Fisheries and Oceans Canada
Pêches et Océans Canada

The Current

MANAGING *OCEANS ACT* MPAS NOW, FOR THE FUTURE – SUMMARY REPORT 2021

Oceans Act Marine Protected Areas

1. SGaan Kinghlas-Bowie Seamount
2. Hecate Strait and Queen Charlotte Sound Glass Sponge Reefs
3. Endeavour Hydrothermal Vents
4. Tarium Niryutait
5. Anguniaqvia niqiqyuam
6. Tuvaijuittuq
7. Gilbert Bay
8. Eastport
9. Laurentian Channel
10. Banc-des-Américains
11. St. Anns Bank
12. Basin Head
13. The Gully
14. Musquash Estuary

Cover photos
Top: Cape Breton, credit: Elizabeth Edmondson; **centre:** Open water “lead” in Arctic Ocean sea ice, credit: NASA/GSFC/Jeff Schmaltz/MODIS Land Rapid Response Team; **bottom:** credit: Fisheries and Oceans Canada.

Read More on MPAs

Visit the DFO MPA website to dive deeper

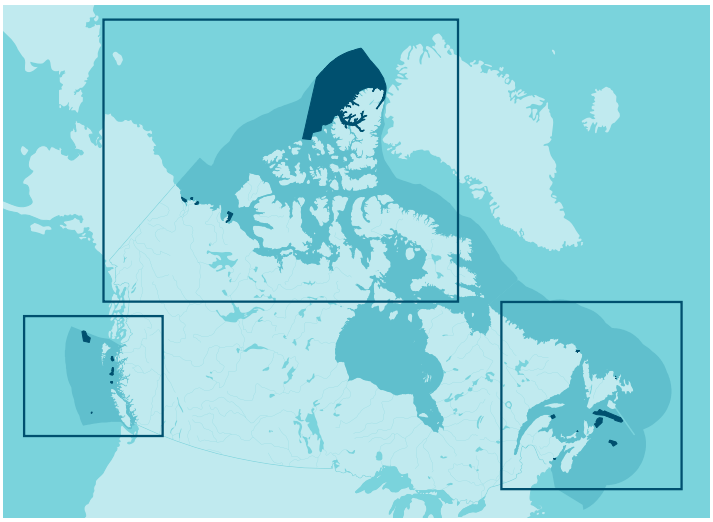
dfo-mpo.gc.ca/oceans/mpa-zpm/index-eng.html

Credit: Fisheries and Oceans Canada

TABLE OF CONTENTS

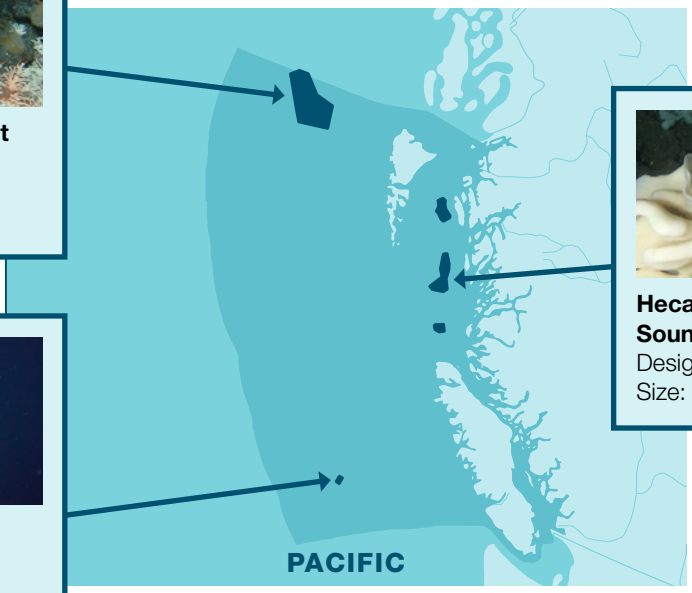
Canada's *Oceans Act* Marine Protected Areas

14 *Oceans Act* MPAs covering approximately 350,000 km², offer protection to important species, habitats, and ecosystems across Canada's oceans



SGaan Kinghlas-Bowie Seamount
Designated: April 2008 (*Haida MPA since 1997*)
Size: 6,103 km²

Endeavour Hydrothermal Vents
Designated: March 2003
Size: 97 km²



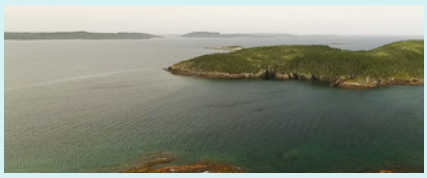
Hecate Strait & Queen Charlotte Sound Glass Sponge Reefs
Designated: February 2017
Size: 2,410 km²

Tuvaijuittuq
Designated: August 2019
Size: 319,411 km²

Tarium Niryutait
Designated: August 2010
Size: 1,750 km²

Anguniaqvia niqiqyuam
Designated: October 2016
Size: 1,750 km²

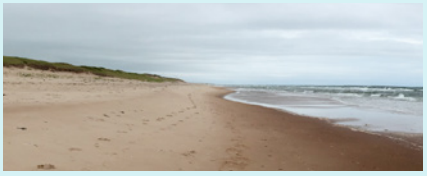
Gilbert Bay
Designated: September 2005
Size: 60 km^2



Eastport
Designated: September 2005
Size: 2 km^2

Banc-des-Américains
Designated: March 2019
Size: 1,000 km^2

Laurentian Channel
Designated: April 2019
Size: 11,580 km^2



Basin Head
Designated: September 2005
Size: 9 km^2

St. Anns Bank
Designated: June 2017
Size: 4,364 km^2

Musquash Estuary
Designated: December 2006
Size: 7 km^2

The Gully
Designated: May 2004
Size: 2,363 km^2

Previous page, clockwise from top right: Sponge reef, credit: Fisheries and Oceans Canada; Tuvaijuittuq, credit: Fisheries and Oceans Canada, Conservation and Protection; ANMPA beach, credit: Jody Illasiak; TNMPA seine nets, credit: Jasmine Brewster; Ridgeia clumps in Endeavour Hydrothermal Vents MPA, credit: Dr. Verena Tunnicliffe; Anemones, credit: Fisheries and Oceans Canada.

This page, clockwise from top right: Eastport MPA Duck Islands, credit: Todd Fowler, Skyreach Media; Redfish and seapens in Laurentian Channel MPA, credit: Fisheries and Oceans Canada; St. Anns Bank MPA, credit: Bruce Hatcher; Dolphins in the Gully MPA, credit: Hilary Moors-Murphy; Musquash Estuary MPA, credit: Fisheries and Oceans Canada; Basin Head MPA, credit: Elizabeth Edmondson; Banc-des-Américains MPA, credit: Fisheries and Oceans Canada; Two loons and a cabin, credit: Corey Morris.

1 Why a healthy ocean matters

Ridgeia clumps in Endeavour Hydrothermal Vents MPA. Credit: Dr. Verena Tunnicliffe

Across the globe, all oceans are connected, occupying more than 70 percent of Earth's surface and 95 percent of the biosphere; all oceans are facing increasing pressures from climate change and human activities.

Healthy marine ecosystems provide a range of benefits, including vital ecosystem services that provide food and water; regulate floods, drought, land degradation, and disease; and support soil formation and nutrient cycling. Marine ecosystems also support cultural and recreational activities, and provide spiritual, religious, and other non-material benefits. The ecosystem services provided by ocean biodiversity are facing increasing pressure from climate change, species decline and loss, ecosystem degradation and loss, aquatic invasive species, and harmful effects from waste and other pollutants. These impacts jeopardize marine biodiversity for present and future generations.

The ocean is also essential to climate regulation — for example, through absorption of heat and greenhouse gases. Plankton produces much of the world's oxygen. Estuaries are one of Earth's most productive ecosystems, providing species with shelter from predators and stresses. Sponges filter nutrients from water. Protected coastal areas can help maintain the natural buffers needed to mitigate the impact on coastal lands from storm surges and floods as well as prevent erosion and stabilize shorelines. The ocean provides the habitat needed to support species population growth and recovery, services that are particularly important for aquatic species at risk.

WHY A HEALTHY OCEAN IS IMPORTANT FOR CANADA

Canada is a maritime nation whose borders touch three parts of the global ocean in the Atlantic, the Pacific, and the Arctic. Canada's full ocean estate, which goes beyond the 200-nautical mile limit of the Exclusive Economic Zone (EEZ) to encompass the extended continental shelf, covers a surface area of approximately 7.1 million square kilometres — equivalent to about 70 per cent of Canada's land mass. Within the EEZ, Canada's oceans cover a surface area of approximately 5.75 million square kilometres.

Biodiversity

Biodiversity is the variability among living organisms from all sources including, among others, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.[1]

A healthy, productive ocean with abundant biodiversity at the genetic, species, and ecosystems levels is important to our shared cultural heritage and our Canadian identity. For coastal Indigenous people, the ocean represents a continuous link to the cultural and spiritual practices of their ancestors and offers the promise of healthy communities for future generations.

Canada's rich endowment of marine resources is also important for sustaining our economy, holding the keys to economic growth, employment, and innovation, not just for coastal communities, but for the country as a whole.

Canadians recognize that to preserve and protect our oceans is to preserve and protect our communities, and with this recognition comes a responsibility to ensure that marine resources are sustainably managed and marine ecosystems are conserved. The establishment of marine protected areas (MPAs) is integral to Canada's efforts to protect the ocean, its species, and habitats.

Ecosystem

An ecosystem is a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.

Ecosystem services

Ecosystem services are processes that occur within an ecosystem that provide benefits to humanity. Ecosystem services include both provisioning services (such as food), regulating services (such as carbon storage), and cultural services.

***Oceans Act* MPAs** can be established for any of the six conservation and protection purposes outlined in the Act:

(a) the conservation and protection of commercial and non-commercial fishery resources, including marine mammals, and their habitats;

(b) the conservation and protection of endangered or threatened marine species, and their habitats;

(c) the conservation and protection of unique habitats;

(d) the conservation and protection of marine areas of high biodiversity or biological productivity;

(e) the conservation and protection of any other marine resource or habitat as is necessary to fulfil the mandate of the Minister; and

(f) the conservation and protection of marine areas for the purpose of maintaining ecological integrity.

Drone photo of marsh and dunes, Basin Head MPA. Credit: Perry Williams

WHAT IS AN MPA?

Marine Protected Area

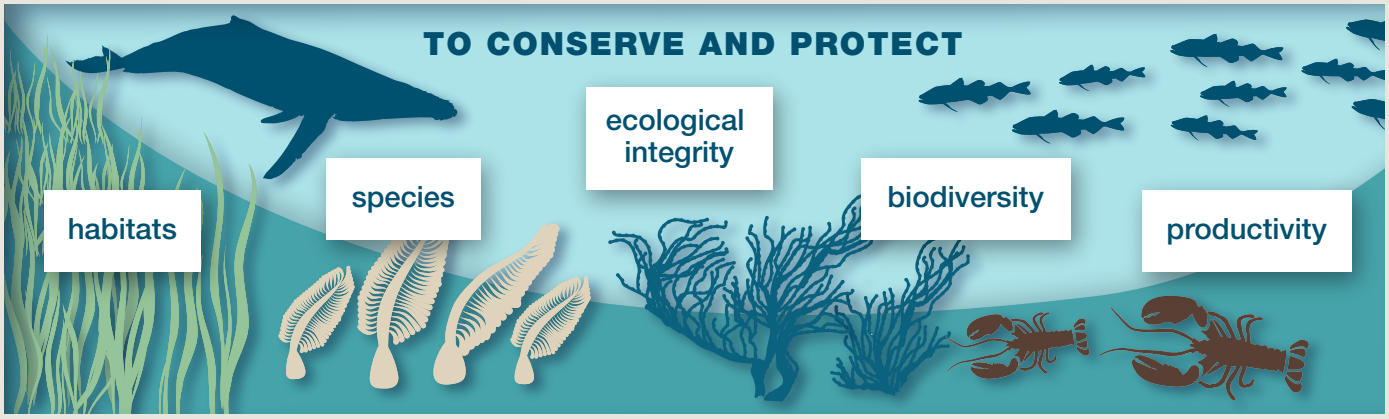
A CLEARLY DEFINED **geographical space**

RECOGNIZED DEDICATED AND MANAGED through legal or other effective means

to achieve the **LONG-TERM** conservation of nature

WITH ASSOCIATED **ECOSYSTEM SERVICES**

WHAT IS AN MPA'S PURPOSE?



BENEFITS OF AN EFFECTIVE MPA MAY INCLUDE

ECOLOGICAL
In addition to the above biodiversity benefits, an MPA can help mitigate climate change and support local ecosystem resilience to stressors.

CULTURAL
An MPA can preserve unique cultural sites and natural beauty to support Indigenous and local cultures and food harvesting.

ECONOMIC
An MPA can provide tourism and recreation opportunities, support fish populations for local fisheries, and grow community partnerships.

SOCIAL
An MPA can promote community awareness and ocean stewardship, visitation and enjoyment of the area, and build relationships.

EACH MPA IS UNIQUE AND PROVIDES A DIFFERENT RANGE OF BENEFITS

WHAT IS AN MPA?

Canada has adopted the internationally recognized definition of an MPA developed by the International Union for the Conservation of Nature: "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."

For an MPA designated by Fisheries and Oceans Canada (DFO) under the *Oceans Act*, this definition means that:

- The area must be clearly described, including by boundaries, size, and depth (if necessary).
- The area is legally recognized and managed by a jurisdiction having the legal authority to determine which activities can take place in the area and which are prohibited.
- The area is established for the long term, and managed to deliver ongoing benefits to the ecosystem and to human communities.

While the term "MPA" is broadly used to refer to a range of marine protection tools available under various pieces of Canadian legislation, this report focuses on MPAs designated under the *Oceans Act*. The *Oceans Act* has been in place since 1997; however, it was not until 2015 that it began to be used extensively to establish and designate MPAs as Canada accelerated efforts to meet the Aichi Target of conserving 10 per cent of marine and coastal territory by 2020. By the end of 2015, around 1 per cent of marine and coastal territory had been protected; by December 2020, Canada had reached 13.8 per cent — reflecting the commitment of governments, Inuit and Indigenous peoples, industry stakeholders, and marine resource users to protect the ocean and its inhabitants. Canada is now looking beyond, toward an ambitious new target of conserving 25 per cent of marine and coastal areas by 2025, working toward 30 per cent by 2030.

What does this mean for ocean users? Will their access be restricted? The short answer is that it depends. Every MPA is established with one or more conservation objectives that define the ecological rationale for its existence. If a human activity does not interfere with the conservation of the ecological components, as determined through a risk assessment, it does not need to be restricted. This often means that many types of human activities can still continue within the MPA. Every MPA is unique and every MPA has a tailor-made approach.

Sampling at main bed, within Basin Head MPA. Credit: Fisheries and Oceans Canada

SPOTLIGHT

Highlighting Ecological Biodiversity and Natural Features in MPAs

Basin Head MPA hosts a commercially valuable ecotype of Irish moss (*Chondrus crispus*) that is unique in Atlantic Canada, and may be endemic to the MPA.

Ecological processes such as "Haida eddies" within the **SG̱aan Ḵinghlas-Bowie Seamount MPA** carry nutrient-rich coastal waters to the area; the fish and plankton that follow the nutrients settle and mature on the seamounts.

The **Musquash Estuary** is one of New Brunswick's largest remaining intact salt marshes still in relatively pristine condition.

In the High Arctic, **Tuvaijuittuq MPA** protects multi-year pack ice, under-ice communities and physical processes, all of which influence conditions throughout the Canadian Arctic Archipelago and adjacent areas.

The **Gully MPA** has the largest underwater canyon in eastern North America that is critical habitat for a population of northern bottlenose whales.

Hydrothermal vent ecosystems are seen on the west coast in the **Endeavour Hydrothermal Vents MPA**. These areas are extremely unique and rare; there is only an estimated 10 km^2 of this habitat globally.*

The **Hecate Strait and Queen Charlotte Sound Glass Sponge Reefs MPA** is composed of very fragile, sensitive sponges that are made of silica (i.e. glass). These sponges, while unique themselves, also provide valuable habitat and nursery grounds for finfish, shellfish, and commercially important rockfish species.

St. Anns Bank MPA is part of an important migration corridor for many species of fish and marine mammals, including a variety of groundfish, and Blue, Fin, and North Atlantic Right Whales that travel through the Cabot Strait to and from the Gulf of St. Lawrence.

* To protect these important vents, the Offshore Pacific Area of Interest will be designated to capture additional vents and the ecosystems they support within the area, including those already being protected by Endeavour Hydrothermal Vents MPA.

Eelgrass. Credit: Souris Wildlife

Sampling site at Basin Head MPA. Credit: Fisheries and Oceans Canada

WHAT BENEFITS CAN MPAS DELIVER?

MPAs are designed to achieve long-term conservation of the ecological components that are essential to the functioning of the ecosystem, as well as the social, economic and cultural values that communities associate with the area. However, positive changes in the marine environment resulting from the establishment of an MPA are not likely to be immediately evident. These outcomes have long timelines and it may take decades of study to determine whether the ecological conservation objectives of the MPA are being achieved. The majority of *Oceans Act* MPAs are in their infancy, so it will likely be years before we know definitively that an MPA's specific conservation objectives are being met. However, experience in Canada and elsewhere has identified a series of potential MPA benefits, and seeing evidence of these is an indicator of progress.

While MPAs aim to deliver benefits over the long term, they can come with costs, especially in the shorter term. Where benefits of an MPA are being assessed, so too should the costs of realizing those benefits. Costs and benefits should be expressed in terms of minimizing negative impacts, promoting positive outcomes beyond the natural environment, and supporting connection to the broader contextual environment of the MPA. While not addressed in this report, future iterations will aim to integrate an assessment of benefits and costs.

A range of demonstrable benefit types that may be seen in various *Oceans Act* MPAs has been discussed extensively in the literature and within international guidance. The "Spotlights" and the various examples in this report provide specific instances of how these benefits are being realized, to varying extents, in Canada.

Potential Benefits of MPAs

Ecological:

- Protection of unique, rare and threatened species, ecotypes or genetic variants
- Preservation of ecological processes and habitats essential for ecosystem functioning
- Protection of unique, distinctive, and intrinsically valuable ecosystems, as well as ecosystems of high biodiversity
- Recovery of depleted populations

Cultural:

- Expression of Indigenous culture
- Subsistence harvesting and food security
- Preservation of culturally, historically, and archaeologically important sites
- Preservation of aesthetically pleasing marine environments

Socio-economic:

- Community-based partnerships
- Employment opportunities and/or increased profits
- Tourism and recreational opportunities

The earliest and most tangible benefits are often the result of multiple governments, sectors, and communities coming together to plan, manage, and monitor an MPA over time. Many *Oceans Act* MPAs were established in partnership with Indigenous groups, industry

sectors, other governments, environmental organizations, and coastal communities, and these relationships are reflected in ongoing involvement in MPA management.

In effect, MPAs are living laboratories that can help Canadians comprehend the broader impacts of climate change, and understand why providing safe havens for vulnerable marine species may increase economic opportunities and strengthen cultural attachments. Establishing and maintaining MPAs demonstrates Canada's consistent and ongoing commitment to action and results through science, information, collaboration, and transparency.

MAKING MPAS EFFECTIVE

MPAs are effective when

- design and management planning are based on the understanding and incorporation of the ecological, cultural, social, and economic contexts,
- participatory and/or collaborative processes guide decision-making, and
- management actions are implemented so that

the conservation objectives are achieved.

The process of identifying and establishing an MPA takes many years and the combined efforts of many people. Managing MPAs so that they are effective in delivering the benefits for which they were put in place takes ongoing commitment over generations to ensure that the values of these areas remain protected in perpetuity. This means that *how* an MPA's objectives are achieved is just as important as the ecological benefits themselves, and in this, ongoing collaboration between governments, Indigenous peoples, stakeholders, and communities is essential.

A key to effective MPAs lies in acknowledging, respecting, and using all sources of available knowledge, understanding that better outcomes are more likely when all perspectives are brought together in genuine collaboration. This depends on knowledge that is gathered, bridged, co-produced, and shared from many different perspectives and sources of information and data. Knowledge gathered and shared by government scientists, Indigenous Peoples, local communities and their members, hunters, fishers, academia, or industry has brought significant benefits through an increased understanding of site dynamics in a changing marine environment.

This report summarizes what steps have been taken to date to set the foundation for the best possible outcomes for all *Oceans Act* MPAs. Chapter 2 speaks to paving the way for an MPA by understanding its values, determining how environmental pressures may be reduced or prevented, and then designing its boundaries and regulations with a view to long-term protection. The chapter describes how all of this work is done in collaboration with other governments, Indigenous peoples, local communities, and all marine resource users and profiles the various management actions that can be taken over time on the pathway towards effectiveness. These include future planning for ongoing research and monitoring, as well as surveillance and enforcement of the regulatory provisions that govern the MPA.

In managing MPAs for the long term, DFO is committed to continuous learning, and to adapting to change when change is needed. The report shows how regulatory and non-regulatory changes have been introduced to make MPAs more effective in achieving their objectives. Each section in Chapter 2 concludes with a "lessons learned" discussion that summarizes existing management and where improvements are needed. Chapter 3 points the way to the future and includes a series of management actions that DFO will seek to address over time to work towards effective MPAs.

Etuaptmumk

Two-eyed seeing or "etuaptmumk" is a concept developed by Mi'kmaw Elder Albert Marshall. It means seeing from one eye with the strength of Indigenous knowledge and ways of knowing, and from the other eye with the strengths of Western knowledge and science.

This concept reflects the importance of considering all perspectives in order to resolve issues of shared concern.

2 Planning, collaborating, and managing for MPA effectiveness

Endeavour MPA. Credit: Ian MacDonald

THE FOUNDATION: DESIGN AND PLANNING

Careful design and planning are essential if an *Oceans Act* MPA is to be effective in meeting its objectives. Every MPA starts its long life as a candidate site meaning that someone in a government, an Indigenous group, an academic institution, an environmental organization, an industry group or a coastal community has identified something within a particular marine area that needs protection. That "something" must be an important component of the ecosystem, but many times the area also has social, cultural, or historical value to local populations or to Canadians generally. It could be a glass sponge reef that, in addition to being ancient and unique, provides habitat for a variety of fish. It could be a migratory route for endangered North Atlantic Right Whales. It could be an underwater volcano rich in biological activity with an historical, spiritual, and cultural connection to Indigenous people. To date, the identification of this "something" has mainly occurred through the identification of ecologically and biologically significant areas and through development of conservation networks by DFO.

Understanding values

The process of taking an Area of Interest and giving it permanent protection as an *Oceans Act* MPA starts with developing a clear understanding of the ecological, social, cultural, and economic context of the marine area and incorporating those considerations into the design and planning for the site. This is the time when scientists and Indigenous and local knowledge holders, communities and resource users come together to identify conservation objectives for the marine area and determine the extent to which certain social or economic activities can continue, while ensuring protection of the key ecosystem components. At this stage in the process, everything is considered:

- What are the ecological values of the area?
- How is the area used? Is there commercial, recreational, or Indigenous fishing or food gathering? Is there aquaculture in or near the proposed area?
- Is there regular transportation through the area? International shipping or pleasure craft? Tourism or whale watching?
- Are there oil and gas facilities in the area or nearby? In more coastal areas, is sand and gravel extraction taking place?
- Are there social or cultural considerations that need to be understood?

WHAT CONTRIBUTES TO MPA EFFECTIVENESS?

FOUNDATION

Design and planning

Understanding ecological, cultural, social, and economic values and uses to inform long-term conservation

INVOLVING PEOPLE

Collaboration and participation

Processes involve people and rely on different knowledge sources

TAKING ACTION

Through management

Management decisions and actions contribute to the achievement of the objectives of the MPA

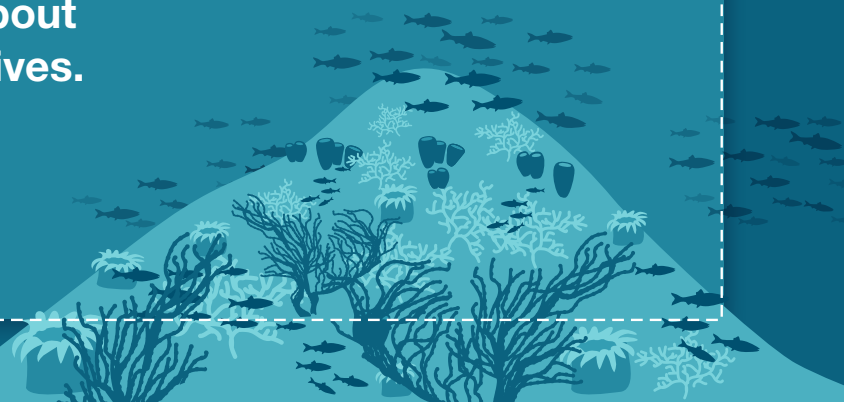
OUTCOMES

MPAs are achieving their conservation objectives and resulting in other positive outcomes

AN EFFECTIVE MPA

An effective MPA is <u>not only</u> about achieving conservation objectives.

The <u>way</u> in which these objectives are achieved and <u>how</u> the MPA contributes to positive social, economic and cultural outcomes also determines its effectiveness.



Basin Head MPA, credit: Elizabeth Edmondson

Answering these questions helps determine the effect an MPA might have on human uses, and the impact those uses may have on the ecological components needing protection. This phase of the process informs discussion about which activities need to be limited or prohibited within the boundaries of the MPA. This is also the stage where consideration can be given to incorporating socio-economic or cultural objectives that can work together with the primary ecological objectives to create further benefits.

Cultural values and interests, which differ from site to site, can provide the impetus for establishing an MPA and may be incorporated into the objectives. The Anguniaqvia niqiqyuam MPA, for example, is culturally important for the Inuvialuit as it supports subsistence harvesting of Arctic char, beluga, birds and other species. Spiritual values can also be protected, as they are in the SG̲aan K̲inghlas-Bowie Seamount MPA, which was established in collaboration with the Haida people.

Understanding pressures and risks

It is critically important to have as complete an understanding as possible of the location, extent, and severity of any current and potential pressures stemming from human activities (also called stressors) that may impact or prevent an MPA from achieving its objectives. These pressures can come from within the MPA boundary or be the result of activities or influences outside of the area. Risk analyses are undertaken to understand the relationship between specific activities and their impacts on ecological features and inform the extent to which these activities may be allowed to continue within an MPA. If, for example, the ecological component needing protection is a concentration of corals or sponges that grow on the ocean floor, fishing gear that drags across the bottom and injures or destroys the habitat would not be allowed within the MPA boundaries. At the same time, it might be possible to allow other types of fishing to continue if they do not impact the conservation objectives of the area.

MPAs do not exist in isolation from the rest of the marine environment. The water in an MPA as well as the plant and animal life within it are constantly affected by pollution, noise, habitat disruption, and other stressors originating outside the MPA's boundaries. DFO works collaboratively with other federal departments and agencies, provincial and territorial governments, Indigenous and local communities, industry, and community organizations to enhance environmental conditions and avoid adverse impacts on the MPA. In the Basin Head MPA,

Indigenous Knowledge

Indigenous Knowledge is used to describe the knowledge held by Indigenous and Inuit peoples across Canada. Indigenous Knowledge may also be referred to as Inuit Knowledge, Traditional Knowledge, Traditional Ecological Knowledge, and Inuit Qaujimajatuqangit.

Local knowledge

Local knowledge is used to describe knowledge held by people within a community and can be held by any individual or group. Local knowledge may also be referred to as local ecological knowledge and community knowledge.

Risk Analysis

A risk analysis considers the potential impacts of human activities on the natural environment and helps determine which human activities are compatible with a site's proposed conservation objectives, whether the proposed activities should be allowed to occur, and if so, where and under what conditions.

Sculpin eggs found in clump bags. Credit: Luke Chaisson

for example, land use in the vicinity puts ecological pressures on the MPA. DFO works closely with provincial departments, First Nations, environmental groups, and the municipality to reduce these pressures and promote best practices that will benefit the MPA.

Understanding the full dimensions of current and potential stressors and the relative risks they pose influences how an MPA is managed and monitored.

Designing for long-term conservation

Once designated by Regulations under the *Oceans Act*, an MPA is intended to be in place for the long term. Consequently, getting agreement on the critical aspects of an MPA is a lengthy and sometimes contentious process — but it is an important one to get right, not only to minimize negative impacts on the marine environment, but also to promote cooperation and collaboration among coastal communities and marine users.

An MPA is designated by Regulations that specify:

- The boundaries of the area
- What is allowed to take place within the area
- The conditions and places (or zones) where activities are allowed to occur

Each MPA's Regulations include a general provision that prohibits all activities in an MPA unless an exception is provided in the Regulation. In providing exceptions, the Regulations specify activities that are allowed to occur within the entire MPA or in a delineated zone because they do not compromise the conservation objectives,

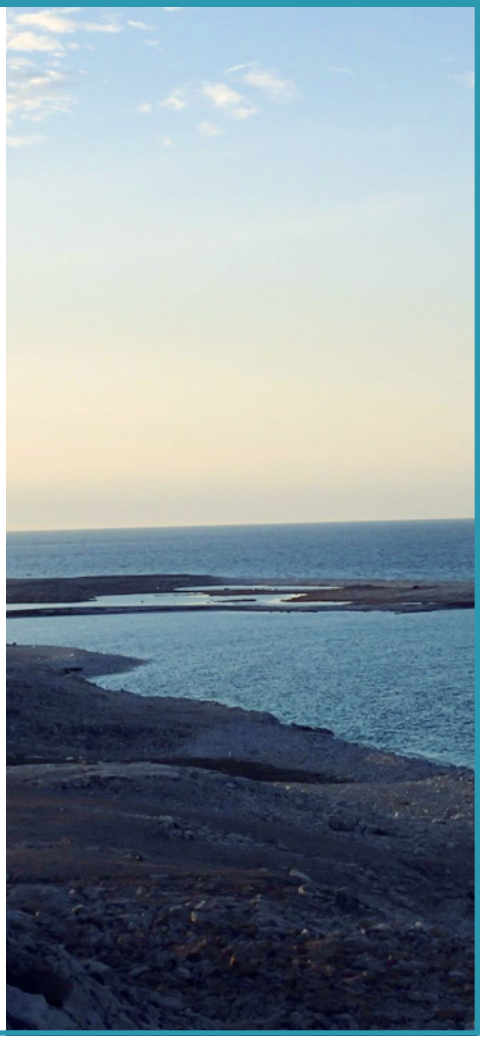
All *Oceans Act* Regulations are public documents. They are linked to each MPA's web page on the "Protecting Oceans" section of DFO's website.

SPOTLIGHT

Traditional Knowledge and Community Involvement in the Development of an MPA

The Anguniaqvia niqiqyuam marine protected area (ANMPA) was the second MPA established in the Western Arctic and the Inuvialuit Settlement Region, and was the first in Canada to have a conservation objective solely based on traditional knowledge. This conservation objective serves to protect important subsistence species: qilalugaq (beluga), iqalukpik (Char), and natchiq and ugyuk (ringed and bearded seals), as well as their key habitat. The ANMPA is named in honor of the late Nelson Green's hunting grounds, reinforcing the importance of the ocean ecosystem to the Inuvialuit and highlighting their subsistence and cultural connection to the Arctic coast.

"Unique" is how the ANMPA Working Group describes the ANMPA. From its creation, to how it is governed, a bottom-up approach to the management of the ANMPA with community guidance and input in all matters pertaining to the ANMPA is of the highest importance. Regional involvement is essential to the monitoring and management of this MPA. The Paulatuk Hunters and Trappers Committee has taken a leadership role in community monitoring programs and sampling in co-managed programs. The first monitoring plan for the ANMPA is being developed so that community priorities are the backbone of the plan. Collaboration with partners will lead to monitoring of the important ecological features of the MPA as well as the priorities and concerns of communities in the Inuvialuit Settlement Region.



ANMPA beach. Credit: Jody Illasiak

although these exceptions are not necessarily applied to the entire MPA. Activities may be allowed through management zones which are also described in an MPA's Regulations. Zoning may be used to protect the conservation objectives while allowing flexibility for activities to occur in certain areas.

In April 2019, the Government of Canada adopted a new approach to marine conservation, outlining a protection standard for all Federal MPAs. The new protection standards prohibit four key industrial activities in all new federal MPAs: oil and gas activities; mining; dumping; and bottom trawling. Bottom trawling for Indigenous food, social, and ceremonial purposes and for scientific research purposes will be allowed within MPAs where it does not pose a significant risk to the MPA's conservation objectives. All other activities, will continue to be assessed on a case-by-case basis to ensure they do not pose a risk to the conservation objectives of an MPA.

Another important aspect of designing for long-term conservation is the consideration of climate change. While *Oceans Act* MPAs have not been designed specifically for the purpose of climate-change mitigation, they represent opportunities to examine nature-based solutions to climate change over the long term. Basin Head MPA, for example, is too small to have a large-scale positive impact on climate change, but as an area that is threatened by rising sea level and seawater temperatures, it is an ideal research site for mitigation strategies that could be employed in other estuaries. In contrast, Tuvaijuittuq MPA manages human activities within a much larger area to prevent the exacerbation of climate-change impacts on multi-year pack ice, coastal ice shelves, and transitional ecosystems.

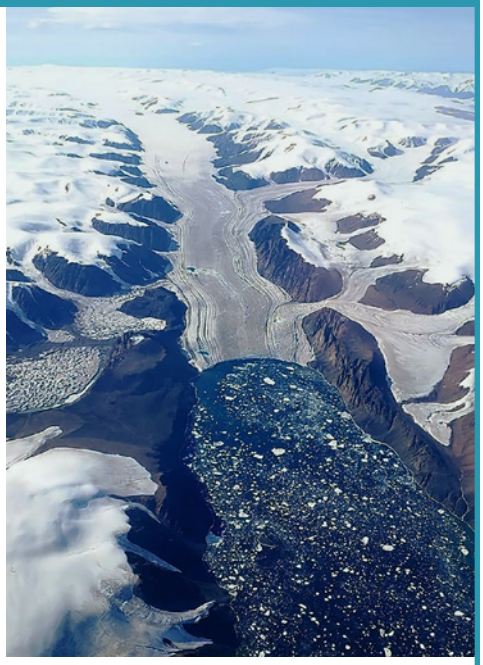
SPOTLIGHT

Preserving Ecological Processes in Tuvaijuittuq MPA

Tuvaijuittuq MPA, meaning "the place where the ice never melts" in Inuktitut, is considered globally, nationally and regionally unique. The MPA represents a portion of the Canadian High Arctic projected to retain thick, multi-year sea ice in the long term and is assumed to become a more critically important habitat for Arctic ice-dependent and ice-associated communities under climate change.

Ice-adapted organisms in the MPA such as microscopic algae form the basis of, and provide energy for, Arctic marine food webs all the way up to marine mammals and polar bears.[2] Dynamic ocean processes are key in driving biodiversity in the MPA. Conditions within the MPA affect those of surrounding marine regions such as the Canadian Arctic Archipelago, an environment upon which Inuit communities depend. The Beaufort Gyre is a major source of multi-year ice to the MPA and Arctic system as a whole, and supplies unique under-ice communities with nutrient-rich Pacific water.

Tuvaijuittuq MPA provides interim protection from new or additional human activities for up to five years as partners explore the feasibility of longer term protection for the area. Preserving ecological processes in Tuvaijuittuq and achieving a greater understanding of the region will be critical as the Arctic becomes more accessible to commercial activities.



Aerial photo of Tuvaijuittuq MPA. Credit: Fisheries and Oceans Canada, Conservation and Protection

SPOTLIGHT

Zoning for the Hecate Strait and Queen Charlotte Sound Glass Sponge Reefs MPA

The Hecate Strait and Queen Charlotte Sound Glass Sponge Reefs are composed of three large, distinct glass sponge reefs, estimated to be at least 9,000 years old, and previously thought to be extinct. Once abundant in the Jurassic Period, these unique reefs are considered the largest living specimen of glass sponge reefs in the world. The slow growth and fragility of these sponge species make the reefs particularly vulnerable to disturbance, and when damaged, recovery may take tens or even several hundreds of years. The conservation objectives for the MPA speak to the need to conserve the structural habitat, biological diversity, and ecosystem function of the reefs, and reflect the direct risk posed by human activities in and around the fragile reef structures.

The zoning approach built into the MPA Regulations for the Hecate MPA reflects the current scientific understanding of impacts from human activity on the reefs. Each glass sponge reef has a Core Protection Zone (two in the Central Reef), a Vertical Adaptive Management Zone, and an Adaptive Management Zone.

The Core Protection Zones are designed to provide the highest level of protection to the reefs. These Zones are closed to all fishing, anchoring, and cable installation, maintenance and repair activities. The Vertical Adaptive Management Zones consist of the water column that extends above the Core Protection Zones to the sea surface. The Adaptive Management Zones consist of the seabed, subsoil and waters that are not part of the Core Protection Zones or the Vertical Adaptive Management Zones. Some non-bottom contact activities are permitted in the Vertical Adaptive Management Zone and the Adaptive Management Zone. Navigation activities are permitted throughout the MPA.

Recent science has indicated that existing Adaptive Management Zones may not provide an adequate buffer and may need to be expanded to ensure that conservation objectives are met. DFO has requested departmental science advice, and the results of that inquiry will be considered as part of the Department's future management of this MPA.

More information on the zoning approach for the MPA can be found on the MPA website.

Glass sponge. Credit: Fisheries and Oceans Canada

LESSONS LEARNED

- For MPA design to be sound and to ensure a wide range of values inform MPA design and planning, Indigenous peoples, governments, industry, communities and other interested parties need to be included in establishing MPAs.
- Social, cultural, and/or economic values may provide added impetus for establishing an MPA.
- MPA designs are unique to their circumstances, including which activities may be allowed within an MPA.
- MPA design is based on its conservation purpose and should reflect the scientific rationale, risk tolerance, and strive to minimize economic impacts.

Aerial photo of Tuvaijuittuq MPA. Credit: Fisheries and Oceans Canada, Conservation and Protection

INVOLVING PEOPLE: COLLABORATION AND PARTICIPATION

When the interests of governments, Indigenous communities, stakeholders, and the general public are reflected in an MPA's design and management, the inclusion of Indigenous and local knowledge is enabled and encouraged, understanding and compliance is improved, and awareness of the MPA is increased.

While DFO is committed to collaborating and ensuring meaningful involvement of everyone interested in all aspects of MPAs, the nature of that involvement varies widely, depending on the unique circumstances of each MPA. Formal collaborative arrangements with provincial, territorial, and/or Indigenous governments, implemented through management boards, may be developed to support the governance and management of an MPA. In other cases, federal, provincial and territorial governments, Indigenous organizations, environmental groups, academia, industry, and community organizations may participate in advisory committees. These less formal structures can reflect a diverse and representative range of interests specifically related to a particular MPA.

Collaboration in management

Collaborative MPA management is present in some MPAs and not in others; there is no "one size fits all" approach. Rather, each arrangement is influenced by local needs and considerations in determining the extent to which collaboration is possible and desired. For the purposes of this report, collaborative governance within the context of *Oceans Act* MPAs refers to nation-to-nation, government-to-government structures and processes related to a specific marine environment that support working together to reach shared agreement on recommendations and decision making in relation to planning, management, monitoring and enforcement in order to meet conservation objectives for that site. Currently, DFO manages five of the 14 *Oceans Act* MPAs collaboratively: Anguniaqvia niqiqyuam MPA, Tarium Niryutait MPA, Tuvaijuittuq MPA, SG̲aan K̲inghlas-Bowie Seamount MPA and the Banc-des-Américains MPA.

Collaborative governance arrangements are established and implemented in a variety of different ways, depending on the issues in the marine area and the interests of the communities and partners. For example, the Memorandum of Understanding between Canada and the Council of Haida Nation provides for the establishment of a management board to facilitate the exchange of views and advice between the Minister of DFO and the Council of Haida Nation on the planning and management of the SG̲aan K̲inghlas-Bowie Seamount MPA.

The Tuvaijuittuq MPA was established through a partnership involving DFO, the Parks Canada Agency, the Qikiqtani Inuit Association, and the Government of Nunavut. Under a Memorandum of Understanding between the Government of Canada, the Qikiqtani Inuit Association, and the Government of Nunavut, work continues to complete a feasibility assessment to determine an approach to the long-term protection of the area.

Several MPAs have management boards that operationalize these collaborative arrangements, and facilitate the process of making recommendations and decisions. For example, the Tarium Niryutait and Anguniaqvia niqiqyuam MPAs in the western Arctic are governed by the Western Arctic MPA Committee, a federal-Indigenous body with representatives from the Inuvialuit Regional Corporation, DFO, the Inuvialuit Game Council, the Fisheries Joint Management Council, and Hunter and Trapper Associations.

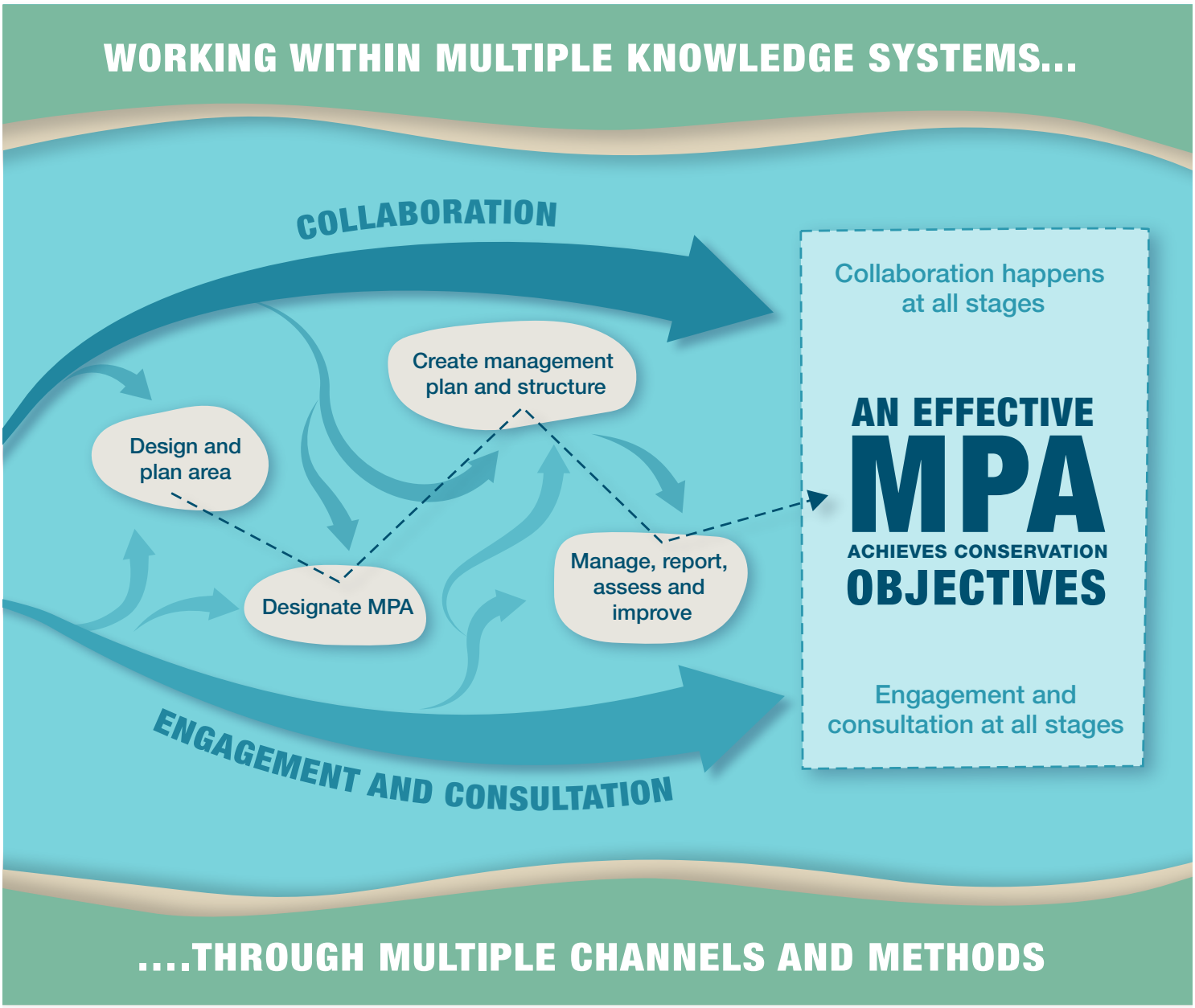
The Banc-des-Américains MPA provides an example of federal-provincial cooperative management. This MPA is the first of a planned network of MPAs, as set out in a collaborative agreement struck in 2019 between the governments of Canada and Quebec (the *Canada-Quebec Collaborative Agreement on the Establishment of a Network of Marine Protected Areas in Quebec*). The MPA is governed by a joint management committee made up of representatives from DFO and Ministries of the Quebec government.

MPAs typically also have an advisory committee which provides advice on the establishment and management of the MPA. Representation on the advisory committee depends on the issues and interests affecting each MPA; however, most have representation from various federal departments and agencies, provincial or territorial governments, and in some cases, Indigenous organizations. These committees offer a way for the fishing industry, academia, community members, and environmental or other non-profit organizations to contribute their perspectives and collaborate on management activities.

Aujuittuq / Grise Fiord. Credit: Andrea McCormack

Participants of advisory bodies reflect both local interests and the conservation objectives of the MPA. In Newfoundland and Labrador, for example, community members advocated for the establishment of both the Eastport and Gilbert Bay MPAs. After these MPAs were designated, community-based advisory committees assisted in monitoring efforts and contributed valuable knowledge on the status and trends of lobster and cod stocks in these areas. Similar community advocacy led to the establishment of the Musquash Estuary MPA in New Brunswick. Local residents have continued to be involved as members of the MPA's advisory committee, providing regular input into management actions.

Walrus haul out. Credit: Audrey Limoges



Credit: Fisheries and Oceans Canada

SPOTLIGHT

Cooperative Governance of the SG̲aan K̲ingh-las-Bowie Seamount MPA

The SG̲aan K̲inghlas-Bowie Seamount MPA, located 180 kilometres offshore of Xaayda Gwaay (Haida Gwaii), British Columbia, provides an important example of how collaborative governance arrangements are serving to protect an ecologically and culturally unique marine area.

The SG̲aan K̲inghlas-Bowie Seamount, one of the shallowest in the north Pacific Ocean, is an underwater mountain formed by volcanic activity which fosters unique oceanographic interactions that enhance the biological productivity of the area and provides rich habitat for many species, including fish, marine mammals, and seabirds.

The Haida have a historical, spiritual, and cultural connection with the SG̲aan K̲inghlas-Bowie Seamount area and have long considered Bowie Seamount sacred. According to gin k̲'iiygangaas (canon of Haida oral histories), before the time of humans, sgáanuwee (supernatural beings) made their home beneath numerous places around Haida Gwaii including mountains, creeks, shoals, and reefs and, in this case, the site of an ancient volcano. The seamount is said to be the home of a supernatural being known as SG̲aan K̲inghlas, which in the Masset dialect means "supernatural being looking outwards."

Jíingáag̲agwíi.úu X̲aadée Sg̲áan K̲ínghlasga gudgíidang.Tlasda g̲agwíi sánsd, sg̲áanuwee 'wáadluwaan tladáawee, g̲ándlee, tsa.ayée, k̲adlée isgyáan tladlúu tlldaaw k̲'wángs gu sg̲áanuwee 'wáadluwaan na.áng-gáangaan, X̲aadáa Gwáayee g̲adúu áa, hín.úu X̲aads ginn k̲'íigangaas súugan. Huutl'an guu Sg̲áan K̲ínghlas gyáa née aa íijang. "Supernatural being looking outwards" hín úu G̲aww X̲aad kíhl kya'aang. (X̲aad kil Haida language, northern dialect)

For more than a decade, since the MPA was established in 2008, Haida Nation and the Government of Canada have been working together to protect this marine area for the benefit, education, and enjoyment of present and future generations, under the terms in a memorandum of understanding (MOU) signed by both parties in 2007. The MOU confirms a shared commitment to a relationship based on mutual respect and understanding and facilitates a cooperative approach to the planning and management of the MPA. Under the MOU, a Management Board was established, with representation from two Council of the Haida Nation (CHN) representatives and two DFO representatives. The Board, with advisory support from stakeholders, seeks to operate on a consensus basis and submits recommendations to the CHN and the Minister of Fisheries and Oceans for their respective consideration. When challenges arise within the Management Board and supporting technical bodies,

Credit: Phantom ROV, Fisheries and Oceans Canada

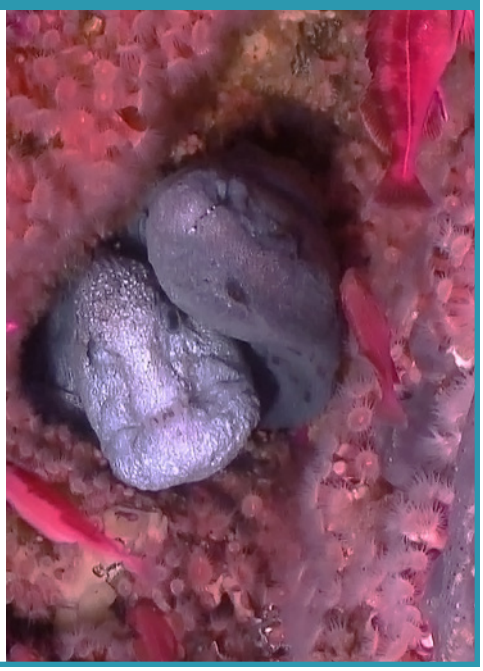
SPOTLIGHT

CHN and DFO fall back on their mutual commitment to co-managing this special marine environment so that future generations are able to enjoy all it has to offer.

In 2019, the Management Board co-published the SK-B MPA Management Plan, which follows an ecosystem-based approach and lays a foundation of guiding principles based on Haida ethics, values, and laws. These principles align with principles in national MPA and ocean strategies and frameworks, and ecosystem-based management.

Commitment to supporting and strengthening cooperative management and adaptive co-management of the MPA, is identified as a priority for implementation in the SG̲aan K̲inghlas-Bowie Seamount Management Plan.

For more information on the management plan for the MPA, please visit the MPA website.



Wolf eels, SG̲aan K̲inghlas–Bowie Seamount MPA. Credit: Phantom ROV, Fisheries and Oceans Canada

Partnerships for research and monitoring

Research and monitoring of MPAs are required to understand the status of ecosystem components of conservation interest (e.g. ocean climate, habitat integrity, species status and trends, human pressures) and track the progress that is being made in achieving an MPA's objectives. The need for research and monitoring of MPAs opens other avenues for participation and collaboration. MPAs are living laboratories offering unsurpassed opportunities for many different kinds of research. At the same time, ongoing monitoring is critical in assessing the ecological performance of an MPA and demonstrating its effectiveness — or showing where management actions should be adapted in order for the MPA to achieve its objectives.

Many *Oceans Act* MPAs have annual monitoring programs that employ local harvesters, Indigenous groups, and/or community organizations. Partnerships with local industry groups can create employment opportunities for community members, provide training in scientific or monitoring processes, encourage community involvement, and provide income to local harvesters, for example, through boat charters.

Indigenous participation in research activities varies across *Oceans Act* MPAs. In some regions, Indigenous organizations participate in research activities through their role as a governance partner within a management board and in the approval of activity plans. In other MPAs, Indigenous community members participate as field workers in annual research activities. In Arctic Region, in accordance with existing collaborative agreements, all research studies are coordinated through Indigenous organizations and councils. Universities and the federal government have involved Arctic communities to help build capacity and strengthen local stewardship. This includes training students and members of hunters and trappers associations to help with research. At the regional level, the Fisheries Joint Management Committee and the Inuvialuit Game Council help to conduct research in coastal and offshore areas.

In the Banc-des-Américains MPA, the Mi'kmaq Maliseet First Nations Fisheries Management Association has developed a five-year plan to contribute to the scientific, ecological, and community monitoring of the MPA. The monitoring is to focus on recreational activities in the vicinity and understanding the extent to which grey and harbour-seal populations are in the MPA. These activities will provide information complementary to the work of government scientists.

MPAs are often home to rare or unique species and natural phenomena. Collaborative research engages

scientists, students, local residents and business owners interested in learning more about these exceptional places. In the Basin Head MPA, youth fieldworkers participate in and learn from research and monitoring efforts through a partnership with the Souris Area Branch of the PEI Wildlife Federation. In another example, a partnership between the Nova Scotia Community College and the Cape Breton Fish Harvesters Association resulted in video cameras attached to lobster traps in the St. Anns Bank MPA to capture life on the seabed. DFO also has a relationship with Cape Breton University, which partnered with local fishing captains and dive shops to collect samples and conduct video surveys and visual fish censuses on Scaterie Bank in the St. Anns Bank MPA.

Since Eastport MPA was created in 2005, local harvesters have been working with scientists from DFO and Memorial University of Newfoundland to monitor lobsters in the MPA and the area around it. Each fall, local harvesters carry out a mark-and-recapture program where lobsters are tagged and released. Harvesters record an extensive range of information about the lobsters caught in this program, including size, sex, whether the lobsters are egg-bearing or marked (v-notched) as past spawners, and whether they were previously tagged. Data collected are analyzed and provide ongoing monitoring information on average size, growth rates, population structure, and movement.

Fall Lobster Tagging Program, Eastport MPA. Credit: Todd Fowler, Skyreach Media

DFO anticipates that opportunities to use existing Indigenous, scientific and local knowledge, and conduct new research in all aspects of MPA management, monitoring, and research is likely to grow and evolve in the years ahead.

Credit: Iain Robert Reid

SPOTLIGHT

Data Collection and Data Sharing for the Endeavour Hydrothermal Vents MPA[3]

The Endeavour Hydrothermal Vents Marine Protected Area (EHV MPA) lies in water 2,250 metres deep, 250 kilometres southwest of Vancouver Island and was the first MPA established under Canada's *Oceans Act* in 2003. The hydrothermal vents consist of large, hot, black smokers — chimney-like structures which release plumes of particle-rich fluid heated by molten lava lying beneath the crust of the seafloor. Temperatures associated with black smokers are typically in excess of 300°C, and these venting systems host one of the highest levels of microbial diversity and animal abundance on Earth. An organism from this site holds the current record for the upper temperature limit to life: 121°C. In the EHV MPA, there are some 60 distinct species native to the Juan de Fuca Ridge. Many of these species are the first in the world to be identified. Hydrothermal vents at Endeavour are home to 12 species that do not exist anywhere else in the world.

Since its discovery in 1982, this marine area has been a focus of research by Canadian and international scientists who come to study unique biota, venting processes and chemistry, as well as seismic and magmatic activity. Researchers strive to uncover secrets of the formation of Earth's tectonic plates and marine food webs. They also seek a potential glimpse of the origins of life on our planet, and perhaps its origins on others.

Collaboration between researchers and MPA managers can help mitigate the challenges associated with protecting these unique deep-ocean ecosystems. Ongoing data surveys and maintenance expeditions run by Ocean Networks Canada (ONC) and streamed through the Neptune Observatory provide critical ship-based and remotely operated vehicle (ROV) data to support management decisions. Data and imagery from ROV dives and fixed subsea observatory sensors are archived in real time, enabling evaluation of the spatial footprint of research activity in the MPA and the baseline level of natural ecosystem change. Access to the imagery gives managers and researchers the opportunity to quantify potential stressors from activities within the MPA, spur future research opportunities, and mitigate the logistical challenges of monitoring these remote ecosystems.

Since EHV MPA was designated, science research has identified additional hydrothermal vents within the Offshore Pacific bioregion that make up two seamount systems. This area was identified as an ecologically and biologically significant area by DFO. To protect these two systems and their hydrothermal vents, the area is proposed to be protected under the Offshore Pacific Area of Interest. This new, large MPA, once designated will protect these important vents and the ecosystems they support within the area, including those already being protected by Endeavour Hydrothermal Vents MPA.[4]

Top: Twin smokers, Endeavour Hydrothermal Vents MPA. Credit: Dr. Verena Tunnicliffe. **Bottom:** Credit: Fisheries and Oceans Canada

Creating Awareness of MPAs

DFO partners with communities and organizations to deliver education and outreach programming in an effort to raise understanding of the importance of marine biodiversity and MPA benefits and build awareness of MPA Regulations. In some cases, just the creation of an MPA can raise awareness of some of the values associated with Canada's unique marine environments. For example, the establishment of the Tuvaijuittuq MPA brought public and media attention to the importance and fragility of the part of the Arctic known as the "Last Ice Area," because that is where, as a result of climate change, it is expected that the last of year-round sea ice will remain.

For coastal MPAs, educational displays, signs, and interpretive kiosks posted around the MPA tell visitors why the MPA is important to maintaining the health of the ecosystem. For MPAs that are located offshore, ocean users can be made aware of the regulations, as well as potential voluntary measures through the publication of guidelines, codes of conduct, and monthly and annual Notice to Mariners published by the Canadian Coast Guard.

Educating Canadians about the importance of MPAs is a key component of ongoing MPA management. A wide variety of different communications tools are used to reach local communities and the public. The Fundy Baykeeper, for example, holds an annual recreational paddle in the Musquash Estuary MPA that brings upwards of 100 paddlers to experience the estuary in person, raising awareness of the many issues confronting a coastal MPA. In a continuing effort to develop citizen scientists, the University of Prince Edward Island and Holland College conduct lessons at the Basin Head MPA, where the senior scientist provides a wide-ranging lecture on MPA history and function, climate change and other challenges, followed by a hands-on experience in ecosystem restoration.

One of the many eco-tourism companies that has developed recently in Atlantic Canada discovered that tourists on a trip to Nova Scotia's Sable Island were very interested in making a stop in the Gully MPA. Adventure Canada now features the Gully MPA as part of its "Atlantic Canada Explorer" tour, which includes a full day in the Gully where visitors mention learning about deep-sea coral communities, deep-water fish, whales and dolphins, and an "abundance of marine life" as highlights of the trip.

In these ways, public presentations to community groups and at conferences, education initiatives in schools, communities, non-governmental organizations, and live-streamed events that showcase research in MPAs, as well as Oceans Day celebrations across the country all promote the importance of Canada's oceans and the need for protection. Social media, pamphlets, reports, and public meetings are also important vehicles used in sharing information with the public.

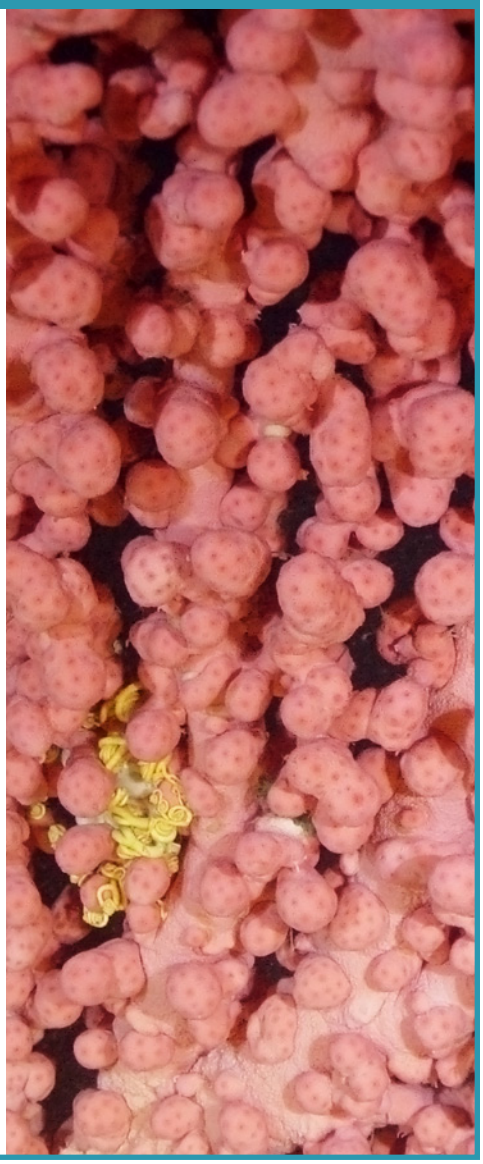
Basin Head MPA. Credit: Perry Williams

SPOTLIGHT

Partnering to Design and Install a Permanent Exhibit on the Gully at the Nova Scotia Museum of Natural History

Research conducted in the Gully MPA has generated a rich knowledge base and spectacular multimedia content that scientists and MPA staff use to engage Canadians. A small theatre at the Bedford Institute of Oceanography provided an interpretive hub for over a decade while staff investigated opportunities for a larger and more accessible venue to showcase the MPA and its wonders. That search ended in 2014 when the MPA turned 10 and the Province of Nova Scotia announced a partnership with DFO to develop a permanent exhibit on the Gully at the Nova Scotia Museum of Natural History in Halifax. Over the next few years, museum employees worked with DFO and other content providers to conceptualize, fabricate, and install a family-oriented interactive display in the popular marine gallery at the Museum.

The good ship *MNH Canyon Explorer* was launched at the exhibit's opening ceremony on November 29, 2017, and quickly became a favourite hang-out for the oceanographers, engineers, and seafarers of tomorrow. Museum visitors use ingenious mechanical and digital simulators to perform deck operations and lab work, including biological sampling, acoustic monitoring, and oceanographic measurements. The design team needn't have worried that patrons, families, and school groups would need suggestions for mission command. Kids make their own games, and their play often embodies the kind of teamwork that is so essential to seagoing research. While very few Canadians will ever visit the Gully, this exhibit will give them a chance to learn about its abundant sea life and study the phenomena that make it so special.



Above: Deep-sea coral, Gully MPA. Credit: Fisheries and Oceans Canada
Below: Two dolphins jumping out of the water, Gully MPA. Credit: Hilary Moors-Murphy

LESSONS LEARNED

- Collaborative governance takes time and the investment is critical to success.
- There is a need for updated national policy and guidance that includes collaborative management of MPAs.
- Integrating Indigenous knowledge and local knowledge is integral to management of MPAs.
- Partnerships in research and monitoring are important in order to leverage up-to-date information, foster a greater understanding of MPAs, and to build relationships,
- Public outreach supports education and awareness of the importance of MPAs and the benefits that come from conserving Canada's marine environment and more needs to be done to enhance this understanding.

Above: DFO employees canoeing in Basin Head MPA. Credit: Souris Wildlife
Below: Deep-sea octopus resting on the seafloor, Gully MPA. Credit: Fisheries and Oceans Canada

TAKING ACTION: MANAGEMENT

Once an *Oceans Act* MPA is established, the actions taken to manage it, day to day and year after year, lead it down a path towards effectiveness. Like design and planning, management relies on knowledge from a wide range of sources, and on collaboration and engagement with people and organizations that have an interest in the area.

Multiple information sources and knowledge types contribute to MPA management and decision making. Scientific data are used in the management of all MPAs, together with Indigenous knowledge, local knowledge, compliance information, and socio-economic data, where they are available. Collaboration and information sharing are encouraged in order to leverage accurate, comprehensive, and up-to-date data.

MPA management is a broad term comprising the following activities:

- Developing plans and strategies for managing access, threats, and use in the MPA
- Research and monitoring of the ecosystem
- Surveillance and enforcement to ensure compliance with MPA Regulations
- Adapting management strategies in response to new information and evaluation

Management plans and strategies

Long-term management strategies are developed to provide clear direction for an MPA. Effective MPA management uses best-available information and data from different sources of knowledge and ways of knowing.

MPA management plans are public documents. They are linked to each MPA's web page on the "Protecting Oceans" section of DFO's website.

Management must also be guided by information gained from monitoring and evaluation in order to see if the MPA is being successful in reaching its objectives.

Best practices for MPA management recommend that each site have a management plan in place. This plan should be reviewed and revised every few years, to reflect new knowledge and information gathered from monitoring, research, and consultations with organizations and communities. Most MPA management plans outline:

- governance structures, roles, and responsibilities
- laws, regulations, and policies affecting management
- priorities and activities to reach the MPA's objectives
- prohibited activities, exceptions, and zones within the MPA

Developing a management plan takes time, and where collaborative governance arrangements are in place, plan development, review and updating can take longer. Management plans are reviewed after an agreed number of years (often 5 years), although a review may take place at any time in response to changing circumstances. Management plan updates are site-specific, and often describe shifts in monitoring priorities or outline specific actions being taken in the MPA.

Young-of-the-year flounder. Credit: Stephanie Cormier

Managing access, stressors, and use

MPA Regulations protect species, habitats, and ecosystems by limiting or prohibiting activities within the area that pose a risk to the conservation objectives of the site. This allows for human use to vary from one MPA to another and results in prohibitions that are closely tied to the MPA's specific conservation objectives. Fishing prohibitions in an MPA are often included in fisheries management plans for the broader ocean area. DFO also sends notices to mariners and puts up signs in some coastal MPAs to let mariners and fishers know what is allowed or prohibited in the MPA. Anyone seeking to conduct research, monitoring, educational activities, or commercial tourism in an MPA must submit an activity plan application. While these are usually approved, they can be denied if the activity does not align with the conservation objectives of the MPA.

Stressors outside of an MPA may also have adverse impacts on the biodiversity within the area. These types of external pressures are not part of an MPA's Regulations since they are not within the spatial boundary of the area. While these impacts cannot be managed as part of the ongoing management of an MPA, they can be considered if circumstances allow (e.g. through cooperation and collaboration with federal, provincial, and local governments).

Voluntary measures are also helpful in managing MPA pressures, both outside the MPA and within its boundaries. Where activities are not prohibited in an MPA's Regulations, best-practice guidelines, industry codes of conduct, and industry stewardship initiatives have been used to change behaviour and use patterns on a temporary or even a permanent basis. Voluntary measures have been employed, for example, to reduce the speed of vessels transiting an MPA during a period of whale migration. On the Scotian Shelf, DFO has worked with the Canada-Nova Scotia Offshore Petroleum Board to develop protocols and policies to help guide the environmental assessment and operation of oil and gas activities that are occurring outside an MPA's boundaries but which may have an impact on the MPA.

Credit: Fisheries and Oceans Canada

SPOTLIGHT

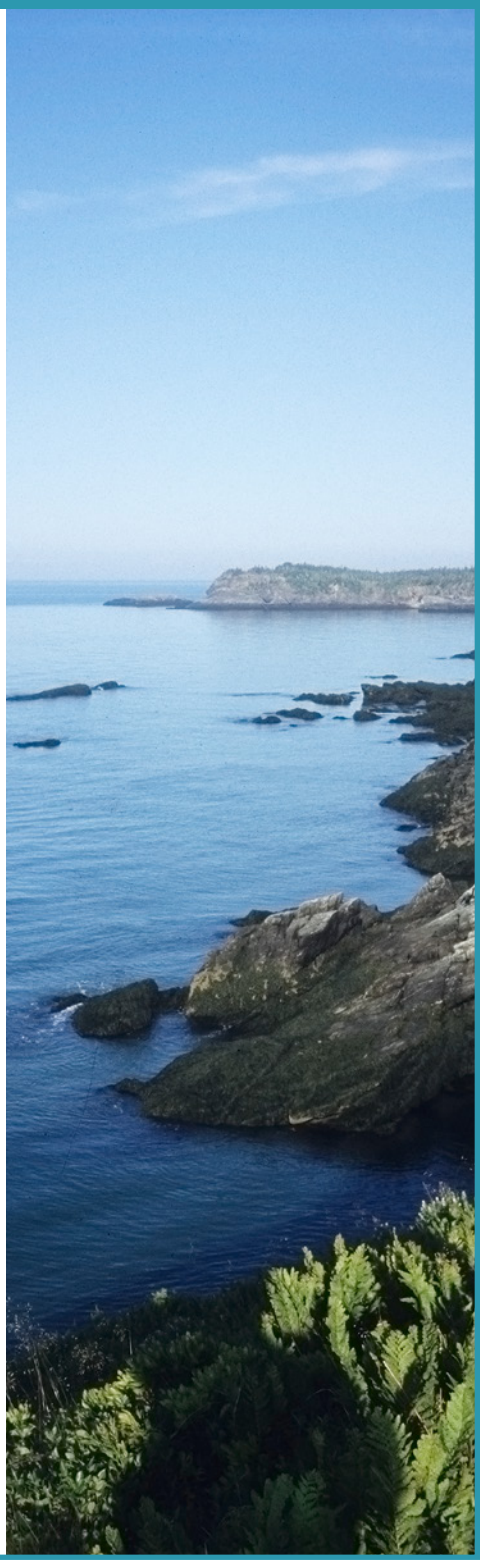
Land-based pressures in the Musquash Estuary Marine Protected Area

The Musquash Estuary MPA in southwest New Brunswick on the Bay of Fundy is almost entirely surrounded by land, making external pressures a noteworthy threat to this coastal MPA. The Musquash MPA Regulations provide protection from harmful human activities within the MPA, but external threats must also be considered in the management and protection of this MPA. Activities outside or adjacent to the MPA could be harmful to the MPA without proper mitigation measures in place.

Dam decommissioning in the watershed above the MPA could introduce heavy metals or excess sediments into the MPA and could also alter the hydrological regime of the waterway. Gold and silver prospecting, wind power development, and roadworks to raise a stretch of New Brunswick highway threatened by sea-level rise are all potential developments that could place pressures on the MPA. In the salt marshes adjacent to the MPA, berm and dyke-removal projects have occurred, and more are proposed; runoff, lead shot, erosion, and accretion are other potential threats that require mitigation and monitoring. As the hiking trails surrounding the MPA gain more popularity for locals and visiting tourists, volunteers and community groups have proposed new trails, boardwalks and footbridge projects, all of which need to be carefully managed.

The accessibility of the Musquash MPA is part of what makes this site so interesting and appealing, but that ease of access and connectivity to a peopled landscape also pose challenges for ongoing management. Land use developments in the surrounding watershed place uncertain stress on the MPA. While individual projects in and around the MPA require focussed attention, consideration must also be given to the additive and cumulative impact of unrelated activities (e.g. channel dredging and saltmarsh restoration require heavy equipment to move earthen materials and both open pathways for suspended sediment.)

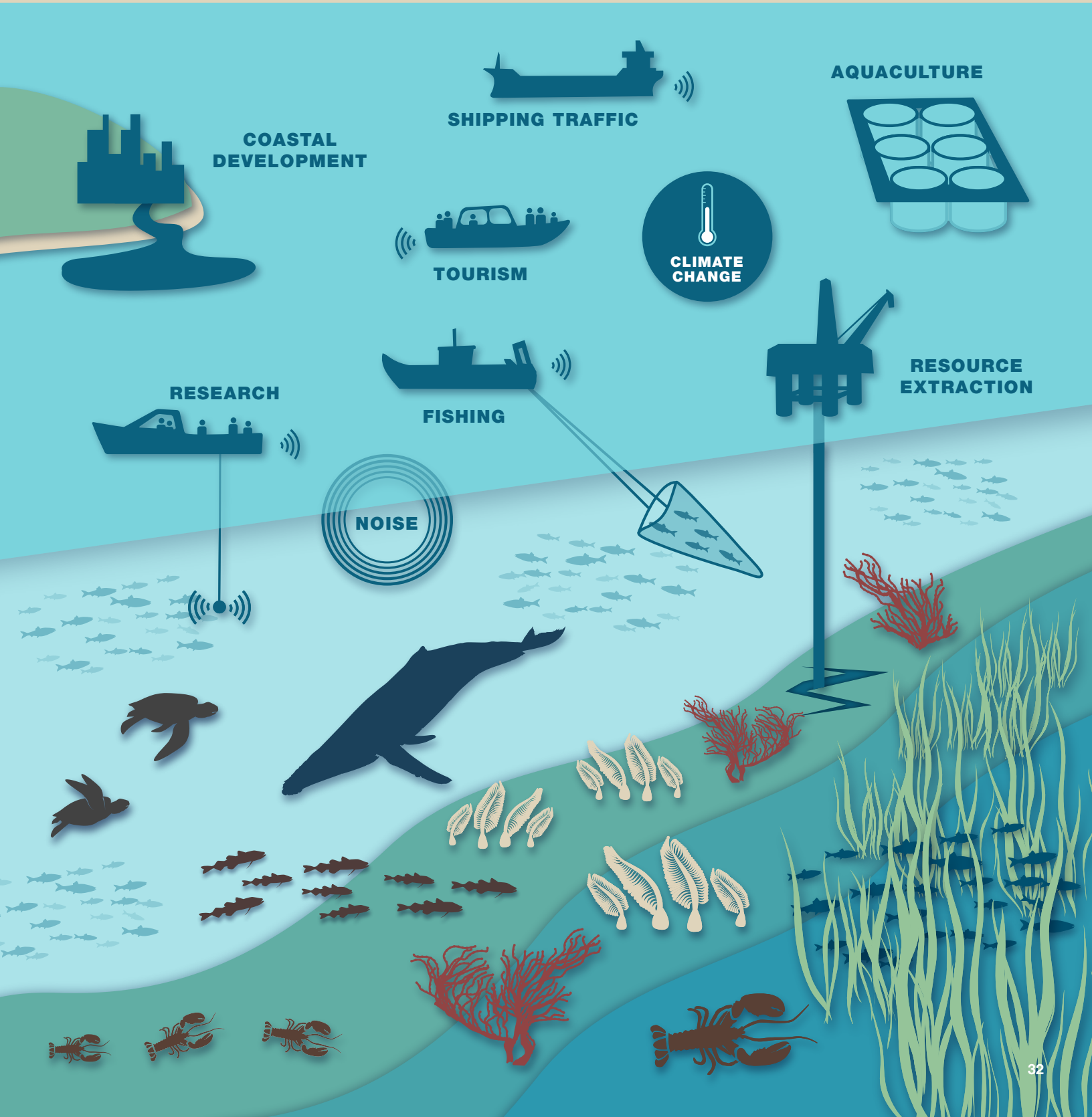
Management is most successful when federal, provincial, and local governments take a coordinated approach to assessment and stewardship that builds on the efforts of community members and non-government organizations to conserve and protect the MPA. The design and management of the Musquash Estuary MPA will be evaluated and adapted as necessary to ensure the effectiveness of the MPA in meeting its objectives.



Musquash Estuary MPA. Credit: Fisheries and Oceans Canada

TYPES OF MPA STRESSORS

Each MPA is affected by different combinations of stressors, which are managed in relation to the impacts they have on conservation objectives



HOW ARE *OCEANS ACT* MPAS MANAGED?

Managing activities to support the unique conservation objectives and circumstances of each MPA requires a tailored approach using a variety of tools

MANAGE STRESSORS

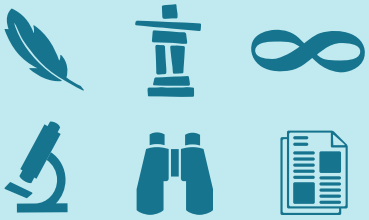
and mitigate impacts through regulatory and non-regulatory measures

Legislation and regulations
Permits and licenses
Surveillance and enforcement
Voluntary measures
Policies, plans, and strategies

DOCUMENT AND MONITOR IMPACTS

through information gathering and knowledge generation

Bridging and co-production of scientific, Indigenous, and local knowledge
Monitoring and research
Dissemination of information



WORK WITH OTHERS

through engagement, partnerships, and collaboration

Management boards
Advisory committees
Education and awareness
Community outreach
Stewardship activities

Credit: Fisheries and Oceans Canada

Deploying a deep-sea submersible vehicle to the underwater volcanic mountains of SK-B MPA. Credit: Fisheries and Oceans Canada

Research and monitoring

When planning *how* to monitor and assess an MPA, it is important to consider *what types* of information are needed so that a comprehensive monitoring approach can be developed that includes ecological monitoring, as well as monitoring for the social, economic, and cultural aspects of the MPA. Research tells us more about the underwater world, and researchers have made some strange and surprising discoveries in the relatively undisturbed environments of *Oceans Act* MPAs. Researchers often use remotely operated vehicles to take images of the seafloor. These excursions have shown us walls of beautiful cold-water corals, ancient reefs of glass sponges, fields of exquisite sea pens, smoking undersea volcanos, and a host of new and sometimes bizarre-looking creatures.

Data sharing between Oceans Networks Canada and Seatube has not only enabled research in the deep waters of the Endeavour Hydrothermal Vents MPA, it has also allowed us to see the results of work done in a place where no human could venture. Researchers have identified 12 species that do not exist anywhere else in the world, and have learned that diversity and animal abundance can thrive in temperatures higher than 100°C.

The Hecate Strait and Queen Charlotte Sound Glass Sponge Reefs MPA is part of the "Science-at-Sea" program that brings scientists on the water to carry out the research needed to monitor, conserve, and protect aquatic ecosystems and resources. This project allows the collection of the best-possible data to inform decisions around safe navigation, fisheries management, climate change, or other activities on or in the water.

DFO also works with academic partners to gain access to specialized knowledge and equipment. In 2018, government scientists, and members of Oceana Canada, Haida Nation, and Ocean Networks Canada embarked on a research expedition that included surveying three offshore Pacific seamounts (SG̲aan K̲inghlas, Dellwood, and Explorer). This research partnership provided valuable data and observations for long-term monitoring of the SG̲aan K̲inghlas-Bowie MPA.

Longstanding research partnerships exist in all MPAs and are integral to monitoring and collecting site data. These collaborations provide MPA managers with new insight

into (and knowledge on) specific sites, thereby improving their management capabilities.

Monitoring helps determine whether an MPA is effective in reaching its objectives by answering such questions as:

- What factors are affecting ecosystem health and population growth?
- What is the current status of species?
- Are populations depleted or have they rebounded?
- Is the ecosystem improving or deteriorating?

Some MPAs have monitoring plans in place that include both ecological monitoring indicators and socio-economic and cultural monitoring indicators. In MPAs where monitoring plans are still being developed, site monitoring takes place even in the absence of a completed plan. In many MPAs, monitoring is conducted in partnership with universities and colleges, Indigenous communities and organizations, or other local industry or environmental organizations. For example, a collaboration between DFO, snow crab harvesters, and the Ocean Tracking Network monitors snow crab movement in the St. Anns Bank MPA.

In the Arctic region, DFO has partnered with Indigenous organizations through the Beaufort Sea Partnership to set priorities, conduct, and provide oversight for monitoring; and to hire community members to do field sampling and interpret results. Indigenous communities take the lead on community-based monitoring, with community members collecting data on fish and beluga populations and fish harvests. Local technicians deploy and retrieve moorings and program instruments, and then download the data.

Monitoring programs have also led to new discoveries about the species within an MPA. It was initially thought that the Gilbert Bay cod carried out their entire life cycle inside the MPA. However, monitoring data collected over the past 25 years by Memorial University in partnership with DFO and local harvesters indicates that the Gilbert Bay cod population is moving outside of the MPA boundaries and becoming vulnerable to fishing pressure.[5] As a result, management strategies are looking to focus on reducing fishing mortality of Gilbert Bay cod outside the MPA. In addition, pilot projects using cod pots were conducted to allow the live release of Gilbert Bay cod.

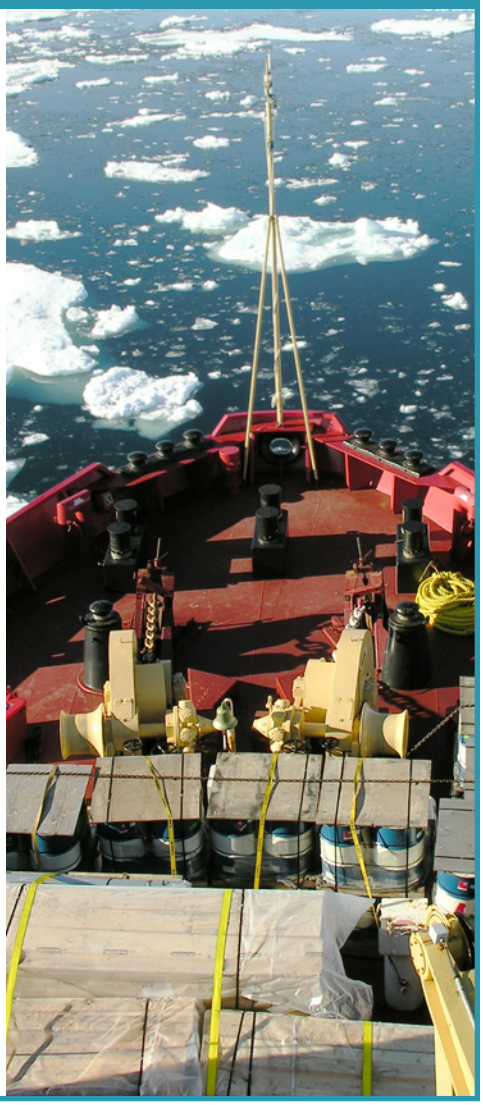
Top: Acoustic recorder deployments in the Gully MPA. Credit: Hilary Moors-Murphy
Centre: Sediment sample from the Gully MPA. Credit: Hilary Moors-Murphy.
Bottom: Credit: Fisheries and Oceans Canada

SPOTLIGHT

Monitoring in Remote Areas

The Tarium Niryutait marine protected area (TNMPA) was the first Arctic MPA in Canada. Established in 2010 in the Inuvialuit Settlement Region, on waters which serve as important harvesting areas of qilalugaq (beluga) and qaluk (fishes). There are three regions within the MPA: Niaqunnaq, Okeevik, and Kittigaryuit which are monitored and managed by Hunters and Trappers Committees (HTCs) of the communities who utilize the MPA. These communities are Aktlarvik (Aklavik), Inuuvik (Inuvik), and Tuktoyaqtuuq (Tutoyaktuk). The remoteness and more importantly, the cultural significance of the area, has made monitoring the TNMPA predominately community-based. The HTCs and the MPA advisory body, the TNMPA working group, have worked to ensure MPA monitoring programs are fully community-led and that research in the area has Inuvialuit support and guidance.

Monitoring vast, remote areas of the Arctic requires community support and involvement to be successful. There have been challenges in the forms of financial resources, year-round enforcement, and consistency in monitoring broad conservation objectives among the three regions of the TNMPA. The TNMPA working group's message is that community priorities must be incorporated when monitoring this culturally important area. Although the MPA regional governance and monitoring has made strides over the years, there is always room for improvement especially when ensuring communities have a voice in the monitoring of the TNMPA. "Tarium Niryutait" means protect the animals of the sea. It is important to know what we are protecting in order to ensure food security for our lands.



West of Ellesmere Island. Credit: Fisheries and Oceans Canada

Among the strangest animals to be found in the Gully MPA is the anglerfish. These fish often live their entire lives in the dark, so females have a bioluminescent lure on the tip of their front dorsal spine used to attract prey — and mates. When a male anglerfish finds a female, he latches onto her with his sharp teeth, and over time, his body physically fuses with her skin and bloodstream. The number and diversity of anglerfish found in the Gully MPA was a surprise to researchers. For nine of the species, it was the first time they had been caught in Canadian waters.

Scientists are also exploring new technology to better monitor MPAs. In Basin Head, drones are being used to survey Irish moss. Drone technology also has potential future applications in the monitoring of green algae, eelgrass, marsh erosion rates, and dune structure dynamics. In the Gully MPA, for example, passive acoustic monitoring collects data on the presence of whales and ambient and human-caused background noise. Drone photogrammetry is used to monitor and assess body condition, reproductive and health status, size, and age of northern bottlenose whales. Ongoing rapid improvements in hardware and processing software are expected to fuel further and more widespread use of drone technology for ecological studies in many MPAs.

DFO works collaboratively with other governments to advance research and monitoring of MPAs. In some cases, partnering governments provide core funding and/or conduct research, monitoring, and analyses themselves, and share the results. In Basin Head MPA,

for example, there have been extensive efforts involving DFO, the local watershed group, local aquaculture industry, and academia to restore a distinct strain of Irish moss found only in that MPA.

Provincial involvement has supported monitoring of water depth at the channel entrance to Basin Head, as well as monitoring and enforcement of restricted access to the Basin Head Sand Dune Natural Area which is integral to the estuarine ecosystem. The Province has also provided aerial photography to document land-based activities that may impact marine ecosystem health. Academia assists in monitoring water flow and nutrient inputs from the watershed, and local groups are engaged in monitoring and removing invasive species, as well as supporting DFO-led restoration activities. The Natural Resource Council of Canada has also partnered with DFO to cultivate the strain of Irish moss that is being restored in the Basin Head MPA.

Surveillance and enforcement

MPA surveillance and enforcement activities are undertaken by DFO to ensure that human activities comply with an MPA's Regulations and management regime. Surveillance and enforcement plans are being implemented or are under development in all MPAs, and they will be regularly reviewed and updated.

In some MPAs, surveillance is limited to times of year when the activities of concern are underway. For offshore MPAs, vessel patrols are more infrequent than they are for areas closer to shore due to the location, financial cost, and time required to survey the area. In areas closer to shore, different means of patrolling may be utilized; for example, in Gilbert Bay MPA, surveillance patrols are sometimes carried out by snowmobile in winter and by canoe in summer.

Surveillance can also be complemented by work carried out by other departments, such as Transport Canada, that are active in the marine environment. These departments collaborate, share data, and provide information that may help with the surveillance of MPAs. Federal departments also work together to provide maritime security through Marine Security Operations Centres. Through their multi-agency approach, these Centres contribute valuable MPA surveillance information as MPA boundaries are included in the tools they use for tracking, alerting, and analysis.

For areas where it is not practical to patrol physically, a greater reliance on technological tools may be necessary to detect vessel activity in MPAs. Marine Security Operations Centres monitor vessel traffic and may work with local DFO Conservation and Protection detachments if an activity requires investigation. In the SG̱aan K̲inghlas-Bowie Seamount MPA, aerial surveillance was deemed an inefficient use of resources and surveillance monitoring relies heavily on vessel traffic analysis.

Advances in technology now support surveillance activities by providing ways to cover ocean territory more thoroughly or frequently. For example, MPAs in Canadian waters are now visible to users of Global Fishing Watch, a website that visualizes, tracks, and shares data about global fishing activity online, free of charge.

Partnering with coastal Indigenous communities and supporting Indigenous involvement in surveillance of MPAs may help to enhance existing efforts and promote collaboration. Changes to the *Oceans Act* were introduced in 2019 to allow the Minister to designate enforcement officers, which may encourage more Indigenous involvement in surveillance and enforcement activities.

Drone photo of monitoring at Basin Head MPA. Credit: Perry Williams

Adaptive management

How do we know if an MPA is on course to meet its objectives? Are management actions going in the right direction? Should management alter course to respond to changing information or circumstances? Because most MPAs were created fairly recently, it is too early to have answers to most of these questions. However, regular monitoring can provide evidence of progress toward an MPA's conservation objectives, and indicate whether some type of adaptive measure is required.

Adaptive management is a core principle in DFO's ocean management policies and is reflected in some individual MPA management plans. Adaptive management occurs where actions are taken in response to new information gathered through monitoring and evaluation of an MPA. This new information is used to improve MPA management, and may be accompanied by regulatory or non-regulatory changes. Several MPAs have required adaptive management as a result of new knowledge or changing conditions:

- Following a drastic decline in the Irish moss coverage, adaptive management measures were required to respond to an invasion of green crab disturbing the ecosystem including intensive predation on Blue Mussels and poor water quality in the Basin Head MPA. In response, restoration activities were initiated to control some of the pressures and ensure that the Basin Head Irish moss did not become extinct. These included moss-mussel clump planting, a green crab removal program, and eelgrass planting.[6]
- Scientific surveys in the Gully MPA resulted in the discovery of important coral concentrations in Zone 2 — an area where a halibut fishery was still allowed. In response, the *Fisheries Act* was used to close the halibut fishery in two small areas through a Variation Order, authorized following engagement with groundfish and MPA advisory committees, and consultations with Indigenous groups.
- When scientific monitoring in the SG̲aan K̲inghlas-Bowie Seamount MPA revealed new species of corals and sponges and showed impacts from sablefish traps, adaptive management was required. After many years of work, DFO and the Haida Nation made the decision to close the fishery as a precautionary measure. This was done through fisheries closures and under the Haida Constitution.

Adaptive management

Adaptive management relies on new information, gathered through monitoring and evaluation of an MPA, that necessitates a change to the management strategy.

SPOTLIGHT

First conviction under the *Oceans Act*

Hecate Strait and Queen Charlotte Sound Glass Sponge Reefs MPA contains ancient, ecologically unique, and exceptionally fragile glass sponge reefs. In 2017, DFO's Conservation and Protection Branch became aware of a commercial halibut longline fishing violation in the MPA as a result of the Electronic Monitoring Service provided by Archipelago Marine Research. After fishing occurred, Archipelago retrieved the Electronic Monitoring hard dive from the vessel and reviewed the sensor data. These data revealed that seven out of nine sets were in the Northern Reef MPA, and one set was partially in the Core Protection Zone. The vessel operator was charged in court and pleaded guilty, with charges totalling $45,000 (*Fisheries Act* s.79 Court Order for $20,000, and an *Oceans Act* fine of $25,000). This case represents the first successful conviction under the *Oceans Act* in Canada.

Glass sponge. Credit: Fisheries and Oceans Canada

LESSONS LEARNED

- Comprehensive management plans and strategies are integral to setting expectations and methodologies that direct how an MPA will be managed once established.
- The best-available information should be used to ensure that management is on track.
- Research and monitoring provide critical information, but more resources are required in order to continue and improve on MPA monitoring efforts.
- Collaboration and information sharing are invaluable in MPA surveillance.

Above: Two bottlenose whales, Gully MPA. Credit: Hilary Moors-Murphy
Below: Credit: P. Fortin, Fisheries and Oceans Canada

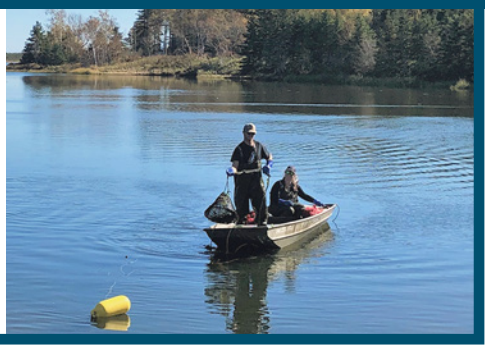
OUTCOMES: WHERE DO THINGS STAND NOW?

Without comprehensive and robust monitoring data, collected over many years, it is not possible to say definitively that an area is meeting its objectives. Progress is currently demonstrated through ongoing monitoring efforts to ensure that ecological attributes and processes are being protected, and major natural values and associated ecosystem services are maintained. Demonstrating effective protection takes time, as many components of MPAs contain long-lived and slow-growing habitats, species, and ecosystems.

As MPAs age and progress in their monitoring, a national framework is needed to ensure consistency in how areas are evaluated, understand the extent to which the MPAs are meeting their objectives, and identify required adjustments to management plans and strategies.

LESSONS LEARNED

- Demonstration of management outcomes is important for understanding how well an MPA is doing.
- This understanding should go beyond the ecological to consider the social, economic, cultural, and management process outcomes.
- Without the systematic collection and analysis of scientific, Indigenous and local knowledge, the outcomes of an MPA will not be able to be assessed completely.



Green crab fishing, Basin Head MPA. Credit: Souris Wildlife

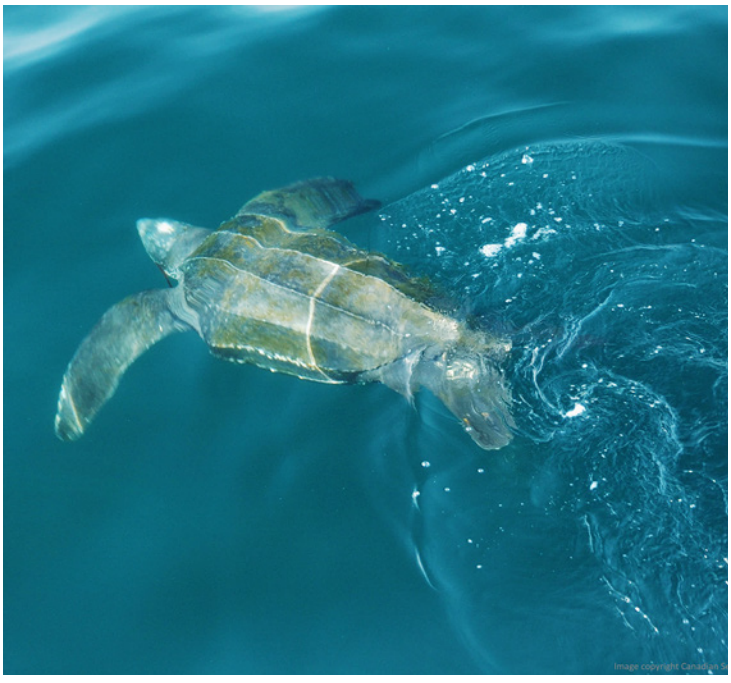
Credit: Chandra Chambers

Irish Moss Survey. Credit: Souris Wildlife

3 The future for MPA management

Credit: Iain Robert Reid

Establishing and managing MPAs in three oceans and across a wide range of ecosystems has given DFO, its governance partners and stakeholders a wealth of experience to build upon. Looking ahead, what has worked well in MPA management, and where do the challenges lie? And what does DFO envision for future management of *Oceans Act* MPAs?



Leatherback sea turtle, Laurentian Channel MPA. Credit: Canadian Sea Turtle Network

Working together: Collaboration and participation, governance and management

The recognition that collaborative governance is an important element of effective MPA management is growing. Efforts to date have been shaped to respond to the needs of individual sites, and the rights, needs and interests of local communities, allowing for a flexible approach. However, as momentum for collaborative governance and partnerships grows, policy guidance to support this work is needed.

The establishment of collaborative governance needs time — time to learn about different values and perspectives, to build relationships and trust, to adjust and update old ways of doing things, to reconcile jurisdictions and authorities, to coordinate, and to come to shared agreement. The Department has learned from experience, and acknowledges that continuing to invest the time in collaborative governance is a high priority.

The sharing and integration of information and effort across programs within DFO and with other federal departments and agencies remains an ongoing effort. While DFO leads in the establishment and management of *Oceans Act* MPAs, departments and agencies also play key roles in their management. The Department is committed to identifying ways to strengthen cross-program and departmental coordination to bolster marine

Credit: Iain Robert Reid

conservation efforts and identify opportunities for improved efficiencies and synergies.

Indigenous and local knowledge are increasingly being incorporated into the design and management of MPAs. Continuing to foster shared understanding and increasing dialogue and interaction with Indigenous and local communities could increase the ways in which science, Indigenous and local knowledge are produced and shared, in order to allow partners and stakeholders to work together more effectively in the management of MPAs.

Building awareness: Education and outreach

Efforts within the Department to build public awareness of MPAs are currently informal and ad hoc in nature. To be effective, information should be targeted to a wide range of audiences and user groups via media that is familiar to them. Rules and regulations should be communicated to ocean users in ways that they can understand and respect. Ensuring that MPA coordinates are easily accessible and having proper signage and information sheets readily available are important in ensuring compliance.

The DFO website is the main tool for conveying information to the broader Canadian public. Within each region, information is generally updated as needed. DFO aims to improve communication about MPAs, especially by keeping its web pages on MPAs more current, as one measure to improve transparency of MPA management.

MPAs are much more likely to be effective if communities are involved, and educating people about the value of MPAs and their role can help foster involvement and stewardship. DFO aims to establish more community education and citizen stewardship programs to strengthen community involvement.

Tracking objectives: Research and monitoring

Research and monitoring are essential in determining whether MPAs are reaching their objectives. However, current collection, collation, and analysis of monitoring data are opportunistic in nature, highlighting a need to enhance these activities in order to support MPA management decisions.

Prioritizing SMART (specific, measurable, achievable, realistic, and time-bound) conservation objectives, developing indicators that allow for assessment of progress, and putting in place comprehensive monitoring strategies chart a course for feasible, affordable, relevant, and practical evaluation. The socio-economic and cultural aspects of MPAs, including use, activities, employment, impacts or benefits to other industries, demographic analyses, cultural practices and traditions, and community interaction should be integrated into the monitoring methodology so that the human aspects of MPAs can be better understood.

As technology evolves, innovative monitoring tools and technologies will aid in MPA research and monitoring. For example, drones or satellite imagery could be used to conduct surveillance of human activities, and cameras on remotely operated vehicles could be used to monitor corals and sponges with little to no impact on the seafloor. DFO will further explore its use of innovative monitoring tools and technologies.

The Department continues to work internally and externally to advance thinking on how to incorporate climate change considerations into the management of individual sites, as well as in the design of networks of protected and conserved areas.

The Department recognizes the importance of maintaining relationships with partners to support MPA monitoring. MPA managers share knowledge and best practices for monitoring, and the Department continues to partner with universities and colleges, community groups, Indigenous organizations, and industry to carry out research and monitoring. DFO continues to emphasize the importance of participation and collaboration in research and monitoring, and is always looking for new ways to improve relationships.

Killer whale. Credit: Fisheries and Oceans Canada

Eyes on the oceans: Surveillance and enforcement

Canada's long coastline and expansive ocean waters make MPA surveillance and enforcement challenging. The coordination and extent of surveillance activities are influenced by the remoteness of an MPA, the nature of the activities permitted in it, and the support and participation of partners and stakeholders. DFO aims to strengthen current surveillance activities. The Department will look at different opportunities and mechanisms for surveillance and enforcement within each MPA, teaming up with other federal departments and agencies, provincial and territorial partners, Indigenous and local communities, and stakeholders. The important work of surveillance and enforcement can be enhanced by ensuring that adequate training is accessible, by partnering with Indigenous surveillance programs, and by utilizing remote monitoring. These directed efforts will assist not only in monitoring sites, but also in gathering information that can be used to assess ongoing surveillance needs, levels of compliance, and build awareness of MPAs.

Credit: Fisheries and Oceans Canada

Focus for the future

Cape Breton. Credit: Elizabeth Edmondson

Working together: Collaboration and participation, governance and management

- Update policy and guidance to support collaboration and participation in MPA governance and management.
- Promote and remove barriers to information sharing, to aid decision making.
- Support community-based monitoring.
- Support Indigenous participation and involvement in surveillance and monitoring.
- Identify ways of encouraging the co-production and sharing of knowledge that could be applied in MPAs.

Building awareness: Education and outreach

- Develop a national outreach and education approach that includes specific plans for each designated MPA.
- Use a variety of modes of communication to inform marine users about MPAs and compliance.
- Support citizen stewardship (including science) and community education programs.
- Update MPA webpages when new information becomes available, including details relating to engagement and consultation, MPA advisory committees, and monitoring activities.
- Update existing national policy and guidance based on lessons learned and experience to date.

Tracking objectives: Research and monitoring

- Develop comprehensive monitoring methodologies to be included in MPA monitoring plans.
- Ensure that MPA monitoring methodologies are affordable, relevant, and practical.
- Support community-based MPA monitoring efforts.
- Support monitoring and research workshops co-sponsored with academic institutions.
- Integrate human-pressure monitoring into a comprehensive monitoring strategy.
- Develop indicators and collect data relating to the socio-economic and cultural components of MPAs.
- Develop SMART conservation objectives.
- Explore the use of emerging and innovative monitoring tools and technologies to improve research and monitoring activities while limiting impacts on the marine environment.
- Develop guidance and recommendations for integrating climate change considerations into the management of MPAs.
- Develop national guidance on adaptive management.

Eyes on the oceans: Surveillance and enforcement

- Continue to develop MPA-specific strategies for surveillance and enforcement.
- Promote training and education to support government, Indigenous, and local involvement in compliance monitoring activities.
- Identify innovative technologies to support remote monitoring.
- Enhance awareness of MPAs with marine users.
- Increase surveillance within MPAs where needed.

Credit: Fisheries and Oceans Canada

WHAT COMES NEXT? FUTURE ASSESSMENTS OF MPA PROGRESS

To ensure that MPAs are effective, progress must be evaluated regularly. DFO will work with partners and stakeholders to develop an evaluation framework and conduct regular reviews of individual MPAs, including all MPAs at a national level. Partners and stakeholders will be invited to be involved in developing and applying a robust and inclusive evaluation methodology that reflects their interests, values, and expertise. This will include developing a method of assessing ecosystem valuation in MPAs, as well as expanding data collection to include partner and stakeholder input.

Future reports will include the status and trends for a variety of ecological indicators, as well as those for the social, economic, and cultural outcomes of MPAs. Future assessments will take into consideration the costs and benefits associated with management of MPAs. It is anticipated that new information and understanding that emerges from regular evaluation and reporting will prompt adaptive management changes within individual sites.

Ongoing reporting on MPA management will require significant time and effort, building on a comprehensive and inclusive evaluation process. The schedule for evaluation and reporting will be specific to each MPA. A national report on progress and activities for the MPAs, considered together, will be published every five years.

The management of *Oceans Act* MPAs will undoubtedly evolve over time. DFO continues to learn from its existing practices, gaining new knowledge and understanding of what works, and adjusting as the species, habitats, and ecosystems that MPAs were established to protect shift with environmental changes. The ebbs and flows of MPAs will rely on a steady stream of management feedback and evaluation. Through this report, DFO aims to build on achievements, address challenges and limitations, and identify future opportunities for improvement from a national perspective. Continuing this work, in collaboration with others, is an essential next step in advancing the collective work to manage and protect Canada's marine environment.

Credit: Iain Robert Reid

1 The Convention on Biological Diversity of 5 June 1992 (1760 U.N.T.S. 69). Retrieved from: https://www.cbd.int/doc/legal/cbd-en.pdf

2 Fisheries and Oceans Canada. (2020). Identification of Ecological Significance, Knowledge Gaps and Conservation Objectives for the Tuvaijuittuq Marine Protected Area. DFO Can. Sci. Advis. Sec. Sci. Resp. 2020/056.

3 Juniper, SK, Thornborough, K., Douglas, K., Hillier, J. (2019). Remote monitoring of a deep-sea marine protected area: The Endeavour Hydrothermal Vents. Aquatic Conservation: Marine and Freshwater Ecosystems 29 (S2), 84-102. DOI: 10.1002/aqc.3020.

4 Fisheries and Oceans Canada (DFO). 2019. Biophysical and Ecological Overview of the Offshore Pacific Area of Interest (AOI). DFO Can. Sci. Advis. Sec. Sci. Resp. 2019/011.

5 Fisheries and Oceans Canada (DFO) (2010) Review of the Gilbert Bay Marine Protected Area monitoring indicators, protocols and strategies, and an assessment of the Gilbert Bay cod population. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2010/027.

6 Fisheries and Oceans Canada (DFO) (2020) Review of monitoring activities in the Basin Head Marine Protected Area in the context of their effectiveness in evaluating attainment of conservation objectives. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2020/003.

Back cover, top: Basin Head, credit: Debbie Rodgers; **centre:** credit: Leah Brown; **bottom:** credit: Iain Robert Reid.