Canadian Council of Fisheries
and Aquaculture Ministers (CCFAM)
Oceans Task Group

Report on Canada's Network of Marine Protected Areas
December 2018

Canada

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List of Acronyms

AOI – Area of Interest

CBA – Cost-Benefit Analysis

CSAS – Canadian Science Advisory Secretariat

DFO – Fisheries and Oceans Canada

EBSA – Ecologically and Biologically Significant Area

ECCC – Environment and Climate Change Canada

ISR – Inuvialuit Settlement Region

IUCN – International Union for the Conservation of Nature

MPA – Marine Protected Area

OEABCM – Other Effective Area-Based Conservation Measure

OTG – Oceans Task Group

PCA – Parks Canada Agency

RIAS – Regulatory Impact Analysis Statement

UN CBD (or CBD) – United Nations Convention on Biological Diversity

Executive Summary

I n 2011, the *National Framework for Canada's Network of Marine Protected Areas (National Framework)* was developed for the Canadian Council of Fisheries and Aquaculture Ministers (CCFAM) to outline a strategic direction for establishing a national network of marine protected areas (MPAs). The vision describes "an ecologically comprehensive, resilient, and representative national network of marine protected areas that protects the biological diversity and health of the marine environment for present and future generations."[1] In January 2016, CCFAM re-established the Oceans Task Group (OTG)[2] to provide guidance on implementation of the *National Framework*.

This report is divided into two parts. Part A highlights progress made on advancing the national network of MPAs in five priority bioregions: Northern Shelf, Western Arctic, Newfoundland and Labrador Shelves, Scotian Shelf, and Estuary and Gulf of St. Lawrence. Part A also provides an update regarding Canada's international commitment to increase marine and coastal conservation in its three oceans to 10 percent by 2020. Network development and bioregional governance processes support the establishment of individual MPAs and contribute toward Canada's domestic and international marine conservation targets.

Significant progress has been made in meeting Canada's domestic and international marine conservation targets. As of June 2018, approximately 7.9 percent of Canada's marine and coastal territory was under some form of conservation, and network development was advancing in all five priority bioregions.

Reflecting the agreement made at the June 2017 meeting of Ministers, Part B presents a special focus on socio-economic and cultural considerations in MPA establishment and MPA network decision making, as well as other areas of cooperation. The report provides an update on the implementation of the *National Framework,* specifically with reference to how socio-economic data and cultural information are collected and integrated into MPA network development, including subsequent MPA establishment. This is a challenging and complex topic that requires clear explanations of the complicated considerations involved in balancing ecological and socio-economic benefits and costs. The OTG believes this report will contribute to increasing the credibility of Canada's marine conservation efforts and assuring Canadians that the process is fair and transparent.

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[1] *National Framework for Canada's Network of Protected Areas* (2011). p. 6.

[2] The Government of Quebec does not endorse the *National Framework for Canada's Network of Marine Protected Areas* and is not a member of the Oceans Task Group. Quebec contributes by sharing the results of work conducted by the Canada-Quebec Bilateral Group on Marine Protected Areas, Quebec's preferred collaboration structure for discussing marine environmental protection with the federal government.

OTG Statements of Interest

- All responsible agencies should use their mandates, in accordance with each government's jurisdiction and priorities, to make a meaningful contribution to MPA network development.

- In the spirit of transparency, all Cost-Benefit Analysis (CBA) reports on *Oceans Act* MPAs should be made available to the public on the Fisheries and Oceans Canada (DFO) website.

- Conducting as much socio-economic and cultural analysis as possible, as early as possible in MPA network development processes, is important for informing selection of potential MPAs, determining relevant protection levels, and identifying appropriate legislative tools.

- All governments should continue to work together to achieve common marine protection and conservation goals.

- The broadest range of input, views and values from Indigenous knowledge holders and stakeholders should be sought as early as possible in MPA network development.

- National consistency in the application of the various tools and approaches to network development across all regions (including analysis of socio-economic and cultural activities that may be affected) needs to be promoted, and early and ongoing engagement of all parties in these processes is important.

- An adaptive management approach should recognize that ecosystems are dynamic and the values associated with their functions need to be quantified. To be effective at the MPA network and site levels, this approach, although costly, requires integrated monitoring and reporting.

Introduction

As a Party to the 1992 United Nations Convention on Biological Diversity (CBD), Canada has pledged to "integrate consideration of the conservation and sustainable use of biological resources into national decision making."[3]

Commitment to the conservation of marine biological resources stands as the first and most important of Canada's three goals for its national network of MPAs: "To provide long-term protection of marine biodiversity, ecosystem function and special natural features."[4] The concept of sustainable use introduces the socio-economic element into network development and is reflected in the second of Canada's network goals: "To support the conservation and management of Canada's living marine resources and their habitats, and the socio-economic values and ecosystem services they provide."[5] Thirdly, Canada has committed to promoting social, cultural, and educational values through its third network goal. This may include protecting areas such as historical and archeological sites where they are compatible with national network goals and eligibility criteria.[6]

During the 2017 CCFAM Ministerial meeting, Ministers agreed that the OTG would develop its second report on implementing the *National Framework* with a special focus on socio-economic and cultural considerations in decision making, as well as other areas of cooperation.

This report responds to that commitment and focuses on how socio-economic, social and cultural analyses are integrated into MPA network development, and illustrates how. within the established parameters of these analyses, this information is subsequently used in MPA establishment. Understanding how information is integrated into MPA network decision making and MPA establishment processes has become increasingly important, especially if conservation measures have potential future benefits and costs for communities or stakeholders because of the management of marine resources to meet the conservation objectives of an individual MPA.

By ensuring that socio-economic and cultural values are effectively integrated into MPA network development, Canada is demonstrating its commitment to the CBD 2050 Vision which states that "by 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people."

The type of socio-economic analysis undertaken to create an MPA network design (a map that guides future conservation efforts within each bioregion, including selection of appropriate conservation measures) differs in scope and depth from the analysis conducted in the establishment of individual MPAs. This report describes the types of analysis that can be undertaken and how the information is then used differently in developing MPA network design options and in establishing MPAs under the *Oceans Act*.

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[3] Convention on Biological Diversity, 1992, Article 10 (https://www.cbd.int/doc/legal/cbd-en.pdf).

[4] *National Framework,* p. 6.

[5] *Ibid.*

[6] *Ibid.*, p. 16.

Box 1: Defining MPAs, MPA Establishment, and MPA Network Development

- The term "marine protected area" or MPA is used generically to refer to areas in marine waters that meet the International Union for the Conservation of Nature (IUCN) definition of a protected area under federal, provincial or territorial legislative instruments. An "*Oceans Act* MPA" refers to a specific MPA designated under the *Oceans Act*.

- Establishing MPAs refers to developing protection for a clearly defined geographical space recognized, dedicated, and managed through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.

- The term "*Oceans Act* MPA establishment" refers to the specific process through which an *Oceans Act* MPA becomes regulated. The term "designation" is not used until the regulations designating the *Oceans Act* MPA come into effect.

- MPA network development is a four-stage process that culminates in establishment of an MPA network. An MPA network is a collection of individual MPAs and other conservation measures that function cooperatively and synergistically, at various spatial scales and with a range of protection levels, in order to fulfill ecological aims more effectively and comprehensively than individual sites could alone. Networks can be composed of *Oceans Act* MPAs, National Marine Conservation Areas, marine National Wildlife Areas, and marine portions of Migratory Bird Sanctuaries, National Parks, and Provincial and Territorial protected areas, as well as other effective area-based conservation measures such as marine refuges.

Banc-des-Américains AOI in the Estuary and Gulf of St. Lawrence bioregion
DFO

Part A: Implementing the National Framework for Canada's Network of MPAs

1. Progress in Priority Marine Bioregions

MPA network designs are being developed in all five of DFO's priority bioregions. Once finalized, MPA network plans will be created to provide further details on implementation, including which network sites will be prioritized for earliest conservation, and the conservation measures to be advanced in those areas.

Indigenous, provincial and territorial governments, Indigenous groups, stakeholders and interested parties in the five priority bioregions are engaged in the network development process to provide input on objectives, data and information, draft network design, and site selection. Because of different ecological characteristics, available data, existing human uses, and engagement and consultation requirements across the bioregions, progress is being made at varying rates. However, the approach to the network development process is consistent across all bioregions, guided by the principles articulated in the 2011 *National Framework*.

All interested parties will continue to have opportunities to provide input throughout the bioregional MPA network development process. Indigenous groups are invited to contribute by sharing information from Indigenous knowledge systems, and voicing their interests and views.

Newfoundland-Labrador Shelves

As the first step, a draft MPA network design is under development using Marxan[7] software, a decision-support tool used as an aid in network development.

The design includes existing MPAs and marine refuges, as well as areas to avoid such as oil and gas significant discovery licences. Recent commercial fishery data have been incorporated into the Marxan analysis. Other socio-economic data, including on historical commercial fishing, aquaculture, oil and gas exploration licences and prospectivity, and Indigenous knowledge, are being considered through a post-Marxan overlay exercise

Initial engagement with partners and key stakeholders has taken place with consultations on a draft MPA network design to follow.

Estuary and Gulf of St. Lawrence

A draft MPA network design has been created based on available geo-referenced data covering the bioregion. Meetings with key stakeholders in the fishing industry were held in 2016-2017 to discuss socio-economic data, after which an analysis using the Marxan decision-support software was conducted using both ecological and socio-economic data.

Engagement with interested parties on the draft network design began in September 2017. Meetings have been held and are continuing with provincial governments in Quebec, New Brunswick, Prince Edward Island, Nova Scotia, and Newfoundland and Labrador, as well as with Indigenous groups, fishing industry associations, and other interested parties. These meetings focus on gathering general comments about the draft network design, inviting suggestions for adjustments, and prioritizing areas for conservation identified in the draft network plan.

Next steps involve, among others, the development of an action plan to assist with the selection (or prioritization) of sites, followed by implementation

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[7] A description of how Marxan is used in network planning is contained in the section of this report entitled "Two Approaches to Developing Network Design Options" and illustrated in Figure 4.

at the site level, and monitoring of designated sites within the MPA network.

Scotian Shelf

A draft MPA network design has been created through a systematic process that included a Marxan analysis for the offshore component of the bioregion. The analysis was guided by a technical working group composed of experts from DFO, Parks Canada Agency (PCA), and Environment and Climate Change Canada (ECCC). Several Canadian Science Advisory Secretariat (CSAS) peer-review processes also informed the network design analysis (most recently in 2016).

Data related to commercial fishing, aquaculture, offshore oil and gas, and other socioeconomic information were built into the network design analysis to, wherever possible, avoid the most important areas for the different industry sectors while meeting network objectives. Potential future activities were considered in certain areas where information was available. For example, offshore petroleum exploration licences and areas with high potential for tidal power were avoided through a post-Marxan overlay analysis. Where available, Indigenous knowledge helped inform the analysis (e.g., culturally significant species such as Atlantic salmon were considered). Work with First Nations is continuing in order to gather Indigenous knowledge for incorporation into the MPA network development process.

In March 2018, DFO Maritimes Region announced two proposed Areas of Interest (AOIs) for potential *Oceans Act* MPA establishment (Eastern Shore Islands and Fundian Channel-Browns Bank) and a potential offshore marine refuge under the *Fisheries Act* (Eastern Canyons). The consultation process has begun for the Eastern Shore Islands AOI, with potential MPA designation by 2020. For the other two sites, public consultations will begin once discussions with the Mi'kmaq of Nova Scotia, the Province of Nova Scotia, and National Resources Canada have concluded.

Engagement with Indigenous groups and the Provinces of Nova Scotia and New Brunswick on the draft MPA network design is ongoing, and a

broad-based consultation process is planned for the draft design following its public release. A final MPA network plan for the Scotian Shelf bioregion will be developed once these consultations have concluded.

Northern Shelf

The Government of Canada, the Province of British Columbia, and 17 Coastal First Nations are working together to develop an MPA network in the Northern Shelf bioregion (NSB). First Nations are engaged as equal partners in MPA development, and will make decisions alongside the federal and provincial governments about MPA site selection and implementation. MPA network development in this bioregion is guided by the Canada-British Columbia Marine Protected Area Network Strategy, approved in 2014. The Strategy is consistent with direction provided by the National Framework.

The Canada-BC-First Nations Marine Protected Area Technical Team (MPATT), in collaboration with scientists, thematic experts, and stakeholders, identified ecological conservation priorities and quantitative target ranges for their spatial representation in the network.

Partner First Nations identified cultural conservation priorities, which are areas important for culture and spirituality, culturally significant species, and harvesting. Examples include supernatural sites, origin story sites, areas of very high current and historical use, areas important for cultural education, and productive areas for harvesting seaweed, halibut, salmon and crabs. This information enables culturally appropriate integration of traditional knowledge and helps ensure that First Nations knowledge, beliefs, and practices are acknowledged and respected. Together, the ecological and cultural conservation priorities will help focus planning effort at the places and species that will deliver the best conservation outcomes.

The full range of uses and values associated with BC's coastal and marine environment have been documented and where data permit, mapped. The process of documenting uses and values was done with stakeholders through various initiatives, including the British Columbia Marine Conservation Analysis (see Box 12), the Marine Plan Partnership (MaPP), and the Pacific North Coast Integrated Management Area (PNCIMA). The nature of the interaction of uses with conservation priorities has been characterized using a compatibility matrix – an activity-by-activity analysis of where marine-based uses can occur relevant to values identified. Data are being shared on Seasketch, a tool being used to facilitate planning and engagement.

A conservation gap analysis has been conducted to assess the capacity of existing MPAs and other conservation measures to effectively protect conservation priorities. The analysis informs where higher levels of protection are needed, where boundaries need adjustments to better capture features, and where new MPAs or other conservation measures might be needed to achieve network objectives.

Existing MPAs, together with ecological, cultural and human-use data layers were analyzed using Marxan. Marxan results, together with input from scientists, experts, communities, and stakeholders, will support the identification of preliminary network areas in the spring of 2018. A draft MPA network design scenario has been developed and will be reviewed and refined with stakeholders and through internal review by the partners.

The Final MPA Network Action Plan will include a description of network sites, marine conservation measures, and responsible authorities; the approach to network design; the final network design; site specific considerations; results of impact analyses; priorities for sequencing of implementation; and management of the network (monitoring, compliance and enforcement, research, resourcing, etc.).

Western Arctic

The Western Arctic bioregion spans 539,793 km^2, encompassing most of the waters of the Inuvialuit Settlement Region (ISR) and the Kitikmeot region of Nunavut. It includes two settled land claims and two co-management systems. There is significant variation in biodiversity and ecosystems occurring in the bioregion, with different community-based approaches to the use and conservation of resources that varies from east to west.

A path toward MPA network development (with current focus on data and information gathering to support creation of a draft MPA network design) was developed with co-management partners in the ISR under the Inuvialuit Final Agreement. Parallel discussions were held with partners from Nunavut under the Nunavut Agreement to develop support for MPA network planning in the Kitikmeot region. This is the first DFO Oceans initiative to bring together partners from both regions in a joint planning effort for marine conservation that spans settlement boundaries over a significantly large geographic area. This project relies heavily on the incorporation of multiple knowledge sources, primarily the use of traditional Inuit knowledge systems, as well as peer-reviewed science information.

Residents in communities, as well as Board members of local hunters and trappers associations from as far west as Aklavik and as far east as Kugaaruk, were interviewed about the species and areas that are important to them to identify as conservation priorities for MPA network planning from a subsistence harvest perspective. Community discussions identified 14 high-priority species for subsistence use from across the bioregion. None of the priorities were the same for all communities, reflecting the range of traditional uses for marine resources in this region and emphasizes the importance of community engagement in effective marine conservation planning. Peer-reviewed science advice was also consulted for priorities to address ecological function and ecosystem integrity. Collectively, these conservation priorities form the building blocks of MPA network development in the Western Arctic.

A Marine Protected Area Network Working Group that includes co-management partners, community members, federal and territorial representatives, environmental groups, and industry partners, ensures that Indigenous knowledge, socio-economic information, and community perspectives are included throughout the network development process to produce a final product that is relevant and supported by all users of the marine waters and resources in the Western Arctic.

The OTG believes that all responsible agencies should use their mandates, in accordance with each government's jurisdiction and priorities, to make a meaningful contribution to MPA network development.

2. Marine Conservation Targets Update: Getting to 10 Percent

In 2015, the Federal-Provincial-Territorial Conservation, Wildlife and Biodiversity Steering Group and its Biodiversity Working Group (with input from Indigenous groups and stakeholders) developed the *2020 Biodiversity Goals and Targets for Canada* and made a commitment to work together in accordance with each government's respective jurisdiction and priorities. The 2020 goals and targets reflect the Aichi Targets to which the Government of Canada is a signatory:

Target 1 is:

By 2020, at least 17 percent of terrestrial and inland waters, and 10 percent of coastal and marine areas, are conserved through networks of protected areas and other effective area-based conservation measures.[8]

On November 13, 2015, the mandate letter for the Minister of Fisheries, Oceans and the Canadian Coast Guard further iterated the Government of Canada's commitment to this international target by adding an interim domestic target to "…*increase the proportion of Canada's marine and coastal areas that are protected – to five percent by 2017 and ten percent by 2020 – supported by new investments in community consultation and science*." In January 2016, CCFAM re-established the Oceans Task Group to provide leadership and strategic advice on meeting these domestic and international targets.

The Government of Canada has supported these commitments with significant investments:

→ $40M per year increase in fisheries and oceans science, including 135 new scientists recruited last year and a science partnership fund to lever partnerships with universities and others;

→ $81M over five years specifically to support achieving these targets; and

→ $1.5B over 5 years for oceans protection which includes support for coastal restoration, emergency response, and much more.

On October 28, 2017, the Honourable Dominic LeBlanc, then Minister of Fisheries, Oceans and the Canadian Coast Guard, and the Honourable Catherine McKenna, Minister of Environment and Climate Change, announced that Canada's interim target of protecting 5 percent of marine and coastal areas had been achieved. The Ministers recognized this achievement as an all-in effort, requiring support and collaboration from Indigenous groups, provincial and territorial governments, environmental organizations, stakeholders, and other interested parties.

The Minister's mandate letter was updated on August 28, 2018, to include "minimum protection standards for Canada's marine protected areas and marine refuges."

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[8] *2020 Biodiversity Goals and Targets for Canada* (http://www.biodivcanada.ca/default.asp?lang=En&n=9B5793F6-1)

Figure 1: Conserved Area of Canada's Marine and Coastal Waters (km²)[9]

274,825

123,560

31,166

19,526

10,277

Oceans Act MPAs (11 MPAs)	Marine refuges (51 marine refuges)	Marine portions of National Wildlife Areas and Migratory Bird Sanctuaries (56 MPAs)	National Marine Conservation Areas and marine portions of National Parks (17MPAs)	Provinces (694 MPAs)
(0.34%)	(4.78%)	(0.54%)	(2.15%)	(0.18%)
DFO		**ECCC**	**PCA**	**PROVINCES**
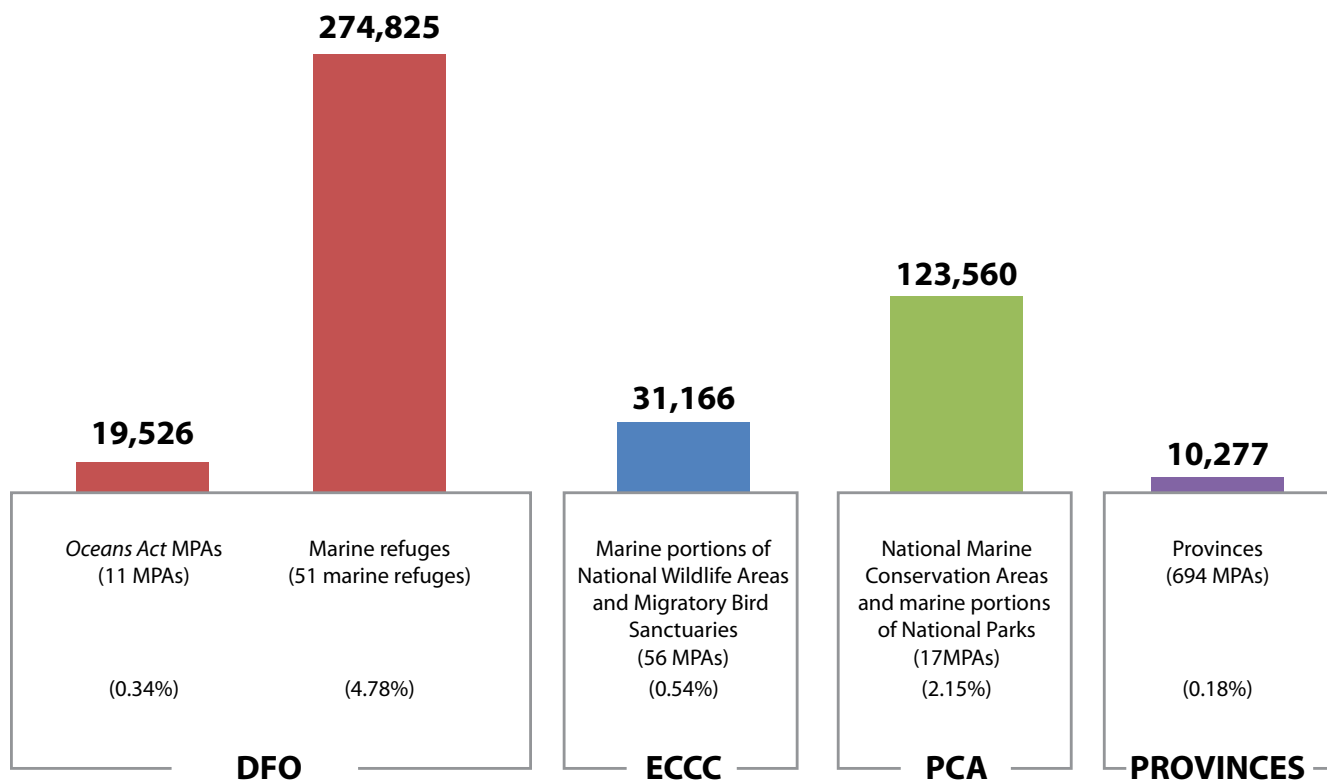
The interim 5 percent target was achieved in part by following a Five-Point Plan that identified areas of action to support reaching the target. As a result of these actions, approximately 7.9 percent of Canada's ocean territory was conserved by the end of June 2018, using a range of federal and provincial legislative and regulatory tools. Figure 1 describes the contributions of governments, working collaboratively with Indigenous groups and a range of marine industries and other stakeholders to achieve this level of conservation. All sites contributing to Canada's marine conservation targets are pictured on the interactive map at http://www.dfo-mpo.gc.ca/oceans/maps-cartes/conservation-eng.html

The Five-Point Plan was updated and continues to be pursued to ensure that the Government of Canada meets its commitment to achieving 10 percent marine and coastal protection by 2020. Box 2 outlines what was achieved by the end of June 2018, and what remains to be accomplished in order to meet the 10 percent target and fulfill our domestic and international commitments by 2020.

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[9] Figure 1 depicts all MPAs and Marine Refuges established as of June 30, 2018. Estimates are based on the 2017 analysis from the Canadian Environmental Sustainability Indicator (CESI) on Conserved Areas, plus the addition of Scott Islands marine National Wildlife Area. The total conserved marine area is approximately 454,000 km² (7.9 %) of Canada's total marine territory and accounts for overlaps between jurisdictions. Percentages shown in this figure are determined by dividing the area (in km²) by 5,750,000 (Canada's total oceans territory) and multiplying by 100. Totals and percentages have been rounded for communications purposes.

Notes: Totaling individual areas and percentages in the figure will not yield the total conserved marine area because overlap is not deducted from each jurisdictional total. Slight variances in reported numbers may be seen between CESI and other departments due to differing GIS methodologies. Coverage is subject to change as improvements are made to reporting Canada's progress towards its marine conservation targets.

Box 2: Five-Point Plan for Achieving Marine Conservation Targets

Achieved by June 30, 2018	To 10% — To be achieved by 2020

1. Finish what was started:
 	
▪ Anguniaqvia niqiqyuam (Western Arctic) and St. Anns Bank (Scotian Shelf) designated as *Oceans Act* MPAs.
▪ Hecate Strait/Queen Charlotte Sound Glass Sponge Reefs (Northern Shelf) designated as an *Oceans Act* MPA with protections strengthened.
▪ Agreement between the Government of Canada, the Government of Nunavut and the Qikitani Inuit Association on the final boundary of Tallurutiup Imanga/Lancaster Sound National Marine Conservation Area.
▪ Laurentian Channel (Newfoundland and Labrador Shelves) proposed *Oceans Act* MPA regulations were published in *Canada Gazette*, Part 1.
▪ Establishment of Scott Islands (Northern Shelf) as a marine National Wildlife Area.
	1. Finish what was started:
	
	▪ Complete establishment of the following as *Oceans Act* MPAs:
	  • Banc-des-Américains (Estuary and Gulf of St. Lawrence); and
	  • Laurentian Channel (Newfoundland and Labrador Shelves).
	▪ Complete Inuit Impact and Benefit Agreement to finalize Tallurutiup Imanga National Marine Conservation Area.

2. Protect large offshore areas: ▪ Announcement of the Offshore Pacific AOI, including establishment of a marine refuge.	**2. Protect large offshore areas:** ▪ Work has begun with Indigenous and northern partners on identifying large areas, possibly in the Arctic. ▪ Designation of areas in the High Arctic Basin as part of the last ice area initiative to be explored in partnership with Indigenous and northern partners. ▪ Complete establishment of the Offshore Pacific AOI as an *Oceans Act* MPA, including the existing marine refuge (Offshore Pacific).

3. Protect areas under pressure in five priority bioregions where MPA network development is occurring:
 	
▪ Network development is advanced in five priority bioregions, including the identification of areas needing protection.
	3. Protect areas under pressure in five priority bioregions where MPA network development is occurring:
	
	▪ Network development has started to identify areas in need of protection under the *Oceans Act*:
	  • Two bioregions (Scotian Shelf and Estuary and Gulf of St. Lawrence) are prepared to release draft MPA network designs and continue engagement with governments, Indigenous groups and stakeholders.
	  • New Eastern Shore Islands AOI in Scotian Shelf bioregion announced.

4. Advance Other Effective Area-Based Conservation Measures: ▪ Between June and December 2017, Canada announced 51 marine refuges [which is the domestic term for fisheries area closures that qualify as Other Effective Area-Based Conservation Measures ("other measures"), according to the science-based operational guidance developed by DFO].	**4. Advance Other Effective Area-Based Conservation Measures:** ▪ Additional marine refuges are being identified and advanced. ▪ Continue to work with international organizations (CBD and IUCN) to develop further international guidance on "other measures".
5. Establish Oceans Act MPAs faster and more effectively: ▪ On June 15, 2017, Minister LeBlanc introduced a series of proposed amendments to the *Oceans Act* and the *Canada Petroleum Resources Act* that are designed to facilitate the establishment process for MPAs without compromising science or the public's opportunity to provide input. ▪ Once in place, the amendments will enable the Minister to designate Interim Protection MPAs that will protect vulnerable areas while further scientific research and consultations take place.	**5. Establish Oceans Act MPAs faster and more effectively:** ▪ Bill C-55 is under review by the Senate. ▪ A National Advisory Panel was established in March 2018, to provide the Minister of Fisheries, Oceans and the Canadian Coast Guard with recommendations on categories and associated protection standards within federal MPAs, including the concept of Indigenous Protected Areas (IPAs). The Panel delivered its report, together with 13 recommendations, on September 26, 2018. More information on the Panel is available at http://www.dfo-mpo.gc.ca/oceans/conservation/advisorypanel-comiteconseil/index-eng.html.

Part B: Thematic Focus of the 2018 Report – Role of Socio-Economic and Cultural Analysis in MPA Network Development and MPA Establishment

This report focuses on how socio-economic data and cultural information are collected and integrated into MPA network development and provides examples illustrating how this information is used in *Oceans Act* MPA establishment (see Box 6). Socio-economic data are readily available from various government sources (see Box 5). Cultural values, which usually arise from the lived realities of local residents, are more challenging to define and more difficult to incorporate into decision making. These considerations include spiritual places sacred to generations of Indigenous Peoples, as well as those values placed by individuals or groups on recreational areas, and the historical importance of heritage shipwrecks.

The National Framework notes that while the main objective of Canada's national network of MPAs is long-term protection of marine biodiversity, ecosystem function, and special natural features, there are many sites that are socially and culturally important to local Indigenous and non-Indigenous communities as well as to Canadians generally.[10]

While socio-economic analysis lends itself to quantitative analysis and the methodologies to assess the economic impacts (such as the CBA during MPA establishment) are well developed, recognition of social and cultural values often requires a more qualitative approach. Nonetheless, it is possible, using a combination of quantitative and qualitative tools, to accommodate conservation, human use, and cultural considerations within an MPA network design and in MPA establishment.

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[10] *National Framework*, p. 16.

Box 3: Defining Socio-Economic Analysis for Establishing *Oceans Act* MPAs

In the context of MPA network design and MPA establishment processes, the scope of socio-economic analysis is guided by the Treasury Board of Canada Secretariat's (TBS) definition of terms in the *Canadian Cost-Benefit Analysis Guide: Regulatory Proposals.* According to this Guide, "**economic**" refers to "… benefits and costs that will affect economic welfare and economic growth," and "**social**" refers to "… the potential distributional impacts of policies being evaluated."

When creating an MPA network design, **socio-economic** data are used in combination with other information, such as ecological and cultural, to identify the total economic value of activities in the geographic areas under consideration for the MPA network.

The designation of an area as an *Oceans Act* MPA requires a **cost-benefit analysis (CBA)** to assess the incremental impacts of the management measures (i.e., prohibitions and allowed activities) specified in the MPA regulations on the Canadian economy and society at both national and regional levels.

Source: Treasury Board Secretariat (2007). *Cost Benefit Analysis Guide*

The OTG requests that in the spirit of transparency, all CBA reports on Oceans Act *MPAs be made available to the public on the DFO website.*

1. Overview of the MPA Network Development Process

MPA networks take a broad view of interdependent components within an ecosystem. In an MPA network, conserved areas work together in a connected way to achieve network objectives, so that the contributions of individual sites are enhanced. These synergies translate into ecological benefits for the area and economic, social, and cultural benefits for all Canadians. Each site within a network is individually planned and managed, including any allowed or prohibited activities.

MPA network development proceeds in four stages: data and information gathering, network design, network implementation, and management and monitoring (Figure 2). All stages of network development require engagement and collaboration with all levels of government, Indigenous groups, industry stakeholders, communities, conservation organizations, and other interested parties. Working with a wide range of individuals and groups with different perspectives generates new knowledge and understanding while helping to identify common goals and alternative options and solutions.

MPA networks are not composed exclusively of *Oceans Act* MPAs; rather, they incorporate multiple types of conservation measures designed to afford appropriate protection to the marine environment. Establishing a conservation measure does not mean that all economic, cultural or social activity in the area will be curtailed, as there is a spectrum of conservation measures available. In the design phase of MPA network development, it is premature to make decisions about what types of conservation measures and associated management regimes will be applied in each area. These determinations are made during the implementation phase using finer-scale ecological, socio-economic, and cultural information, in combination with information and discussions with interested parties. In many cases, human activities will be allowed to continue if they do not negatively impact the measure's conservation objectives. Network development respects the rights of Indigenous Peoples, potential or established, as set out in agreements, titles and treaties.

Section 3 of this report provides greater detail on how these socio-economic impacts are evaluated in creating individual MPAs.

The OTG emphasizes the importance of conducting as much socio-economic and cultural analysis as possible, as early as possible in MPA network development to inform selection of potential MPAs, relevant protection levels, and appropriate legislative tools.

Box 4: Examples of Possible MPA Network Conservation Measures

- **Marine Protected Areas** (including *Oceans Act* MPAs, National Marine Conservation Areas, marine National Wildlife Areas, and marine portions of Migratory Bird Sanctuaries, National Parks and Provincial or Territorial protected areas).

- **Other Effective Area-Based Conservation Measures**, including marine refuges (some fisheries area closures), and other areas that meet science-based criteria set out in DFO's *Operational Guidance Identifying 'Other Effective Area-Based Conservation Measures' in Canada's Marine Environment*.

- **Tribal Parks**, also referred to as Tribal Protected Areas, they are Indigenous-led and while mainly used in a terrestrial context, they may provide coastal biodiversity conservation benefits.

- **Indigenous and Community Conserved Area (ICCA)** is an internationally recognized term for conserved areas that are led by Indigenous groups and other communities.

Figure 2: MPA Network Development
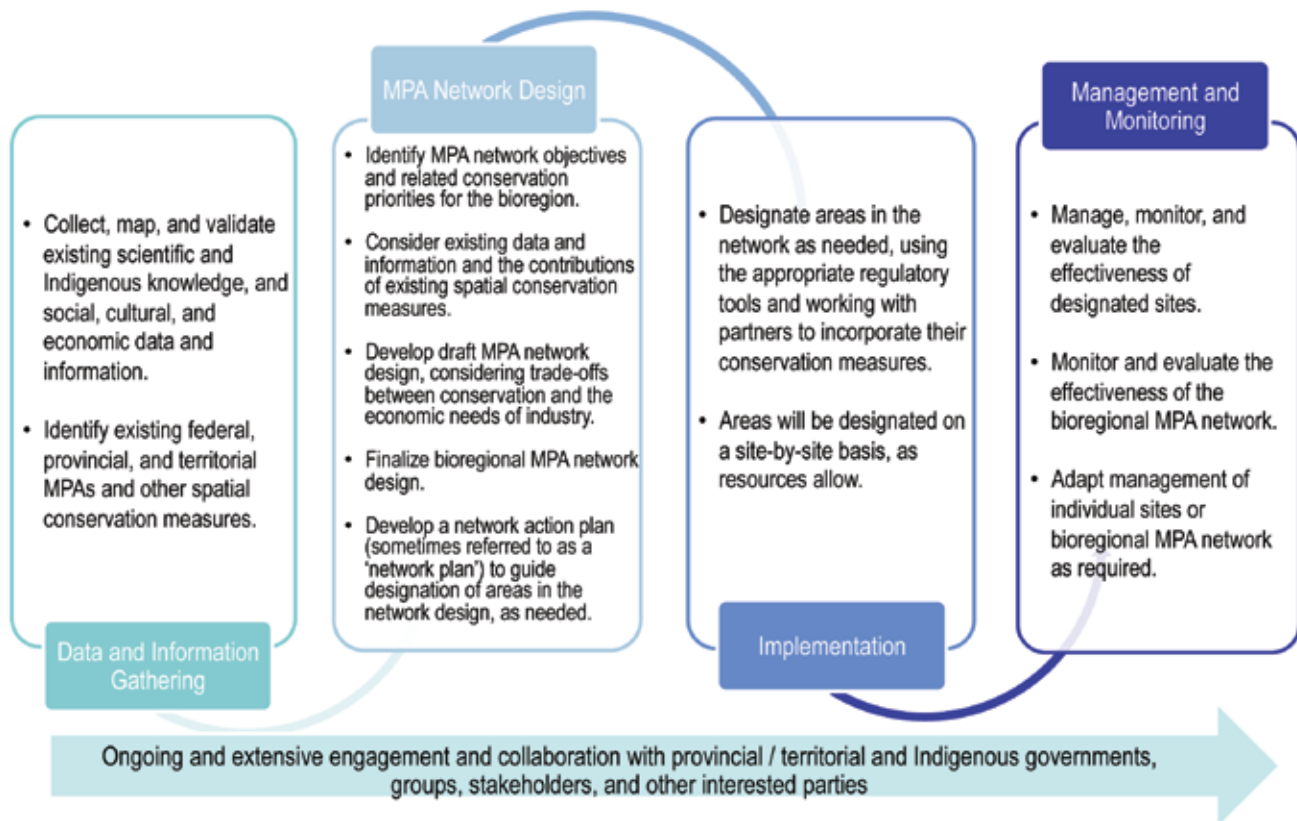
Stage 1:
Data and Information Gathering

▪ Gathering, mapping, and validating ecological, socio-economic and cultural data and information are critical to the success of any MPA network development process. This includes information from Indigenous knowledge systems and other forms of experiential knowledge. Indigenous Peoples can benefit most from MPAs and other conservation measures when they are part of the process to identify the habitats and species that are most important to their culture.

▪ Developing bioregional networks requires ongoing and extensive engagement and collaboration with governments, stakeholders, communities, and other interested parties.

Stage 2: MPA Network Design

▪ Working from the three national network goals, network objectives and conservation priorities for the bioregional networks are determined through the best available science and engagement of partners and other interested parties. Where possible, Indigenous knowledge holders are brought into the network design process to ensure that their perspectives and interests are respected.

- An MPA network design is drafted, showing proposed sites for conservation. This draft design considers the contribution of existing conservation measures (e.g., federal MPAs, provincial and territorial measures, marine refuges) and trade-offs between conservation and the socio-economic interests of marine users (i.e., fish harvesters, oil and gas, shipping industries, etc.). Efforts are made to minimize overlap of the draft network design with potential socio-economic activities without compromising network objectives. Adjustments to the draft design are made based on feedback received.

- Once the final MPA network design has been determined, an MPA network action plan (often referred to as a "network plan") is developed that prioritizes the network sites and identifies the appropriate conservation measures applicable to each site.

Stage 3: Implementation

- Areas identified within the network are designated on a site-by-site basis, over time and by the appropriate authority using the relevant legislation and policies.

Stage 4: Management and Monitoring

- Once in place, bioregional networks are managed and monitored on an ongoing basis to ensure that the network goals and objectives are being achieved. As MPA networks are fully implemented in the future, socio-economic and cultural information will continue to be accumulated and integrated into the establishment process for individual MPAs to ensure informed decision making. The primary purpose of MPAs and MPA networks is protection of the ecosystem; as that ecosystem changes over time, networks may need to be adapted as new information becomes available. Principles of adaptive management also accommodate new scientific, socio-economic, and cultural information. As the need for additional (or the relaxation of) protections arise, new considerations are incorporated into network renewal.


Sea anemone in the Scotian Shelf bioregion
Scott Leslie

2. Integrating Socio-Economic and Cultural Analysis in Network Design

Social, cultural and economic data and analyses play different roles at each of the four stages outlined in

Figure 2. The type of socio-economic analysis required for the development of network design options differs in scope and complexity from what is needed during the MPA establishment phase, as illustrated in Figure 3.

Figure 3: Socio-Economic Analysis in Network Design and MPA Establishment
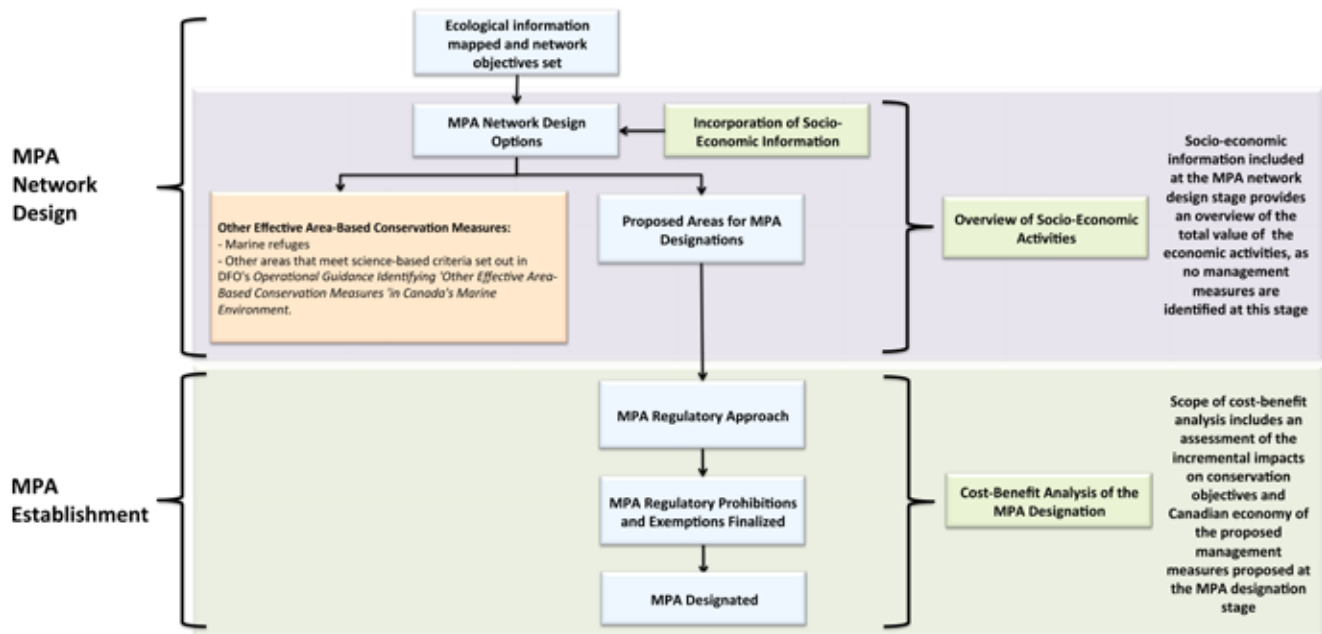
Source: Economic Analysis and Statistics Directorate, DFO

Socio-Economic Analysis and MPA Network Design Options

Information and data regarding the socio-economic activities taking place in an area are combined with ecological data and cultural information, as well as information and views expressed during engagement with interested parties, to develop feasible MPA network design options. DFO has developed the *Guidance on Incorporating Economic Use Information into MPA Network Design*[11] (*Guidance*) on incorporating

spatial socio-economic data into MPA network design, including discussion of:

→ the purpose and limitations of socio-economic data in this context;

→ the scope and types of socio-economic data used (see Box 5); and

→ options and recommendations for combining data for multiple uses in the network design analysis.

The end result of this exercise, in combination with engagement results, is the development of MPA network design options presenting multiple combinations of proposed sites that achieve the network objectives for a bioregion while minimizing

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[11] Fisheries and Oceans Canada (2017). *Guidance on incorporating economic use information into marine protected areas network design.*

potential negative overlap with economic, social and cultural activities. Where applicable, MPAs and other conservation measures target conservation of cultural values that are important for Indigenous traditional and contemporary use of the marine environment. MPAs and other conservation measures seek to maximize both ecological and cultural benefits.

The technical details of DFO's two-step process for incorporating socio-economic data into the MPA network design process are outlined in the *Guidance* document.[12] Briefly, it is described as follows:

Step 1: Defining the scope of the socio-economic analysis. This is done by mapping the economic activity against the geographic area under consideration to determine which sectors to include in the MPA network design process. This requires the determination of those economic activities that directly use or depend on the resources available in the proposed geographic area, and that are anticipated to be affected by the network.

- Economic activities classified as "direct uses" encompass those that take place on or in the water, and include those that are renewable resource activities (e.g., fishing and aquaculture) and non-renewable resource activities (e.g., oil and gas, waste disposal at sea) or other human uses (e.g., recreation and tourism, transport).

  - Opportunity costs are assessed based on what activities are currently occurring or likely to occur (i.e., there is a formal commitment of some type) within the next 10 years, and consideration regarding which of those activities are likely to be affected by network development. Engagement with provinces, territories and industry stakeholders (e.g., fishery, oil and gas, tourism, and other relevant sectors), other federal government departments (e.g., resource and economic assessments from Natural Resources Canada), and others informs this analysis. Other human activities that are not thought likely to be affected by network development will still be considered during site-by-site establishment processes during MPA network implementation.

[12] *Ibid.,* pp. 15-16.

Box 5: Types of Economic Data and Information Sources used in MPA Network Planning and MPA Establishment

Fish Harvesting and Seafood:
- Commercial Fishing: DFO Statistics: commercial sea fisheries landings, Canada provincial-values, Indigenous commercial landings
- Aquaculture: Statistics Canada, Aquaculture Statistics, and Provincial Government Data
- Fish processing: Statistics Canada
- Employment: Statistics Canada and Provincial Government data

Contribution of Sectors to National Economy:
- Statistics Canada's Inter-provincial Input-Output Model, Principal Statistics for Manufacturing Industries, International Trade Statistics, Labour Force Statistics, Small and Medium Size Enterprises (SME Benchmarking Tool), etc.

Oil and Gas and other Energy and Mineral Resources:
- Natural Resources Canada (resource and economic assessments)

Transportation:
- Marine transportation: Canada Revenue Agency
- Transport Canada Data
- Mean traffic density of all ships should be used to reflect the importance of planning units to this sector.

Tourism and Recreation:
- Recreational fishing: DFO Survey of Recreational Fishing
- Cruise Ships: Statistics Canada Tourism Satellite Survey
- Recreational Travel: Statistics Canada public use microdata travelers' file and traveler data

Source: Economic Analysis and Statistics Directorate, DFO

Box 6: Consultation and Engagement Activities during the Selection and Establishment of the St. Anns Bank MPA

The St. Anns Bank MPA was officially designated under the *Oceans Act* in June of 2017. The site was announced as an AOI in June of 2011, and the majority of the technical work and consultations associated with this site occurred over a two-year period that ended in April 2013. In total, there were three distinct phases of consultations during the process to select and designate this area as an MPA.

AOI Selection Phase

The first phase of consultation was a public process between October 2009 and May 2010 where the objective was to gather feedback from marine users, First Nations and Indigenous organizations, government agencies, and the public on three candidate AOIs. The consultation period was extended from two to seven months to accommodate stakeholder concerns with the process. Input was captured through online feedback forms (158), formal written submissions (24), phone conversations/ teleconferences (53), emails to the Minister of DFO (7), and face-to-face meetings with a variety of industry groups, government agencies, and other interested parties (70). A series of bilateral meetings with stakeholders, First Nations and Indigenous organizations, and the Province of Nova Scotia took place following the public consultation process. St. Anns Bank AOI was ultimately selected because, in addition to its high ecological value, it received the most direct support and was expected to have the lowest economic impact among the candidates.

MPA Design Phase

The MPA design phase included a series of technical steps that ran in parallel with a period of intensive consultation. The technical activities included an ecological overview (a scientific peer-review process that described the ecosystem and identified the conservation priorities for the MPA), a socio-economic assessment (which described current and potential human uses of the area and their value), and an ecological risk assessment (which evaluated the threat of existing activities to the conservation priorities for the MPA). The St. Anns Bank AOI Stakeholder Advisory Committee (Advisory Committee) was established shortly after the site was announced as an AOI, and was made up of representatives from industry, academia, environmental non-governmental organizations, other provincial and federal government regulators, and First Nations and Indigenous organizations. Between April 2012 and April 2013, the Advisory Committee met four times (in Cape Breton) to help design the MPA. This included reviewing available ecological and human use information, contributing to the development of the conservation objectives, providing input on the MPA boundary and zones, and offering advice on allowable activities.

A series of bilateral meetings (e.g., Province of Nova Scotia, First Nations) were held in addition to the Advisory Committee meetings. Information was also distributed to First Nations through formal letters. A Fishing Industry Working Group was also established to ensure all interested harvesters (including First Nations) and processors had an opportunity to participate in the process. This technical work, coupled with the Advisory Committee, Working Group, and bilateral meetings played a major role in defining the MPA boundary, the zones within it, and the fishing activities permitted in those zones. The proposed MPA boundary that emerged from this phase (see map) was significantly different from the original AOI boundary and resulted in reduced overlap with several current and potential economic activities, such as oil and gas, and mobile-gear fisheries.

Regulatory Phase

Following consultation, DFO and the Department of Justice developed draft MPA Regulations for consideration in the Federal regulatory development process. The draft regulations were published for a 45-day public comment period in *Canada Gazette* I in December of 2016. This included a description of the costs and benefits of the proposed Regulations. Close to 1000 comments, including suggested changes to the Regulations, were received from interested stakeholders and the public. After careful consideration, the Regulations were revised to include a modification to one of the zones to address some of the concerns from several fish harvesters. The regulations were registered and published in the *Canada Gazette* II in June 2017, establishing an MPA encompassing 4,364 km².

Since its designation, there have been ongoing efforts made to increase the overall ecological knowledge of the area to support effective management and establish effective mechanisms for ongoing engagement. Work is underway on the development of a St. Anns Bank MPA management plan which will help guide future activities and decisions related to managing the MPA. The establishment of an ongoing St. Anns Bank Advisory Committee to support management activities is a priority action item. Compliance and enforcement activities are carried out by DFO enforcement officers and include vessel and aerial patrols to ensure compliance with fishing licence conditions and closure areas.
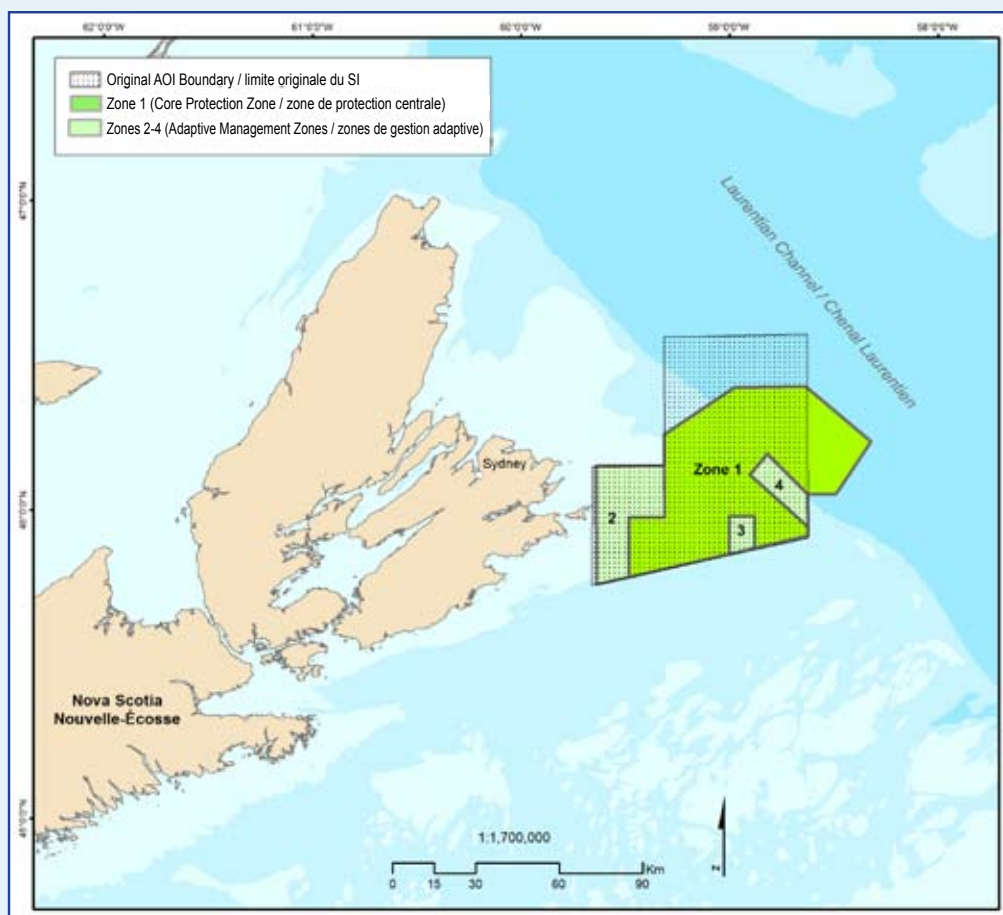
- Data sources include those outlined in Box 5, as well as critical information received during consultations (see Box 6 for an example of how the St. Anns Bank MPA was established)

■ In contrast, "indirect uses" (e.g., water purification by biota, climate regulation through carbon sequestration), do not involve human presence on or in the water. These uses will not be negatively affected if an area is included in the network, and therefore it is not necessary to include their associated socio-economic data in the network design analysis. Instead, many of these values are expected to be preserved by the network because they are directly derived from the ecological components that are targeted for conservation (the conservation priorities).

Step 2: Determining the value of these sectors to the geographic areas in the bioregion. This step is conducted after the sectors to be included in MPA network design analysis are confirmed. The purpose of this exercise is to spatially represent the value of each socio-economic activity.

The socio-economic information generated in the two steps outlined above is intended to assist development of MPA network design options in meeting network objectives, including associated quantitative (i.e., percent) targets, as applicable, while minimizing overlap with areas identified as having important socio-economic activities. The resulting MPA

network design option maps provide an objective and transparent representation of the conservation priorities and the socio-economic importance of the area to inform decision making, accounting for a broad range of considerations, stakeholders, and trade-offs in an inclusive and iterative way.

As described above, consideration of future activities is limited to those where there is some formal commitment to allow them in the near future (i.e., within the next 10 years). This would include activities for which a clear intent to undertake the activity (e.g., business plans, permits, submission of plans for approvals, etc.) can be established. At the same time, it is important to remember that new data, such as results of MPA network monitoring, will emerge over time as sites identified in MPA network designs are established. Adaptive management is an important component of MPA network development that makes use of best available data over time to ensure that the network is effective in meeting its objectives. Any proposed adjustments to the network design to ensure that network objectives are met will also consider economic impacts of those potential adjustments, including best available data about future activities.

The OTG acknowledges the importance of governments working together to achieve common marine protection and conservation goals.

Two Approaches to Developing Network Design Options

There are several different ways to produce MPA network design options. In bioregions where data are readily available, software-based analysis is possible using a decision-support tool such as Marxan, which can support creation of potential MPA network design options that meet conservation targets while minimizing overlap with areas identified as having important socio-economic activities. The way in which software-based analysis using Marxan can inform a specific network design is illustrated in Figure 4.

Orca in the Northern Shelf bioregion
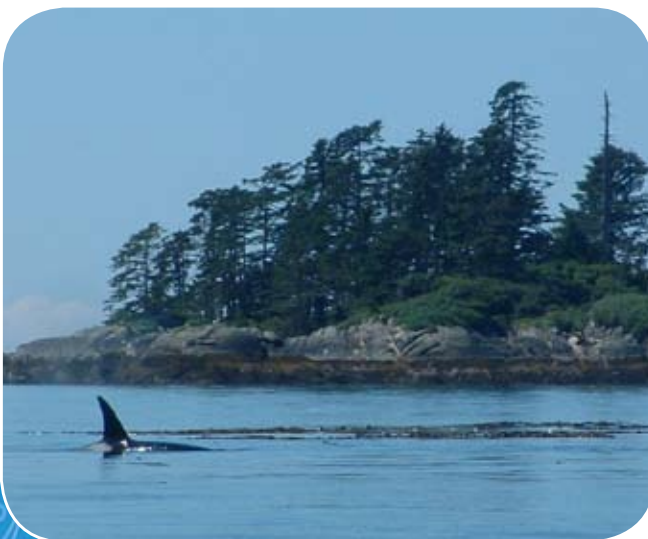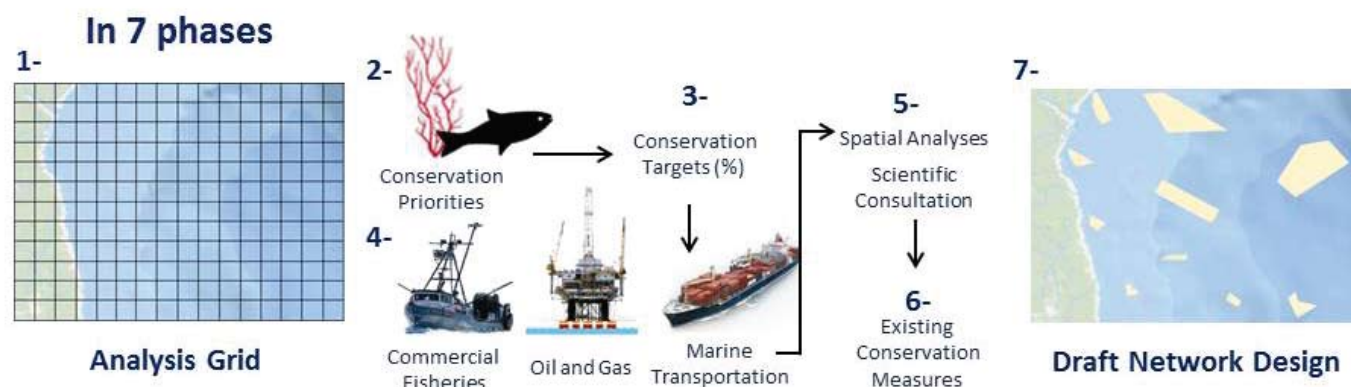DFO

Figure 4: The Network Development Process

In 7 phases

1- Analysis Grid

2- Conservation Priorities

4- Commercial Fisheries | Oil and Gas

3- Conservation Targets (%)

Marine Transportation

5- Spatial Analyses / Scientific Consultation

6- Existing Conservation Measures

7- Draft Network Design

Phase 1: Divide the bioregion into km² units.

Phase 2: Define the conservation priorities.

Phase 3: Assign conservation targets for conservation priorities.

Phase 4: Factor in socio-economic activities

Phase 5: Use a decision-support tool (such as Marxan) to facilitate spatial analysis; consult scientists and economists.

Phase 6: Factor in existing conservation measures.

Phase 7: Produce a draft MPA network design that helps achieve ecological conservation targets while minimizing impacts on socio-economic activities.

In some bioregions, data are not available at the scale of the planning area or in a format that allows for the use of decision-support software. In these cases, network development is done using a qualitative, or Delphic, approach through interviews and surveys of experts or community elders who have traditional, historical or contemporary familiarity with the human-use activities conducted in the area. The network development process in the Western Arctic bioregion relies on both a qualitative approach as described in Box 8, but is also incorporating Marxan, or similar decision-support tool, for areas and layers of information that are suitable for this treatment.

Box 7: How Decision-Support Software Works

Decision-support software (such as Marxan) is often used to help develop MPA network design options as it allows network planners to generate as many potential scenarios as needed to produce results that meet conservation targets while minimizing the potential overlap with economic activities, to the extent possible. These scenarios can be refined as needed, based on expert knowledge and additional analyses, to create one or more MPA network design options that will ultimately lead to the creation of a draft MPA network design for subsequent engagement.

Marxan is designed to address the general problem of optimizing user-defined "targets" when faced with potentially competing objectives. This is highly applicable to Canada's marine environment where there are often numerous competing objectives, users, and industries. Conservation priorities often coincide with important human-use areas (such as fishing grounds); Marxan is a useful tool in helping to identify areas for conservation that have high conservation value but lower economic value.

Software generates options for consideration; it does not make decisions.

Box 8: Network Development in the Western Arctic Bioregion

In the Western Arctic, the conservation and protection of traditional-use species and areas, culturally significant areas and archeological resources are as important as the conservation and protection of unique or sensitive species, ecological features, and habitat types. The Western Arctic is a bioregion rich in local and Indigenous knowledge, both Ilisimaun Sumunsuli in the ISR and Inuit Qaujimajatuqangit in Nunavut. The most effective approach to ensuring that both ecological and cultural priorities are included in network planning is through community consultation (conducted in this bioregion through a community tour) to collect information on subsistence harvest priorities, and combining this information with existing science advice on ecologically and biologically significant areas and species.

A draft MPA network design will be produced using a hybrid approach, combining Marxan analysis with an iterative Delphic approach in communication with co-management partners, science experts, industry representatives, and community members. This methodology will enable the inclusion of knowledge about all aspects of activities occurring within the bioregion, and allows information available at the bioregional scale, as well as more localized information, to be incorporated effectively into the design.

Socio-economic information will also be included in the analysis to reflect current non-renewable resource use and lease information, as well as the activities of other industries currently underway in the bioregion (i.e., shipping, tourism). These data will inform the spatial analysis method for site identification and site placement that will minimize disruption of economic activities in the area while meeting network objectives at the bioregional level. A draft MPA network design will be shared for review in community consultations and through meaningful engagement with co-management partners, industry, and other stakeholders. This process will be an essential element in providing a comprehensive review of the draft design and assessing recommendations for conservation measures while addressing the needs and concerns of all users in the bioregion.

The consultation process will be critical in establishing support for moving toward the next steps in MPA network development, including implementation of new sites and creating management and monitoring plans. External engagement in MPA network planning in the Western Arctic is currently on hold to enable adequate time for discussions with partners to develop support for this initiative. Next steps toward site identification or site selection will not proceed without the support of co-management partners, industry representatives, stakeholders, and community members.

The OTG emphasizes the importance of seeking the broadest range of input, views and values from Indigenous knowledge holders and stakeholders as early as possible in MPA network development.

Regardless of the approach, the result forms the basis for more substantive discussions on MPA network design options and reflects a key point for engagement. In this design stage of the MPA network development process, decisions regarding the types of conservation measures to be applied in each area have not been taken. Therefore, this socio-economic analysis does not evaluate the cost and benefit impacts of the MPA network design options; rather, it provides an overview of the current socio-economic activities in the geographic area under consideration and provides insight into the regional and distributional importance of the proposed network sites to the interested parties. A draft MPA network design, or potentially several network design options, is discussed with partners, stakeholders, and other interested parties and feedback is received, before finalizing the MPA network design and proceeding to the implementation stage of the process.

The analysis of the costs and benefits is undertaken using finer-scale ecological, socio-economic, and cultural information during the implementation phase (i.e., during MPA establishment) when information on the specific conservation measures becomes available.

Descriptions of socio-economic activities, together with information about the conservation aspects of proposed sites in the network design and any other characteristics of interest, are part of a process that involves more detailed engagement with stakeholders. It is those more detailed processes that ultimately inform decision making on a final MPA network action plan[13] and the regulatory tools that will be used to ensure conservation.

The OTG emphasizes the importance of a consistent approach to MPA network development and the use of marine conservation tools across Canada's three oceans. Early engagement of jurisdictions, partners and stakeholders in these processes, including analysis of socio-economic and cultural activities that may be affected, is also important.

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[13] *Guidance*, p. 43.

Box 9: Balancing Conservation Objectives and Socio-Economic and Cultural Impacts

When implementing conservation objectives, two broad principles are considered. The first is the total impact of the network on current and future economic users. The second is the distribution of impacts arising from an MPA network across individuals and groups.

The goal at the network development stage is typically to maximize the ecological and socio-economic benefits while minimizing the socio-economic costs. There may be cases, however, where the option with the lowest socio-economic costs imposes notably unbalanced costs on a specific group or community. In such a situation, the best option may be one with slightly higher but more equitable costs.

There may also be cases where the ecological importance is so great that some socio-economic considerations cannot be accommodated, or where socio-economic significance is so great that areas would be deemed inappropriate for setting aside as marine protected areas.

Determining the balance between economic uses and conservation objectives is a step undertaken in collaboration and engagement with the interested parties.

Source: *National Framework*, p. 13.

3. Socio-Economic Analysis in MPA Establishment

DFO and ECCC establish protected areas using regulatory processes mandated by their legislation. The following section outlines the regulatory process, using MPAs established under the *Oceans Act* as an example. The PCA process is described in Box 10.
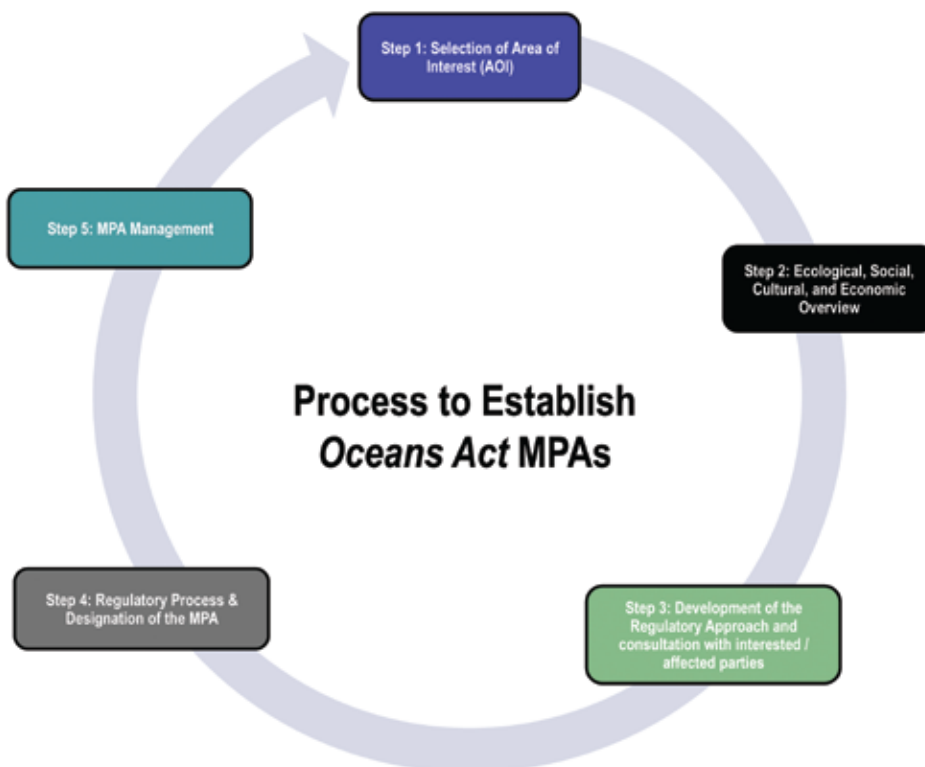
The socio-economic data reflected in the MPA network design is further elaborated for any specific network site that is identified as an AOI through a socio-economic overview. This overview report, which details the economic activities and the key interested parties involved within the boundaries of the AOI, also serves to inform the consultations with interested parties leading up to the decision regarding specific measures outlined in the proposed MPA regulations.

The process for *Oceans Act* MPA establishment is iterative, with the socio-economic analyses evolving alongside. Each step connects to the next. The ecological information from the bioregional MPA network development contributes to a preliminary indication of sectors that may be implicated by the establishment of an MPA, and informs discussions with stakeholders and interested parties. This information is further refined through continued analysis and consultation during the MPA establishment process.

This socio-economic overview report builds on the information provided in the MPA network design by focusing on the selected geographic boundary for the AOI. The report provides an in-depth assessment of the socio-economic activities that are currently taking place or are dependent on the resources in the area, as well as those expected to occur in the future,

Figure 5: Process to Establish *Oceans Act* MPAs

Socio-economic and cultural information is an important element of steps 2, 3 and 4 in the *Oceans Act* MPA establishment process. Step 2 includes an overview report that incorporates ecological, social, cultural and economic information. Interested and affected parties may contribute information based on their expertise in their field, or the local or Indigenous knowledge they hold. Step 3 includes the proposed MPA regulatory approach which is developed based on the best available science, including Indigenous and local knowledge, an understanding of human uses, a risk analysis of the impacts of those human uses on the conservation objectives of the site, and consultations with provinces, territories, Indigenous Peoples, and stakeholders. Step 4 is the regulatory process which includes publication of the Regulatory Impact Analysis Statement (RIAS) where socio-economic and cultural considerations are detailed and made available to Canadians for comment.

Process to Establish *Oceans Act* MPAs

Step 1: Selection of Area of Interest (AOI)

Step 2: Ecological, Social, Cultural, and Economic Overview

Step 3: Development of the Regulatory Approach and consultation with interested / affected parties

Step 4: Regulatory Process & Designation of the MPA

Step 5: MPA Management

Box 10: Establishing National Marine Conservation Areas

National marine conservation areas (NMCAs) and NMCA reserves are established and managed by the Parks Canada Agency to protect and conserve areas representative of the 29 marine regions covering the Atlantic, Arctic and Pacific Oceans and the Great Lakes described in the NMCA system plan. NMCAs and NMCA reserves are established using the following process:

Identify and Select Area:
Parks Canada works to identify a number of marine areas that are representative of the biological, geological, oceanographic and cultural features of a given marine region and that could merit protection as an NMCA. One of these sites is then selected as the best candidate to represent the marine region.

Assess Feasibility: Should there be support from implicated provincial and territorial governments and Indigenous governments and organizations, an assessment of the feasibility and desirability of protecting a specific site as an NMCA is undertaken, including consultations.

Decision on Feasibility:
Based on the results of the feasibility assessment, the relevant Parties determine whether establishment of an NMCA should proceed, including a potential boundary.

Negotiate Agreements and Develop Interim Management Plan:
Should the Parties agree that protecting a specific site is feasible, negotiation of an establishment agreement or agreements is undertaken, setting out the terms and conditions under which the area will be administered and managed, including the final boundary and the transfer of any lands/seabed to the federal government. At the same time, an interim management plan is developed through consultations to guide management during the first five years of operations.

Establish in Legislation:
The area is formally designated under the *Canada National Marine Conservation Areas Act* by amending the Act to add a description of the boundary of the NMCA (or NMCA reserve) to the schedule.

Note: An NMCA reserve is established and managed in the same manner as an NMCA, but its status is subject to the resolution of a claim or claims in respect of Indigenous rights.

Source: The Parks Canada Agency

with respect to those industries that have existing operations in the area. The purpose of the socio-economic overview report is to inform consultations and engagement initiatives, and the scope of this report includes a profile of the interested parties based on a historical trend analysis. The analysis draws on data for key economic indicators such as GDP, fishing landed value, employment, number of establishment or other entities, revenue, trade, demographic profile of the area, etc., at the provincial or regional and national scale. The report also includes a brief summary of the unique ecological characteristics of the area and the reason for conservation, an outline of the existing risks and the protections currently in place, and a discussion of the existing national and international commitments.

The socio-economic overview report presents the policy and economic baseline for the next phase of economic analysis of the MPA establishment process. The overview report provides a profile of the economic sectors within the proposed geographical boundary of the AOI. An analysis of the costs and benefits of the impacts is not undertaken at this stage, given that actual management measures for the proposed MPA are yet to be determined.

A CBA is undertaken once the specific management measures (prohibitions and allowed activities) to be utilized in the proposed MPA (developed through engagement with interested parties) have been finalized. The CBA evaluates the incremental impacts (costs and benefits) of the regulatory requirements for the MPA regulations on the interested parties over a period of time in the future. At the CBA stage, once regulatory measures, prohibitions, and allowed activities are known, impacts on future economic opportunities can be identified and reflected in the report. In the case of *Oceans Act* MPAs, the CBA is carried out in accordance with federal government requirements outlined in the Cabinet Directive on Regulatory Management (CDRM). In addition, DFO has developed the *Framework for Integrating Socio-Economic Analysis in the Marine Protected Areas Designation Process* [14] *(Framework)* specifically for the MPA establishment process aligned with the CDRM.

MPAs follow a life-cycle approach, and stakeholder involvement is important to the management, monitoring, evaluation and review of the effectiveness of any MPA. Stakeholders provide input into draft MPA management plans and their subsequent revisions. Monitoring and evaluation play an important role in the life cycle of MPA management with respect to assessing progress toward conservation objectives and determining the need for adaptive management to better achieve the conservation objectives.

Changes in eco-tourism in the Gully MPA, for example, triggered a need for adaptive management – not only to ensure that the natural biological life functions protected by the MPA were not altered by eco-tourism, but also to allow the area to be visited both for the economic benefit of tour operators and the opportunities for public engagement and education.

The OTG supports an adaptive management approach which recognizes that ecosystems are dynamic and therefore the values associated with their functions need to be quantified. To be effective at MPA network and site levels, this approach, although costly, requires integrated monitoring and reporting.

The CBA is a broad tool that evaluates the incremental cost and benefit impacts of policy interventions, using a common baseline. It is an overarching framework embodying the concept of incrementality by comparing the "with" and "without" intervention scenarios. In this context, the CBA would examine impacts from the designation of an *Oceans Act* MPA compared to a scenario without the MPA. For this purpose, the regulatory and non-regulatory management measures that are currently in place, or are proposed and approved for implementation, are outlined as the baseline against which the proposed regulatory requirements of the MPA are compared [e.g., assessing the change in fishery landings (loss in fishery, tourism, oil and gas revenues or profits) from a complete prohibition of fishing activity in the area designated as an MPA, as well as estimating the change in fishery population biomass as a consequence of the prohibition and potential spillover impacts to adjoining areas]. The former (prohibition of activities) are referred to as cost impacts, while the latter (spillover impacts) are assessed as potential future benefits, namely increased harvest levels in the adjoining areas.

Thus, a CBA clearly identifies the economic sectors and other interested parties that would be negatively impacted by the MPA designation and those that stand to positively gain from such a designation. A robust socio-economic analysis (see Box 11) clearly

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[14] Fisheries and Oceans Canada (2016). *Framework for integrating socio-economic analysis in the marine protected areas designation process.*

specifies the costs and the benefits of the proposed MPA designation over a period of time to ensure that the relevant information is available to inform consultations and decisions.

Evaluating Socio-Economic Impacts in MPA Establishment

While there is always an effort made during MPA network development to provide a broad-scale balance between achieving network objectives and minimizing social, economic and cultural impacts, specific costs can only be itemized and quantified at the CBA stage in site-by-site establishment processes. This in-depth analysis is governed by the design of the management approach. Specifically, more detailed socio-economic impact analysis becomes possible as the management approach evolves for each site and informs the extent to which human activities may continue while meeting the conservation objectives for the site. In conducting this analysis, it will often become apparent that costs may have been minimized, but not completely eliminated. It should be noted that in order for a regulatory action such as MPA establishment to occur, a net benefit to Canadians needs to be demonstrated.[15]

Some costs stem more directly from ongoing MPA management while others represent opportunity costs, such as the potential for lost future revenue due to restrictions on fishing or marine resource use. For example, if MPA management includes halting commercial fishing activity in an area, expected losses from this action would be projected into the future. If management options include prohibitions on non-renewable resource extraction activities such as oil and gas, the value associated with extraction and exploration licences in the area would be projected. The national approach is for areas with production licences and significant discovery licences to be locked out of MPA network design options, and hence these licences would not be affected by the establishment of an MPA, in bioregions where MPA network development is underway.

At the same time, the management measures will also impact biological and ecological outcomes

and as such, consideration must be given not only to the costs, but also the benefits of such measures. The restrictions on fishing, mineral extraction or any other economic activity are imposed as a response to manage threats to the ecosystem services. Managing threats can therefore reasonably be assumed to result in some positive outcome with respect to the ecosystem service in question, including, for example, higher fisheries harvests outside of an MPA, should an increase in biomass stem from the protected area. In order to evaluate the benefits, the ecological outcomes of the management measures are modelled to provide an estimate of the economic value. The incremental costs and benefits provide the necessary information to assess the magnitude of the net benefits to the Canadian economy and society.

Summaries of several international studies and reports documenting MPA effectiveness and their socio-economic and cultural benefits can be found in Annex 2.

4. Integrating Social and Cultural Analysis in MPA Network Design and MPA Establishment Processes

Network development is an iterative process that requires ongoing engagement to facilitate the collection of human-use and cultural information, including, for example, the identification of areas sacred to Indigenous Peoples or places valued by others for recreational, historical or spiritual reasons.

Local harvesters and residents may hold valuable information acquired through extensive experience and direct interaction with the marine environment. This information – which can be an important element in network development – can only be gathered through engagement with those who have a cultural connection to the area in which MPA network development is underway. Indigenous people also

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[15] Treasury Board Secretariat. 2012. Cabinet Directive on Regulatory Management.

Box 11: Example of Socio-Economic Analysis for Anguniaqvia niqiqyuam MPA

The regulatory process has evolved over time, in parallel with MPA establishment. While common elements have been present in all, the Anguniaqvia niqiqyuam (AN) MPA establishment process is an example of establishment under current practices.

In the early stages, conservation objectives were determined. Draft or potential MPA boundaries were produced based on those objectives and efforts to minimize impacts to human use were identified based on available information. The potential MPA boundaries, along with information used to draft them, were taken to consultation and engagement sessions to determine other human activities that could be affected by any potential MPA boundaries. These consultations provided input on how the boundaries could be better positioned to best avoid impacting human use, and flagging potential exemptions or prohibitions that could cause positive or negative impacts. Thus, while it is not possible to conduct formal socio-economic or cultural impact analysis at this stage due to the evolution of the MPA boundaries and management measures, a tremendous amount of socio-economic and cultural information feeds into the process. While there is no place to readily highlight the socio-economic or cultural impacts avoided as a result of this input later in the process, such information plays a central role in both developing the MPA boundaries and allowing many MPA establishments to achieve low impact status.

Management measures, prohibition and exemption scenarios were developed following identification of the potential MPA boundaries. At this stage it was possible to conduct a CBA. Based on input received during consultations and known socio-economic activity occurring in the area, the costs and benefits to the following key sectors were assessed:

Costs of Designation: MPA management costs may result in opportunity costs from restrictions on: commercial fishing, recreational fishing, mineral exploration and production, recreational activities, and commercial shipping.

Benefits of Designation: subsistence fishing, recreational fishing, recreational activities, option value, non-use values, and archaeological and historical values.

The analysis found that the present value of the main costs associated with establishment of the MPA would total approximately $1.8 million over 20 years, including opportunity costs and ongoing MPA management costs.[1] Due to a lack of information, the benefits could not be assessed quantitatively. However, in addition to the ecological benefits, the analysis found that establishment of the MPA would ensure the area's ability to continue contributing to the subsistence harvest of fish and marine mammals, and preserve the traditional ways of life of the Paulatuk community. The designated area is also predicted to create recreational activity opportunities.[2]

These findings were then used to draft the Regulatory Impact Analysis Statement, published in the *Canada Gazette*.

Sources:

[1] Fisheries and Oceans Canada. 2014. *Anguniaqvia niqiqyuam Marine Protected Area Regulatory Impact, A Cost-Benefit Analysis*

[2] *Canada Gazette, Part II.* 2016. Anguniaqvia niqiqyuam Regulatory Impact Analysis Statement (RIAS)

hold valuable information about the habitats and species that are most important to their culture, for food, social and ceremonial purposes.

While Indigenous and cultural use information is critical to developing the socio-economic and cultural layers that inform MPA network development, it is not always easy to access. There can be apprehension about sharing sensitive or culturally significant information, and there is often difficulty in interpreting information or translating it accurately into maps. Language barriers can also create impediments to understanding.

In 2008, DFO established the Centre of Expertise for Traditional Ecological Knowledge to develop a national approach to using Indigenous knowledge to address ocean management challenges. The Centre created several documents[16] to provide advice on how best to incorporate this information into the day-to-day work of ocean planners.

While the information compiled has helped to ensure that Indigenous knowledge is integrated with scientific conservation considerations at an early stage, often in the identification of EBSAs, more work needs to be done to ensure that Indigenous knowledge, perspectives and interests are reflected within the required socio-economic analyses. The economic language of socio-economic analysis (and the CBA) can incorporate certain impacts to Indigenous communities (e.g., impacts on commercial communal fishing and subsistence fishing) where available. However, using dollar metrics and concepts of isolated incremental impacts is often not compatible with the holistic perspective that is reflected in Indigenous knowledge systems.

Nevertheless, any impacts (e.g., food, social and ceremonial uses) to Indigenous communities could be qualitatively described in the RIAS where available, and published in the *Canada Gazette*. References to more comprehensive assessments, where they exist, should also be included. Reflecting Indigenous considerations in various documents such as the RIAS can illustrate how the MPA establishment process benefits from Indigenous knowledge.

Box 12: Laying the Groundwork for Marine Spatial Planning in British Columbia

Effective marine spatial planning relies on comprehensive ecological and human-use data, which requires a significant collaborative effort across governments, scientists, stakeholders, and communities to collect. In 2006, the British Columbia Marine Conservation Analysis (BCMCA) project was initiated to capture information on ecological features, the physical marine environment, and all marine activities, and subsequently map them on a coast-wide basis. The human-use themes included marine areas important for commercial fisheries, recreational fisheries, shipping and marine transportation, ocean energy, recreation and tourism, and marine or foreshore tenures such as aquaculture or log booms. Data sets were assembled from existing sources including government databases, academic research results, and participatory mapping exercises.

In 2011, the BCMCA released its *Marine Atlas of Pacific Canada* - a rich set of maps and descriptive information that would help lay the groundwork for marine planning and management initiatives, such as the Marine Plan Partnership (MaPP). Through MaPP, the Government of British Columbia and 17 First Nations developed marine spatial plans for the Northern Shelf. Ecological, cultural, and human-use data sets were supplemented with extensive knowledge held by Indigenous communities and brought together in Marxan to identify areas of high conservation value and importance to a variety of marine users. The zones allocate space for different purposes including the protection of ecologically and culturally significant areas, and the provision of opportunities for sustainable marine economic development.

While the BCMCA project required significant time and effort to complete, the investment resulted in an impressive resource for a variety of applications including habitat management, marine ecology, environmental assessments, oil spill response, integrated marine spatial planning, and marine protected area planning.

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[16] The documents referenced here are still in the development stage. Once completed, they will be posted on the DFO website.

Box 13: Example of the Integration of Social, Cultural and Economic Information – Tallurutiup Imanga National Marine Conservation Area

On August 14, 2017, the Government of Canada, the Government of Nunavut and the Qikiqtani Inuit Association (QIA) signed a Memorandum of Understanding agreeing to final boundaries and interim protection for the 109,000 km^2 Tallurutiup Imanga National Marine Conservation Area (NMCA) in Lancaster Sound, pending completion of the Inuit Impact and Benefit Agreement.

The announcement was based on recommendations from the feasibility assessment report produced by representatives of each of the Parties and tabled with governments and QIA to provide them with the necessary information to make an informed decision with respect to the NMCA.

Over the course of the feasibility assessment, information was gathered on ecological values, tourism opportunities, fisheries, marine transportation and potential hydrocarbon resources (including two resource assessments completed by the Geological Survey of Canada). Consultations were conducted in local communities and input was solicited from regional and national stakeholders including industry and non-government organizations. Inuit Qaujimajatuqangit (Inuit traditional knowledge) was used alongside contemporary science to get a more complete understanding of the use and value of the area and proved to be fundamental in understanding and illustrating the Inuit perspective of the region. These developments led to a more universal ecological and social outlook on the proposed NMCA.

The report concluded that the establishment of a national marine conservation area in Lancaster Sound could provide numerous ecological and social benefits, including:

- conserving the rich biodiversity and maintaining ecological processes of the Lancaster Sound marine ecosystem for the benefit of marine species, Nunavummiut and Canadians;
- establishing a collaborative relationship between Canada and Inuit that would guide current and future activities in Lancaster Sound to ensure the ecological and cultural viability of the area;
- protecting and conserving species at risk and their habitats;
- protecting the Inuit way of life and Inuit traditions through conserving the marine environment and wildlife food sources;
- allowing all activities within the NMCA, including fisheries and marine transportation activities, to be managed in a more ecologically holistic manner;
- protecting historical resources, such as shipwrecks and archaeological sites;
- providing opportunities for visitors to experience and appreciate this environment;
- encouraging ecological research and monitoring;
- providing a level of resilience to the fragile Arctic marine ecosystem facing climate change; and
- encouraging ecologically sustainable economic opportunities in the region.

Box 13 (cont.)

The following were considered when delineating a boundary for an NMCA in Lancaster Sound:

- the views of local Inuit communities;
- the ecological values identified through contemporary science and Inuit Qaujimajatuqangit;
- Inuit traditional use of the Lancaster Sound region;
- cultural values;
- hydrocarbon resource assessments, particularly considering that the only remaining industrial hydrocarbon exploration permit in the area was voluntarily relinquished;
- the views of stakeholders; and
- government priorities and commitments.

Source: *A National Marine Conservation Area Proposal for Lancaster Sound -- Feasibility Assessment Report*. (2017). Submitted by the Lancaster Sound National Marine Conservation Area Feasibility Assessment Steering Committee.

Experiential forms of knowledge, together with science and research, are critical elements that inform identification of network objectives and conservation priorities, and which in turn inform conservation objectives for MPAs and other conservation measures that are established as MPA network implementation occurs.[17] MPA network development is a highly iterative process that combines consideration of potential social, economic and cultural impacts, ecological information, network objectives, and conservation priorities in detailed engagement and discussions with partners, stakeholders, and other interested parties. These complex interrelated processes and considerations ultimately inform decision making on a final MPA network design and subsequent MPA network action plan.[18]

Kugaaruk, NU, in the Western Arctic bioregion
DFO, Bethany Schroeder

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[17] *Identification of Ecologically and Biologically Significant Areas*, DFO Ecosystems Status Report, 2004/006.

[18] *Guidance*, p. 43.

Conclusion

Conserving Canada's marine and coastal areas is a collective responsibility. All levels of government, Indigenous groups, industry sectors and coastal communities across Canadian society play an important role in marine and coastal protection, conserving biodiversity, and in the sustainable use of marine resources.

Continued progress in developing a national network of MPAs and meeting the international marine conservation target will be made through a wide range of efforts by all groups that rely on sustainable marine resources for Canada's long-term prosperity.

Gilbert Bay MPA in the Newfoundland-Labrador Shelves bioregion
DFO, Corey Morris

Glossary

Adaptive management: A systematic process for continually improving management policies and practices by learning from the outcomes of those previously employed.

Area of Interest (AOI): An area that has been identified as a candidate *Oceans Act* MPA. The identification of a site as an AOI does not provide immediate protection to an area. If an important area appears to be threatened at any step during the evaluation process, the Government of Canada or other levels of government may establish interim measures to conserve and protect potentially affected species and habitats (see definition for *Interim Protection Measures*).

Area-based management measure: A general term for any spatially defined management measure implemented to achieve one or more objectives. Not all area-based management measures are MPAs or other effective area-based conservation measures, but all MPAs and other effective area-based conservation measures are necessarily area-based management measures.

Biological diversity: The full range of variety and variability within and among living organisms and the ecological complexes in which they occur; the diversity they encompass at the ecosystem, community, species, and genetic levels; and the interaction of these components.

Bioregion: A biogeographic division of Canada's marine waters extending to the edge of the Exclusive Economic Zone (EEZ) and including the Great Lakes, based on attributes such as bathymetry, influence of freshwater inflows, distribution of multi-year ice, and species distribution.

Conservation measure: An inclusive term that can refer to either an MPA (created under any legislation) or an Other Effective Area-Based Conservation Measure (e.g., a marine refuge, or other area-based management measure that meets the science-based criteria set out in DFO's *Operational Guidance for Identifying 'Other Effective Area-Based Conservation Measures' in Canada's Marine Environment).*

Conservation objective: Reflects the species, habitat or features that the area has been put in place to conserve. Every conserved area has a conservation objective. Certain activities may be allowed to take place within a conserved area provided they do not interfere with the conservation objective.

Conservation priority: Species, habitats, or other features targeted for conservation through bioregional network objectives.

Ecologically and Biologically Significant Areas (EBSAs): Geographically or oceanographically discrete areas that meet DFO's criteria of uniqueness, aggregation, fitness consequences, resilience, and naturalness, evaluated in the context of the ecological functions that EBSAs are intended to reflect (i.e., spawning/breeding, nursery/rearing, feeding, migration, and seasonal refuges.

Indigenous knowledge systems: A cumulative body of knowledge, practice, and belief that have evolved by adaptive processes and been handed down through generations by cultural transmission, regarding the relationship of living beings (including humans) with one another and with their environment. Indigenous knowledge systems are ways of knowing; they are dynamic, building on experience, adapting to changes, and evolving over time (Berkes, Sacred Ecology, 2008:7).

Interim protection measures: Governments have various measures for protecting marine resources, habitats and species on an interim basis while longer-term management measures are developed. Some examples include:

- broad notification of stakeholders to discourage uses that conflict with the conservation objectives;

- partnering arrangements with industry and other stakeholders to protect the area;

- requests to other government agencies to defer establishment of tenures such as leases, licences, or other rights to occupy the site;

- application of *Fisheries Act* regulations and fisheries closures;

- implementation of *Canada Shipping Act* regulations such as anchoring, navigation, and pollution restrictions; and

- establishment of controls by other government agencies, such as implementation of wildlife protection measures, moratoria on new tenures or renewals, restrictions on resource uses in or around the area, protection from influences of land-based activities, and prohibitions of waste disposal and dumping.

Local knowledge: Knowledge or expertise held by local residents or communities (e.g., fishing community); characterized by common or communal ownership.

Marine Protected Area (MPA): A term used generically to describe areas in marine waters that meet the IUCN definition of a protected area. These include: National Marine Conservation Areas, marine National Wildlife Areas, and marine portions of Migratory Bird Sanctuaries, National Parks and Provincial Parks. An MPA established by DFO is referred to as an *Oceans Act* MPA.

Management measure: Unless the term is specified as 'area-based', a management measure refers to prohibitions and allowed activities, together with other aspects of the management regime, specified for a given conservation measure.

Marine refuge: A fisheries area closure that meets all the "other measures" criteria (see definition for *Other Effective Area-Based Conservation Measure*).

MPA network: Defined by the IUCN as a collection of individual MPAs that functions cooperatively and synergistically, at various spatial scales, and with a range of protection levels, in order to fulfill ecological aims more effectively and comprehensively than individual sites could alone. Canada's approach to MPA development also recognizes the contribution of other conservation measures, including marine refuges.

MPA network action plan (or MPA network plan): Documents that provide details on MPA network implementation including which network sites will be prioritized for earliest conservation and the conservation measures that will be advanced in those areas.

MPA network design: A map that guides future conservation efforts within each bioregion, including selection of appropriate conservation measures.

MPA network development: A four-stage process (see Figure 2) that culminates in establishment of an MPA network.

Network objective: Bioregion-specific strategic and operational objectives that inform MPA network development, including identification of conservation priorities and associated quantitative (i.e., percent) conservation targets, as applicable.

Network site: Considered to be "proposed" in a draft MPA network design (or when there are several MPA network design options); once the MPA network design is finalized, the sites are no longer referred to as "proposed." The establishment of each site within the network will trigger its own specific engagement and consultation processes.

***Oceans Act* Marine Protected Area (MPA):** Defined in Section 35 (1) of the *Oceans Act* as "an area of the sea . . . (that) has been designated ... for special protection for one or more of the following reasons:

- the conservation and protection of commercial and non-commercial fishery resources, including marine mammals, and their habitats;
- the conservation and protection of endangered or threatened marine species, and their habitats;
- the conservation and protection of unique habitats;
- the conservation and protection of marine areas of high biodiversity or biological productivity; and
- the conservation and protection of any other marine resource or habitat as is necessary to fulfill the mandate of the Minister (of Fisheries and Oceans)."

Other Effective Area-Based Conservation Measure (OEABCM) / other measure: Found as part of the UN CBD's Aichi Target 11. While international guidance on 'other measures' continues to develop, DFO has developed operational guidance for identifying and implementing these conservation measures. This guidance was based on science advice and uses five broad criteria to determine whether an area-based measure is likely to provide marine biodiversity conservation benefits. Any proposed 'other measure' must meet all five criteria to be identified as a marine OEABCM:

1. The measure must be in a spatially defined area;
2. The measure must have a conservation or stock management objective AND the objective must directly reference at least one species of regional importance or habitat that is important to biodiversity conservation;
3. The measure must contain at least two ecological components of interest: a habitat that is important to biodiversity conservation *and* a species of regional importance that uses the habitat;
4. The measure must either be entrenched in legislation or regulation, or show clear evidence that it is intended to be in place for a minimum of 25 years; and
5. The ecological components of interest are effectively conserved because no human activities that are incompatible with the conservation of those components may occur or be foreseeable within the defined geographic location.

Fisheries area closures that meet all five criteria are termed 'marine refuges.' Should new activities be introduced into a marine refuge, the area can either be evaluated for further protection (i.e., becoming an MPA) or revert to its original unrecognized state.

Annex: Summary of International Studies of MPA Network Effectiveness

It is generally recognized that it may take many years before the effects and benefits of MPA networks can be evaluated. As a result, studies that demonstrate the effectiveness of MPAs and MPA networks have only recently emerged from areas where MPAs and networks have existed for a period of time, and the majority of those studies have focused on the fisheries recruitment benefits of marine reserves.

Experiences with MPAs around the world provide examples of benefits stemming from MPA establishment.

United States of America (USA) Marine Reserves and MPAs:

Stellwagen Bank National Marine Sanctuary covers the mouth of Massachusetts Bay, in Maine, USA. The marine sanctuary was established in 1991. Socio-economic research conducted by the National Oceanic and Atmospheric Administration (NOAA) found that in 2008, tourists spent USD $125 million to travel to and visit the sanctuary. Whale watching tours yielded USD $24 million/year in revenues, and recreational fishing by charter boats resulted in direct sales value of USD $2.5 million/year.[19]

A 2005 study from Hawaii[20] examined a network of nine Fish Replenishment Areas (MPAs that prohibit collection of aquarium fish) established in 1998 to resolve conflicts between aquarium collectors and dive-tour operators. Within five years of establishment, there were significant increases in the overall abundance of fish targeted by collectors, the price for the top-valued fish increased by an average of 33 percent, and conflicts between collectors and other ocean users had been reduced. Study authors concluded that MPAs can effectively promote recovery of fish stocks, enhance nearby fisheries, and help resolve user-group conflicts.

Marine Protected Areas in the European Union (EU)[21] and Australia:

In the EU, MPAs cover 7,725 sites and 338,623 square kilometers. The EU definition of MPA for the research was: "a clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values." In the EU MPAs, imposing explicit restrictions on fishing or different fishing

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[19] NOAA National Marine Sanctuaries socio-economic factsheets. https://sanctuaries.noaa.gov/science/ socioeconomic/factsheets/stellwagenbank.html

[20] Walsh and Hallacher. 2005. Evaluation of the effectiveness of an MPA network in Hawaii: ecological, economic and social dimensions. https://www.researchgate.net/publication/255579191_Evaluation_of_the_effectiveness_of_an_MPA_network_in_Hawaii_ecological_economic_and_social_dimensions

[21] Unless otherwise specified, source for this section is: Russi D., Pantzar M., Kettunen M., Gitti G., Mutafoglu K., Kotulak M. & ten Brink P. (2016). Socio-Economic Benefits of the EU Marine Protected Areas. Report prepared by the Institute for European Environmental Policy (IEEP) for DG Environment

gear (depending on conservation objectives) has proven to have significant positive effects on species conservation.

Lamlash Bay, United Kingdom, was designated as a fully protected marine reserve in 2008, with no fishing of any kind permitted within its boundaries. Despite its relatively recent establishment, evidence shows that the reserve has benefited scallop populations in nearby fishing grounds. A greater abundance of juvenile scallops were observed within the reserve compared to the surrounding areas, supporting the idea that MPAs can enhance the recruitment of commercially exploited species near the reserve in two ways. First, protection of nursery habitats increased the settlement levels of the species, and second, the protection allowed a greater number of individuals to become larger and older. These effects are expected to increase over time.

A 2010 study quantified the number and biomass of lobsters spilling over from the Columbretes Islands. Individuals tagged inside the reserve and recaptured in the surrounding fisheries were used to track the origin of the lobsters. Goñi et al. found that the harvested spillover offset the loss of yield due to reduction of fishing grounds. Further, lobsters emigrating from the reserve were larger on average than those outside, resulting in a mean annual net benefit of 10 percent of the catch in weight[22].

A 2012 Australian study[23] showed evidence that larval export from a well-established marine reserve provided recruitment benefits for reef fisheries in adjacent areas. The conclusion of the study found that reserves, which accounted for 28 percent of the local reef area, produced approximately half of all juvenile recruitment to fished reefs within 30 km of the surrounding area. While the socio-economic benefits to stakeholders were not measured, the study concluded that recruitment from local reserves offered proof that networks can be an effective tool for sustaining generations of fish harvesters.

[22] Goñi, R., Hilborn, R., Díaz, D., Mallol, S., Adlerstein, S. (2010). Net contribution of spillover from a marine reserve to fishery catches. Marine Ecology Progress Series, 400, 233-243.
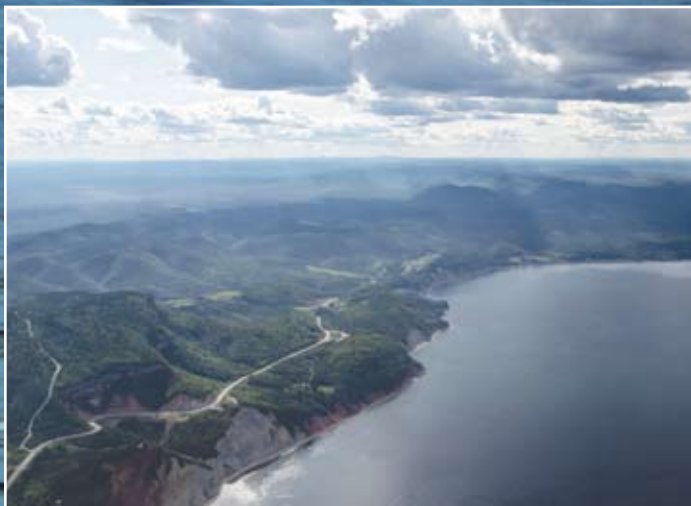
[23] Harrison et al., Larval Export from Marine Reserves and the Recruitment Benefit for Fish and Fisheries (2012). https://www.researchgate.net/publication/225063226_Larval_Export_from_Marine_Reserves_and_the_Recruitment_Benefit_for_Fish_and_Fisheries