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MARINE PROTECTED AREAS: AN ESSENTIAL ELEMENT OF THE FISHERIES MANAGEMENT TOOLBOX

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INTRODUCTION

The urgent need to improve protection and management of marine areas is becoming more and more apparent as the number and status of many important fish stocks continue to deteriorate. It has become evident that the vast majority of attempts to manage fisheries resources in a sustainable fashion have been unsuccessful, and resource managers are beginning to seek alternatives to traditional management strategies. Marine protected areas (MPAs) are viewed as important tools in reducing the risks associated with current fisheries management practices. MPAs are areas of ocean that are protected from various human activities.(1) Canada has taken initial steps to ensure that MPAs will complement existing measures to conserve and protect fisheries resources. In fact, the establishment of a national network of MPAs is one of the main components of the federal oceans management strategy outlined in Part II of the 1997 *Oceans Act*.(2) By all accounts, however, progress has been slow.

This paper provides an overview of some of the background theory behind creating and managing effective MPAs, and looks at how these areas are being used as part of Canada's oceans and fisheries management strategy.

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(1) The term "marine protected area" is recognized internationally. Its meaning is broad, and the level of protection varies considerably among different MPAs.

(2) The *Oceans Act* is founded on three principles: sustainable development, integrated management, and the precautionary approach.

BACKGROUND ON MARINE PROTECTED AREAS

Overexploitation of oceans' resources has been well documented for decades, and in recent years there has been a growing concern in coastal nations about the welfare and long-term viability of the world's oceans and the fish that live in them. As early as 1946, the UN Food and Agriculture Organization (FAO) Fisheries Technical Committee had noted the looming problem of overfishing. This problem has since been highlighted in successive FAO fisheries conferences and by other international and national bodies, and yet the situation continues to deteriorate. In *The State of World Fisheries and Aquaculture 2004*, the FAO estimated that more than 75% of the world's marine fish stocks were either fully or heavily exploited, overexploited or depleted, up 24% from the mid-1970s.(3)

In an attempt to deal with this issue, international agreements on oceans and fisheries management, such as the 1982 *UN Convention on the Law of the Sea* and the 1995 FAO *Code of Conduct for Responsible Fisheries*, have included endorsements and management provisions for conservation and sustainable development. The Plan of Implementation of the World Summit on Sustainable Development in 2002 specifically emphasizes the need to "maintain or restore stocks to levels that can produce the maximum sustainable yield(4) with the aim of achieving these goals for depleted stocks on an urgent basis and where possible not later than 2015."(5) As it is often the case with international protocols, these documents offer little operational guidance, and few countries are willing to implement effective responses in their fisheries management strategies. Yet, the continued decline of stocks has an impact on the structure, functioning and resilience of marine ecosystems, as well as on food security, economic development and social welfare.(6)

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(3) Food and Agriculture Organization of the United Nations, *The State of World Fisheries and Aquaculture 2004*, FAO Fisheries Department, Rome, 2004, p. 32. This reference contains the most recent and relevant available data on the matter. About half of the stocks were fully exploited, a situation similar to the mid-1970s. At the same time there was an increase in the proportion of overexploited and depleted stocks, from about 10% in the mid-1970s to close to 25% in the early 2000s. In 2003, it was estimated that 90% of large predatory fish had been removed from the world's oceans; see Ransom A. Myers and Boris Worm, "Rapid worldwide depletion of predatory fish communities," *Nature*, Vol. 423, 15 May 2003, pp. 280-283.

(4) Maximum sustainable yield is the maximum amount of stock that can be removed from a fishery without impairing the stock's ability to regenerate itself through natural growth or replenishment.

(5) United Nations, *Plan of Implementation of the World Summit on Sustainable Development (2002)*, 2004, para. 31 (a), p. 17, http://www.un.org/esa/sustdev/documents/WSSD_POI_PD/English/WSSD_PlanImpl.pdf.

(6) Daniel Pauly, Reg Watson and Jackie Alder, "Global trends in world fisheries: impacts on marine ecosystems and food security," *Philosophical Transactions of the Royal Society B*, Vol. 360, 2005, pp. 5-12; FAO (2004), p. 19.

To address the issue of declining stocks, fisheries managers have typically resorted to a progressive reduction of the fishing effort or the total allowable catch. This strategy is often ineffective as it ultimately does not reduce fishing capacity to a sustainable level of harvest. As a last resort, fishing effort may have to be eliminated abruptly for ecological reasons; the collapse of the cod fishery on the East coast is one of the most notable recent examples.

MPAs have emerged as a complement to traditional management strategies. According to Roberts *et al*., marine reserves(7) "should be incorporated into modern fishery management because they can achieve many things that conventional tools cannot. Only complete and permanent protection from fishing can protect the most sensitive habitats and vulnerable species. Only reserves will allow the development of natural, extended age structures of target species, maintain their genetic variability and prevent deleterious evolutionary change from the effects of fishing."(8)

Including marine protected areas in strategies for the sustainable management of fisheries has gained the support of many nations and international bodies. Several nations, including Canada, have already legislated the establishment of MPAs as an important component of their fisheries management and conservation strategies. In 2002, parties to the World Summit on Sustainable Development agreed on the objective of establishing national networks of marine protected areas by 2012.(9) In 2003, the World Parks Congress recommended that 20-30% of every habitat in the oceans be given full protection from fishing. In October 2005, the First International Marine Protected Areas Congress convened. Progress, however, is slow. At the current rate of global MPA designation, recent data indicate that the 2012 target will not be reached until at least 2085.(10)

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(7) Marine reserves are a special category of MPA. Within a reserve, biological resources are generally protected through prohibitions on fishing and on the removal or disturbance of living and non-living marine resources, except as necessary for monitoring or research to evaluate reserve effectiveness. See Center for Biodiversity and Conservation of the American Museum of Natural History, http://research.amnh.org/biodiversity/symposia/archives/seascapes/glossary.html.

(8) Callum M. Roberts, Julie P. Hawkings and Fiona R. Gell, "The role of marine reserves in achieving sustainable fisheries," *Philosophical Transactions of the Royal Society B*, Vol. 360, 2005, pp. 123-132.

(9) United Nations (2004).

(10) "Global Targets for MPA Designations Will Not Be Met Experts Respond," *MPA News*, Vol. 7, No. 5, November 2005.

The World Conservation Union (IUCN) is a pioneer in promoting the establishment of both terrestrial and marine protected areas. As such, it has developed working definitions and guidelines. Thus, the IUCN defines a protected area as "an area of land and/or sea especially dedicated to the protection of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means."(11) For marine areas, the IUCN states that an MPA is "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."(12) According to the IUCN, an MPA:

- includes the marine environment but may also include coastal land areas and islands;
- has some form of protection, usually legal but not necessarily;
- has a degree of protection that is not necessarily the same throughout the area;
- should cover not only the seabed but also at least some of the water column above with its flora and fauna; and
- protects cultural features such as wrecks, historic lighthouses and jetties.

Levels of protection can range from limitations on fishing and other human activities to complete prohibition of any forms of use or extraction (also known as a "no-take" zone). Several studies have demonstrated that MPAs can help reach conservation and fisheries management objectives by improving biodiversity, restoring the population structure and dynamic of stocks, and facilitating the establishment of stable and productive ecosystems. For

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(11) G. Kelleher, *Guidelines for Marine Protected Areas*, IUCN, Gland, Switzerland, and Cambridge, UK, 1999, pp. xvii-xviii. According to the IUCN, protected areas are divided into six categories, depending on their management objectives:

- for science or wilderness protection (Strict Nature Reserve/Wilderness Area);
- for ecosystem protection and recreation (National Park);
- for conservation of specific natural features (Natural Monument);
- for conservation through management intervention (Habitat/Species Management Area);
- for landscape/seascape conservation and recreation (Protected Landscape/Seascape);
- for the sustainable use of natural ecosystems (Managed Resource Protected Area).

(12) *Ibid*., p. xi. The definition was adopted as Resolution 17.38 of the IUCN General Assembly in 1988, and reaffirmed in Resolution 19.46 in 1994.

example on Canada's Atlantic coast, the year-round closure of areas to fishing on the Scotian Shelf has resulted in an increase in the numbers and sizes of several commercially important species in both the closed and adjacent areas.(13)

As a tool for sustainable management of ocean resources, the establishment of MPAs is meant to achieve the three following main objectives:

- reduction of the risk of overfishing;
- management of population structure; and
- maintenance of representative habitat characteristics.

A. Reduction of the Risk of Overfishing

One of the most valuable roles MPAs can play in fisheries management is to reduce the risk of overfishing by providing an ecological buffer against miscalculations in fisheries assessments. Traditional management strategies rely heavily on the accurate assessment of stock size, life history parameters and managers' ability to account for all forms of fishing mortality (i.e., the rate at which fish are removed from the stock as a result of fishing activities). However, scientific and technological limitations as well as unpredictable natural fluctuations in biological and ecological parameters (including global climate change and its impact on oceans) make this virtually impossible. Consequently, unintentional overexploitation of stocks can easily occur even when harvest rates are perceived to be low. MPAs can safeguard against errors in fisheries assessments by providing protection to a portion of the stock so that it can act as a source for population recovery if the unprotected portion of the stock were to collapse.(14) The establishment of MPAs to protect a stock can also contribute to a reduction of the fishing mortality of adults, allowing the stock to replenish itself. While traditional management tools such the reduction of the total allowable catch can achieve the same goal, protection of stock through the establishment of MPAs may be more easily enforceable.

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(13) J. Fisher and K. Frank, "Changes in finfish community structure associated with an offshore fishery closed area on the Scotian Shelf," *Marine Ecology Progress Series*, Vol. 240, 2002, pp. 249-264. For further examples, see: Callum M. Roberts *et al.*, "Effects of marine reserves on adjacent fisheries," *Science*, Vol. 294, 30 November 2001, pp. 1920-1923; Roberts *et al*. (2005); and Trevor Ward and Eddie Hegerl, *Marine Protected Areas in Ecosystem-based Management of Fisheries*, Department of the Environment and Heritage, Australia, 2003, pp. 16-24.

(14) Tim Lauck *et al.*, "Implementing the precautionary principle in fisheries management through marine reserves," *Ecological Applications*, Vol. 8, Issue 1, Supplement, 1998, pp. S72-78.

Maintaining and protecting stocks provides a relatively simple and effective method of applying the precautionary principle to fisheries management and establishing sustainable fisheries.

B. Management of Population Structure

Fishing often overwhelms the natural population equilibrium and can create dramatic changes in the life history and physical characteristics of a species in a very short time. For example, studies have shown that significant declines in the average age of maturity have occurred in numerous exploited stocks.(15) It is also known that smaller fish often produce fewer eggs, thereby contributing to a reduction in survival and recruitment. The establishment of MPAs could reduce such changes in reproductive behaviour as well as other changes in genetic diversity of stocks by protecting a portion of the stock. Published data indicate an increase in abundance, size and reproductive potential of stocks under MPA protection.(16)

C. Maintenance of Representative Habitat Characteristics

Many fishing activities, as well as other oceans-based industrial activities, can have devastating effects on marine ecosystems.(17) Bottom trawling, for example, is a non-selective, destructive practice that drags weighted nets along the ocean floor. This practice captures all organisms in its path and, in worst cases, levels the bottom of the ocean. Such excessive removal and destruction of biotic and abiotic features makes it significantly more difficult for the ecosystem to recover.(18)

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(15) P. J. Auster and N. L. Shackell, "Marine protected areas for the temperate and boreal Northwest Atlantic: the potential for sustainable fisheries and conservation of biodiversity," *Northeastern Naturalist*, Vol. 7, Issue 4, 2000, pp. 419-434. This is the case, for example, for the Northern cod off the coasts of Newfoundland and Labrador.

(16) Roberts *et al*. (2001); Fisher and Frank (2002).

(17) G. S. Jamieson and C. O. Levings, "Marine protected areas in Canada – implications for both conservation and fisheries management," *Canadian Journal of Fisheries and Aquatic Sciences*, Vol. 58, 2001, pp. 138-156. Table 4 of this reference describes and weighs the impacts of a range of human activities on the habitat and species. Trawling is assessed as one of the activities with the heaviest impact on the habitat integrity.

(18) In November 2004, the UN General Assembly failed to recommend a worldwide moratorium on bottom trawling. The Canadian Minister of Fisheries and Oceans at that time, Geoff Regan, addressed the UN General Assembly in support of the need to combat destructive fishing practices in international waters. He did not, however, condemn any given type of fishing methods as inherently destructive.

A representative MPA is an area that has high biodiversity, is unique, contains critical habitat for ecosystem function or for a species of interest, or has high productivity.(19) MPAs can be designed to protect important or representative habitats by eliminating or limiting damaging fishing practices and other harmful human activities. Over time, in the absence of negative human impacts, habitat complexity can increase, possibly enhancing the survival of, and recruitment to, fishable stocks.

MPAs representing all major habitats, both within and beyond national jurisdiction, are central to the objective of establishing networks of marine protected areas, as agreed upon at the World Summit on Sustainable Development in 2002. So far, efforts have focused on areas under national jurisdiction. There has been, however, a push from several environmental non-governmental organizations (NGOs) and academics to recognize and establish MPAs or high-seas reserves in international waters. The nose and tail of the Grand Banks of Newfoundland, which have been continually fished since at least the 15th century, and 10% of which lie in international waters, have been proposed as a candidate for a high-seas reserve.(20)

CONCERNS OVER THE ESTABLISHMENT OF MARINE PROTECTED AREAS

Despite the recognized advantages of MPAs as conservation tools in comparison to traditional ones,(21) some concerns have been expressed about the establishment of these protected areas. The notion of permanently closing off major sections of fishing grounds is the focus of disputes. Fair compensation for lost fishing opportunities is probably one of the key points. It should be noted, however, that MPAs can be designed to support protection of species and habitats while still permitting some fisheries. For example, in coastal areas, smaller, more

(19) T. Stevens, "Rigor and Representativeness in Marine Protected Area Design," *Coastal Management*, Vol. 30, 2002, pp. 237-248.

(20) Henry Nicholls, "Marine conservation: Sink or swim," *Nature*, Vol. 432, No. 7013, 4 November 2004, pp. 12-14.

(21) See Roberts *et al.* (2005) for a discussion of common fishery management tools, their value and limitations.

numerous protected areas have proven effective in recovering stocks and habitats while enabling continued access to fishing grounds for all.(22)

An additional set of concerns pertains to the fact that the benefits of protected areas rely on a flow-through of genetic material and organisms to replenish the genetic variability and populations of organisms. If the adjacent areas are severely altered, degraded or exploited, protected areas will become vulnerable to genetic bottlenecks and population fluctuations. On the other hand, it has been argued this situation is still better than the alternative of leaving the area and the species unprotected.

A related concern is that an increase in the concentration of the fishing effort at the boundaries of protected areas will wipe out the MPAs' fishery benefits. This would be particularly problematic in the case of highly mobile or migratory species. In response, a number of approaches have been proposed. MPAs should be large enough not to risk becoming a genetic bottleneck, and adjacent areas should never be allowed to be degraded to such an extent that it would affect the species and the habitats meant to be protected. Instead, adjacent areas to MPAs could be treated as buffer zones. The implementation of MPAs would be done in association with other management tools such as effort reduction, catch quotas and closed seasons in adjacent areas. In addition, areas of known vulnerability should be given priority for protection. Strategically located MPAs would benefit migratory species through protection of spawning areas, feeding areas, aggregation sites and migration bottlenecks.(23)

CANADA AND MARINE PROTECTED AREAS

A. The Marine Protected Areas Network

The 1997 *Oceans Act* provides the legislative foundation for the establishment of a network of marine protected areas in Canada. According to the *Oceans Act*, an MPA is an area of sea in Canada's internal waters, territorial sea or exclusive economic zone that receives special protection from human activity for the purposes of conserving and protecting 1) commercial and non-commercial fishery resources, 2) endangered or threatened marine species and their habitats, 3) unique habitats, 4) special areas of high biodiversity or biological

(22) Roberts *et al*. (2005).

(23) *Ibid*.

productivity, and 5) any other marine resources or habitat that the Minister of Fisheries and Oceans deems necessary. The *Oceans Act* gives the Minister of Fisheries and Oceans the authority to coordinate all federal marine activities, including the establishment of marine protected areas. Environment Canada and Parks Canada are, however, also involved in establishing and operating MPAs.(24) Canada's federal marine protected area network comprises three core programs:

- marine protected areas, established by Fisheries and Oceans Canada (DFO) under the *Oceans Act* to protect and conserve important fish and marine mammal habitats, endangered marine species, unique features and areas of high biological productivity or biodiversity;
- marine wildlife areas, established by Environment Canada to protect and conserve habitat for a variety of wildlife including migratory birds and endangered species; and
- national marine conservation areas, established by Parks Canada to protect and conserve representative examples of Canada's natural and cultural marine heritage and provide opportunities for public education and enjoyment.

The *Federal Marine Protected Areas Strategy*,(25) prepared jointly by DFO, Environment Canada and Parks Canada and released in July 2005, outlines how these departments and agencies will work together to establish a comprehensive network of marine protected areas that will conserve and protect Canada's natural and cultural marine resources.

B. Marine Protected Areas

The first phase of DFO's Oceans Action Plan, released in 2005, gives a prominent place to MPAs with a planned spending of $8.3 million over two years (out of a total investment of $28 million).(26) DFO states that "Without a strategy to more effectively manage our oceans

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(24) As indicated previously, the meaning of the term "marine protected area" is broad, which may lead to confusion. The Department of Fisheries and Oceans manages MPAs under, and as specifically defined by, the *Oceans Act*; however, the term "marine protected area" is also applied generically to protected areas established under other federal or provincial legislation.

(25) DFO, *Federal Marine Protected Areas Strategy*, http://www.dfo-mpo.gc.ca/canwaters-eauxcan/infocentre/publications/docs/fedmpa-zpmfed/index_e.asp (accessed 14 July 2005).

(26) DFO, Backgrounder, "Oceans Action Plan – Phase I," May 2005, http://www.dfo-mpo.gc.ca/media/backgrou/2005/hq-ac47a_e.htm; and DFO, *Report on Plans and Priorities 2005-2006*.

and address these challenges, there will be continued environmental degradation and lost economic and employment prospects."(27)

There are currently five MPAs established under the *Oceans Act*:(28)

- Endeavour Hydrothermal Vents, off Vancouver Island;
- The Gully, located close to Sable Island, Nova Scotia;
- Basin Head, on the eastern tip of Prince Edward Island;
- Eastport Peninsula, in Bonavista Bay, Newfoundland;
- Gilbert Bay, on Labrador's southeast coast.

Other locations are being considered for MPA designation under the *Oceans Act*. These areas of interest (AOIs) are: Bowie Seamount, which lies west of the Queen Charlotte Islands in British Columbia; Race Rocks, on the southern tip of Vancouver Island; the Mackenzie Estuary in the Yukon, to support the Beaufort Sea Beluga Management Plan; Manicouagan Peninsula on the North Shore of the St. Lawrence Estuary; an area in the St. Lawrence Estuary; the Musquash estuary in New Brunswick; and Leading Tickles, on the northeast coast of Newfoundland.

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(27) DFO, *Canada's Oceans Action Plan – For Present and Future Generations*, Ottawa, 2005, p. 4, http://www.dfo-mpo.gc.ca/canwaters-eauxcan/oap-pao/index_e.asp. The challenges to which this quote refers are: failing ocean health; growing oceans user conflicts; and a weak oceans industry sector.

(28) Information about these MPAs is available on-line, as follows:

Endeavour Hydrothermal Vents, http://www.dfo-mpo.gc.ca/canwaters-eauxcan/infocentre/guidelines-conseils/factsheets-feuillets/mpa-zpm/endeavour_e.asp (accessed 14 July 2005);
SOR/2003-87, http://laws.justice.gc.ca/en/O-2.4/SOR-2003-87/index.html (accessed 14 July 2005).

The Gully, http://www.dfo-mpo.gc.ca/canwaters-eauxcan_/infocentre/guidelines-conseils/factsheets-feuillets/mpa-zpm/sable_e.asp (accessed 14 July 2005);
SOR/2004-112, http://canadagazette.gc.ca/partII/2004/20040519/html/sor112-e.html (accessed 14 July 2005).

Basin Head, http://www.dfo-mpo.gc.ca/canwaters-eauxcan/infocentre/guidelines-conseils/factsheets-feuillets/mpa-zpm/bhead_e.asp;
SOR-2005-293,http://laws.justice.gc.ca/en/O-2.4/SOR-2005-293/index.html.

Eastport Peninsula, http://www.dfo-mpo.gc.ca/canwaters-eauxcan/infocentre/guidelines-conseils/factsheets-feuill ets/mpa-zpm/eastport_e.asp;
SOR-2005-294, http://laws.justice.gc.ca/en/O-2.4/SOR-2005-294/index.html.

Gilbert Bay, http://www.dfo-mpo.gc.ca/canwaters-eauxcan/infocentre/guidelines-conseils/factsheets-feuillets/mpa-zpm/gbay_e.asp;
SOR-2005-295, http://laws.justice.gc.ca/en/O-2.4/SOR-2005-295/index.html.

DFO's 1999 *National Framework for Establishing and Managing Marine Protected Areas*[29] outlines a six-step process for establishing MPAs, from the initial identification of an AOI to the management of a designated MPA. Due to the great diversity of marine ecosystems and human activities in those areas, the conservation and management goals of individual MPAs vary throughout Canada. In order to accommodate the wide range of goals, the DFO guidelines state that management plans for MPAs are to be developed on a case-by-case basis in cooperation with local resource users and interested and affected parties, including other federal ministers, provincial and territorial governments and Aboriginal groups. These plans establish the details of partnering responsibilities, funding arrangements, jurisdictional coordination, zoning, protection standards, regulations, permissible activities, enforcement, monitoring and research, and public awareness. DFO recognizes that cooperation between the various stakeholders is vital to the success of any MPA, particularly with regard to gathering information, developing public awareness on environmental issues, conducting research and enforcing regulations.

The federal government's commitment has, however, been questioned. Chapter 1 of the 2005 Annual Report of the Commissioner of the Environment and Sustainable Development (CESD) was dedicated to an audit of the Oceans Management Strategy and the implementation of the *Oceans Act*. The CESD stated that "[i]mplementing the *Oceans Act* and subsequent oceans strategy has not been a government priority. After eight years, the promise of the *Oceans Act* is unfulfilled. Fisheries and Oceans Canada has fallen far short of meeting its commitments and targets: it has finalized no integrated management plans and has designated only two marine protected areas."[30] The report examined the process of establishing MPAs under the *Oceans Act* in three cases: the Gully, designated as an MPA in 2004; and two AOIs,

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(29) DFO, *National Framework for Establishing and Managing Marine Protected Areas*, http://www.dfo-mpo.gc.ca/canwaters-eauxcan/infocentre/publications/docs/newmpa/fpd/fullprintable_fpd_e.asp (accessed 14 July 2005). Besides this framework and the federal strategy referenced above, DFO has also published the following two documents: *Marine Protected Areas Policy*, http://www.dfo-mpo.gc.ca/canwaters-eauxcan/infocentre/legislation-lois/policies/mpa-policy/fpd/fullprintable_fpd_e.asp (accessed 14 July 2005); and *Working Together for Marine Protected Areas: A National Approach*, http://www.dfo-mpo.gc.ca/canwaters-eauxcan/infocentre/publications/brochures/wtogeth_e.asp (accessed 14 July 2005).

(30) Commissioner of the Environment and Sustainable Development, *Report of the Commissioner of the Environment and Sustainable Development to the House of Commons*, Chapter 1, "Fisheries and Oceans Canada – Canada's Oceans Management Strategy," Office of the Auditor General, Ottawa, 2005, p. 2. (As indicated previously, there are now five – not two – designated MPAs.)

the Bowie Seamount in the Pacific Ocean and the Tarium Niryutait in the Beaufort Sea. The CESD wrote that "For the three cases examined, we found that the evaluation process took five to seven years. At this rate, it will take many years to put in place a national system of marine protected areas. The length of time being taken to designate MPAs brings into question whether the Department's commitments and targets can be met."(31)

C. Marine Wildlife Areas

Under the *Canada Wildlife Act* and the *Migratory Birds Convention Act*, Environment Canada is mandated to protect unique, critical and productive terrestrial, wetland and marine habitats/ecosystems for wildlife in Canada. Major marine ecozones and nearshore areas are protected through the creation of national wildlife areas (areas on land or within the territorial sea), marine wildlife areas (MWAs – areas beyond the territorial sea) and migratory bird sanctuaries.(32) As of July 2005, there were 51 national wildlife areas and 92 migratory bird sanctuaries, a number of which are located in marine areas. There are currently no MWAs but several sites are being considered for MWA protection, including the Scott Islands in British Columbia.

D. National Marine Conservation Areas

Under the *Canada National Marine Conservation Areas Act*, Parks Canada has the authority to establish and maintain national marine conservation areas (NMCAs). These are designed to protect marine and Great Lakes areas that are representative of the country's natural and cultural heritage. The Atlantic, Pacific and Arctic oceans along with the Great Lakes have been divided into 29 marine regions. The ultimate goal of the program is to establish national marine conservation areas in each region. There are currently two NMCAs: Fathom Five Marine Park in Georgian Bay, Ontario, and Saguenay-St. Lawrence Marine Park in Quebec. There are proposals for NMCAs in Lake Superior, Ontario, Gwaii Haanas, British Columbia, and Southern Strait of Georgia, British Columbia.

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(31) *Ibid.*

(32) Migratory bird sanctuaries are some of the oldest areas with protection status in Canada. For example, Bonaventure Island became a migratory bird sanctuary in 1919 following the signature in 1916 of the Migratory Bird Convention between Canada and the United States.

CONCLUSION

In terms of concept development and establishment, marine protected areas are now at a point where terrestrial protected areas such as national and provincial parks and wildlife conservation areas were decades ago. Banff National Park, Canada's first national park, was established in 1885. Both types of protected areas ultimately serve the same purpose and are needed for the same reason: to conserve the diversity of plants and animals within them. MPAs can thus help preserve natural marine heritage as well as being fisheries management tools. The first set of MPAs established under the *Oceans Act* appear to favour the former purpose. The latest MPAs, however, appear to have been designated more as fisheries management tools. For example, the Eastport MPA was established in 2005 as a direct result of a proposal from the Eastport Peninsula Lobster Protection Committee to address declining lobster catches and protect and conserve the fishery resources on which the community depends.

Though the use of marine protected areas as part of a sustainable fisheries management strategy is still relatively new, experience has already shown that properly designed, implemented and monitored MPAs can be valuable tools in an effective conservation strategy for fisheries resources. Indeed, it has been suggested that "MPAs may well be the simplest and best approach to implementing the precautionary principle and achieving sustainability in marine fisheries."(33) The 1994 closure of areas on Georges Bank off the New England coast, for example, had a striking effect on both the habitat and the ecosystem productivity. Not only did it contribute to reducing fishing mortalities of the stocks meant to be protected (cod and yellowtail flounder), but the scallop population had increased 14-fold within four years of the closure.(34) MPAs can reduce the risk of overfishing, increase biomass and improve the population parameters of target species while accommodating the needs of multiple stakeholders. They can also serve as valuable sites for research and education to improve understanding of fisheries biology and ecosystem processes. The dramatic declines in fisheries stocks around the world and the consequent threat of fisheries collapses are creating a pressing need for more research into the role MPAs can play in establishing sustainable fisheries.

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(33) Lauck *et al.* (1998).

(34) L. Bergen and M. H. Carr, "Establishing Marine Reserves – How Can Science Best Inform Policy?" *Environment*, Vol. 45, No. 2, March 2003, pp. 8-19.