on the common grounds. Having control of his/her fishing and catching rates over the season will allow the harvester the option of making supply-based deals with the buyers to secure a premium price for their catch by agreeing to a more steady supply of catch throughout the

season. In order for this catch management system to work, berth fish harvesters would have to be confident that the majority of the resident lobsters on their berth will not move to outside areas. Again, detailed sampling and perhaps tagging studies would shed some light on this question. The obvious personal economic benefit for the berth holder would be that the available lobsters on the berth bottom would not be shared, they would be available and caught only by the berth owner.

3.2: THE TRAGEDY OF THE COMMONS

In Hardin's tragedy of the commons (TOC), the theory states that cattle owners will tend to increase the number of cattle they have grazing on the common grazing grounds in order to maximize their own utility. In doing so, they will force the others to increase their stock and in effect go beyond the level of cattle the common grounds support, and their stocks will crash. When related to the fishery, Hardin's tragedy of the commons means that fish harvesters will be tempted to increase their catch to a level where the resource will be depleted and become a non-renewable resource (Eythorsson 1996).

In the non-berth areas, lobster harvesters will compete for the best fishing grounds. Upon opening day of the season, harvesters will race out to set their traps on what is considered prime lobster bottom, concentrating their efforts on highly productive areas. When the catch in these areas taper off and harvesters hear reports of better landings on adjacent grounds, harvesters move their gear to increase their share of the catch. This results in gluts of lobster landings early in the season and markets will become flooded with a high quantity of lobster. Sometimes there are quality issues during these gluts. Fishermen focus on catching as much as possible and may

not take the time or have the room to properly look after the lobsters they harvest. This often results in lower prices received for the product, as seen in LFA 34 in November 2012, and creates an excess of product that must be kept alive until it is sold (Medel 2012). Lobster quality declines the longer the animal is out of its natural habitat which can further reduce the price. Fish plants are swamped with lobster during the start of the season requiring more workers to process the product; once the high catch rates slow down, the plants are not receiving enough lobster to keep them busy and the workers employed. The cycle of peaks and lulls in the catch makes the business of lobster processing difficult and reduces the marketability of the product.

The focus of lobster harvesters becomes getting their own personal piece of the pie – how many lobsters they catch as individual harvesters competing for the same resource. In this system, as described in Hardin's theory, harvesters are not focusing on looking after the stock by restricting efforts on the common resource because it is not in their personal interest to do so. Fishing efforts must remain strong throughout the season for every harvester or else others will reap the benefits of those trying to conserve fishing effort to support sustainable and consistent landings throughout the whole season. The sense of responsibility and ownership of the lobster stock gets lost and harvesters tend to look out for their personal profit.

The berth system does not allow for this TOC theory to take root because there is a limit on the level of effort that can be concentrated in one area. By creating quasi private property rights with the berth system in the lobster fishery, harvesters are in effect solving the problem of the TOC. The common pool resource now has enforceable limitations. In the berth system, fishermen feel a connection to their berth and the resource that is on it. They don't feel compelled to bring in the catch as fast as possible, they have options to fish to maximize price

and they have a sense of ownership that will lead to responsibility in management – what they do is for their resources and their future.

These limitations placed on fish harvesters in the berth system could be viewed as detrimental to the individual harvester. They no longer have the ability to increase fishing effort in the most bountiful areas and increase their yearly catch and subsequent income. The harvesters fishing within the berth system, however, feel the benefits of lower costs associated with not having to move gear from area to area equal or outweigh the benefits of having the flexibility. That is coupled with the belief harvesters have that their management system has led to the stocks in their area remaining stable while other ports in the region have seen a steady decline in their catch rates. As mentioned in section 1.3, harvesters in the berth ports have a higher catch per boat than the non-berth harvesters which would show the non-berth harvesters are experiencing effects of the TOC for the area.

SECTION 4.0: COMPARISON OF SIMILARILY MANAGED FISHERIES

4.1: NOVA SCOTIAN SEA URCHIN FISHERY MANAGEMENT

The sea urchin fishery in Nova Scotia from Shelburne to Cape Breton, including Digby County is a dive only fishery. This is an owner/operator fishery where each vessel is only permitted to have one license per captain and each boat can have a maximum of four divers.

The sea urchin dive fishery in Nova Scotia was developed into an exclusive area fishery managed under allocation of exclusive fishing grounds. This was accomplished by establishing multiple urchin areas, and only issuing one license per area. The inspiration for this management system came from reef and lagoon fishing rights in the South Pacific, community management in Japan and Kurian and similar systems in India, Chile and Mexico (Townsend et al. 2008).

The Nova Scotian sea urchin fishery was brought under this new system of management in 1991 and developed throughout the years. Initially, the fishery was still somewhat competitive in that fish harvesters were limited to one of three large areas (Towsend et al. 2008). This gradually changed with the involvement of license holders who provided information on catch locations and bottom conditions of the areas. These large areas were slowly divided into a number of smaller zones and in 1995, restricted zones were approved under the authority of the 1985 Canada Fisheries Act.

Under the new system conditions were placed on these zones which included the following:

i. only one licensee could fish in a zone and he could not fish outside it;

ii. the zone applied to no fishery other than sea urchins;

iii. the licensee must enhance the resource productivity in the zone; and

iv. after a trial period of four years, an audit of compliance with the enhancement requirement would be carried out.

(Townsend et al. 2008). The only area that did not apply for the restricted zones was Digby County.

Some of the factors that lead to the change in management system were the instability of the sea urchin stock in previous years, difficulty in predicting recruitment to legal size due to growth rate variations and the unpredictability in the seasonal cycle of the sea urchin which affects marketability (Townsend et al. 2008 and DFO 2010). All these factors made it difficult for fisheries regulators to set quotas, season timing and length of season. Also, sea urchin yield (percentage of gonad weight per animal) could be greatly increased if divers could thin out the animals feeding on the seaweed fronts. This type of active harvesting and husbandry increased productivity for the harvesters.

The development of restricted zones differed greatly from the usual system of fisheries management in the Maritimes and in all of Canada. Most fisheries have a large zone which allows harvesters within the zone to compete for the best catches and prime fishing locations.

There was protest from the Aboriginal groups in Nova Scotia when the restricted zones came into place. They based their objections on the idea that the zones created ownership of the resource and this was against their traditions. Another group that objected to the zones was fish harvesters who did not have a sea urchin license. This group stated that the restricted zones would limit others from entering the fishery.

The exclusive area fishery for sea urchins was successful for the most part. Catches and profits increased and there were reduced costs to the fish harvesters. Reduced costs were a result of harvesters having the ability to be selective on when they fished and the areas they fished during stormy days. They no longer had to spend as much time searching for urchins or worry that another license holder would harvest all the prime locations before they got to the area and could reserve sheltered grounds for stormy days (Townsend et al. 2008). Also, if they invested time to condition the sea urchin beds, they would get the benefits of enhanced productivity.

4.2: EASTPORT NEWFOUNDLAND MARINE PROTECTED AREAS

In 1995 fish harvesters in Eastport Newfoundland, faced with a declining lobster fishery, formed the Eastport Peninsula Lobster Protection Committee (EPLPC) with the goal to implement an overall conservation management strategy for lobsters (Fisheries and Oceans 2013). In 1997 the EPLPC and Fisheries and Oceans Canada agreed to limit fishing effort in the area and close two prime lobster habitats in an attempt to conserve and sustain the lobster population (Fisheries and Oceans 2013 and Janes 2009). In 1999, the EPLPC set about to have these two areas, Duck Island and Round Island, designated as Marine Protected Areas (MPAs) under the Fisheries Act. In 2005, Fisheries and Oceans Canada formally designated the two areas as MPAs. (Fisheries and Oceans 2013)

Marine Protected Areas have been shown to increase size and abundance of a stock, as well as improve habitat. Studies on existing MPAs have shown the benefits from establishing these areas can include increased egg production, adult spillover into non-protected areas, and increased larval export to outside commercially harvested areas (Janes 2009 and Roberts et al.

2001). Protected areas generally contain a larger biomass (size and quantity) than surrounding non-protected areas (Roberts et al. 2001).

Key to the establishment of the MPAs in Eastport Newfoundland was monitoring of the Duck Island and Round Point MPAs, along with the commercially fished areas adjacent to them. In a technical report by Janes, analysis of information collected over an eleven year period (1997-2007) was analyzed to determine what effects, if any, the MPAs have on the lobster biomass in both the MPAs and the surrounding commercial fishing areas (Janes 2009).

Results of the analysis by Janes showed that although changes in the size structure of lobsters in the MPAs took varying periods of time, the mean size of the lobster stock increased after being protected in the MPA for a period of time. The number of large males and females (including large ovigerous females) in the MPAs after several years was significantly greater than in the adjacent commercially fished areas.

It is possible that higher egg production inside the MPAs and movement of some lobsters out of the MPAs may be enhancing local populations in the adjacent commercially fished areas (Janes 2009). Miller et al. showed movement of Nova Scotia lobsters ranged from 10-20 km (Miller et al. 2006). Campbell and Stasko showed movement of mature lobsters is significantly greater for mature lobsters and showed greater migration and presence of larger lobsters in deep water during the winter months, leading to the conclusion that larger, more mature lobsters prefer not to winter in shallow waters (Campbell and Stasko 1986).

Caution is given in the report that MPAs cannot be proven solely responsible for the improvements in lobster population as there is no baseline data to compare to prior to 1997 and

there have been several other conservation measures (i.e. v-notching) implemented in the area. (Janes 2009)

Comparison of the MPAs with lobster berths in St. George's Bay may suggest there are benefits to the berth system that can be quantified if specific data is collected for berth and adjacent non-berth areas. As suggested in Section 3, additional research is required to determine if similar results would be found in Cribbon's Point, Ballentyne's Cove and the surrounding areas.

SECTION 5.0: INVOLVEMENT FROM FISHERIES AND OCEANS CANADA

SECTION 5.1: FISHERIES AND OCEANS CURRENT INVOLVEMENT WITH LOBSTER BERTHS

Fisheries and Oceans Canada has come under increased pressure in recent years to develop a new management scheme which would allow for more involvement from fish harvesters when creating and revising fisheries management plans. This new system of co-management would allow for fisheries managers to utilize the body of information and knowledge fish harvesters hold. The use of traditional, local ecological knowledge in Nova Scotia has been limited in the past, and as a result, fisheries management plans are lacking in their objectives and scope (Davis and Wagner 2004).

The system of informal property rights in Morristown and Cape George is a perfect example of how Fisheries and Oceans could utilize and exploit the vast knowledge of fish harvesters. Although they are aware of the berth system, Fisheries and Oceans have not shown any public interest in formalizing or expanding lobster berths to other areas. In fact, they are very reluctant to give the berth system any credit for the success of the lobster stock in the area (Chisholm, 2002; Interview with Fisheries and Oceans Manager 2003[5]). Fish harvesters, on the other hand, are quite adamant that their efforts to enforce private property rights within the lobster fishery are key to the success of the stock.

Under the current management system and mandate from the Minister of Fisheries and Oceans, local Fisheries and Oceans authorities would be forced to support the interests of harvesters

[5] Interview with local Fisheries and Oceans representative Leroy MacEachern

moving into the berths of area fish harvesters. Current lobster licenses specify a home port (wharf) for each lobster fishing vessel and outline the general lobster fishing area assigned to that license (Figure 1.5). Fisheries and Oceans Officers have not pushed the boundaries of the local berth system and would have no reason to do so. They receive very few complaints from harvesters in the area about the berth system as all fish harvesters and Fishermen's Associations in the area are aware of and are knowledgeable about the berth system.

5.2: ENFORCING THE BERTH SYSTEM

There are several ways Fisheries and Oceans Canada could monitor the implementation of lobster berths in St. George's Bay. One option would be to require all fishing vessels involved in the lobster fishery to have a Vessel Monitoring System (VMS) installed on their boat. The VMS would give Fisheries and Oceans the ability to track the location, time, and fishing effort of all the boats in the fleet. The VMS system incorporates a GPS system and a satellite transmitter that provides almost real-time data to Fisheries and Oceans.

VMS are used in many other fisheries in the area including the crab fishery. These systems have allowed Fisheries and Oceans enforcement to track the fishing activities and position of vessels at a reduced cost to fisheries enforcement. VMS would give Fisheries and Oceans a relatively straightforward, low cost option to monitor a harvester's fishing activity.

Another way for Fisheries and Oceans to enforce the berth system would be to increase the presence of Fisheries and Oceans Officers on the water. Due to the small area that berths encompass, it would not be inconceivable to have Fisheries and Oceans Officers visit most of the

lobster vessels within St. George's Bay in a daily trip. The boats are in close proximity to one another and are easily observed and approached from the water.

Increased Fisheries Officers would be an increased cost to Fisheries and Oceans as they would be required to hire additional staff to monitor the area. One would anticipate that increased enforcement in the initial years of implementing the berth system would be necessary to ensure the new management scheme was being followed and was successful. If the berth system was accepted in the area, enforcement would become less of a necessity and enforcement could return to the pre-berth system level after a few years of success. Unfortunately, the recent trend for DFO and other government departments is reduce enforcement and general services as departmental budgets are stretched.

5.3: OBSTACLES TO OFFICIAL IMPLEMENTATION AND ENFORCEMENT OF THE BERTH SYSTEM

As with the Nova Scotian sea urchin fishery, the main obstacle to successful implementation and enforcement of the berth system would be the objections of other groups. The Aboriginal groups would likely have the same argument as with the sea urchin fishery; that berth rights go against their traditions and would infringe upon their rights to a Canadian resource. Other harvesters in the area would object on the basis that berths limit their rights to a resource they currently hold a license for.

Under the Canadian Fisheries Act, it is possible for the Minister of Fisheries and Oceans to implement one fish harvester/zone as they did in the sea urchin fishery in 1985. However, aside from the interested fisheries groups, there could be an argument from the general public about the berth system being an underutilization of a Canadian resource. Without competition in high lobster biomass areas, there leaves room for argument that there is no proof that opening the berth areas for all harvesters to compete would be detrimental to the stock. Aside from comparing declining stocks in surrounding non-berth fishing areas, and the expected benefits of increased yield/recruit and egg/recruit, scientists have not proven that the berth system is responsible for the stability of lobster catches at Cribbon's Point and Ballantyne's Cove. As noted in section 3, more precise sampling at sea in experiments specifically designed to get detailed size distributions and effort data over a season from represented vessels in berth vs. non-berth areas may provide more accurate information that may show different results.

In order to formalize the current berth system, there would be some discussion and argument on the exact location of the zones for each individual harvester. The berth system as it currently exists has issues with harvesters arguing over the boundaries of the berths, but these arguments are generally resolved through the measures mentioned in Section 2.4. Determining lobster berth coordinates would be a relatively simple task compared to the sea urchin zones which took years of meetings and discussions with scientists and fish harvesters to come to an agreement on the new zoning scheme. The general location of each lobster berth is already well-known; the only discussion would be the exact coordinates of each.

The process to formalize lobster berths would be time consuming. The Minister of Fisheries would likely hold an open public forum to allow all interested parties, both fisheries groups (Aboriginal and non-Aboriginal) as well as the general public to voice their concerns and

opinions; which can be expensive and labour intensive for Fisheries and Oceans. Public hearings for Oil and Gas exploration off the coast of Cape Breton in 2001-2002 took several months and required a Public Review Commission to hear the voice of all interested parties before a decision was made.

Another factor that would make formal implementation and enforcement of the lobster berth system difficult would be the economic importance and high profile of the lobster fishery in the Southern Gulf. Unlike the sea urchin fishery which has relatively low economic importance, there would be much more scrutiny by government officials, impacted fishermen and the public. Due to the lack of science and study on the economic and biological benefits of the lobster berth, and the fact that most lobster fishermen in Canada operate outside of such a system, implementation of berth system property rights in the lobster fishery would be a hard sell outside of the local area. Similar opposition is voiced whenever a quota system is suggested for lobsters.

As noted above, DFO can use the "one licence per area" option to legalize lobster berths. This may result in a complex administration and enforcement system because of the multiple areas. Other options could be explored such as formalizing properties rights within existing management plans, or area leasing arrangements, perhaps in cooperation with provincial governments. In the past, DFO has granted oyster leases, but in Nova Scotia, that role has now been assumed by the province. A lease would provide other enforcement options because anyone in violation would be stealing from the lease holder. Changes in the Fisheries Act may well be needed in order to address alternate property rights options.

SECTION 6.0: CONCLUSIONS

Due to the economic value of the lobster fishery in the southern Gulf of St. Lawrence, the importance of preserving the lobster stock is vital. Recent declines in lobster landings in some areas of the southern Gulf of St. Lawrence prove the need for management and conservation of the lobster stocks to be a top priority for Fisheries and Oceans Canada.

Utilization of a property rights based management plan for the lobster fishery in a portion of St. George's Bay has potential as a formal conservation tool. Lobster berths place restrictions on the amount of fishing activity that can take place in areas with proven high lobster biomass. Although not demonstrated by the data analysed in this study, in other fisheries, it has been shown that reduced effort leads to increased yield/recruit and increased egg/recruit – which would lead to bigger lobsters, more lobsters (Miller 1997). Partnered with the existing formal conservation tools (minimum carapace length, trap limits, non-removal of egg bearing females, etc.), the lobster berth system limits the harvesting activity on the affected grounds and removes the incentive for berth holders to overfish their areas. It can be argued that as a result, the grounds will become more productive and the economic benefits to fishermen will increase. Additional effort reductions may be needed within lobster berths to achieve the full economic and biological benefits, but the chances of fishermen reducing trap limits and fishing activity would be much greater if they knew that the benefits of those reductions will flow to them and not others, as is the risk in a competitive fishery. It is also much more likely that fishermen, who have an ownership connection to the resource, as is the case with berths, will be more receptive to other conservation/management changes because of their vested interest.

The data collected and analysed as part of the review of the Eastport Newfoundland Marine Protected Area showed that a reduction in fishing effort can impact size structure of the local population. Although fishing is prohibited in the MPAs and not in the berth areas, the similarities lie in limiting effort to a fishing zone. A similar project for at-sea sampling in the berth vs. non-berth areas in St. George's Bay would be required to properly quantify the benefits lobster berths in Cribbon's Point and Ballentyne's Cove provide to the fishery. Comparison with other MPAs may then suggest the berth system has real value to the health of the lobster stock in the whole of St. George's Bay. As with Marine Protected Areas, strong empirical support exists for the benefits of lobster berths; actual evidence that they enhance the fishery is sparse.

Although there would be many obstacles to the formal recognition and implementation of lobster berths by government officials, including objections from non-berth fish harvesters and possibly the general public, the overall benefit to the lobster stock and subsequent fishery could outweigh the anticipated negative reception it would receive.

The likely argument that berths go against the tradition of the lobster fishery is questionable. How can a system of fisheries management that has been in existence since before the start of the commercial fishery not be considered tradition to the area harvesters?

Unlike the sea urchin fishery in Nova Scotia or the MPAs in Eastport NL, lobster berths have been established since the 1800's. Fisheries and Oceans would not have to undergo the long process of developing zones through the input of scientists and local harvesters. The process to establish the boundaries of the lobster berths may be fairly simple compared to the several years it took to assign the restricted sea urchin zones. As with the MPAs in Newfoundland, the berth

harvesters would be supportive of the conservation methods and would likely facilitate regulating the system.

Fishermen believe the success of the berth system has been a result of the dedication and desire of those who fish within this structure. Recent threats to the system, including increased license prices and low desire of fish harvesters to have their offspring enter the fishery have become a concern to many involved in the fishery and the community. Without further recognition of the system by the regulating body, the lobster berth system in St. George's Bay may not proceed into the future with the new generation of fish harvesters.

Setting different management targets for specific areas of a fishery is not a new concept. Research on the spatial variability between egg production and fishery yield has resulted in various recommendations from Fisheries and Oceans Scientists for a portion of the Gulf of St. Lawrence (Miller et al. 2006). Setting different management strategies is the same concept. The biological factors along the coasts of Canada have many varying factors. Localized management of each area and biological habitat would benefit from consideration of these variables and what they mean to the fisheries stocks. In the case of lobster berths, local harvesters, their communities and the resource may well benefit from this property-rights system if such an option remained available to them.

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