

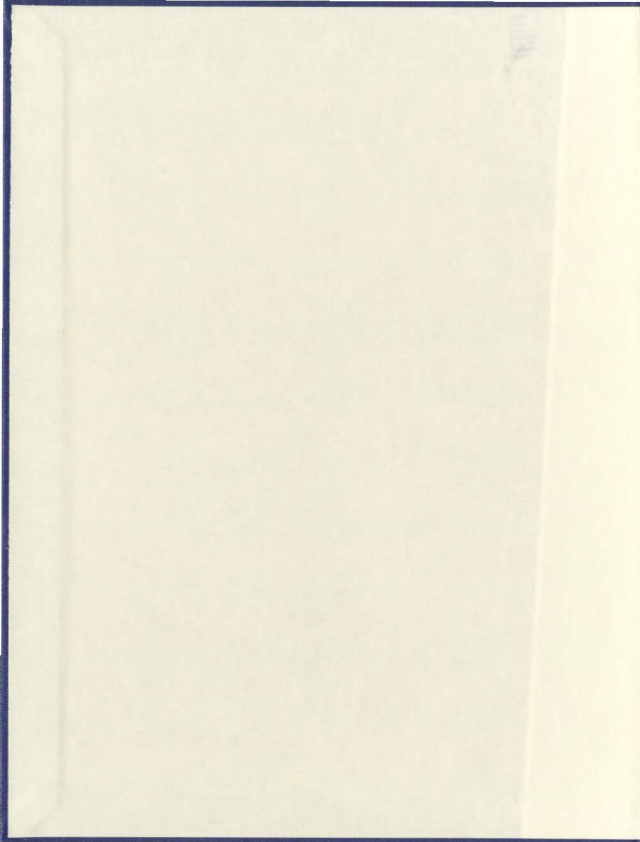
MARINE CONSERVATION AREAS IN THE
NEWFOUNDLAND CONTEXT:
THE PROPOSED BONA VISTA AND
NOTRE DAME BAY INITIATIVE

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MARINE CONSERVATION AREAS IN
THE NEWFOUNDLAND CONTEXT:
THE PROPOSED BONA VISTA AND
NOTRE DAME BAY INITIATIVE

by

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A report submitted to the
School of Graduate Studies
in partial fulfillment of the
requirements for the degree of
Master of Marine Studies
(Fisheries Resource Management)

Memorial University of Newfoundland

August 1998

St. John's

Newfoundland

Abstract

Marine Protected Areas (MPAs) are regions that have been reserved by law to protect all or part of a designated environment. In Canada, this concept has evolved into Marine Conservation Areas (MCAs) which are defined as regions that are managed for *sustainable use*. These include regions ranging from the sea bed to the surface of the water and include the living resources within that environment. MPAs have been studied mostly in terms of their possible biological implications, but, as in other aspects of fisheries biology, it is also important to examine the legal, economic and social implications of their implementation. These considerations are especially important in locations where the majority of people earn their living from the sea. Recently, Parks Canada identified the Bonavista and Notre Dame Bay regions of coastal Newfoundland as a possible site for an MCA. A number of considerations by management can help ensure the ultimate success of this MCA. Clearly identifying the regulations and associated penalties within appropriate legislation is a difficult but necessary step. Maximizing the potential economic benefits of these regions would also improve the chances of success for such initiatives in that they improve public support for this initiative. Whether economic benefits are compatible with the biological goals of the region would appear to be highly dependent upon the efficiency of the management structure in enforcement measures and public education. The need for public support has been recognized by Parks Canada and exhibited in their attempts to educate and update the affected communities with newsletters, public meetings, and community facilitators. It is possible

for the Bonavista and Notre Dame Bay MCA to be successfully implemented. Given the economic difficulties that have resulted from the northern cod moratorium it will be an uphill battle. The moratorium has, however, also provided the perfect opportunity to argue for conservation measures. A successful initiative has the potential to revitalize the economy and the biological characteristics of the region. Failure, given past trends within this region, will most likely result in further depletion of the resources that are distributed within this region.

Acknowledgements

I would like to thank Dr. P.V.R. Snelgrove for supervising the development and completion of this project and especially for his valuable advice throughout the editing process.

Thanks also go to Dr. J. Lien for providing documents in the initial stages of project development and to Ted Potter of Parks Canada for information on the Bonavista and Notre Dame Bay proposed National Marine Conservation Area.

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List Of Abbreviations and Symbols Used

MCA - Marine Conservation Area

MPA- Marine Protected Area

IUCN - The International Union for the Conservation of Nature

NMCA - National Marine Conservation Area

Chapter I: Introduction

1.1 ~ Introduction

Human impacts upon the Earth have never been greater. The sheer scale of these impacts has expanded largely because of the ever-increasing population of humans, more "efficient" technologies, and the effects of human activities upon the earth. The natural resources that are utilized to support human populations (e.g. oil) are largely extractive in nature and the processes involved in extracting these resources can often be detrimental to the ecosystem. It follows then that the problems arising from these sorts of activities will be compounded as populations and their demands continue to increase. With respect to the world's oceans, a full three-quarters of the pollution presently entering this environment can be attributed to human activities on land (Weber 1993), and this impact is expected to increase as populations shift towards the coastal zone in the coming decades. Concurrent with these developments, human awareness of the environment and our impacts upon it have also reached an all time high. In the age of the "global village", phrases such as "ozone friendly", "recyclable", and "biodegradable" have become commonplace in the average North American household. Despite this resurgence in interest in the environment, many people are unaware of the many problems within the world's oceans. There is widespread belief that the oceans are an undiscovered wilderness with inexhaustible resources that will act as a possible remedy to the world shortages in food and particularly in protein (Lien and Graham 1985; Weber 1993; Agardy 1995).

The oceans of the world play a critical role in the health of the Earth's biosphere (Parks Canada 1998a) and they also provide immeasurable aesthetic value to humans. Oceans are vital in the atmospheric exchanges along the water air interface. These exchanges regulate the global climate and contribute to the global oxygen supply while reducing the amount of carbon dioxide present within the atmosphere - a mechanism which is referred to as the "biological pump" (Weber 1993). Ocean life also impacts nitrogen and sulfur cycling, pollutant dispersion and metabolism, and the stability and erosion of coastal areas (Peterson and Lubchenco 1997; Snelgrove et al. 1997). In addition to the importance of the oceans for the Earth's general health, the oceans are of primary importance because of the resources that they contain. Marine fisheries have sustained innumerable coastal communities for millennia (Weber 1994), and failures of fisheries have subsequently created social and economic havoc on impacted areas. Oceans also provide recreation and tourism dollars that can form a staple of local economies, encompassing activities from sunbathing to boating to whale watching.

The oceans cover some 70% of the Earth, and it is their massive scale that has given the impression that fisheries could be sustained at continuously higher levels for millennia to come (Weber 1994). However, it has been estimated that approximately 80-90% of some world fish stocks are being removed each year by industrial fishing (Safina 1995). While this type of depletion may be the most evident human impact, other trends represent a threat to the oceans. Rapid population growth, industrial expansion, increased food consumption and poverty have contributed to coastal pollution, habitat destruction

and the depletion of marine life. These impacts have had their own implications including depletion in local species diversity and reduced recreational uses of the oceans. A depletion in marine biodiversity can result in depleted functioning of the “biological pump” and possible elimination of unique, undiscovered organisms, and their potential uses within the ocean (Weber 1993; NRC 1995). In addition, pollution of coastal and open water environments threatens “eco-tourism” industry within these environments.

Our increasing social and economic dependence upon the oceans combined with the continual depletion of world resources, has created a pressing need for some remedy for the escalating deterioration of marine habitats and resources. It has become obvious that traditional approaches to fisheries and marine resource management have not been successful, and it has been suggested that marine reserves in the form of Marine Protected Areas could offer a promising alternative as part of future management initiatives (Lauck et al. 1998). Marine Protected Areas or MPAs are considered to have great potential for saving, studying and sustaining the biodiversity of the world’s oceans (Sobel 1993; Larkin 1996) because they provide a geographic framework in which resources can be utilized on a sustainable basis. MPAs also provide a legal structure that is considered to be beneficial for government purposes and for those who will be directly affected by such regions (Agardy 1995).

1.2 ~ The Historical Development of the Marine Protected Area Concept

The concept of Marine Protected Areas (MPAs) is not a new one. The earliest MPA is thought to have been established in Glacier Bay, Alaska in 1910 (Morton 1996). Another MPA, the Fort Jefferson National Monument Park in Florida, was established in 1935 and encompasses 18,850 ha of ocean and 35 ha of coastal land (Gubbay 1995; Morton 1996). Despite these early initiatives, the terms refuges and sanctuaries are still associated largely with the terrestrial realm. This is not surprising, considering that the concept of national terrestrial parks was developed and established much earlier and to a much greater degree than their marine equivalents. Within Canada, for example, an area of 26 km² in Banff, Alberta was set aside in 1885 for public use. Since then, 31 other areas totaling 140,00 km² of land have been set aside (Mondor 1985; Graham et al. 1992). The shift towards the marine realm and MPAs took place in 1962 when the first World Conference on National Parks emphasized the need for the designation of marine sites, then referred to as marine parks. This recognition of a problem arose in response to increasing threats to the beauty, cultural heritage and floral and faunal composition of the ocean (Kelleher and Kenchington 1991; Graham et al. 1992; Duffus and Dearden 1993; Morton 1996). Since this time, MPAs have continually been a part of the policies of the World Congress on National Parks and Protected Areas and other world environmentally-oriented organizations (Gubbay 1995). This heightened profile has resulted in the creation of marine protected area programs throughout the world.

The first MPAs were most often extensions of terrestrial parks and protected areas, and often consisted of small, enclosed bays that were adjacent to existing terrestrial parks (Graham et al. 1992; Gubbay 1995). Coastal locations were also often identified because of pressure created in these regions from human patterns of coastal settlement (Gubbay 1995). Thus, the need for reserves was more evident in coastal areas where deterioration was more easily seen. More recently, marine sites have been designated independently of their coastal counterparts, and a number of areas offshore have been identified as potential MPAs. These include potential sites off the coast of the island of Newfoundland (Gubbay 1995; DFO 1997).

1.3 ~ Traditional Impediments to Implementation and Success

Despite the increase in importance of MPAs on a global scale, there are a number of potential problems faced by those who are responsible for the designation and establishment of these regions. One of the most daunting issues facing implementing organizations is obtaining public support from the communities that will be affected by the MPA. A lack of public support can result from the commonly used top-down, which is perceived as an autocratic approach to implementation (Graham et al. 1992). This often creates a lack of understanding on the part of the public on what rules and regulations will be enforced within the proposed marine protected area. This uncertainty then translates into a sense of distrust on the part of the public. Other impediments can result from a lack of specificity in the applicable legislation. Any type of ambiguity

within legislation can create a lack of commitment on the part of the staff involved, which in turn can jeopardize the entire initiative. Any breakdown within the regulating bodies is often translated to the members of the community which in turn can affect their attitudes toward the MPA. It has also been suggested that difficulties in implementation may be partly due to a lack of information, understanding and communication of ecosystem concepts among the scientists, managers, and harvesters involved (Done 1998).

1.4 ~ Research Goals

Because of the increasing profile of such regions, Parks Canada has introduced an initiative that would establish a modified marine protected area or Marine Conservation Area (MCA) in a marine region adjacent to the coast of Newfoundland. The goal of this particular study is to examine the concept of Marine Conservation Areas within the Newfoundland context, with particular reference to the proposed site in the Bonavista and Notre Dame Bay regions. This will be done first, to examine the legal implications of implementing such a system within this region, and then to assess the biological, economic, and social implications of limiting access to the fishery resource that is the primary employer of the people who inhabit this region. The Bonavista and Notre Dame Bay regions are particularly appropriate for such a Marine Conservation Area because of the wide variety of physical, biological, and cultural characteristics that are displayed within this region (Parks Canada 1997). Within some of the inlets, for example, some warm water species that are normally found in more southern locations have been

identified, and the colder waters within the fjords contain arctic species such as Icelandic scallops. In addition, many marine mammals and whales are frequent visitors of this region (Parks Canada 1997). An MCA could also be of particular significance as a mechanism to help reduce the impacts of the depletion of the northern cod stock and the moratorium on harvesting of this species. Despite these many attributes, an MCA for this region is complicated by the fact that commercial fishery for cod, and more recently for crab and other species, has been by far the most significant employer in the region. Thus, can the traditional usage of this region be reconciled with marine conservation needs and can a Marine Conservation Area be the means through which these opposing goals are reconciled?

1.5 ~ Research Methods

This study will synthesize extensive research from existing literature concerning Marine Protected Areas and Marine Conservation Areas with information obtained from local newspapers, television, radio programs, and documents obtained from contacts within government organizations (e.g., Parks Canada, Federal Department of Fisheries and Oceans). Such a synthesis will allow evaluation of how the broad concept of Marine Protected Areas that has been developed for other areas of the world may or may not be appropriate to the Newfoundland situation, and how specific concepts may be applied to this region.

Chapter II: Marine Conservation Areas: Purpose, Practice and Benefits

2.1 ~ What are Marine Protected Areas?

The term Marine Protected Area (MPA) has been used to describe a diversity of applications, thus, providing a precise definition is not an easy task. The International Union for the Conservation of Nature (IUCN) identified the following definition in 1988 at its 17th General Assembly:

“Any area of intertidal or subtidal terrain, together with its overlying water and associated flora, fauna, historical and cultural features, which has been reserved by law or other effective means to protect part or all of the enclosed environment” (Gubbay 1995).

While this definition is a good one, it by no means describes all of the structures that use this name, as different countries often have differing goals and policies to govern these regions (Gubbay 1995). In addition, many of the countries involved have used different terminology to identify regions that are very similar in purpose. Terms that have been used include: ‘marine parks’, ‘marine reserves’, ‘marine sanctuaries’ and, in Canada, ‘marine conservation areas’ (Gubbay 1995; DFO 1997; Parks Canada 1997). The goals of these regions can range from protecting the genetic diversity of a region to the protection of a rare or endangered species or population. Other objectives target protecting regions that are important to the life cycles of economically important species, facilitating the interpretation of marine regions, or identifying regions where scientific research or training can take place (Gubbay 1995). Different countries often have one or

more of these objectives with unique modifications to accommodate the specific situation involved.

2.2 ~ Parks Canada Concept

Marine Conservation Areas (MCAs) are a Parks Canada modification of the MPA concept. These are regions that are singled out to be protected, but they are also designated as regions that are to be '*sustainably used*' -- they allow the resources that are found within the defined area to be harvested at a *sustainable* level (Parks Canada 1997).

In the words of Parks Canada (1997):

"A national marine conservation area is a marine environment which is managed for sustainable use. It includes everything from the sea bed, including the subsoil, to the surface of the water and includes the living resources within that environment. The emphasis is on the ocean, although wetlands, river estuaries, uninhabited islands and some small amounts of coastal land may be included".

This definition is very similar to the one that was defined by the IUCN, however, the Parks Canada concept is more specific because it states that harvesting activities are considered to be a part of these regions as long as they "subject to protecting the conservation area's ecosystems, to maintaining viable stocks, and to attaining the purpose and objectives of the marine conservation area" (Parks Canada 1998b). This is a necessary inclusion within the Canadian policy if these regions are to be successfully implemented within waters that have traditionally supported harvesting activities that often form the basis of local economies.

One of the essential components of the Canadian MCA system plan is the concept of zoning, which defines different levels of both use and protection within the MCA (Parks Canada 1998b). There are three zones that can potentially apply to regions within the MCA, and these are referred to as Zones 1, 2 and 3 respectively. Zone 1 regions will be regions that are singled out for preservation. Within these zones the harvesting of renewable resources will not be permitted and visitors will normally be restricted from entering. Construction of permanent structure within these regions will also not be permitted. Such regions will normally be selected based on any of several criteria, including that they are either considered critical to the survival of threatened or endangered species, particularly sensitive to human activities, ecologically unique, or of historical significance. The Zone 2 designation defines regions that are singled out for the components of their natural environments. Within these regions, harvesting activities will also be prohibited, however, a small amount of research and public education will be permissible with minimal support facilities. Zone 2 regions will include those that surround Zone 1 regions, and regions where public education is an integral part of both environmental monitoring and research activities. Finally, Zone 3 regions will be singled out as conservation areas. Within these regions, fish harvesting activities will be permitted as long as the basic function of the ecosystem is maintained, and hunting activities will also be permitted at a conservative level. Permanent facilities to support public education activities will be permitted within Zone 3 regions. It is also important to note that all MCAs will contain a core of both Zone 1 and 2 areas and that all zones of

MCAs can potentially be closed if, at a point in time, they require greater protection (Parks Canada 1998b). Zones have not, as of yet, been applied to the Bonavista and Notre Dame Bay site.

2.3 ~ Development of the Marine Conservation Area Concept within Canada

The Marine Protected Area concept is not a new one within Canada. As in other countries, the profile of this concept increased within Canada in the 1960's, and in 1971 studies were sponsored by Parks Canada to examine the feasibility of adding marine components to the existing national terrestrial parks. Among those considered was Terra Nova National Park, which falls within the current proposed site (McBurney 1978; Bird 1995; Yurik and Mercier 1995). These early studies represented the first attempt by any country to look at oceanic processes and to suggest how a long-range national plan for the conservation of the marine habitat could be formulated (McBurney 1978). In addition, the proponents of the study were among the first to recognize the need for joint management between the involved departments (Graham et al. 1992). Although the level of awareness of this subject was raised in the 1960's and 1970's, the translation to official policy did not take place until 1986 when Parks Canada released the "National Marine Parks Policy" (Parks Canada 1998a). This delay in policy implementation may have been the result of a number of contributing factors, including a lack of resources and research capability within the Parks Canada institution at the time, the fear of the potential cost of funding research within the larger, more dynamic marine ecosystem,

concerns about public access to the region, and the protective nature of the Parks Canada infrastructure (Graham et al. 1992). Despite this delay, the policy was released in 1986 including input from extensive public consultations. This was modified in 1994 into the “Parks Canada Guiding Principles and Operational Policies”. One of the more notable modifications contained within this document was the change from the usage of the term “marine park” to the current term, “marine conservation area”. This modification was made in order to minimize the comparisons between the terrestrial park concept that prevents the extraction of natural resources and the less restrictive marine concept (Parks Canada 1998a). Other important points that were included in this policy included emphasis on the unique nature of the marine environment, the importance of public consultations, and the necessity for integrated or cooperative management (Mondor 1988). In 1995, the national marine conservation areas system plan, “Sea to Sea to Sea” was released by Parks Canada. This document outlined their methods for identifying potential MCAs through the use of a biogeographical classification system (Parks Canada 1995).

2.4 ~ Goals of Marine Conservation Areas

As mentioned earlier, the goals of Marine Protected Areas can vary according to the country and the characteristics of the environment to be protected. The ultimate objective of Marine Conservation Areas has been identified by Parks Canada (1998a) as follows:

“To protect and conserve for all time national marine areas of Canadian significance that are representative of the country’s ocean environments and the Great Lakes, and to encourage public understanding, appreciation and enjoyment of this marine heritage so as to leave it unimpaired for future generations”.

Other goals for the national MCAs as indicated within Parks Canada policy documents (1995; 1997) include:

- maintaining marine ecological processes and life support systems
- preserving biodiversity
- serving as models of the sustainable use of both species and ecosystems
- facilitating and encouraging marine research and ecological monitoring
- the protection of depleted, vulnerable, threatened, or endangered species or populations
- preserving habitats that are considered critical to the survival of species
- protecting and maintaining regions that are critical to the lifecycles of economically important species

Generally speaking, these more specific goals are summarized in the general statement that the purpose of an MCA is to “protect and to conserve the marine environment” (Parks Canada 1997). It is also interesting to note that many consider the preservation of biodiversity as a prerequisite for sustainable use of natural resources (Hammer et al. 1993). If Parks Canada achieves this goal alone, many would consider these initiatives successful.

2.5 ~ Identification of the Proposed Site

The large land-mass that comprises Canada, and the variety of aquatic ecosystems that border and lie within it, make the protection of these aquatic ecosystems difficult. Randomly designating MCAs would be an option, however, Parks Canada wishes to designate aquatic ecosystems that are representative of these regions (Parks Canada 1995). There are five basic steps that Parks Canada has developed to identify and implement MCAs. These include: (1) identifying representative marine areas (2) selecting potential MCAs (3) assessing MCA feasibility (4) negotiating an MCA agreement and (5) establishing the new MCA in legislation (Parks Canada 1998b). To accommodate the first goal, Parks Canada has adopted a biogeographical method that identifies possible sites for MCAs. This method divides the marine environment into distinct regions based upon their biological and oceanographic characteristics (Parks Canada 1995). Through the use of this biogeographical method and a scientific consultative process, 29 marine regions have been identified within the Great Lakes (5 regions), Arctic (10), Pacific (5), and Atlantic Oceans (9) (Duffus and Dearden 1993). This number represents a significant increase from the 9 marine regions that were identified by Parks Canada in the late 1960s (Graham et al. 1992). The ultimate objective is that each of the 29 regions would be represented by a national MCA (Parks Canada 1998a). This does not mean there will be one MCA for each region, because one MCA may represent more than one biogeographic region (Graham et al. 1992). For example, 5 of the 29 marine regions are currently represented in 3 MCAs and the marine component

of a terrestrial park: two in Gwaii Haanas, B.C.; one in Fathom Five, ON; one in Saguenay-St. Lawrence, PQ; one in Pacific Rim National Reserve (Parks Canada 1998c).

One of the 29 regions that Parks Canada has identified within the Atlantic zone is described as the "Newfoundland Shelf Region" (Parks Canada 1995). From this region, three possible sites were initially identified as potential MCAs. These included Bonavista Bay/Funk Island, Trinity Bay and Hare Bay. From these sites, the final area of interest was identified as extending from Cape Bonavista to North Head in Notre Dame Bay and offshore to Funk Island (Parks Canada 1995; Parks Canada 1997). The final MCA could include all or a portion of this area of interest (Figure 1).

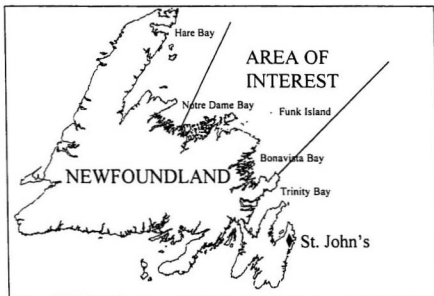


Figure 2.1. The Area of Interest for the Proposed Bonavista and Notre Dame Bay Marine Conservation Area (Modified from Parks Canada 1997).

No offshore boundaries have been defined for the proposed MCA, but it has been suggested that protection should ideally extend to the end of the continental shelf (Macnab 1997). This encompasses a large region, but is considered to be an ideal representation of the Newfoundland Shelf region (Parks Canada 1997) because of the variety of marine life present and the physical and cultural characteristics of the area. The region is physically very diverse; the Notre Dame Bay end has many different sized islands scattered along the coastline, and numerous bays and inlets, whereas the Bonavista end includes more narrow bays and sounds, with cliffs, sandy beaches, marshes and intertidal flats (Parks Canada 1998d). In addition, the depths range from intertidal to depths of 500 m in bays up to 3000 m along the continental shelf. The region also includes Funk Island which is a multi-species seabird colony of national significance (Parks Canada 1998d). The large size of the region is important in helping to ensure that the area is representative of the identified region and that the overall conservation of the region is maintained (Parks Canada 1998b). This potential site is also advantageous because it is adjacent to an established national terrestrial park, which reduces the amount of land-based pollution which may enter the ecosystem (Parks Canada 1998b). In addition, the infrastructure for the interpretive nature of the MCA is already present within the terrestrial component of the national parks system.

Currently, step (3), the feasibility study of the MCA process, is underway on the Bonavista and Notre Dame Bay site. The objectives of the feasibility study are: (1) to determine the public's goals for the region in question (2) to provide the public with

information of the implications of the MCA, and (3) to obtain public opinion on whether the proposed MCA should be established (Parks Canada 1997). The feasibility study itself will have four parts, including information exchanges, workshops, public reviews of proposals, and finally the advisory committee's recommendation (Parks Canada 1997). The first stage has been completed through the employment of community facilitators who have prompted informal meetings with residents and through the circulation of a newsletter in October 1997 (Parks Canada 1997). Further stages, including the selection of 20 members for the public advisory committee from communities and other stakeholders within the region, are ongoing. Greater than half of the people on the board will be harvesters or representatives from the local fish harvester's union, and will be chosen because they exemplify the wide variety of interests and the geographic extent of the region (Parks Canada 1997; CBC Radio 1998a). This committee will oversee the feasibility study and recommend whether the MCA should be established (Parks Canada 1997).

Chapter III: Legal Aspects of Marine Conservation Areas

3.1 ~ Considerations for Legislators

Prior to creating new, or amending old, legislation to accommodate these regions, a number of international agreements and national laws and policies that potentially affect them must be considered. The most important international law that affects the ocean is the Law of the Sea. The Law of the Sea had its beginnings in 1958, yet despite these early origins it was not ratified until 1994 (Gibson and Warren 1995). Within this law, conservation is only generally dealt with in that it imposes a basic obligation for those countries involved to protect the marine environment and to prevent or limit the amount of pollution that enters the environment. There is, in fact, no direct mention of Marine Protected Areas (MPAs) within the Law of the Sea (Gibson and Warren 1995). MPAs have, however, been mentioned within a number of other international conventions and agreements. The extent of the effects of these conventions range from a regional level to global coverage. When creating an Marine Conservation Area (MCA), one of the criteria that can ensure its success or failure is the legislation involved.

The legislation in the establishment process of an MCA is vital because if it lacks sufficient detail about all aspects of the MCA, then the management regime will be subject to heightened public pressures from powerful local groups. It is the short-term economic goals of these groups that may ultimately jeopardize the success of the conservation area (Kelleher and Kenchington 1991). The details of the legislation should include the regional objectives for conservation, recreational activities, education, and

research. Without this legislative specificity, the designation of this area would be viewed by the public as a political gesture rather than one that was genuinely designed to conserve the marine environment (Kelleher and Kenchington 1991). The specifics of the legislation will, of course, vary from country to country according to culture and traditions.

The disparity in jurisdictions and objectives worldwide emphasizes the fact that international law does not have the legislative nor enforcement power to protect these types of regions (Gibson and Warren 1995). Instead, this type of regulation must be provided for within the national legislation of the countries involved and including the necessary specificity if the initiative will be ultimately successful.

3.2 ~ Canadian Legislation

An official Canadian marine parks policy was created in 1986, however, the legislative efforts to accommodate this policy were limited to modifications of the "National Parks Act" in 1988 (Parks Canada 1998a). This accommodation was accomplished through broadening the definition of "park" as it was previously defined to include the concept of national marine parks (Graham et al. 1992). As in most other countries, the existing legislation that deals with national parks in Canada is terrestrial in nature because the first protected areas were established on land (Salm and Clark 1984). Terrestrial laws, however, often lack the necessary specificity to accommodate the unique characteristics of the marine environment. For example, one of the major problems that

arises when drafting legislation specific to the marine environment is in defining boundaries for the regions (Kenchington 1988). As such, the amendments that have been made to the "National Parks Act" have been viewed as temporary until such a time when new, more comprehensive legislation can be formulated (Parks Canada 1998b). A more comprehensive legislation would include specifications on the minister's responsibilities for the administration and management of the MCA. Creating new legislation, however, will not be an easy endeavor. The complexities of both the legislation and the different jurisdictions within Canada preclude any simple resolution.

Even within the Canadian system, there are numerous laws and accords that must be considered in the development of MCAs. For example, there are an estimated 36 federal acts and 20 provincial and territorial acts whose objectives affect the marine environment. The most prominent of these acts are summarized in Tables 3.1 and 3.2.

Table 3.1. Federal Statutes for Protecting Marine Regions (Graham et al. 1992; Taylor 1995)

National Parks Act	The Canada Water Act
Canada Shipping Act	The Navigable Waters Protection Act
Fisheries Act	The Migratory Birds Convention Act
Pilotage Act	The Canada Wildlife Act
Coastal Fisheries Protection Act	Canadian Petroleum Resources Act
Canadian Environmental Protection Act (CEPA)	Oil & Gas Production & Conservation Act
Arctic Waters Pollution Prevention Act	The Historic Sites and Monuments Act
Archaeology Act	

Table 3.2. Provincial and Territorial Laws and Policies (modified from Graham et al. 1992; Taylor 1995)

British Columbia <ul style="list-style-type: none"> • Ecological Reserve Act • Parks Act • Heritage Conservation Act • Environment & Land Use Act 	Nova Scotia <ul style="list-style-type: none"> • Special Places Protection Act • The Beaches Act • Provincial Parks Act • Lands & Forests Act
Quebec <ul style="list-style-type: none"> • Ecological Reserves Act • Parks Act 	Manitoba <ul style="list-style-type: none"> • Wildlife Act • Provincial Parks Act
New Brunswick <ul style="list-style-type: none"> • Ecological Reserves Act • Parks Act • Fish & Wildlife Act 	Newfoundland <ul style="list-style-type: none"> • Wilderness & Ecological Reserves Act • Historic Resources Act • Wildlife Act
Prince Edward Island <ul style="list-style-type: none"> • Recreation & Development Act • Natural Areas Protection Act • Game Protection Act 	North West Territories <ul style="list-style-type: none"> • Territorial Lands Act • Territorial Parks Act • Wildlife Act
Yukon <ul style="list-style-type: none"> • Territorial Parks Act • Wildlife Act 	Ontario <ul style="list-style-type: none"> • Provincial Parks Act

This type of complexity makes cooperation across jurisdictional boundaries a necessity if MCAs are to be successful (Graham et al. 1992). Because of the variety of marine environments that are to be represented within the National MCA system, any legislation must be flexible in terms of both planning and management if they are to be successful within the different regions of Canada (Parks Canada 1998b). Provisions to be included within the proposed legislation include (Parks Canada 1998a):

- Recognize the economic, cultural and spiritual support that Canadians get from the marine environment.
- Stress the need to create a system of regions to accurately reflect the diversity that exists within Canadian aquatic ecosystems.
- Stress the need for Canada to contribute to the worldwide initiative to establish protected regions.

- Stress the need to provide opportunities to visit and learn about the region.
- Emphasize that the MCA will be established according to agreements with the relevant provincial governments, federal departments, and Aboriginal groups.
- Explain that the Crown will own or acquire all land within a national MCA.
- Ensure that the final boundaries, harvesting rights and involvement of Aboriginal peoples will be included.

It is important to include all of these objectives within the legislation because the legislation itself is one of the methods that is used to alleviate public concerns. Those who will be most impacted are those who have used the region without the legislation. It is these individuals who must be convinced that the new legislation and administration will be of long-term benefit to the environment and themselves (Kenchington 1988).

3.3 ~ Management Structure

An MCA will not be managed for strict protection in the same manner as terrestrial parks. Instead, it is the intention of Parks Canada to manage a wide variety of human activities as a part of the MCA (Parks Canada 1998b). However, the diversity of human activities that can take place within the marine environment will require that management include the services of a number of government agencies. As such, an integrated approach to management would appear to be most appropriate (Mondor 1988; Graham et al. 1992; Parks Canada 1998b). The overall responsibility for the management and administration of MCAs rests with the Minister responsible for National Parks, which is currently the Minister of Canadian Heritage (Parks Canada 1998a). Some of the Minister's management responsibilities will include reviewing and tabling the

management plans for the MCA. In addition, it is considered the Minister's responsibility to ensure that the public is involved in the creation of new policies, new management plans, and new MCAs (Parks Canada 1998a). In the case of other human activities, other ministers will become involved. For example, it is a provision of the MCA policy that fishing activities and aquaculture will be the responsibility of the federal Minister of Fisheries within federal jurisdictional boundaries and the provincial minister of fisheries otherwise (Parks Canada 1998a). In locations where shipping takes place it is the responsibility of the Minister responsible for Transport under the "Canada Shipping Act". Public input about proposed management plans will be passed upwards through a management advisory committee (Parks Canada 1998b).

3.4 ~ Regulations

As in any piece of legislation, the new legislation that deals with the national MCA system must contain regulations as to what activities will or will not be permitted within the boundaries of the MCA. These regulations should be specific regarding the possible penalties associated with each action. Suggested prohibited activities within national MCAs include those involved with the identification or the extraction of non-renewable resources (Parks Canada 1998a). In addition, sport hunting and the dumping of materials into the ocean will be prohibited (Parks Canada 1986). Fishing is considered to be an appropriate activity within Zone III areas as long as it does not interfere with the objectives of the MCA (i.e. the ecosystems and fish stocks are not being degraded). It

must be noted, however, that within the Marine Parks Policy it states that harvesting activities that are suspected of having an adverse affect upon the marine environment will be of concern to Parks Canada (Yurick 1988; Parks Canada 1998b). Prior to taking any action, confirmation of these impacts will be required through joint research with possible solutions being determined in cooperation with harvesters (Yurick 1988). In addition to restrictions created within the MCA, other restrictions may be created outside the MCA that pertain to those activities (industrial, agricultural, municipal) that contribute to the level of pollution within the area (Parks Canada 1986). Shore-based facilities for harvesting and aquaculture activities are permitted with the above stipulations. Similarly aquaculture itself is considered to be an acceptable activity as long as it does not conflict with other activities within the region, such as other fishing activities; ship navigation; marine recreation; and interpretive activities within the MCA (Parks Canada 1998a). Recreational activities within the MCA will continue as long as they are considered compatible with the objectives of the MCA. It is also important to note that all of these activities will be limited to the appropriate zones of the MCA.

Once the MCA has been created, no lands within the region will be made available for private use. Those that were previously owned will remain within the hands of the owners, however, and limited use of the land within the region may be allowed in the form of temporary permits or leases (Parks Canada 1998a). The problem is that in the MCA context, the term "lands" has not been defined.

Penalties for violating any of the above regulations or any others provided for within the proposed legislation would be similar to those penalties that are stipulated under the "Oceans Act". For those persons found guilty of a violation, they may be deemed responsible for fines ranging from \$100,000 to \$500,000 (Parks Canada 1998a).

3.5 ~ Are These Regulations Applicable to the Current Site?

As is outlined in Section 3.1, specificity is a vital component of legislation that deals with protect areas. The current policy that deals with Marine Conservation Areas is fairly specific in all of its measures. However, there is some apparent ambiguity within some of the regulations. It can also be argued, however, that rather than being ambiguous, this is simply the amount of flexibility that is required if the regulations are to be applied across Canada and to encompass future unknowns.

Some of the regulations outlined above may particularly be a source of contention to the people who will be affected by them. For instance, the idea that the management of this region may be able to restrict activities outside of the designated MCA could cause problems within those industries that will be affected and further complicates the issue of obtaining public support. In addition, those individuals involved in aquaculture may have problems with the idea that relatively new activities like those which are interpretive in their nature appear to be more important than those involved with aquaculture. This impression may be created by the fact that aquaculture, is only considered permissible if it doesn't interfere with the above activities. Finally, the regulations that deal with land

ownership could be particularly contentious in this case considering the large number of communities that fall within the Bonavista and Notre Dame Bay area.

A key consideration in terms of legislation is that these regulations are not final because they are only a part of the “National Marine Conservation Areas Policy” (NMCA), and as such will be subject to modifications prior to establishment of binding legislation. This potential for change could be perceived as a threat to the people within the area.

Although some of the specific regulations contained within the NMCA policy may be contentious, it is important that the Federal Government of Canada formalize these regulations in the form of legislation as soon as possible. Having the regulations formalized through legislation is important because it would provide the public with a concrete reference point. Legislation can, of course, be modified but this is not an easy process and, in the meantime, the uncertainty that may result from the lack of legislation can be alleviated.

3.6 ~ Enforcement

Enforcement through the use of surveillance activities is the most common approach used to gain user compliance (Alder 1996). Enforcement is the measure that is most often supported by management because surveillance and enforcement activities have a high profile within the communities and because of their relatively immediate and easily measured impacts (Alder 1996). In addition, the users of the region often perceive

that enforcement is necessary for the protection of certain regions in addition to their own personal safety (Alder 1996).

To enforce the regulations contained within the proposed national MCA legislation, officers will be designated within Parks Canada in cooperation with other enforcement agencies such as the Department of Fisheries and Oceans (DFO). DFO operates 32 patrol vessels on the east coast which are supplemented through the cooperation with the National Department of Defense and the Canadian Coast Guard (DFO 1998).

It has been argued that education could also be a positive reinforcement measure in the management of those individuals visiting the area (Gubbay 1995; Alder 1996). Educational measures have the potential to improve the visitor's experience within the MCA, gain support for the management practices, and reduce the costs of management while reducing the social conflicts and impacts upon the resources present. However, the benefits of a successful educational program are often only realized a long time after the program has been implemented (Alder 1996). It is unavoidable that when decisions are made, costs are taken into account, and both enforcement and education are expensive (Alder 1996). If the benefits from each are considered against the costs, it would appear that education is both cheaper and has more widespread effects than enforcement. On the one hand, education programs can affect the management objectives relating to community awareness and their attitudes, behaviors, and perceptions. Educational effects are also more long term in nature, as they do not go to zero if the level of enforcement is

relaxed. Enforcement, on the other hand, has effects that are relatively focussed i.e. it aims to change the public's behavior with regards to their compliance to the area's rules and to ensure public safety. In contrast to the long term nature of educational effects, those that are related to enforcement are very short term in nature and tend towards zero if the level of enforcement is relaxed (Alder 1996).

The approach that the Canadian Federal Government uses to create and enact the legislation pertaining to MCAs would appear to be an important component of the success of these regions. Both leadership and cooperation is necessary on many different levels including between federal and provincial governments, within government structures and on a local level if this initiative is to be a success. A key to obtaining the required local support is to ensure that the regulations, management structure, and enforcement measures involved are clearly elucidated within the legislation making the public aware of what they will have to deal with in the future (Kelleher and Kenchington 1991). Without these types of measures, the initiative to establish this type of region will be jeopardized.

Chapter IV: Biological Benefits and Drawbacks of Marine Protected Areas and Marine Conservation Areas

4.1 ~ Potential Biological Benefits of Marine Protected Areas and Marine Conservation Areas

Marine Protected Areas or MPAs are considered to have great potential for saving, studying and understanding the biodiversity of the world's oceans (Sobel 1993; Larkin 1996). Biodiversity or biological diversity is more simply defined as the diversity of life and is primarily considered in terms of species and genetic diversity, although it can also be considered at other taxonomic levels (Jones 1994; Sobel 1993; Gray 1997). The importance of reserves as a tool for preserving biodiversity has been recognized since 1975, yet the conservation of marine biodiversity has not been a priority because the marine environment has been considered to be more homogenous and less subject to localized threats than the terrestrial environment (Jones 1994). With recent advances in molecular biology it has been shown that the marine environment is not biologically homogenous, and there is increasing evidence that "species" once considered to be cosmopolitan may, in fact, be complexes that encompass multiple species (Knowlton 1993). In fact, it has been argued that genetic variability, in terms of the heterozygosity, is greater in marine than in terrestrial species (Jones 1994). Patterns of biodiversity in marine systems have been the subject of some debate, with some investigators arguing that species richness in the deep sea is extraordinarily high relative to other systems including shallow water (Sanders 1969; Grassle and Maciolek 1992), but others argue

that shallow-water systems are equally or more diverse (Gray et al. 1997). Regardless of which argument is true, it is apparent that the oceans harbour many species.

Maintaining high biodiversity within the marine environment is considered of utmost importance because of the basic requirement that living systems maintain energetic exchanges between the producers, consumers and decomposers of the system (Hammer et al. 1993). The potential impact of biodiversity loss on these processes is poorly understood, but changes within the marine system can be expected (Peterson and Lubchenco 1997; Snelgrove et al. 1997). Even in systems with low species diversity, the buffer capacity of the region is lowered when the diversity is lowered, even if the species involved are considered to be particularly tolerant (Hammer et al. 1993). The preservation of biodiversity is also considered to be important because of its unknown potential for pharmaceutical compounds and the role that biodiversity may play in conserving critical habitats within the marine environment (Jones 1994). In addition, maintaining high biodiversity levels ensure that some level of economic gain could potentially be obtained from the conservation of the species themselves (Salm and Clark 1984). Thus, species that are not presently of obvious economic value could potentially offer economic benefits in the future.

The marine environment has tremendous habitat diversity that can range from coral reefs to deep-sea hydrothermal vents (Agardy 1994). MPAs are a mechanism that can protect those environments that are deemed to be of special interest. MPAs can also provide biological benefits in the form of the protection of those habitats that are not

particularly unique, but may be critical for spawning or early life cycle stages of some species. Specific habitats may support not only the adult life stages of species but can also be vital in reproductive and developmental processes (Allison et al. 1998). For instance, larval export from marine reserves is considered to have great potential for increasing the sustainability of world fisheries (Rowley 1994). Davidson and DeYoung (1995) modeled cod egg and larval distribution and transport on Newfoundland's northeast shelf and suggested that spawning location is an important determinant of larval retention on the shelf, and therefore survival. Indeed, northwestern areas act as larval sources for more southeaster areas. Thus, cod spawning in the Bonavista and Notre Dame Bay area could be important to the Northern Grand Bank population. Along these lines, it has also been suggested that the post-settlement survival of Atlantic cod is greater in regions that contain habitats that are considered more structurally complex (Tupper and Boutilier 1995). Thus, the destruction of these habitats, which can result from bottom trawling activity (e.g. Hutchings 1990; reviewed by Dayton et al. 1995; reviewed by Auster et al. 1996), could seriously limit the reproductive success of the species involved. There are, therefore, compelling reasons relating to potential benefit to cod in setting aside areas where trawling is not permitted. These issues are of considerable importance to the Bonavista and Notre Dame Bay proposed Marine Conservation Area (MCA) given the historical ties to the cod. In addition, it is not only necessary to protect critical habitats but also to protect sufficient habitats so that those species that rely upon multiple spawning sites for their replenishment will survive (Allison et al. 1998). Habitats within

MPAs can also provide relatively safe environments for those species that are commercially exploited (Allison et al. 1998), depending, of course, upon the level of protection that exists within the MPA. The Canadian Marine Conservation Areas, for example, contain Zone 1 regions within their boundaries that are presumably minimally impacted by ongoing human activities in adjacent areas (Parks Canada 1998b). Given that cod are thought to be highly mobile, migratory species (e.g. Rose 1993), it is unclear whether large numbers of adult cod would be protected by the Bonavista and Notre Dame Bay MCA but providing a safe spawning haven could be a great help. This could be of considerable significance for those cod that are distributed inshore as these cod will also spawn in the inshore waters (Andersen and Dalley 1997; Grant and Brown 1998; Methven and Schneider 1998).

MPAs also have the potential to act as buffers against a number of external environmental factors including pollution, greenhouse warming, ozone depletion and introduction of non-native ("exotic") species because ideally the greater marine life within these regions will allow increased functioning of the biological pump (Jones 1994; Allison et al. 1998). Larger-scale disturbances cannot, however, be controlled by MPA or MCA designation. If the negative effects are compounded by smaller-scale disturbances, then the MPA or MCA can reduce the local effects by acting as a buffer against the effects of these disturbances (Jones 1994).

The protection of rare or endangered species is another of the potential biological benefits of MPA designation. This is, of course, dependent upon the designation of no-

take or no harvesting areas within the MPA that contain densities of the species in question that are sufficiently high to maintain populations. Again, within the Canadian system, this sort of protection is provided in the designation of Zone 1 regions (Parks Canada 1998b). Within the Bonavista and Notre Dame Bay MCA, no species have as of yet been identified as endangered within the proposed MCA (Mercier 1995), though quite recently it has been suggested that the barndoor skate is nearly extinct relative to its previously widespread distribution on the Newfoundland continental shelf (Casey and Myers 1998).

The recolonization of exploited regions is a benefit that is observed primarily in regions that are adjacent to areas where exploitation is not permitted and where species are free from the pressures created by harvesting activities (Allison et al. 1998). Once this pressure has been relieved, the population may once again become structured by natural mortality factors that allow the population to rebound within the no-exploitation area and potentially in surrounding areas as well (Jones 1994). This type of rebound has been observed in shell and finfish fisheries within the Leigh Reserve of New Zealand, with a particular resurgence occurring in the crayfish and lobster harvests (Ballantine 1989). In addition, a side benefit of these types of refuges is the protection of species that are not the targets of harvesting activities and that contribute to the biodiversity of the region (Allison et al. 1998). One issue that deserves mention is that there is no guarantee that removal of fishing pressure (or other human impact) through establishment of MPAs will necessarily allow species to rebound. Although there is considerable debate on the

issue, there is acceptance among some ecologists that multiple stable states exist in nature, where alteration of ecosystem structure can create a new dominance structure. Thus, although there are systems where species do rebound to pre-impact levels in response to reduced human pressures, there are also systems that remain in altered states even after the pressure is removed (e.g. Barkai and McQuaid 1988). Clearly, MPAs will be most effective if initiated before ecosystems are impacted, but there is still good reason to act later rather than not at all.

The protection of coastal environments is considered to be one of the more specialized biological objectives of MPAs because it is only applicable to those MPAs that are adjacent to coastal regions (Jones 1994). In addition, the coastal environments that are considered to be of utmost urgency for conservation tend to be geographically confined and specialized ecosystems like mangroves and coral reefs. However, those habitats that are more broadly distributed geographically such as kelp forests, salt marshes, and seagrasses can also help to prevent the erosion of coastal regions and, as such, are also critically important for conservation (Jones 1994). These habitats also tend to provide habitat refuge for juveniles of many species, including some that are of commercial value. Juvenile Atlantic cod (age 0+), for example, use eelgrass as a nearshore habitat (Gotceitas et al. 1997). Coastal regions are also those that tend to be most impacted by human activities because of their proximity to human settlements. Given that most commercial fisheries occur in coastal or near-coastal regions, there are

also compelling economic reasons to protect the integrity and productivity of coastal habitats for future generations.

As a final point, the promotion of biological research within the relatively controlled environment of the MPA or MCA is considered to be of utmost importance (Lindeboom 1995). Not only can relatively unimpacted regions be compared to others to reveal the extent of the damage caused by pollution and other human activities, but the structure of MPAs and MCAs can also facilitate the study of the general ecological processes that characterize the region.

4.2 ~ Limitations of Marine Protected Areas and Marine Conservation Areas

Although the potential biological benefits of MPAs and MCAs are numerous, there are also many limitations that may hinder their success. The success of many of the marine reserves that have been created have largely been dependent upon the assumption that reserves protect the populations within their boundaries (Allison et al. 1998). This is not necessarily the case for the entire area that will be designated as an MCA, but often applies only to those smaller regions identified as Zone 1. Regardless of this difference, the effectiveness of reserves as a whole to protect populations is limited as a result of the complex oceanographic processes that go on within the marine environment (Allison et al. 1998). The effects of some of these processes include hydrographic circulation patterns (direction and speed of currents, eddy events, upwelling, etc.) and episodic events such as El Nino that span thousands of kilometers (Rowley 1994; Allison et al.

1998). Accordingly, the biological processes that are impacted by these events take place on a much larger scale than is found within most reserves (Allison et al. 1998). For example, many marine species have pelagic stages in their life histories that expand the spatial scales over which these populations may be impacted. As a result, the boundaries of the MPA or MCA may not be of sufficient size to benefit from the recruitment of new adult members of the population (Bohnsack 1993; Jones 1994; Rowley 1994; Allison et al. 1998). This type of uncertainty has stimulated studies that attempt to model the dispersal patterns of these species. This is especially true of those species that are considered to be of commercial importance like the Atlantic cod. Traditional studies have only provided the general patterns of dispersal of cod larvae, but current initiatives have attempted to model drift paths in specific areas around the coast of Newfoundland (Helbig et al. 1992; Anderson et al. 1995; Davidson and DeYoung 1995). Davidson and DeYoung (1995) suggest that cod spawning that takes place along the Northeast coast of Newfoundland will benefit regions along the northeast coast in addition to more offshore locations. This is supported by the discovery that cod juveniles (age 0+) are confined to the coastal regions of Newfoundland and Labrador (Dalley and Andersen 1997; Methven and Schneider 1998). These studies will be of particular importance when the boundaries of the Bonavista and Notre Dame Bay site are defined because once the adult leaves the boundaries of the MCA or the Zone 1 regions, they will no longer be protected. It has also been suggested that the dispersal distance of planktonic developmental stages of some marine species is roughly correlated with the duration of the planktonic stage

(Allison et al. 1998). As a result, it becomes evident that understanding the dispersal patterns and the habitat requirements of the species within the reserve are vital for the planning process and ultimately the success of the reserve.

4.3 ~ Harvesting Activities and Biological Benefits

As mentioned earlier, the presence of harvesting activities within MPAs or MCAs can have serious impacts upon potential biological benefits. Harvesting activities can have major impacts in both a direct and indirect manner upon the goals of MPAs. Many researchers such as Jones (1994) believe that full closure of the fishery is required in at least some of the regions of the MPA with partial closure and gear restrictions in the rest of the regions if the objectives of the MPA are to be met. Others believe that harvesting activities will affect migrating fish populations whether the activities are limited within the park or not (e.g. Brown 1985). It is on this basis that many such as Mondor (1985) argue that the prohibition of harvesting activities cannot be defended. There is, however, general agreement among experts that any harvesting activities that take place within the region should be "conservative". More specifically, they should not damage habitats, quotas should be conservative and the so-called wasteful fishing practices such as discarding should be discouraged (Brown 1985). While these measures will not solve the larger scale problems of the region, they may help.

The Canadian system of MCAs has not incorporated permanent fishery closures as a major part of their structure. Indeed, such a measure would be virtually impossible

when the social and political implications of the regions are considered. However, MCAs have included smaller regions (Zone 1) that are closed to harvesting activities. This type of multiple-use region has become the most recent trend in marine conservation (Kelleher and Kenchington 1991), in part because it recognizes the need for some type of flexibility within the system given the level of social, economic and cultural dependence upon the ocean. Thus, the core buffer zones help to protect the vital processes within the environment while allowing usage of the resources in other regions to satisfy human needs (Agardy 1995). The controversy arises in what level of extraction is defined as "sustainable" in the eyes of the management structure. Whichever method is used, Agardy (1995) suggests that three general principles are kept in mind when defining sustainability. These include: (1) The entire ecosystem and its linkages should be kept in mind rather than singling out one species or stock when determining ecologically and socially acceptable levels of resource extraction. (2) Determination of levels of sustainability should be based on accepted scientific methods including the fields of population dynamics, food web ecology and genetics. (3) Level of use must be flexible with adjustments occurring according to changes in both the supply and demand of the resources in question. It is hoped that with this type of structure, the regions that are considered to be most important for the ecological processes of the marine ecosystem will be preserved while continuing to allow access to users who depend upon the ocean for their way of life.

4.4 ~ Can the Biological Benefits be Achieved within the Proposed Marine Conservation Area?

As is discussed above, the potential biological benefits of MCAs are numerous but the specifics of each case (i.e. geography, oceanographic characteristics, species composition etc.) must be considered together with the applicable regulations if the potential for the success of the region is to be determined. A major problem that prevents these types of determinations in the Bonavista and Notre Dame Bay MCA is the lack of specific knowledge of some of the most basic biological characteristics of the region. In fact, in this case, only the general biological characteristics of the region have been examined (Steele et. al 1979). For instance, very little is known about the specifics of the marine plants, invertebrates and plankton of the environment (Mercier 1995). There is, however, some indirect information available that suggests a general species list of 40-50 marine fish species for the Bonavista area. These species display a mixture of both Arctic and temperate distributions; a similar mixture of faunas may be expected for other taxa (Mercier 1995). In addition, accurate information on the spawning areas of the region are only recently beginning to be understood (Hutchings et. al 1993; Hutchings and Myers 1994). Though some headway is being made with the use of local knowledge (Potter 1996), existing inadequacies make it difficult to both achieve and measure the biological benefits.

Maintaining natural levels of biodiversity is highly possible within the format of the MCA system, but documenting biodiversity is a necessary prerequisite. This uncertainty is largely the result of a lack of information on the species composition of the

region, making it difficult to determine when a drop or rise in biodiversity has taken place. In addition, the fluidity of the environment and the mobility of many of the species often makes it difficult to determine whether a species has truly been eliminated from a region. This problem could possibly be alleviated through the promotion of biological research within this region, which is a policy directive of the current initiative. With research, future biodiversity levels could be monitored more closely, especially if the management structure is efficient and wishes to keep track of the successes of the region. This is, however, a long-term benefit that will not be immediately observable to the public.

Providing protection for regions that are deemed of particular interest is another of the goals that could be achieved within this proposed MCA, particularly within Zone 1 regions of the MCA system. These regions provide protection for similar types of environments and for some of the unique species found therein. The problem is again a lack of information on what environments or species are unique within this environment. In fact, according to Mercier (1995), none of the marine fish species are unique to the proposed Bonavista and Notre Dame Bay MCA. However, the lack of specific information makes it difficult to say this definitively. Once again, studies that can be facilitated within the structure of this proposed MCA can help to remedy this situation.

Whether MCAs have the potential to allow species to recolonize exploited regions is an issue of much debate. This debate is an important one as it directly relates to the economic well-being of the primary users of the region. Obtaining this kind of

knowledge, however, again requires specific knowledge of the reproductive habits of the species in question, in addition to knowledge of circulation patterns within the specific location. Most often, however, the species that the public considers to be of primary interest are those that are of commercial importance such as cod, lobster and more recently crab. Currently there is more known about the reproductive and lifestyle characteristics of lobster and crab because they are relatively sedentary species. This knowledge in combination with the sedentary lifestyle of these species makes it very likely that the proposed MCA would be successful in protecting these species. Surprisingly, similar knowledge about the cod is only beginning to be compiled despite its historical significance. The lack of specific knowledge about this region makes it difficult to predict whether the Bonavista and Notre Dame Bay region will benefit biologically from the so-called sustainable level of harvesting. This sort of knowledge is gained only through intense and expensive study, without which it will require many years (depending upon age of maturity of the different species) to determine whether any improvement in harvest has been achieved.

Finally, the potential to protect coastal environments and other habitats within the MCA can be achieved through the regulation of those harvesting and other activities that are considered harmful to these environments. Those activities that have been identified as harmful to the seabed will be prevented within this location (e.g., trawling). Trawling impact studies that have been done elsewhere suggest that trawling is harmful to the sea bed (reviewed by Dayton et al. 1995). This may be a contentious issue to those

harvesters who employ these methods and may require proof in the form of research specific to the region. This proof could possibly be obtained from joint monitoring studies sponsored by Parks Canada, provided that sufficient funding were available. Solutions would be found in cooperation with user groups and considered mutually acceptable for both groups (Parks Canada 1986; Yurick 1988). It is this final stipulation that will undoubtedly be the most difficult part of the process.

The potential biological benefits of MPAs and MCAs are numerous, however, the consumer nature of today's society, and the cultural ties of the users makes it virtually impossible to designate MCAs without considering the people who have traditionally used these regions. As a result, it has become increasingly evident that in attempting to achieve biological benefits, managers must emphasize how the benefits can complement the needs of the users.

Chapter V: The Economic Implications of Marine Protected Areas

5.1 ~ General Information on the Economics of Protected Areas

The economic aspects of marine reserves is a subject that has only recently received the attention of environmental economists who purport that access restrictions are "potentially justifiable" when the benefits of these restrictions outweigh the costs (Farrow 1996). Many of the arguments for conservation of particular environments are based on biological criteria. Although biological criteria are very convincing to some, many would argue that economic arguments carry the most weight with development planners, aid agencies and governments (Dixon and Sherman 1990; Farrow 1996). Many of the benefits of protected areas are difficult or impossible to measure, making the determination of the economic value of protected areas very elusive. Because an economic value is often unavailable for Marine Protected Areas (MPAs), the short-term gains obtained from the exploitation of biological resources will often appear more attractive than the long-term benefits of conservation (Dixon and Sherman 1990). In addition, traditional economic analyses do not account for the social benefits of these regions, including the inherent value in the aesthetics, biodiversity, and ecosystem services. Nor do these analyses account for the potential future benefits obtained from natural products or the prosecution of alternative fisheries. As such, traditional analyses show that greater financial returns would be gained from putting these regions to an applied use rather than maintaining them in a natural state (Dixon and Sherman 1990). The initiative to discover methods to quantify the more intangible economic benefits and

costs of these regions continues and is of particular importance if support from many sponsoring entities is to be obtained. An understanding of benefits and costs can help to ensure that efficient resource management and sustainable economic development are a part of the MPA in question (Hoagland et al. 1995).

In general terms, the primary economic issues that are associated with protected areas are similar for terrestrial and marine environments. These issues include the evaluation of non-market goods, opportunity costs and resource prices (Hoagland et al. 1995). It is the unique characteristics within the marine environment that make the specific economic issues different from those within the terrestrial environment. Some of the marine issues that differ from their terrestrial counterparts include: (i) the different tastes and socioeconomic profiles of marine versus terrestrial reserve users (ii) the patterns of visitation within the marine environment differ and cost more because of the relative remoteness (iii) the lack of boundaries makes control of access and resource use more difficult and enforcement costs higher (iv) resource management is difficult because the fluidity of the environment increases the mobility of resources and increases the complications caused by pollution (v) user rights and liability for damages are different within the marine environment than on land (Hoagland et al. 1995).

5.2 ~ Economic Benefits of Marine Protected Areas and Marine Conservation Areas

The establishment of protected areas is one of the ways that the benefits of natural areas can be preserved, however, many of the benefits are difficult to measure

economically because they are not directly exchangeable in markets. Nonetheless, it is possible to measure in monetary terms the benefits obtained from direct resource use, and activities such as recreational activities can be valued in a more direct manner. Resource values can be obtained through evaluation of the total tonnage and market values of fish. The value of recreational activities can be determined from income gained from both the industries themselves and from the supporting industries involved in providing accommodations, food and transportation (Salm and Clark 1984; Dixon and Sherman 1990).

Benefits that are difficult to value economically, yet provide benefits to society as a whole, are referred to as "social benefits" (Salm and Clark 1984; Dixon and Sherman 1990). These benefits can be further divided into (i) existence values, which represent the inherent value in the existence of these regions and (ii) bequest values, whose primary benefits are obtained from the knowledge that these areas will exist for future generations (Salm and Clark 1984). An additional economic value can be obtained from not pursuing those activities that will have irreversible effects upon the environment (Salm and Clark 1984). Some of the sources of the economic benefits of MPAs and their associated costs are summarized in Table 3.

The relative intangibility of the economic benefits of MPAs and MCAs are the result of a number of factors:

- (1) Many of the goods produced within these regions are of a non-rival nature, meaning that the goods are non-consumable. Many of these goods are only considered non-rival to a certain level and then begin to be consumable. In addition, many non-rival goods have high start-up prices and low, if any, user

costs. It is significant to note that almost all of the economic benefits of protected areas are considered to be non-rival in nature (Dixon and Sherman 1990). An example of non-rival goods would be recreational activities that can be enjoyed by people up to the point where the numbers of people begin to degrade the environment that provided the initial attraction.

- (2) Because of the nature of the environments involved, it is often not economically feasible (i.e. costs of exclusion exceed the benefits) to exclude people from consuming the goods that are produced within these regions. This is referred to as the non-excludability concept. As a result, a potentially valuable benefit exists, but is difficult to translate to economic income. An example of a non-excludable good would be a particularly good ocean view or an expansive sandy beach within these regions. In such a case it would be virtually impossible to prevent people from having access to these goods.
- (3) While many of the benefits obtained within MPAs remain within their boundaries, many also extend beyond their boundaries because of the fluidity and three-dimensional nature of the environment.
- (4) The uncertainty involved in protected areas is manifested in the form of incomplete or inadequate information about both the natural environment and the nature of human demands within the region. These types of uncertainties make it difficult to evaluate the economic benefits of protected areas
- (5) The irreversible impact of some of the decisions made within these types of environments (Dixon and Sherman 1990) may make it impossible to return to previous benefits or to evaluate what the current or future condition of resources may be.

These types of problems result in an underestimation of the value of the conservation of natural areas and results in a bias towards the exploitation of the region. This results in the creation of fewer protected areas. The process where erroneous signals from the market result in erroneous decisions (which results in the undervaluation of many MPA benefits) is what economists refer to as "market failure" (Dixon and Sherman 1990).

The problem of assigning economic values to protected areas has been allayed by the development of numerous techniques that allow valuation. These techniques include:

(1) those based on market prices, which values what changes the quantity and quality of goods that are exchanged in the market (2) those based on surrogate market prices, which estimate the value of environmental goods by using the price paid for a closely associated good (3) those that are based on surveys, where values are assigned based on survey responses (4) those that are cost-based in nature, which focus on the costs if areas were converted to alternative uses (Dixon and Sherman 1990). While these techniques are useful, they are only estimates and are therefore subject to many criticisms. The nature of many of these benefits, however, prevents the derivation of a more precise valuation.

Table 5.1. The Sources of Economic Benefits and their Opposing Costs within MPAs and MCAs (modified from Hoagland et al. 1995)

Benefit	Cost
None	Acquisition of Land and Facilities
New or Improved :Tourism, Diving, Boating, Recreational and Commercial Fishing	Lost Opportunities In Terms Of: Minerals, Fisheries etc.
Promotes Natural Resource Management: Protects Species, Stocks, Habitat, etc.	Administrative Costs Enforcement Costs
Promotes Cultural Resource Management: Can Promote Archaeological Studies	Administrative Costs Enforcement Costs
An Ideal Location for Oceanographic Research	Educational and Research Costs
Promotes Positive External Effects	Lost Industrial Development Opportunities
Prevents Developments that are Costly to Reverse	None
The Provision of "Non-market" Benefits Including Bequest and Existence Values	None

5.3 ~ Economic Costs of Marine Protected Areas and Marine Conservation Areas

In any economic analysis of costs, three different aspects must be considered. These include: (1) Direct costs (2) Indirect or External costs and (3) Opportunity costs. Direct costs are those directly related to the establishment and the on-going management of protected areas (Dixon and Sherman 1990; Dixon et al. 1993). Indirect or external costs are those borne by the public as a result of establishment and daily operation of protected areas (Dixon 1993). Finally, opportunity costs are represented by the loss of benefits that may potentially result from protecting the region in question rather than exploiting it (Dixon and Sherman 1990). Examples of each of the three types of economic costs that may be accrued within MPAs are summarized in Table 4.

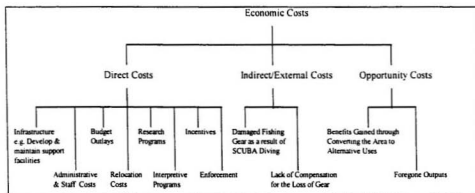


Figure 5.1. Examples of the Economic Costs that may be Accrued within MPAs and MCAs (Dixon and Sherman 1990; Dixon et al. 1993)

Generally speaking, because direct costs involve the outlay of funds for the establishment and management of these regions, they fall subject to external pressures when resources are considered to be scarce (Dixon and Sherman 1990). This may jeopardize the initiative to establish such areas. In contrast, the nature of indirect/external costs are usually spread over a number of individuals, which makes it difficult for those concerned to express their concern in an organized manner. Finally, opportunity costs can play an important role in political decision-making, regardless of their extent (Dixon and Sherman 1990).

5.4 ~ Considerations for Managers

The difficulties that are outlined above make it evident that creating MPAs and MCAs on a purely economic basis is by no means a straight-forward endeavor. In fact, in most cases, when the quantifiable benefits and costs are calculated, the benefits are frequently less than the costs (Dixon and Sherman 1990). If the quantifiable benefits were greater than the costs then the decision to establish these regions would be an easier one (Dixon and Sherman 1990). Unfortunately this is rarely true. Some points that are important for management to keep in mind in terms of the economic benefits and costs of these types of regions as summarized by Dixon et al. (1993) include:

- MPAs and MCAs can preserve biodiversity while continuing to generate economic benefits either through sustainable fishing practices, recreational uses, or tourism activities.
- There is, however, a limit to the maximum sustainable economic and ecological uses of these regions.

- Management costs of these regions will more than likely be small compared to the potential benefits of these regions.
- User fees can be implemented to offset costs, though these may be met with public resistance.
- Any developments should be planned to provide a large proportion of the economic benefits to the public.

If these points are considered in the management of MPAs or MCAs, then the areas should be able to remain economically viable while continuing to protect the resources they contain.

5.5 ~ The Economic Potential of the Proposed Marine Conservation Area

The most important issue for those individuals who will be directly affected by the proposed Bonavista and Notre Dame Bay MCA is how it will impact them economically. It is therefore vital for the management structure to emphasize the potential economic benefits of MCAs and to maximize the number of potential benefits within the region. One of the most obvious economic benefits that can be achieved within these regions is the potential income generated from increased "eco-tourism". Because these regions are conservation oriented, they are opportune areas for those individuals who wish to experience nature in its most pure form. The most common tourist activity that generates income within MPAs worldwide is from SCUBA diving, particularly in coral reef MPAs in the tropics (Davis and Tisdell 1996; Harriott et al. 1997). Although this potential can also be explored within the proposed MCA, the North Atlantic is not as attractive to the general public for SCUBA as coral reef environments.

Potential also exists in other tourist activities including tour boat excursions to observe whales, marine bird colonies and scenic views of the marine environment. With these tourists also come the potential for shore-based support facilities such as hotels and restaurants, and thus increases in the number of jobs within the region. In addition, some tourist activities can initially be supported by the existing infrastructure of Terra Nova Park. It has also been stressed by the organizing structure that harvesting activities and their economic benefits will continue under the current management structure within this region. However, people tend to be naturally suspicious of change and government initiatives, and this is true of the average harvester no matter how hard Parks Canada tries to reassure them. These regions also can potentially improve the income obtained from harvesting activities if the re-establishment of traditional commercial species is successful. Given the level of current biological information, this is quite realistic for the more sedentary species such as lobster if the harvest level is not set too high. For more mobile species, prediction of harvesting success is more difficult. As a final point, this MCA, like any other, possesses an economic benefit as a result of its sheer existence. Though existence values are inherently economically beneficial, they are of little relevance to the average harvester.

The economic costs of the Bonavista and Notre Dame Bay MCA will be much more real to the harvesters of this region because most of the costs are direct and most occur at the initial stages of implementation. In addition, not only do the harvesters face a potential loss in access to resources but they would also contribute financially for the

implementation and management of the structure in the form of their tax dollars. This type of economic reality stresses the need to ensure that the majority of the affected public is able to continue to make a living despite the establishment of the MCA. Without this assurance, achieving the public support that is necessary for success will be impossible.

Chapter VI: Public Opinion and the Social Effects of Marine Conservation Areas

6.1 ~ The Importance of Public Support

The importance of achieving public support for Marine Protected Areas (MPAs) and Marine Conservation Areas (MCAs) has been recognized with increasing frequency in governmental policies worldwide (Lien 1988; Kelleher and Kenchington 1991; Wells and Brandon 1993; Agardy 1995; Gubbay 1995; Wells and White 1995). Governments have realized the potential for conflict between local users and establishment of protected areas, and methods to prevent such conflicts have therefore been developed (Wells and White 1995). Conflict over establishment of protected areas is not unique to marine habitats, however, there are aspects of the marine environment that are often very different from their terrestrial environments counterparts. First of all, most terrestrial parks are located in some of the most remote and least settled parts of the terrestrial environment. In contrast, marine areas that are considered to be of particular significance for conservation tend to be located in highly biologically diverse and populated coastal environments (Lien 1988). In addition, differences arise because of the fluidity of the ocean that makes it almost impossible to define the boundaries that are necessary to allocate property rights. As a result, the ocean is considered to be "common property" in many countries worldwide. This "common property" attitude, combined with the economic dependence that is often exhibited by people who rely upon marine resources for their livelihoods, often leads to strident protestation by those individuals and communities who will be affected by establishment of Marine Conservation Areas (Wells

and Brandon 1993; Wells and White 1995). In such cases, the responsibility lies with the sponsoring government to show the affected individuals that their communities will be better off with these types of regions than without them (Atmosoedarjo et al. 1982). This argument is easier to present when the direct benefits, such as economic return, obviously exceed the negative aspects of establishing the conservation area. When individual benefits will be decreased, however, the argument is much more difficult.

Involving the affected communities from the very beginning is seen as an effective means of reducing the potential conflict in the initial stages of establishing conservation areas (Andersson and Ngazi 1995; Wells and White 1995). Actively involving the public ensures that they understand what is involved in the implementation process and what MPAs and MCAs will mean to them (Atmosoedarjo et al. 1982; Gubbay 1995). Involving the public also has a number of potential benefits for the people and for the MPA. The economic benefits that can be gained from user fees and visitor facilities within the MPAs and MCAs have the potential to increase the income of those people who live adjacent to these regions. In addition to, and perhaps as a result of these types of benefits, improved employment opportunities can result. The community can also benefit from the possibility of improved fisheries, as is outlined in Chapter 4, especially in terms of the more sedentary species that remain within the immediate area. The management structure can also benefit from the knowledge that local fishermen have of their local ecosystems. This knowledge can be used in the development of the MPA (i.e. the designation of loose boundaries) and to create management plans with the

specific region in mind. In addition, local knowledge can also help in the development of interpretation centres and enhance the cultural experience of MPA visitors (Neis 1995).

6.2 ~ Mechanisms to Achieve Public Support

Being aware that public support is essential for the success of MPAs and MCAs and actually attaining the support are two separate things. It is generally accepted that the primary method of achieving public support is through involving the public in both the establishment and management processes of the MPA (Lien 1988; Wells and White 1995). The public can become involved in a number of ways and at a number of stages in MPA establishment and management (Lien 1988; Wells and White 1995). Involving harvesters is considered to be especially important because they have such a large stake in the outcome of these regions. In fact, trying to keep harvesters out of the decision-making of these initiatives is an unrealistic ideal because of their ties to the environment and its resources (Lien 1988). Harvesters can become involved in the process if management makes an effort to listen and understand their opinions. In addition, they can participate in educational programs that will involve them in the planning process and facilitate their understanding of the management process. Identifying and persuading respected and influential individuals within the affected communities of the potential benefits can also be a method of achieving credibility within the community as a whole. Finally, exploring the economic benefits and costs of these regions in as straight-forward

a manner as possible can help to achieve the harvesters support because cost is generally their bottom line (Lien 1988).

Communities as a whole can also become a part of the process at several stages of the establishment and management of these regions (Wells and White 1995). The communities can become involved in the initial planning stages through the promotion of community discussions on the proposed MPA. This type of discussion is most often promoted by designated community workers who introduce the topic to the area, organize local meetings and meet with community leaders. Members of the community can also become involved in data collection and scientific studies that take place within the area. Education should be ongoing throughout the establishment and management of these MPAs, and is most successful when the community becomes involved. When the stages of MPA establishment become more formal, the community can become involved in committees that draft management plans and regulations. Committees can also involve the community in the enforcement of regulations, which in many cases has proven to be a more effective and less expensive approach than traditional government enforcement (Alder 1996). Finally, the involvement of the community should and can be regularly encouraged through a continuous feedback system. This can be achieved through media coverage of the successes of the MPA (Wells and White 1995). Of course, the nature of involvement on the part of the community is largely dependent upon the individual goals and characteristics of the MPA in question and the cultural ties, history and structure of the local communities (Wells and White 1995). Although involving the community can

be as expensive as running MPAs entirely through a central government, the rate of success is much higher and more long-term when the community is involved in the initiative (Wells and White 1995).

6.3 ~ Attitudes Toward Marine Conservation Areas in the Newfoundland Context

Parks Canada recognizes the importance of public support in establishing successful MCAs, and the economic importance of the marine habitat in the Bonavista and Notre Dame Bay proposed area has been acknowledged as they stress the need for public support and understanding in their policy documents and feasibility study. An essential part of their process has been the designation of community facilitators and a project coordinator whose function it is to assess the public opinion on the initiative and to answer any questions which may arise on the subject (Parks Canada 1997). These individuals will be vital to the success of the Bonavista and Notre Dame Bay initiative given that public support has increased the success of similar initiatives worldwide (Andersson and Ngazi 1995; McClanahan 1997). The importance of public support has been illustrated in initiatives such as the Eastport Lobster Protection Agency, which was created from the user-groups within this same region. The success of this organization, which was formed from a small, localized group of stakeholders, is seen in the level of consensus achieved in conservation issues. Clearly, it is possible for a management plan that originates from government level to succeed if local support and involvement are maximized. The problem with the Bonavista and Notre Dame Bay MCA is that it must

involve harvesters from a much larger geographical area. Indeed, it is likely that thousands of harvesters from different communities will be affected in some manner by this MCA, and trying to achieve a common voice among such a large group is inherently more difficult. A given community may have its own goals that are often in conflict with those of other communities. Thus, the process of achieving a consensus is both more difficult and more important to the success of the whole endeavor.

Relations between Parks Canada and the communities that fall within the proposed Bonavista and Notre Dame Bay MCA have been characterized as "poor" (Bird 1995). This is especially true of the harvesters who feel that they will be most affected by MCA establishment and their communities will receive few benefits (Bird 1995). Generally speaking, there are three major fears that characterize the people who have been affected by potential MCA establishment (Ricketts 1988), and each of these fears are relevant to the Bonavista and Notre Dame Bay situation. These include: (1) potential changes in fishery regulations and increased interference on the part of management will affect their livelihood; (2) increased tourist activities will interfere with harvesting practices; (3) permanent settlements would be forced out of the region. The first is of course, the most prominent of the fears and has been expressed on the part of harvesters who will be affected by the proposed Bonavista and Notre Dame Bay MCA (CBC Radio 1998b). The only way to alleviate these fears and to relieve some of the distrust towards government agencies is to be as open and clear as possible in the pertinent legislation and in educating the public on how they will be affected by such regions. This approach has

been used by Parks Canada through the designation of community facilitators, the distribution of newsletters, and the organization of public meetings. Nonetheless, the harvesters appear to feel that straight answers about the initiative are not very forthcoming (CBC Radio 1998b). In addition, the desired separation between the concept of National Terrestrial Parks and MCAs has not been achieved. Fears that harvesting activities within the region will ultimately be prohibited persist despite attempts to illustrate otherwise (CBC Radio 1998b).

Do the harvesters have cause to be concerned that harvesting will be curtailed or prohibited? Their concern is valid because harvesters perceive that the current crisis in Newfoundland's fisheries is a result of the Federal Government's mismanagement. This is undoubtedly true to a certain extent, however, the harvesting activities within MCAs will continue under the management of the Department of Fisheries and Oceans (DFO). Given that this is the case, ultimately there really should be no more concern than is usually experienced when DFO allocates quotas, licences and fishing seasons. This information is contained within the newsletter that has been distributed throughout the affected communities, and the ongoing distrust suggests that either harvesters have not read them or they are suspicious of what they perceive to be government propaganda. The latter is more likely given the level of mistrust that exists between harvesters and the DFO. There is also legitimate concern about the impact of new regulations. For example, one regulation within the MCA policy minimizes the use of harmful harvesting activities that are destructive to the sea bed. This is an obvious source of contention

because regulating agencies will have the potential to limit any number of fishing practices if they are proven to be harmful to the sea bed. This is perceived as a threat despite the fact that DFO already has the jurisdiction to impose these regulations. Thus, it is the threat of the unknown that jeopardizes the success of this initiative. The only potential remedy to these problems is continued attempts to educate fishers and the general public on the initiative and provide straightforward responses to questions. In addition, new regulations would be subject to review processes that are done in consultation with the public, making the potentially affected individuals fully aware of the problem before a new regulation is enacted.

MCAs that have the support of local communities are much more likely to be successful in achieving their goals of protecting elements of the marine environment while allowing harvesting activities to continue. This has proven to be true within the established MCAs such as Fathom Five in Canada and in MPAs worldwide such as the Great Barrier Reef MPA (Kenchington 1988; McClellan 1988). Public support does not mean that user conflicts will not occur, however, and to expect a complete avoidance of conflict is unrealistic. Nonetheless, it is entirely possible to minimize conflict through community involvement. Education of the affected public, and involving the community in both the establishment and management of these regions is an essential part of this process. This approach has proven to be effective in many cases worldwide including regions in the United States with issues similar to those in the Bonavista and Notre Dame

Bay area (CBC Radio 1998c). Parks Canada is by no means ignoring this fact, and has attempted to follow this model as much as possible.

It is apparent that while the biological and economic reasons for establishing MCAs may be compelling, it is the social aspects that can make or break these initiatives. Whether Parks Canada will be successful in their attempts to obtain the support of the affected communities within the Bonavista and Notre Dame Bay proposed site appears to be a matter of time. Clearly, the road ahead of them is made considerably more difficult by the strong cultural ties to the sea and the innate distrust of government that is displayed by the potentially impacted inhabitants of this region.

Chapter VII: Summary, Conclusions and Recommendations

7.1 ~ General Summary

Historically, the initial goals in creating Marine Protected Areas (MPAs) were biological in nature, however, it was quickly realized that the unique characteristics of the marine environment required a different approach than had been used within the terrestrial realm. These differences have been a major contributor to the delays in the development of MPAs worldwide, and Marine Conservation Areas (MCAs) in Canada. In order to overcome the problems that have delayed the establishment of MPAs and MCAs, an approach that deals with these differences has been developed.

MPAs and MCAs must be specifically dealt with through the designation of unique legislation, which is preferable, or through amendments to existing legislation. Regulations, penalties and methods of enforcement should be clearly indicated so that those affected will be aware of the consequences of the legislation and failure to comply. Within Canada, MCAs are currently only dealt with through an amendment to the National Parks Act. Though legislation dealing specifically with MCAs has been proposed and is fairly specific in its regulations it has not, as of yet, been ratified. This lack of binding legislation may create delays or cause problems because without it, changes to the initiatives can be made much more easily. This flexibility may be a point of contention for the affected public.

The biological benefits of these regions should also be spelled out in as straightforward a manner as possible. Linking these benefits to economic benefits is a

particularly effective strategy. The biological benefits are numerous, provided that the regions are initially selected and then managed correctly. It is also important to note that many of these benefits may take years to realize, while still others are difficult to value economically and instead must be valued at a social level.

The economics of MPAs should also be clearly explained to those affected. This is after all, the bottom line for most individuals. Making the public aware of the potential economic benefits is, of course, especially important although the costs should by no means be ignored. Supporting economic initiatives within the MCA may be a mechanism by which public support can be obtained.

The social aspect of these regions is probably one of the most important aspects to consider in protected area establishment. This is especially true of the marine environment because those regions that are most important to protect also tend to be those that are the most populated. Without support at the grassroots level it will be virtually impossible to successfully establish these regions, let alone to ensure their success. A key step to help ensure public support is education and involvement in all stages of MPA establishment and management. This brings the initiative to the public and makes them feel they are part of it.

When considering implementing protected areas, the sponsoring government must be aware of the potential for conflict amongst those individuals who have traditionally used the environments. In order to minimize these problems, the legal, biological, economic and social aspects must all be considered. Within today's society, it is no

longer possible to establish MPAs on a purely biological basis without considering those who will be affected or the economic impacts of their implementation. Those MPAs or MCAs which will be ultimately successful are those which keep these considerations in mind.

7.2 ~ Conclusions - Marine Conservation Areas and the Bonavista and Notre Dame Bay Site

It is without a doubt that MPAs worldwide have succeeded in a variety of ways and in a variety of fields. They have prevented the degradation of the marine environment while enhancing the resources both within and outside of their boundaries. In addition, they are a management initiative that involves the public in marine conservation and educates on issues within the marine environment. Finally, they may potentially reap economic benefits for the region in question and can be opportune sites for marine research (Gubbay 1995).

MCAs also have similar potential as MPAs, however, the obstacles to their success are considerable. Environmental ideologies such as MPAs cannot always be achieved in the real world. MPAs were designed in order to provide for the protection of the marine environment in the form of marine reserves. These were to provide a refuge for marine organisms that would preserve rare species, allow possible increases in others, provide a relatively untouched environment for biological study, and a locale for limited eco-tourism where feasible. They would ideally preserve a piece of the environment that has been and is currently being decimated worldwide. This is not the basis for the

initiative that has been proposed for the Bonavista and Notre Dame Bay regions. The goal of this initiative is to preserve the marine environment while allowing the sustainable use of the resource. While this statement may appear to be contradictory in nature, the sheer existence of this initiative within the Newfoundland context is a huge step forward given that fishing has been the lifeblood of thousands of Newfoundlanders for centuries. In addition, many believe that this type of multiple-use initiative is the way to go in the future. The key is in defining activities that are compatible. Whether compatibility can be achieved in the current Bonavista and Notre Dame Bay initiative will be determined in time. Inevitable complications have been introduced into the process as a result of the use and misuse of common buzzwords such as *sustainable*. This term has innumerable definitions that most often depend upon the inexact science of stock assessment and the decisions of politicians. This could, given both the environment and past history, jeopardize the goals of this initiative. If public support could be obtained, the initiative may also be ineffectual in its biological goals as a result of the uncertain biological management techniques.

Regardless of the outcome, it is encouraging that this type of initiative is being considered within Newfoundland, given that it appears to reflect a change in management perspective towards the public, their thoughts, desires, and perspectives. This is truly important because, perhaps for the first time, the public is being included within the decision-making process. This is a shift in ideology that reflects that the management of the resource must come from the people if it is ultimately going to be successful.

7.3 ~ Recommendations

As a result of examining the different aspects of MPAs and MCAs, the following recommendations can be made for those individuals involved in establishing these regions with particular reference to the Newfoundland context:

- More detailed study of the social impacts/attitudes about this MCA. This may be facilitated through a survey.
- Management structure should look into the potential economic benefits of this region in detail and stress these to the public.
- Obtaining local ecological knowledge from harvesters about some of the physical and biological characteristics should be a priority, particularly in terms of establishing compelling biological bases for establishment and maintenance of the MCA.
- Harvesters should be aware of the importance of their contributions and how they will benefit the project.
- Harvesters should be a part of the enforcement measures of the region. This will potentially be more effective and promote income within the region.
- Zoning for the area should be released as soon as possible and designed in consultation with harvesters
- Specific legislation dealing with MCAs should be enacted as soon as possible to provide a binding framework that the affected public can continue to consult.

Literature Cited:

- Agardy, T. 1994. Advances in Marine Conservation: the Role of Marine Protected Areas. *Trends in Ecology and Evolution*. 9:267-270.
- Agardy, T. 1995. The Science of Conservation in the Coastal Zone: New Insights on How to Design, Implement and Monitor Marine Protected Areas. IUCN. Gland, Switzerland. 72 pp.
- Alder, J. 1996. Costs and Effectiveness of Education and Enforcement, Cairns Section of the Great Barrier Reef Marine Park. *Environmental Management*. 20(4):541-551.
- Allison, G.W., J. Lubchenco and M.H. Carr. 1998. Marine Reserves are Necessary but Not Sufficient for Marine Conservation. *Ecological Applications*. 8(1):S79-S92.
- Anderson, J.T. and E.L. Dalley. 1997. Spawning and Year-Class Strength of Northern Cod (*Gadus morhua*) as Measured by Pelagic Juvenile Cod Surveys, 1991-1994. *Canadian Journal of Fisheries and Aquatic Sciences*. 54:158-167.
- Anderson, J.T., E.L. Dalley, and J.E. Carscadden. 1995. Abundance and Distribution of Pelagic O-Group Cod (*Gadus morhua*) in Newfoundland Waters: Inshore Versus Offshore. *Canadian Journal of Fisheries and Aquatic Sciences*. 52:115-125.
- Andersson, J.E.C. and Z. Ngazi. 1995. "Marine Resource Use and the Establishment of a Marine Park - Mafia-Island, Tanzania." *Ambio*. 24(7-8):475-481.
- Atmosoedarjo, S., L. Daryadi, J. MacKinnon, and P. Hillegers. 1982. National Parks and Rural Communities. In: *National Parks, Conservation and Development: The Role of Protected Areas in Sustaining Society*. McNeely, J.A. and K.R. Miller (eds). Smithsonian Institution Press. Washington, DC. pp.237-244.
- Auster, P.J., R.J. Malatesta, R.W. Langton, L. Watling, P.C. Valentine, C.L.S. Donaldson, E.W. Langton, A.N. Shepard, and I.G. Babb. 1996. The Impacts of Mobile Fishing Gear on Seafloor Habitats in the Gulf of Maine (Northwest Atlantic): Implications for Conservation of Fish Populations. *Reviews in Fisheries Science*. 4(2): 185-202.
- Ballantine, W.J. 1989. Marine Reserves: Lessons from New Zealand. *Progress in Underwater Science*. 13:1-14.
- Barkai, A. and C. McQuaid. 1988. Predator-Prey Role Reversal in a Marine Benthic Ecosystem. *Science*. 242:62-64.

- Bird, C. 1995. NMCA Establishment in People's Backyards. In: *National Marine Conservation Areas Workshop*. Canadian Heritage. Sidney, BC. pp.27-29.
- Bohnsack, J.A. 1993. They Enhance Fisheries, Reduce Conflicts, and Protect Resources. *Oceanus*. 36:63-71.
- Brown, K. 1985. The Role of Protected Areas in the Conservation of Coastal and Marine Resources. In: *Marine Parks and Conservation: Challenge and Promise*. Lien, J. and R. Graham (eds). National and Provincial Parks Association of Canada. St. John's, NF. pp.51-54.
- Casey, J.M. and R.A. Myers. 1998. Near Extinction of a Large, Widely Distributed Fish. *Science*. 281:690-692.
- CBC Radio. 1998a. (27 April 1998). *Morning Show - Interview with John Melendy*. St. John's, NF: CBC.
- CBC Radio. 1998b. (28 April 1998). *Morning Show - Interview with Don Tremblett*. Gander, NF: CBC.
- CBC Radio. 1998c. (25 May 1998). *Morning Show - Interview with Frank Mirachi*. Gander, NF: CBC.
- Dalley, E.L., and J.T. Anderson. 1997. Age-Dependent Distribution of Demersal Juvenile Atlantic Cod (*Gadus morhua*) in Inshore/Offshore Northeast Newfoundland. *Canadian Journal of Fisheries and Aquatic Sciences*. 54:168-176.
- Davidson, F.J.M., and B. DeYoung. 1995. Modelling Advection of Cod Eggs and Larvae on the Newfoundland Shelf. *Fisheries Oceanography*. 4(1):33-51.
- Davis, D. and C. Tisdell. 1996. Economic Management of Recreational Scuba Diving and the Environment. *Journal of Environmental Management*. 48:229-248.
- Dayton, P.K., S.F. Thrush, M.T. Agardy, and R.J. Hofman. 1995. Environmental Effects of Marine Fishing. *Aquatic Conservation: Marine and Freshwater Ecosystems*. 5:205-232.
- Department of Fisheries and Oceans. 1997. An Approach to the Establishment and Management of Marine Protected Areas under the Oceans Act. *A Discussion Paper*. Ottawa: Communications Directorate Fisheries and Oceans Canada. 47pp.

- Department of Fisheries and Oceans. 1998. *Fisheries Management - Overview*. ONLINE. 1998. Department of Fisheries and Oceans. Available: http://www.ncr.dfo.ca/communic/fish_man/overview/fm_eng.htm [23 Jan. 1998].
- Dixon, J.A. and P.B. Sherman. 1990. *Economics of Protected Areas: A New Look at Benefits and Costs*. Island Press. Washington, D.C. 234 pp.
- Dixon, J.A. 1993. Economic Benefits of Marine Protected Areas. *Oceanus*. 36(3): 35-40.
- Done, T.J. 1998. Integrated Coastal Zone and Fisheries Ecosystem Management-Generic Goals and Performance Indexes. *Ecological Applications*. 8(1S):S110-S118.
- Duffus, D.A. and P. Dearden. 1993. Marine Parks: The Canadian Experience. In: *Parks and Protected Areas in Canada: Planning and Management*. Dearden, P. and R. Rollins (eds). Oxford University Press. Toronto, ON. pp.257-272.
- Farrow, S. 1996. Marine Protected Areas: Emerging Economics. *Marine Policy*. 20(6):439-446.
- Gibson, J. and L. Warren. 1995. Legislative Requirements. In: *Marine Protected Areas: Principles and Techniques for Management*. Gubbay, S (ed). Chapman & Hall. New York, NY. pp.32-60.
- Gotceitas, V., S. Fraser, and J.A. Brown. 1997. Use of Eelgrass Beds (*Zostera marina*) by Juvenile Atlantic Cod (*Gadus morhua*). *Canadian Journal of Fisheries and Aquatic Sciences*. 54:1306-1319.
- Graham, R., N. Stalport, D. Vanderzwaag, C. Lamson, M. Butler, and D. Boyle. 1992. The Protection of Special and Coastal Areas. In: *Canadian Ocean Law and Policy*. D. Vanderzwaag (ed). Butterworths. Toronto, ON. pp.341-390.
- Grant, S.M. and J.A. Brown. 1998. Nearshore Settlement and Localized Populations of Age 0 Atlantic Cod (*Gadus morhua*) in Shallow Coastal Waters of Newfoundland. *Canadian Journal of Fisheries and Aquatic Sciences*. 55: 1317-1327.
- Grassle, J.F. and N.J. Maciolek. 1992. Deep-Sea Species Richness: Regional and Local Diversity Estimates from Quantitative Bottom Samples. *American Naturalist*. 139:313-341.
- Gray, J.S. 1997. Marine Biodiversity: Patterns, Threats and Conservation Needs. *Biodiversity and Conservation*. 6:153-175.

- Gray, J.S., G.C.B. Poore, K.I. Ugland, R.S. Wilson, F. Olsgard, and O. Johannessen. 1997. Coastal and Deep-Sea Benthos Diversities Compared. *Marine Ecology Progress Series*. 159:97-103.
- Gubbay, S. 1995. Marine Protected Areas - Past, Present and Future. In: *Marine Protected Areas: Principles and Techniques for Management*. Gubbay, S (ed). Chapman & Hall. New York, NY. pp.1-14.
- Hammer, M., A. Jansson, and B. Jansson. 1993. Diversity Change and Sustainability: Implications for Fisheries. *Ambio*. 22(2-3):97-105.
- Harriot, V.J., D. Davis, and S.A. Banks. 1997. Recreational Diving and its Impact in Marine Protected Areas in Eastern Australia. *Ambio*. 26(3):173-179.
- Helbig, J., G. Mertz, and P. Pepin. 1992. Environmental Influences on the Recruitment of Newfoundland/Labrador Cod. *Fisheries Oceanography*. 1(1):39-56.
- Hoagland, P., Y. Kaoru, and J.M. Broadus. 1995. *A Methodological Review of Net Benefit Evaluation for Marine Reserves*. World Bank Environment Department Paper No. 27. 69 pp.
- Hutchings, P. 1990. Review of the Effects of Trawling on Macrobenthic Epifaunal Communities. *Australian Journal of Marine Freshwater Research*. 41:111-120.
- Hutchings, J.A., R.A. Myers, and G.R. Lilly. 1993. Geographic Variation in the Spawning of Atlantic Cod, *Gadus morhua*, in the Northwest Atlantic. *Canadian Journal of Fisheries and Aquatic Sciences*. 50:2457-2467.
- Hutchings, J.A. and R.A. Myers. 1994. Timing of Cod Reproduction: Interannual Variability and the Influence of Temperature. *Marine Ecology Progress Series*. 108:21-31.
- Jones, P.J.S. 1994. A Review and Analysis of the Objectives of Marine Nature Reserves. *Ocean & Coastal Management*. 24:149-178.
- Kelleher, G. and R. Kenchington. 1991. *Guidelines for Establishing Marine Protected Areas*. IUCN. Gland, Switzerland. 79 pp.
- Kenchington, R. 1988. The Environmental and Legal Distinctions between Terrestrial and Marine Environments: the Effect on Planning for the Great Barrier Reef Marine Park. In: *Proceedings of the Workshop on National Marine Park Planning*. Mondor, C. and B. Henwood (eds). Parks Canada. Ottawa, ON. p.1-15.

- Knowlton, N. 1993. Sibling Species in the Sea. *Annual Review of Ecological Systematics*. 24:189-216.
- Larkin, P. A. 1996. Concepts and Issues in Marine Ecosystem Management. *Reviews in Fish Biology and Fisheries*. 6:139-164.
- Lauck, T., C.W. Clark, M. Mangel, and G.R. Munro. 1998. Implementing the Precautionary Principle in Fisheries Management through Marine Reserves. *Ecological Applications*. 8(1):S72-S78.
- Lien, J. and R. Graham. 1985. An Introduction to Marine Parks and Conservation. In: *Marine Parks and Conservation: Challenge and Promise*. Lien, J. and R. Graham (eds). National and Provincial Parks Association of Canada. St. John's, NF. pp.3-6.
- Lien, J. 1988. How, When and Why to Involve Fishermen in the Park Management Planning Process. In: *Proceedings of the Workshop on National Marine Park Planning*. Mondor, C. and B. Henwood (eds). Parks Canada. Ottawa, ON. pp.36-49.
- Lindeboom, H. J. 1995. Protected Areas in the North Sea: An Absolute Need for Future Marine Research. *Helgolander Meeresuntersuchungen*. 49:591-602.
- Macnab, P.A. 1997. Exploratory Planning for a Proposed National Marine Conservation Area in NE Newfoundland. In: *National Parks and Protected Areas*. Nelson, J.G. and R. Serafin (eds). NATO ASI Series. Series G: Ecological Sciences, Vol. 40. Springer. New York, NY. pp.133-143.
- McBurney, D. 1978. *The Management of Fisheries within Marine Waters of National Parks*. Parks Canada. 42 pp.
- McClanahan, T. R. 1997. The Effects of Traditional Fisheries Management on Fisheries Yields and the Coral-Reef Ecosystems of Southern Kenya. *Environmental Conservation*: 24(2): 105-120.
- McClellan, S. 1988. Fathom Five National Marine Park. In: *Proceedings of the Workshop on National Marine Park Planning*. Mondor, C. and B. Henwood (eds). Parks Canada. Ottawa, ON. pp.28-30.

- Mercier, F. 1995. Report of a Workshop to Identify a Potential National Marine Conservation Area on the NE Coast of Newfoundland. In: *Marine Protected Areas and Sustainable Fisheries*. Shackell, N.L. and J.H.M. Willison (eds). SAMPAA. Wolfville, NS. pp.240-248.
- Methven, D.A., and D.C. Schneider. 1998. Gear-Independent Patterns of Variation in Catch of Juvenile Atlantic Cod (*Gadus morhua*) in Coastal Habitats. *Canadian Journal of Fisheries and Aquatic Sciences*. 55:1430-1442.
- Mondor, C. 1985. An Historical Overview of the National Marine Park Concept in Canada. In: *Marine Parks and Conservation: Challenge and Promise*. Lien, J. and R. Graham (eds). National and Provincial Parks Association of Canada. St. John's, NF. pp.9-19.
- Mondor, C. 1988. Planning for National Marine Parks in Canada. In: *Proceedings of the Workshop on National Marine Park Planning*. Mondor, C. and B. Henwood (eds). Parks Canada. Ottawa, ON. pp.16-27.
- Morton, B. 1996. Protecting Hong-Kong Marine Biodiversity - Present Proposals. Future Challenges. *Environmental Conservation*: 23(1):55-65.
- National Research Council. 1995. *Understanding Marine Biodiversity*. National Academy Press. Washington, DC. 114pp.
- Neis, B. 1995. Fishers' Ecological Knowledge and Marine Protected Areas. In: *Marine Protected Areas and Sustainable Fisheries*. Shackell, N.L. and J.H.M. Willison (eds). SAMPAA. Wolfville, N.S. pp.265-272.
- Parks Canada. 1986. *National Marine Parks Policy*. Federal Government of Canada. Ottawa, ON. 17pp.
- Parks Canada. 1995. *Sea to Sea to Sea*. Federal Government of Canada. Ottawa, ON. 106pp.
- Parks Canada. 1997. *A National Marine Conservation Area Proposal for Bonavista Bay and Notre Dame Bay*. Ottawa, ON: Federal Government of Canada. 12pp.
- Parks Canada. 1998a. *Charting the Course Towards a Marine Conservation Areas Act*. Ottawa, ON: Federal Government of Canada. 9pp.

- Parks Canada. 1998b. *Parks Canada Guiding Principles and Operational Policies: National Marine Conservation Areas Policy*. Ottawa, ON: Federal Government of Canada. pp.26
- Parks Canada. 1998c. *Canada Unveils National Marine Conservation Areas System Plan-A Big "Splash" for Marine Heritage*. ONLINE. 1998. Canadian Heritage. Available: <http://pch-inet.pch.gc.ca/cgi-win/dgcom.exe?View:5NR085E>
- Parks Canada. 1998d. *Copps and Tobin Announce a National Marine Conservation Feasibility Study for Bonavista and Notre Dame Bays*. ONLINE. 1998. Canadian Heritage. Available: <http://pch-inet.pch.gc.ca/cgi-win/dgcom.exe?View:7NR240E>
- Peterson, C.H. and J. Lubchenco. 1997. Marine Ecosystem Services. In: *Nature's Services: Societal Dependence on Natural Ecosystems*. G.C. Daily (ed). Island Press, Washington. Pp.177-194.
- Potter, A. 1996. *Identification of Inshore Spawning Areas: Potential Marine Protected Areas?* Unpublished Master's Project. Marine Affairs Program, Dalhousie University. Halifax, Nova Scotia.
- Ricketts, P.J. 1988. Use Conflicts in Canada's National Marine Park Policy. *Ocean & Shoreline Management*. 11:285-302.
- Rowley, R.J. 1994. Marine Reserves in Fisheries Management. *Aquatic Conservation Marine and Freshwater Ecosystems*. 4:233-254.
- Safina, C. 1995. The World's Imperiled Fish. *Scientific American*. 273:46-53.
- Salm, R.V. and J. R. Clark. 1984. *Marine and Coastal Protected Areas: A Guide For Planners and Managers*. IUCN. Gland, Switzerland. 302 pp.
- Sanders, H.L. 1969. Marine Benthic Diversity and the Stability Time Hypothesis. *Brookhaven Symposium on Biology*. 22:71-80.
- Snelgrove, P.V.R., T.H. Blackburn, P. Hutchings, D. Alongi, J.F. Grassle, H. Hummel, G. King, I. Koike, P.J.D. Lamshead, N.B. Ramsing, V. Solis-Weiss, D.W. Freckman. 1997. The importance of marine sediment biodiversity ecosystem processes. *Ambio*. 26:578-583.
- Sobel, J. 1993. Conserving Biological Diversity Through Marine Protected Areas. *Oceanus*. 36:19-26.

- Steele, D.H., J.M. Green and J. Carter. 1979. *A Biological and Oceanographic Study of the Atlantic Southeast Coast Marine Region*. MUN Printing Services. St. John's, NF. 236pp.
- Taylor, T. 1995. *The Role of Closed Areas in the Newfoundland Lobster Fishery*. Unpublished Master's Project. Marine Affairs Program, Dalhousie University. Halifax, Nova Scotia.
- Tupper, M. and R.G. Boutillier. 1995. Effects of Habitat on Settlement, Growth, and Postsettlement Survival of Atlantic Cod. *Canadian Journal of Fisheries and Aquatic Sciences*. 52:1834-1841.
- Weber, P. 1993. Abandoned Seas: Reversing the Decline of the Oceans. *World Match Paper*. 116:1-66.
- Weber, P. 1994. Net Loss: Fish, Jobs, and the Marine Environment. *World Match Paper*. 120:1-76.
- Wells, M.P. and K.E. Brandon. 1993. The Principles and Practice of Buffer Zones and Local Participation in Biodiversity Conservation. *Ambio*. 22(2-3):157-162.
- Wells, S. and A.T. White. 1995. Involving the Community. In: *Marine Protected Areas: Principles and Techniques for Management*. Gubbay, S (ed). Chapman & Hall. New York, NY. pp.61-84.
- Yurick, D. 1988. Parks Fisheries Management Plans for National Marine Parks. In: *Proceedings of the Workshop on National Marine Park Planning*. Mondor, C. and B. Henwood (eds). Parks Canada. Ottawa, ON. pp.31-35.
- Yurick, D., and F. Mercier. 1995. System Planning: A Brief History, Current Initiatives and Future Prospects. In: *National Marine Conservation Areas Workshop*. Canadian Heritage. Sidney, BC. 174 pp.

