Paper Parks or Protection: Evaluating Atlantic Canada's Marine Protected Areas

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Abstract

Reversing biodiversity loss is one of society's most pressing challenges. In response, marine protected areas (MPAs) are arguably one of the most effective conservation solutions. Yet, the outcomes of MPAs are highly variable. Some deliver positive biodiversity outcomes while others are criticized for being "paper parks"; a term used to describe protected areas that are designated on paper but offer little contributions towards the conservation of nature. The current protection levels of Canada's MPAs are largely unknown. In this major research paper (MRP), I evaluated the protection levels for eight MPAs located in Canada's Atlantic Ocean. The analysis revealed that over half (62.5%) of Atlantic MPAs are incompatible with conservation due to the heavy presence of offshore oil, fishing, and shipping. These results suggest that enhancing the levels of protection in the MPAs on Canada's east coast is required for MPAs to contribute effectively to biodiversity conservation and human well-being.

Keywords: Marine conservation; exploitation; protection levels; marine biodiversity

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1. Introduction

Biodiversity is deteriorating at an unprecedented rate (Dirzo et al., 2014). In 2019, the Intergovernmental Science-Platform on Biodiversity and Ecosystem Services (IPBES) found that biodiversity is declining at a rate unseen in the last 10 million years and more than 1 million species are currently on the brink of extinction (IPBES, 2019). Biodiversity provides structure and support to every process on earth that all species, including humans, require for life-sustaining services (Diaz & Malhi, 2022). Examples of these processes include carbon storage, climate regulation, and oxygen produced from photosynthesis (ten Brink et al., 2016). Without these essential services, the health and well-being of both natural environments and society will also decline (ten Brink et al., 2016; Diaz & Malhi, 2022).

In response to this growing biodiversity crisis, communities from local to global are engaging in biodiversity conservation (IPBES, 2019). While the tools for biodiversity conservation are diverse (Gurney et al., 2021), the most common conservation strategy is protected areas (Bingham et al., 2019). Indeed, protected areas remain a central strategy in the new Global Biodiversity Framework (Kunming-Montreal Global Biodiversity Framework), which was adopted in Montreal in December 2022 and will guide conservation efforts to 2030 (Convention on Biological Diversity, 2022). Deemed as the *30x30 target*, the framework says that 30 percent of earth's degraded terrestrial and marine ecosystems should be actively protected by 2030 (Convention on Biological Diversity, 2022).

Due to the significant support oceans can offer to the environment and society, there has been an extreme interest throughout the last several decades to conserve marine and coastal spaces via marine protected areas (MPAs) (Laffoley et al., 2018). MPAs aim to conserve threatened species and unique geographic locations, as well as support additional outcomes such as sustaining genetic integrity, mitigating trophic cascades, maintaining ecosystems resilience, enhancing fish stocks both in and out of the MPA boundaries, and supporting human well-being (Laffoley et al., 2018). Despite significant efforts towards implementing MPAs, marine biodiversity has continued to decline due to several factors that undermine the overall effectiveness of MPAs (IPBES, 2019). Establishment of a MPA alone does not guarantee conservation outcomes; rather, a range of factors including the level of protection, compliance, inclusive decision-making, and governance, determine the environmental and socio-economic benefits provided (Gill et al., 2017; Dehens & Fanning, 2018; Laffoley et al., 2018).

The term "paper parks" refers to protected areas that exist in a regulatory or legal sense on paper but fail to fulfill their conservation objectives (Pieraccini et al., 2016). In a marine context, an MPA that is legally established but lacks management or enforcement required to halt biodiversity loss is considered a paper park (Rife et al., 2013). It is estimated that roughly 70% of global MPAs are partially protected and fail to achieve their conservation targets, leading marine conservation scholars to suggest that quality in protected areas (i.e., high levels of protection, sufficient management, co-governance) is more important than quantity (Turnball et al., 2021).

Reflecting global trends, MPA protection in Canada has been inconsistent across the country as result of vague regulations and management (Watson & Hewson, 2018). Therefore, in this major research paper (MRP) I assess the levels of protection in Canada's eight marine protected areas found along the east coast in the Atlantic Ocean, specifically using the decision-tree assessment tool provided in *the MPA Guide* (Grorud-Colvert et al., 2021). The results of this study provide a baseline of the protection-levels for Atlantic Canada's MPAs, while identifying gaps in current management and governance that can help inform intervention points for strengthening Canada's marine conservation targets.

2. Literature Review

2.1. Benefits from the Blue: The Services of Marine Biodiversity

Defined by the United Nations Convention on Biological Diversity (CBD) in 1992, biodiversity is "the variability among living organisms from all sources including inter alia, 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" (United Nations Environment Programme, 1992, p. 3). When put into an aquatic context, marine biodiversity is the critical foundation of all ocean ecologies that refers to the plethora of taxa supporting the structure and function of underwater life (Cochrane et al., 2016; Lotze, 2021; National Research Council, 1995).

Maintaining marine biodiversity is essential for marine environments, coastal communities, and global economies through its role of various ecosystem services (Barbier, 2017; Laffoley et al., 2018; Blythe et al., 2020). In support of this statement, Armstrong et al. (2012) created a catalogue of goods and services offered by the deep sea, arguing that the regulation of cultural and provisioning services all contributes to various forms of human wellness. Included in this catalogue of the oceans' contributions to society is waste absorption, climate regulation, nutrient cycling, oil/gas production, inspiration, and cultural meaning (Armstrong et al., 2012). Providing further evidence towards the interconnections between marine ecosystems, social systems and the economy, a study by Brandini (2014) found that less invasive fishing technologies in a small Brazil community reduced damage to underwater benthic communities, and overall enhanced the economy and well-being for artisan fishers and tourism operations.

2.2. Human Impacts on Marine Biodiversity

Despite the immense benefits provided by marine biodiversity, anthropogenic stressors continue to cause biodiversity loss and historical declines in ecosystems. The 2019 Summary for Policymakers report by IPBES (2019) found that 66% of the ocean is experiencing cumulative human impacts, while only 3% is free of human influence. Similarly, Jones et al. (2018) reports roughly 13% of the ocean qualifies as marine wilderness, while the remaining is affected by

human activities. A well documented example of biodiversity devastation is the decrease in coral reef cover and diversity as a result of climate change induced bleaching events throughout the last few decades (Eddy et al., 2021; IPBES, 2019). Not only have coral reef populations halved since the 1950's, Eddy et al. (2021) indicate that ecosystem services have also been cut and reef associated biodiverisity has decreased by 60%.

Comparable scenarios have been seen all over the world, including in Canada where marine biodiversity has been historically damaged. Fisheries are one of the most important services provided by marine biodiversity in Canada. Yet, fishery services are under threat as evidenced by the famous Atlantic cod stock crash of the 1990's (Hutchings et al., 2012). Overfishing caused cod populations to dimish by 90%, and populations of prey species, such as shrimp and snow crab, to flourish (Hutchings & Rangeley, 2011). Frank et al. (2011) reviews this ecosystem transformation, claiming that while growing benthic fish populations are promising, biodiversity will never return to it's pre-collapse richness. As of 2012, 20% of Canada's at species at risk are marine (Hutchings et al., 2012). Several studies show that Canada's current policies towards marine conservation management are highly seperated from ocean science and result in failure towards mitigating marine biodiversity loss (Robb et al., 2011; Watson & Hewson, 2018).

2.3. Marine Protected Areas and their Inconsistencies

Marine protected areas are defined as "…intertidal or subtidal terrain, together with its overlaying water and associated flora, fauna, historical and cultural features, which has been reserved by law or other effective means to protect or all of the enclosed environment" (Kelleher & Kenchington, 1992, p.7); MPAs have been implemented across the globe to address marine biodiversity loss (Kelleher, 1999; Laffoley, 2018). When successful, MPAs provide protection to marine ecosystems and support local communities; socially and economically (Ban et al., 2019). In contrast, concerns have been raised regarding inconsistency among MPAs, specifically pertaining to their variable levels of protection, conservation outcomes and overall quality (Laffoley et al., 2018). As outlined by Wilhelm et al. (2014), increases of global MPA coverage has been result of the implementation of several large MPAs. Faulty conservation efforts are common among large MPAs due to lack of resources, funding, surveillance, and technologies (Wilhelm et al., 2014). Barnes et al. (2018) builds on this argument by stating current marine conservation efforts are focused on quantity (e.g., precent area coverage to meet national and international targets), not quality.

Discrepancies in MPA management contribute to the production of "paper parks"; a term used to describe MPAs that are legal in a documentation context but fail to contribute adequately to marine conservation due to insufficient management or enforcement (Pieraccini et al., 2016). Due to lack of considerate standards towards protection, many Canada's MPAs serve as an example for paper parks. Watson & Hewson (2018) argue that extractive activities, such as fishing and oil prospection, should not be permitted inside Canada's MPAs. Likewise, Kapoor et al. (2021) claims petroleum and economic benefits are being prioritized over conservation in Canada's Atlantic water ecosystems, which may undermine conservation efforts all together.

2.4. The MPA Guide: A new tool for assessing ocean protection

In response the various inconsistencies and challenges associated with implementing effective MPAs, Grorud-Colvert et al. (2021) propose a new framework to utilize for MPA assessment, categorization, and planning. The concept of the framework is formulated from the IUCN Protected Area Categories and fills gaps by delivering a tool for evaluating protection level and established stage measurements (IUCN WCPA, 2018).

The MPA Guide primarily focuses on the assessment of protection level (Grorud-Colvert et al., 2021). It uses relevant scientific research and policies to address what human impacts (such as oil/gas, dredging dumping, anchoring, infrastructure, aquaculture, fishing, non-extractive/recreation) correlate with various protection levels, ranging from fully protected to incompatible with the conservation of nature. Variations such as activity type, intensity, frequency, and duration are all considered when determining protection level. For example, under the fishing category, cast nets and spearfishing are considered small scale and low impact and can be compatible with a 'highly protected' status. Alternatively, bivalve dredging and driftnets are considered large scale and large impact and indicate that an MPA is 'minimally protected'. Additionally, the framework assesses stage of establishment, enabling conditions and gives estimates on ecological outcomes. Grorud-Colvert et al. (2021) propose that their guide can be used to increase transparency about protection levels within MPAs, as well as suggest potential areas of improvement for enhanced future biodiversity.

3. Methods

In this MRP I used a mixed methods approach to analyze protection levels of Atlantic Canada's MPAs using the MPA Guide (details below). In Phase 1, I compiled data on prohibited and permitted activities within each MPA by reviewing the associated regulatory documents and academic studies (e.g., Government regulations, management plans, journal articles). In Phase 2, I extracted geospatial data for Canada's 8 Atlantic MPAs, drawing on publicly available data (i.e., Global Fishing Watch, CNSOPB, etc.) for the seven types of activities identified in the MPA Guide (Grorud-Colvert et al., 2021). In Phase 3, I utilized the findings from Phase 1 and 2 to assess levels of MPA protection using the MPA Guide decision tree tool. This approach has been adapted from a similar study that assessed levels of protection in MPAs in other locations by Roessger et al., 2022.

3.1. Phase 1: Regulatory Data Compilation

To begin Phase 1, I compiled a list of Atlantic Canada's MPAs that are contributing to Canada's target percentage of protected marine areas. This list was extracted from the Government of Canada websites, specifically those authorized by the Department of Fisheries and Oceans (DFO): https://www.dfo-mpo.gc.ca/oceans/mpa-zpm/index-eng.html and https://www.dfo-mpo.gc.ca/oceans/conservation/areas-zones/index-eng.html. Information

pertaining to the location, size and establishment date was recorded in an Excel spread sheet to form a basis for data extraction. Presence of active management plans with corresponding hyperlinks was also documented and kept in this Excel file for an easy reference point of general statistics concerning each site.

Next, and adapted from the methods employed by Roessger et al. (2022), regulations relating to the seven human activities – as outlined in *the MPA Guide*: *fishing, dredging, oil/gas, aquaculture, anchoring, infrastructure*, and *non-extractive activities* - were collected using the Advanced search engine on the Government of Canada Justice Laws website (Grorud-Colvert et al., 2021). For areas composed of multiple Maritime Zones (i.e., internal waters, territorial seas, exclusive economic zones, and high seas), and that have various legal documents that contribute to their management strategy, all regulations will be considered collectively to provide the most accurate assessment of protection possible per site.

3.2. Phase 2: Geospatial Data Compilation

In Phase 2, to support and validate the data collected in the previous phase, I extracted geospatial datasets pertaining to Canada's eight Atlantic MPAs. I created maps for each MPA using ArcGIS Pro and geospatial datasets to visualize the overlay between Canada's Atlantic MPAs and degrading human activities. Only marine data was kept, and terrestrial data was omitted. Geospatial data was obtained through various publicly available sources: ArcGIS Online, Government of Canada Websites (DFO), and external organizations: Canada-Nova Scotia Offshore Petroleum Board (CNSOPB), Canada-Newfoundland Offshore Petroleum Board (CNLOPB), Global Fishing Watch. The source of all geospatial data was organized in the same Excel datasheet as previously referenced.

3.3. Phase 3: The MPA Guide: Protection Level Assessment

In Phase 3, I utilized the findings from Phase 1 and 2 to assess levels of MPA protection using the MPA Guide. Applying the framework created by Grorud-Colvert et al. (2021) the *MPA Guide* determined the level of protection for each MPA based on the decision tree assessment tool. Management plans, regulations, academic studies, and geospatial data as compiled in my Excel datafile provided the foundation for evidence-based answers in the decision tree steps, and created a path that represents the activity types occurring within each assessed site. The decision tree is composed of seven questions pertaining to the presence of oil/gas, dredging, anchoring, infrastructure, aquaculture, fishing, and non-extractive activities in each MPA, with fully listed activities correlating to the appropriate level of protection. For example, the first activity to consider is mining: "is mining, mineral oil and/or gas prospective or exploitation allowed?" The options to this question are "No – No mining, prospecting, or exploitation. No active pipelines allowed with potential to leak" or "Yes – Any mining, mineral oil and/or gas prospecting or exploitation, or active pipelines with the potential to leak, occur and may have impacts that are incompatible with the conservation of nature. E.g., for sand, gravel, minerals, oil, or gas". (Grorud-Colvert et al., 2021).

There are several aspects of the *MPA Guide* that can vary depending on the MPA being considered and the activities that are imposing its level of protection. Therefore, It was with best judgement that some categories were altered slightly to fit the requirements of the guide. For example, in question 3: “Is there any anchoring”, refers to anchoring as in releasing a metal object for the purposes of resisting the movement of a vessel. It does not necessarily pertain to the activity of navigation due to the nature of international shipping laws. However, in the case where there is potentially harmful navigation (i.e., consistent presence of oil tankers), navigation was considered in addition to the on-going anchoring.

Final decision tree outcomes ranged between five protection levels: fully protected, highly protected, lightly protected, minimally protected and incompatible with the conservation of nature. Lack of available data was dealt with on a case by case basis, depending on what activity was of interest. For example, official MPA regulations not mentioning infrastructure laws would represent a lightly protected MPA, while no mention of fishing laws will likely correlate with an incompatible MPA. The MPA Guide suggests that consulting managing authorities or MPA experts when needed to fulfill the tool requirements, however such activities were out of scope for the given MRP.

4. Results

Out of Atlantic Canada’s eight MPAs, 62.5% were found to be incompatible with the conservation of nature, 12.5% are minimally protected , 12.5% are lightly protected and only 12.5% are highly protected. Incompatible MPAs accounted for a total of 19, 316 km^2 or 0.34% of Canada’s National Ocean jurisdiction. The three MPAs that offer some level of protection and benefit to biodiversity accumulate to 69 km^2. This 69 km^2 accounts for 0.004% of Canada’s Atlantic estate, or 0.0012% of Canada’s National Ocean jurisdiction. Based off this analysis, Canada’s conservation efforts from federal MPAs towards 30x30 targets should be lowered from 11.76% to 11.44%.

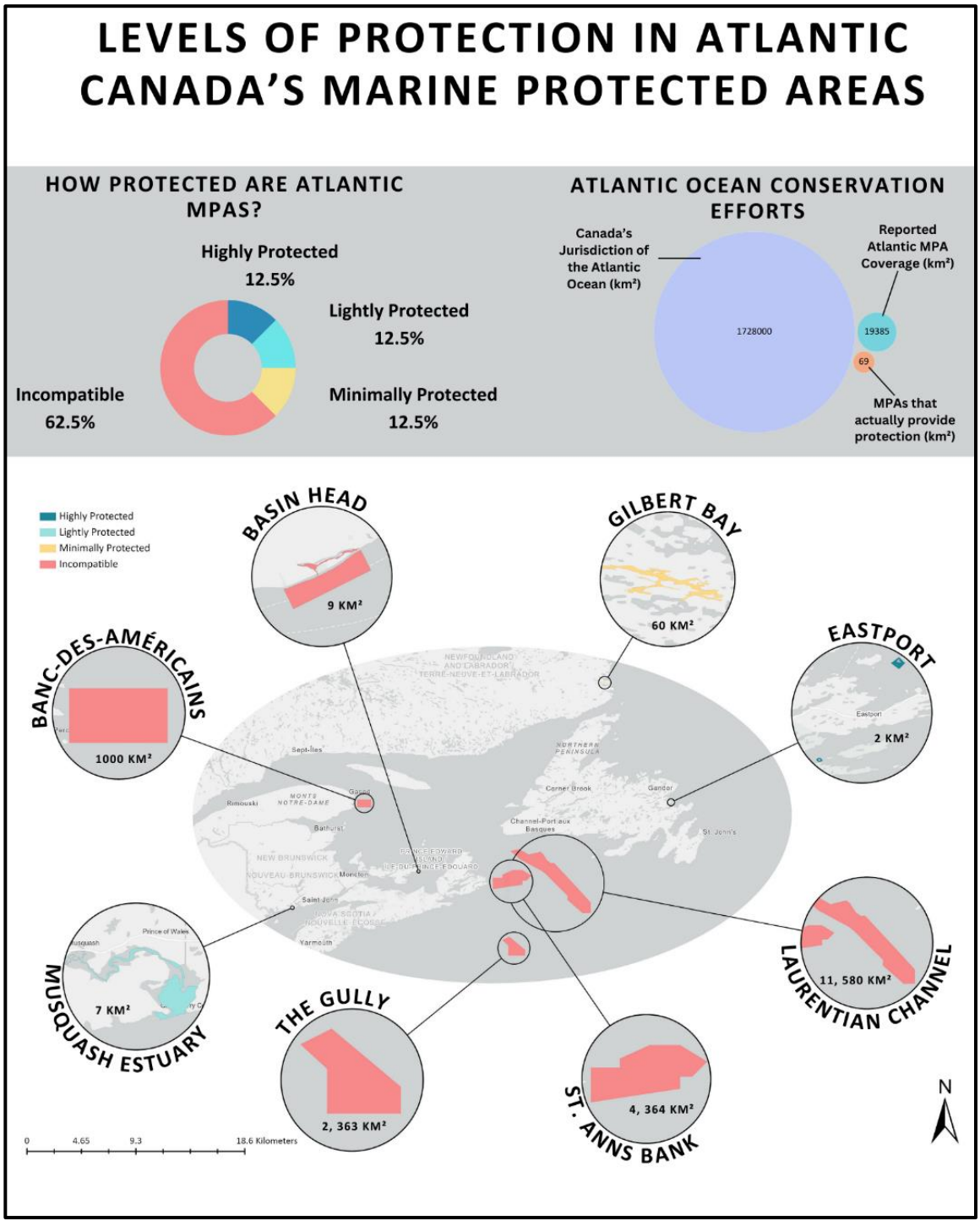

Figure 1. Levels of Protection in Atlantic Canada's Marine Protected Areas. The following infographic summarizes the inconsistent protection levels of Atlantic MPAs. Pink MPAs are those that offer no benefit towards biodiversity, while yellow, teal and blue offer some benefits. No Atlantic MPAs are fully protected.

4.1. Banc-des-Americains

The Banc-des-Americains MPA was determined to be incompatible with the conservation of nature. In response to question 2: “Are dredging and dumping allowed?”, incompatibility was indicated by the answer of “yes” (Fig. 2). The Banc-des-Americains MPA regulations state that if a vessel is navigating through the boundaries of the MPA and is less then 400 gross tonnes (GT) and/or carrying less then 15 people, discharging greywater water is permitted (see Table B1 in Appendix B). Automatic Identification System (AIS) data obtained from Global Fishing Watch (GFW) tracked approximately 42 hours from 14 vessels that qualify for dumping permissions, assuming their capacity is less then 15 people. The most frequent vessel, *Anita Bernard*, is a 21.64 metre-long industrial trawler that weighs 125 GT and has spent eight hours in Banc-des-Americains since January 1, 2023 (Fig. 3; see Table B1 in Appendix B).

To further confirm this incompatibility, in response to question 6 “Is fishing allowed?”, Banc-des-Americains responded “Any gear that is incompatible with biodiversity conservation, including industrial” due to high volumes of destructive fishing. GFW tracked 360 hours of active fishing in Banc-des-Americains between 11 vessels since January 1, 2023 (see Table B1 in Appendix B). The most prevalent fishing vessel was *Calypso Gespeg*, a 20 metre-long industrial trawler with 110 tracked hours of trawling.

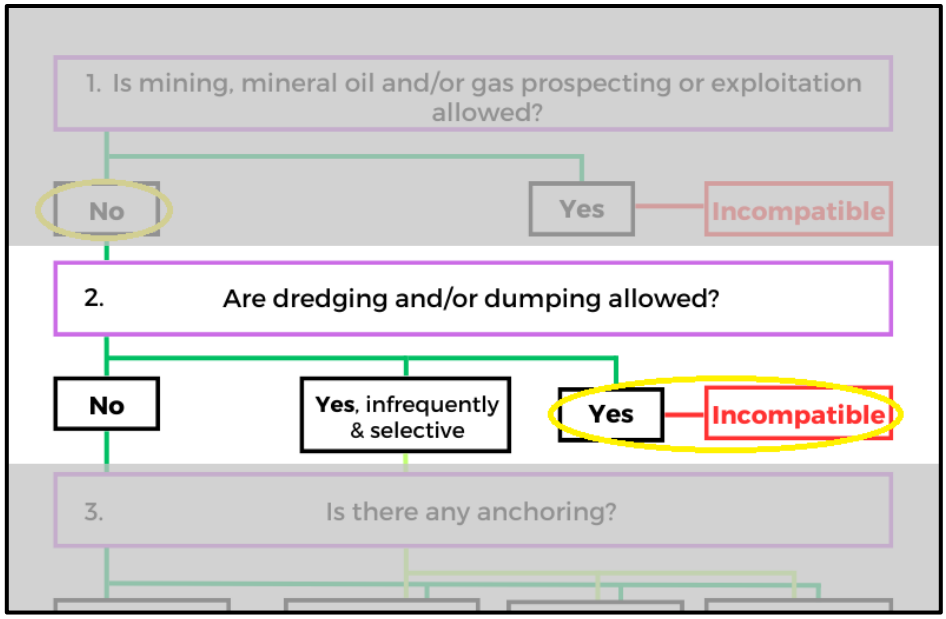

Figure 2. MPA Guide Decision Tree to determining the level of protection for Banc-des-Americains. Banc-des-Americains was deemed incompatible for conservation in question 2: “Are dredging and /or dumping allowed?” with the answer “yes”. The following decision tree was adapted from Grorud-Colvert et al., 2021.

Figure 3. Trawling vessel *Anita Bernard*. The following vessel is 21.64 metres long and weighs 125 gross tonnes, authorizing it for dumping within the Banc-des-Americains boundaries assuming the crew is less than 15 people. It has had eight tracked hours in MPA since January 1, 2023. (Photo credits: Eric Lanteigne of Marinetraffic.com.)

4.2. Basin Head

Basin Head MPA was determined to be incompatible with conservation on nature. In response to question 2: “Is dumping or dredging allowed?”, Basin Head corresponded with “yes” due to inconsistent agriculture runoffs from nearby farming operations (Fig. 4; Fig. 5), where nitrate concentrations were measured between 125-275 umol/L at various sites in 2017 (see Table B2 in Appendix B). Furthermore, Government led dredging projects have been periodically occurring since 2019 to clear navigation channels prone to erosion in the area, although all attempts have been unsuccessful in mitigating the problem and annual dredging has been required (see Table B2 in Appendix B).

To further confirm this incompatibility, Basin Head regulations are lenient with fishing allowances by permitting commercial fishing under the Atlantic Fishery Regulations 1985 or the Maritime Provinces Fishery Regulations in zones 2 and 3 (see Table B2 in Appendix B). GFW did not track any active hours of this occurring, but the leniency alone is concerning for conservation efforts (see Table B2 in Appendix B).

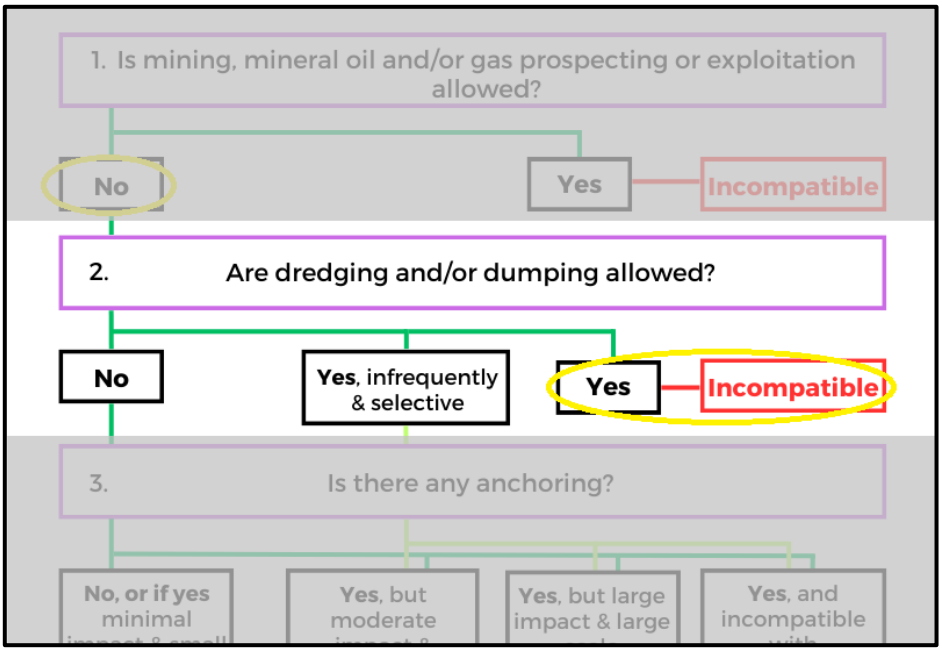

Figure 4. MPA Guide decision tree to determining the level of protection for Basin Head Marine Protected Area. Basin Head was deemed incompatible for conservation in question 2: "Are dredging and dumping allowed?", with the answer "yes". The following decision tree was adapted from Grorud-Colvert et al., 2021.

Figure 5. Aerial view of zone 1 and zone 2 of Basin Head Marine Protected Area. The red area makes up zone 1 and 2 of Basin Head Marine Protected Area. Surrounding, are the various agricultural operations that contribute to the efflux of nitrate found in soil samples. (Photo credit: Bob Semple, DFO Website).

4.3. Eastport

Eastport MPA was determined to be highly protected. Eastport correlated with a highly protected MPA by responding “No” to questions pertaining to oil, dredging, anchoring, infrastructure, aquaculture, and non-extractive activities (Fig. 6; see Table B3 in Appendix B). Question 6: “Is fishing allowed?” responded with “Yes, only minimal and low impact…” due to evidence towards most fishing for the purpose of research and educational purposes (Fig. 6; Fig. 7; see Table B3 in Appendix B). There was also evidence that some recreational fishing occurred only by qualifying community members, at very low impact, and at high regulation through the effective co-management strategies between community members and governing bodies. This response to fishing was responsible for downgrading the protection level of Eastport MPA from fully protected to highly protected.

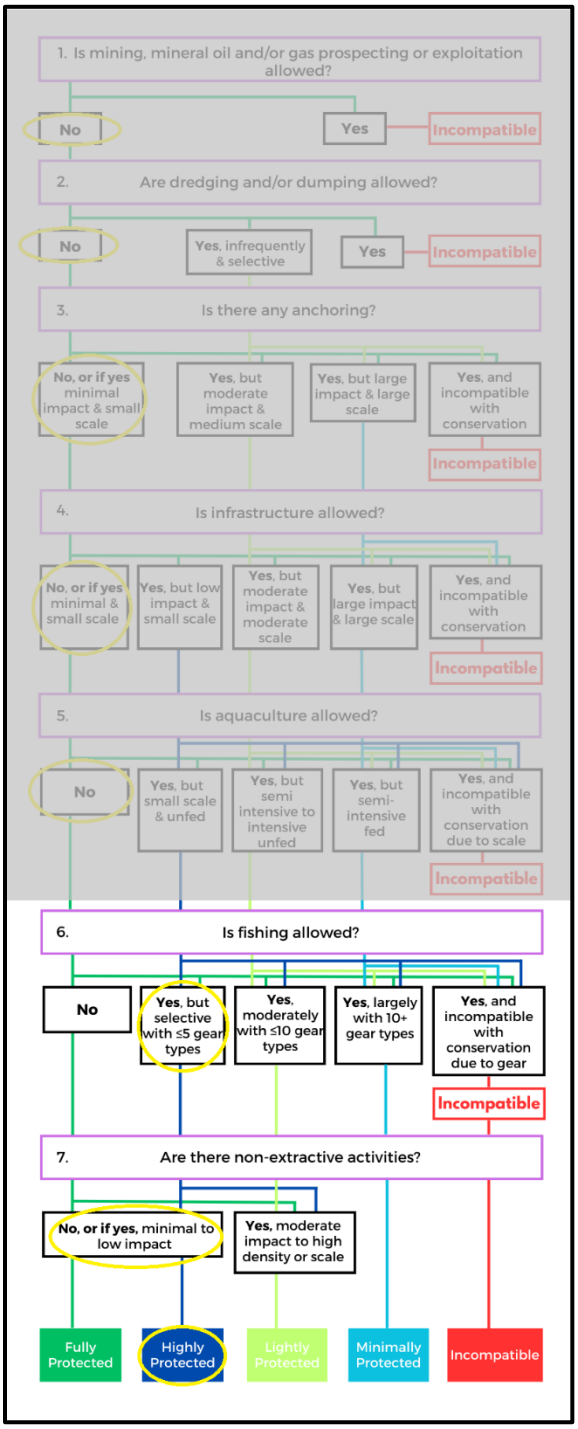

Figure 6. MPA Guide Decision Tree to determining the protection level for Eastport Marine Protected Area. Eastport was deemed highly protected, influenced by question 6: “Is fishing allowed?” with the answer “Yes, moderately with <10 gear types”. The following decision tree was adapted from Grorud-Colvert et al. 2021.

Figure 7. Lobster monitoring occurring at Eastport MPA. A DFO scientist is performing an analysis on a lobster obtained from Eastport MPA. On going monitoring programs look to track the biological condition and ecological standing of lobsters, as well as larval drifts and juvenile populations. (Photo Credit: Jennifer Janes, DFO-Eastport MPA Management Plan)

4.4. Gilbert Bay

Gilbert Bay MPA was determined to be minimally protected. Gilbert bay responded “No” to questions pertaining to oil, dredging and aquaculture (questions 1, 2, 5) by having adequate regulations and no applicable GIS data (Fig. 8). Slightly diminishing its protection level evaluation was its response to question 3 and 4 with “Yes, but low-impact and small scale” to the presence of anchoring and infrastructure (Fig. 8). Evidently, GFW tracked 5 hours of vessel presence within Gilbert Bay since January 1, 2023, implying to a potential of minor anchoring and navigation (see Table B4 in Appendix B). There have also been signs installed for navigational purposes within the MPA, counting towards low-impact infrastructure (see Table B4 in Appendix B).

For question 6: “Is fishing allowed?”, Gilbert Bay responded with “yes, high number (more then 10) gear types that are large impact, but not industrial” because of lenient regulations that allow recreational and commercial angling, gillnetting, and trawling in zones 2 and 3 (see Table B4 in Appendix B). There is no current GFW data to supplement these fishing allowances. Extraction operations as such could possibly correlate with an incompatible MPA because of the “commercial” dredging, however DFO limits dredging to special licenses and requires vessels to be smaller then 35 feet, making them small enough to not be considered “industrial” as per the MPA guide.

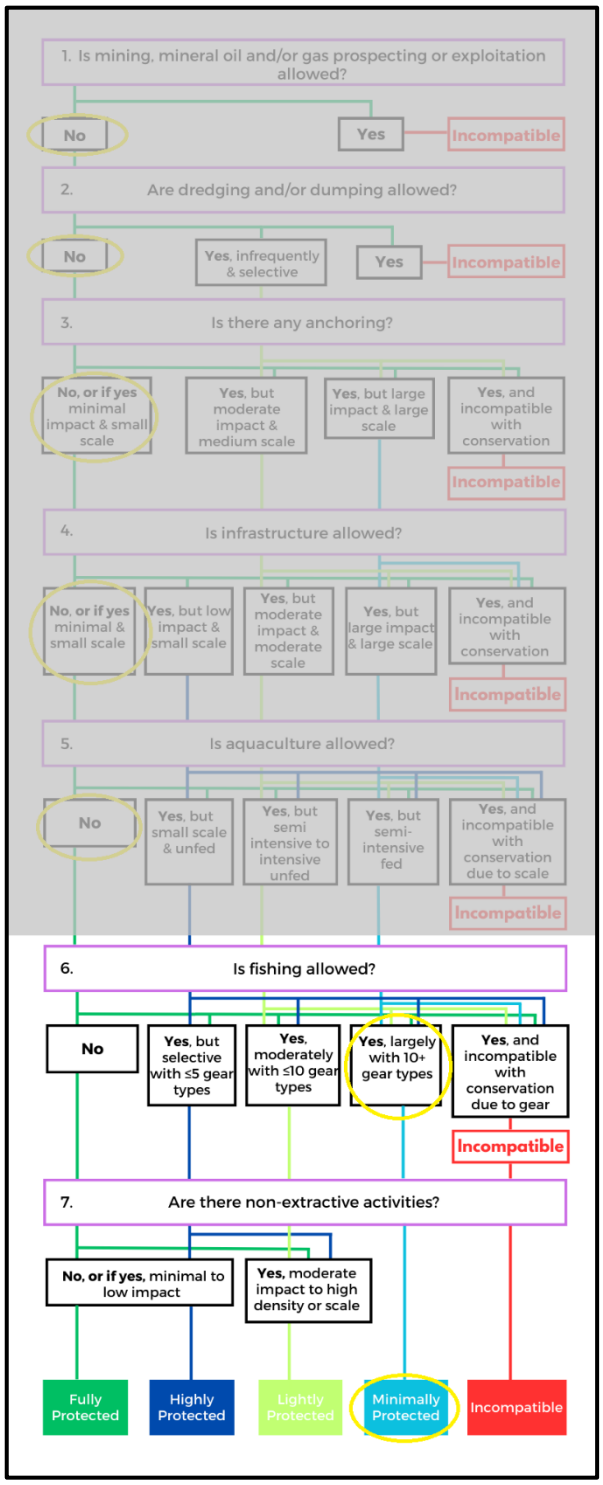

Figure 8. MPA Guide Decision Tree to determining the protection level for Gilbert Bay Marine Protected Area. Gilbert Bay was deemed minimally protected, influenced mainly by question 6: "Is fishing allowed?" with the answer "Yes, largely with 10+ gear types". The following decision tree was adapted from Grorud-Colvert et al. 2021.

4.5. The Gully

The Gully was determined to be incompatible with the conservation of nature. In response to question 1: “Is mining, mineral oil and/or gas prospecting or exploitation allowed?”, incompatibility was indicated with the answer “Yes” (Fig. 9). Historically, there has been oil prospecting and production within the Gully, as there is still a significant discovery license and oil well (plugged & abandoned) within the boundaries (see Table B5 in Appendix B). The willingness to still recognize this significant discovery, as well as keep the well plugged proves that there is a potential for the area if regulations were to ever loosen. Additionally, 2023 call for bids parcels are currently being evaluated. The proposed parcels, which if approved will become exploratory licenses, are approximately 1.18 km from the western boundary of the Gully (Fig.10).

To further confirm this incompatibility, there were several reasons as to why the Gully failed when it came to protection level (see Table B5 in Appendix B). In question 2: “Is dredging and dumping allowed?” the Gully responded with “yes” due to the regulations permitting deposition in zone 3, as zone 3 is considered a variation zone of the ecosystem. Likewise in question 6: “Is fishing allowed?”, the gully responded with “Any gear that is incompatible with biodiversity conservation, including industrial”. GFW tracked over 400 hours of fishing within the Gully between January 1 and September 1, 2023. These hours were from over 20 vessels of various gear types including gillnet, drift longline, set longline, trapping, and angling. *Final Answer* was one of the largest vessels tracked, being 45 metres long and operating with drift longline gears. The Gully regulations permit commercial fishing of such degrees, which is concerning and contradictory to conservation objectives.

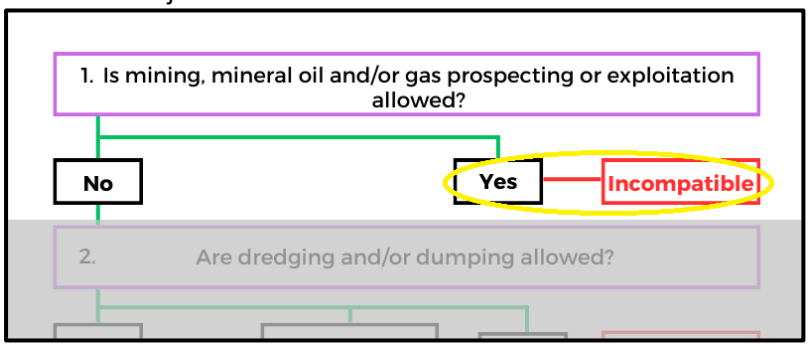

Figure 9. MPA Guide Decision Tree to determining the protection level for The Gully Marine Protected Area. The Gully was deemed incompatible with the conservation of nature, due to its high presence of oil prospecting in question 1. The following decision tree was adapted from Grorud-Colvert et al. 2021.

4.6. Laurentian Channel

The Laurentian Channel was determined to be incompatible with the conservation of nature. In response to question 3: “Is there any anchoring?”, Laurentian Channel corresponded to “Yes, and it is incompatible with the conservation of nature” due to its heavy presence of vessels in all zones (Fig. 10; see Table B6 in Appendix B). Although not permitted in zone 1A or 1B, there was

over 600 hours of vessel presence between zone 1A and 1B, and over 4,000 hours of vessel presence across the entire MPA from January 1, 2023 (see Table B6 in Appendix B). It can not be proven that these vessels were anchoring, however there was a high presence of oil tankers and other cargo vessels that spent significant time within the MPA and could cause extreme damage to the environment if not controlled cautiously (see Table B6 in Appendix B). For example, *Solar Madelein* is a 183 meter long oil/chemical tanker from Singapore (Fig. 11). Between January 1 and September 1, 2023, it spent 42 hours within the Laurentian Channel; 7 of those hours were in zone 1B which is apart of its highly protected habitat of the MPA.

To further confirm its incompatibility, in response to question 6: "Is fishing allowed?", Laurentian Channel received another incompatibility classification due to GFW tracking 127 approximate hours of fishing within the MPA between January 1 and September 1, 2023. Gear types included fixed gear, gillnet, and trawler. *Cape Cordell*, an 18.64 meter fishing vessel spent approximate 18 tracked hours of fishing within Laurentian channel using trawling gears in 2023 (see Table B6 in Appendix B).

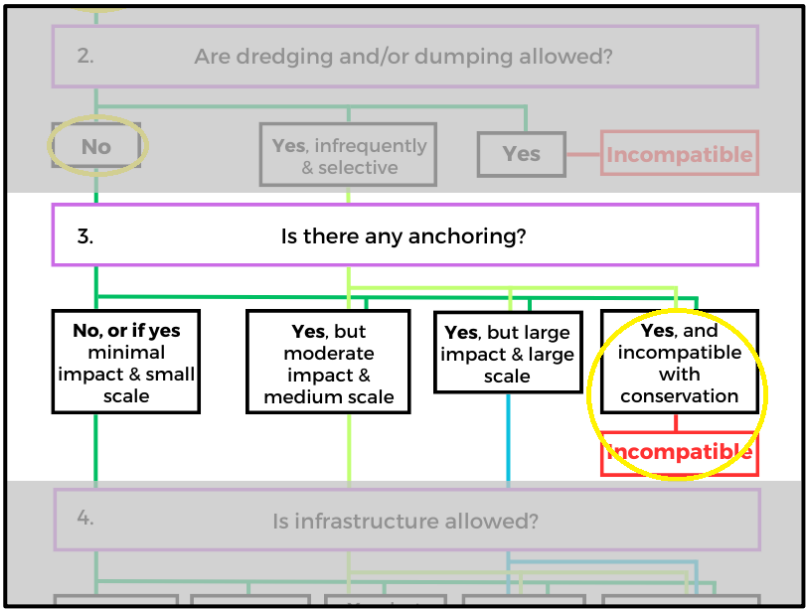

Figure 10. MPA Guide Decision Tree to determining the protection level for the Laurentian Channel Protected Area. Laurentian Channel was deemed incompatible with the conservation of nature, due to its heavy presence of harmful vessels navigating in question 3. The following decision tree was adapted from Grorud-Colvert et al. 2021.

Figure 11. Oil/chemical tanker *Solar Madelein* from Singapore. The following vessel is 183 metres long and weighs 29591 gross tonnes. It has had 42 tracked hours in the Laurentian Channel MPA since January 1, 2023. Although navigation cannot be stopped due to international shipping laws, there is no enforcement towards stopping vessels of such magnitude and concern from avoiding sensitive areas, like Laurentian Channel (Photo credits: Christian Baker of Marinetraffic.com.)

4.7. Musquash Estuary

Musquash Estuary was determined to be lightly protected. Musquash Estuary MPA responded with “No” to questions 1 and 5 pertaining to oil activity and aquaculture, however every other category (question 2, 3, 4, 6, 7) had some activity that is responsible for diminishing the protection level (see Table B7 in Appendix B; Fig. 12). In response to question 2: “Is there dumping or dredging?”, Musquash Estuary correlated with “Infrequent for select purposes” due to the allowance in the regulations to maintain navigation channels in zone 2A, meaning there may be restorative dredging at some point. Additionally, in response to question 6: “Is fishing allowed?”, the MPA regulations allow for recreational and commercial fishing but only using specific gears and for specific species. GFW didn’t track any active fishing hours in 2023, thus ensuring the impact is moderate and not high (Fig. 12).

Other categories pertaining to anchoring, infrastructure and non-extractive activities were all responded to with “Yes, only small scale…”. Musquash Estuary regulations don’t necessarily address anchoring, but they do allow low amounts of navigation and GFW did track minimal vessel presence within the MPA (see Table B7 in Appendix B). There are also various boardwalks, educational signs and enhancement areas along the natural intertidal areas that count towards infrastructure (Fig. 13). Lastly, non-extractive activities such as scuba diving, canoeing, and kayaking are all permitted anywhere within the MPA (see Table B7 in Appendix B).

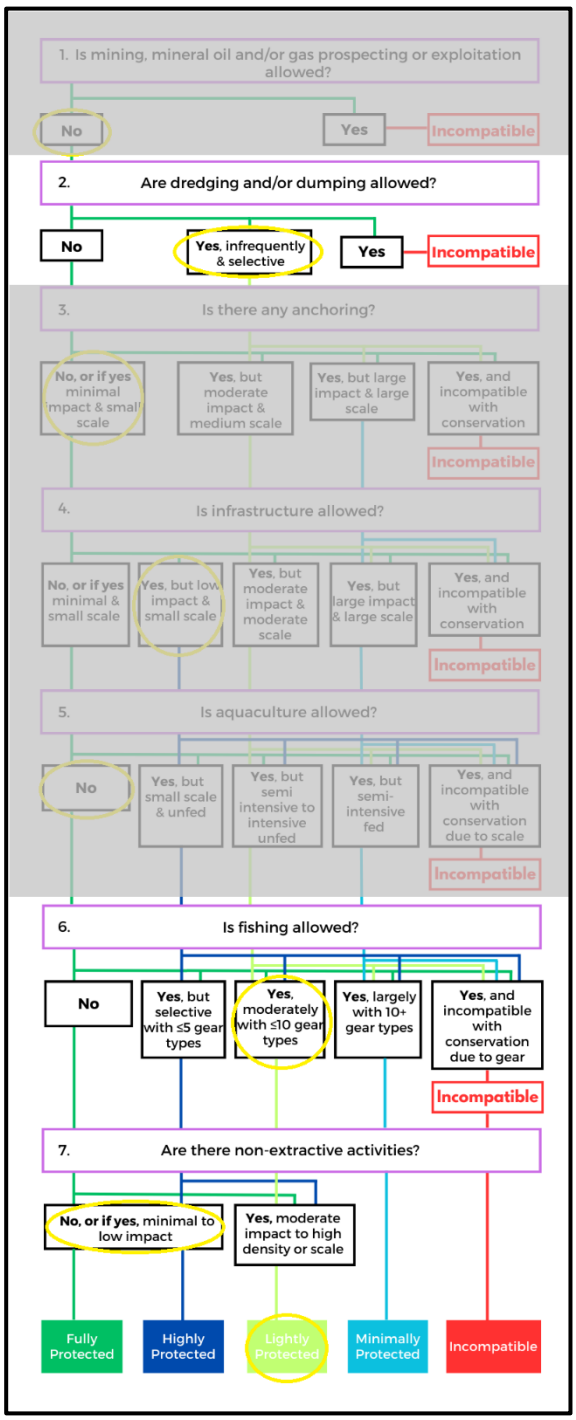

Figure 12. MPA Guide Decision Tree to determining the protection level for the Musquash Estuary Marine Protected Area. Musquash Estuary was deemed lightly protected, due to its lenient allowances for dredging and moderate fishing. The following decision tree was adapted from Grorud-Colvert et al. 2021.

Figure 13. Examples of infrastructure present within Musquash Estuary MPA. The following are examples of minimal, low impact infrastructure that focus on educational and safety purposes. (Photo credits: Jessica Corkum, DFO, Dave Thompson, Rabindra Singh; DFO, 2015)

4.8. St. Anns Bank

St. Anns Bank was deemed incompatible for the conservation of nature. In response to questions pertaining to oil, infrastructure, and aquaculture (question 1, 4, 5), St. Anns Bank answered “No” (see Table B8 in Appendix B). In contrary, in response to question 2: “Is there dumping or dredging?”, St. Anns bank corresponded with “yes” (Fig. 14). There was no explicit, regulatory prohibition of depositing or dredging, but current analysis state that ballast waster had no large impact on biodiversity (see Table B8 in Appendix B). This means that dumping of ballast water is occurring within the MPA.

To further confirm its incompatibility with conservation, in question 3: “is there any anchoring?”, St. Anns Bank answered “yes, incompatible with the conservation of nature” (see Table B8 in Appendix B). Navigation is permitted everywhere within the MPA, but it’s the heavy presence of oil tankers qualify it to be incompatible. Theres over 4,200 hours of GFW tracked vessel presence within St. Anns Bank from all types of vessels. *Cap Lara*, a 274.2 meter long oil tanker weighing 81,409 gross tonnes has spent 34 hours within St. Anns Bank since January 1, 2023 (Fig. 15).

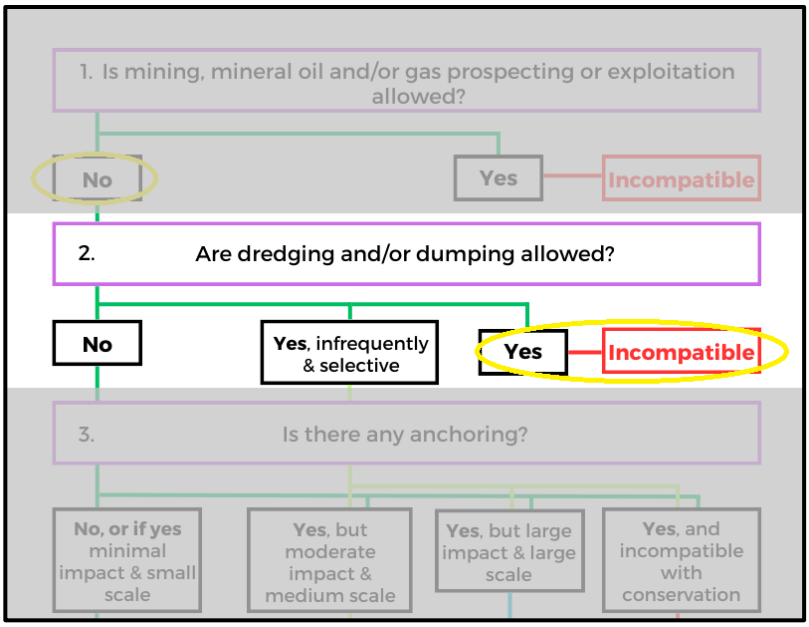

Figure 14. MPA Guide Decision Tree to determining the protection level for St. Anns Bank Marine Protected Area. St. Anns Bank was deemed incompatible for the conservation of nature, due to its lack of dumping/depositing regulations. The following decision tree was adapted from Grorud-Colvert et al. 2021.

Figure 15. Oil tanker *Cap Lara* from Liberia. Cap Lara has spent 34 tracked hours within St. Anns Bank MPA in 2023. It weighs 81409 gross tonnes and is 274.2 meters long. Shipping cannot be stopped within MPAs; however, it should be more heavily regulated due to their high potential to threaten underwater ecosystems. (Photo credit: Steve J. Henderson, Marinetraffic.com).

5. Discussion

Global biodiversity is declining at an unprecedented rate. MPAs are a conservation tool that can provide numerous benefits for underwater ecosystems, as well as local communities and economies (Mascia et al., 2010; Strain, et al., 2018). However, many MPAs fail to provide adequate protection and are more accurately characterized as "paper parks" because they allow destructive activities to occur such as fishing, dumping, and mining (Di Cintio et al., 2023). In this MRP, I employed a mixed approach to evaluate Atlantic Canada's eight MPAs. The approach utilizes both regulatory and geospatial information to form a deeper understanding of what is occurring within each MPA at the current time. This analysis revealed three key findings that may be of interest to future researchers, government officials, policy makers, NGOs, community members and stakeholders. First, the research shows that majority of Atlantic Canada's MPAs are not fully protected and offer little to no benefit towards biodiversity. Second, the research shows that the protection level assessment of incompatible MPAs was heavily influenced by mining, dumping, navigation and fishing. Lastly, the research demonstrates that a combination of grey literature (regulatory documents, management plans, etc.) and GIS data were important to accurately assessing the protection level of Atlantic Canada's MPAs. These three key findings are discussed here in turn.

5.1. Low protection levels in Atlantic Canada's MPAs

My first key finding emphasizes widespread levels of under-protection in Atlantic Canada's MPAs, as 62.5% were found to be incompatible with the conservation of nature. The analysis shows that Canada does not have one MPA on the east coast that is considered fully protected. Historically, Canada has acknowledged their insufficient management of conservation sites, and admittedly undermine the long-term commitment to biodiversity as outlined by the IUCN (Lemieux et al., 2019; Dudley, 2008). This suggests that inconsistencies in regulations, management and monitoring have led to a decline in prioritizing biodiversity protection, consequently resulting in the creation of several paper parks (Gill et al., 2017). Further, these results suggest that 99.64% of the reported kilometers that make up federal MPAs in the Atlantic Ocean are incompatible with the conservation of nature (DFO, 2023a).

Similar scenarios are seen on a global scale. For example, in the Mediterranean approximately 30% of the area found with MPAs offers some level of protection (Rossenger et al., 2021). This raises important concerns regarding the implementation of MPAs in Canada; whether implementation is intended for the conservation of biodiversity or whether Canada is rushing towards their 30x30 target (Lemieux et al., 2019). As other have argued, national governments that genuinely seek to reverse biodiversity loss should focus on biodiversity outcomes rather than area-based targets (Lemieux et al., 2019). These findings highlight the need for further research to determine why Canada is producing so many paper parks, and how efficient protection can be achieved. It also points towards the need for an analysis on other MPAs in Canada.

5.2. Drivers of Incompatibility in Atlantic Canada's MPAs

My second key finding underlines that incompatible MPAs are associated with activities involving oil, dumping, high-risk navigation and permitted fishing with multiple gear types. Previous events have shown that malfunctions in offshore drilling operations, unregulated dumping and failures in oil transportation can significantly alter marine habitats and species functions (de Oliveira Soares et al., 2020; Thakur & Koul, 2022) . Spreading of oil biofilms across seafloors and the accumulation of millions of tonnes of gaseous hydrocarbons in the deep sea are common outcomes of previous oil events (Joye et al., 2011; Silva et al., 2016). Indeed, the oil industry is a driver in socio-economic success, but the high-risk potential it holds over its surrounding environment should deter these activities from crossing paths with protected areas (Kapoor et al., 2021).

It is also important to note that 80% of incompatible MPAs were also found to be incompatible with the conservation of nature due to the presence of intense fishing. Fishing intensity and gear types are greatly correlated with protection level; the more impactful the fishing the less protected the MPA (Horta e Costa et al., 2016). For example, the Gully was found to have thousands of hours of tracked fishing using 10+ gear types including industrial trawling and longlines, making it incompatible. On the contrary, Eastport is Atlantic Canada's only no-take MPA and the only MPA to be deemed highly protected. This suggests that fishing may limit the potential to reaching higher protection levels, and Canada's conservation outcomes can be enhanced by more no-take MPAs (Campbell et al., 2017; Frid et al., 2023; Baliwe et al., 2022). No-take MPAs with suitable measures against fishing have been shown to provide enhanced biodiversity and increased species abundances (Baliwe et al., 2022). Critics of strict no-take zones argue that cutting off all fishing removes the socio-economic benefits from the MPA, while supporters claim no-take management styles support socio-economic development and empower community members (Andradi-Brown et al., 2023; Smallhorn-West et al., 2020).Undenibly the balance between social and ecological outomes offered by MPAs are ever-changing and complex, however it is true that current levels of oil, dumping, navigation and fishing in some of Atlantic Canada's MPAs do not align with conservation objectives. These concerns highlight the urgency to determine ways in which appropriate avoidance of these industries can be achieved, while stilll satisfying demands from economics and local communities. Fully understanding why these activities are permitted at such a level of degradation may also benefit implementation and management strategies in future MPAs.

5.3. Adopting marine spatial planning in data analysis

My third key finding highlights that a combination of grey literature (regulatory documents, management plans, etc.) and GIS data were important to accurately assessing the protection level of all Atlantic MPAs. For example, three of the incompatible MPAs (basin head, The Gully, Laurentian Channel) relied on a combination of grey literature and GIS datasets pertaining to activities such as navigation and fishing to confirm their inconsistent conservation efforts. This result suggests that aspects of Marine Spatial Planning (MSP) should be incorporated regularly into the monitoring and evaluation of MPAs to obtain the most accurate understanding of

ongoing human activities (Agardy et al., 2011). In comparison, a study by Canadian NGO CPAWS only used grey literature to analyze Canada's MPA protection levels and found drastically different results; stating that based on their analysis, none of Canada's MPAs are incompatible and all offer some level of protection (CPAWS, 2021). Indeed, regulatory and management based literature is crucial for clarity on MPA objectives and general usage, however regulations alone do not provide insight into non-compliance and quantity of said illegal activities (Worboys & Trzyna, 2015; Iacarella et al., 2021). MSP has been useful in focusing in on high priority habitats and areas facing the highest anthropogenic threats, allowing for resources, staff, and funding to be concentrated in a geographical area (Nelson & Burnside, 2019; Sletten, et al., 2021). This study acts as an example to demonstrate the applicability of MSP as an assessment and potential management tool for MPAs in Canada, further implying that there is a need for research on effective implementation strategies of MSP for maximum balance between socio-economic and environmental realms that make up MPAs (Picone et al., 2020; Trouillet & Jay, 2021).

5.4. Limitations

While this study provided an important preliminary assessment of the level of protection of MPAs in Atlantic, Canada, there are several limitations. First, this study was based only on publicly available data. Given the nature of the topic, it is very likely that industries of high governmental regulation, such as oil and shipping do not make all their documentations or GIS datasets publicly available. Future research that explores protection levels based on interviews, with MPA managers and policy makers for example, could offer valuable insights. Secondly, evaluating the degree in which some activities were affecting MPAs was a challenge. This was specifically evident for the infrastructure category. As stated in the MPA Guide, infrastructure such as artificial reefs or wharfs that are often composed of harmful materials or emit certain chemicals are not compatible with conservation efforts. In my study, best judgement was used in a few cases where there was no literature pertaining to the materials that made up certain infrastructure found within MPAs. The final limitation is connected to the subjective nature of the MPA Guide. The MPA Guide, although a rigorous decision tool, is considerably flexible in its applicability and states that it is meant to be used as a general guide. When activities are not explicitly stated or represented in compiled data, users of the MPA Guide should draw on knowledge and consultation from managing authorities or MPA experts to find an appropriate answer. Performing consultations was out of scope for this research and not achievable at this time.

These limitations could be addressed in future studies by expanding the scope and lengthening the timeline. Conducting interviews with stakeholders or managing authorities would have alleviated the various unknowns in each category/MPA, and furthermore, traveling to Atlantic Canada to experience each MPA firsthand may have altered my analysis. Nonetheless, this study provides a rigorous break down of the current state of protection Atlantic Canada's MPAs.

6. Conclusions

Global biodiversity, and the human well-being it supports, is declining at extraordinary rates. In response to the pressing anthropogenic activities that degrade biodiversity, governments around the globe are working towards reaching 30x30 target of the Kunming-Montreal global biodiversity framework through the implementation of marine protected areas. However, many are concerned that the rush to meet global initiatives has resulted in the prioritization of quantity over quality.

In a seminal paper published in *Science*, a group of more than 30 interdisciplinary marine scientists proposed the MPA Guide, a decision tree tool that aims to help identify the level of protection within MPAs and connect these levels of protection with biodiversity outcomes (Grorud-Colvert et al., 2021). This study applied the MPA Guide to evaluate the levels of protection within Atlantic Canada's eight MPAs, and found that over half of the MPAs in Atlantic Canada are incompatible with the conservation of nature. Therefore, these incompatible MPAs can be characterised as paper parks.

It is evidence that most Canadian MPAs are not aligned with nature conservation goals and offer minimal to no protection for biodiversity. It is recommended that the Government of Canada reassess its current efforts towards effective marine conservation, reconsidering their priorities and developing a network of MPAs that benefit surrounding economies, communities, and environments. Reducing the exploitation of oil resources, including the travel of high-risk oil tanker travel, and the use of degrading fishing gears within MPAs would immediately improve the protection levels of various MPAs.

Going forward, future research could usefully evaluate the level of protection in MPAs in other parts of Canada (i.e., Arctic, Pacific), as well as in OECMs and marine reserves that are also being counted towards the 30x30 conservation initiative. A country-wide evaluation using this methodology will compile robust evidence towards accurate protection level assessments, and hopefully persuade Canada to increase their efforts in marine conservation to reach the 30x30 goal of effective and equitable conservation. Ultimately, transitioning from paper parks to protection should not only be of interest for environmentalists, but for policymakers, local community members, fishers and even government officials, if benefits from our oceans want to be sustained indefinitely.

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Appendix A: MPA Guide Decision Tree

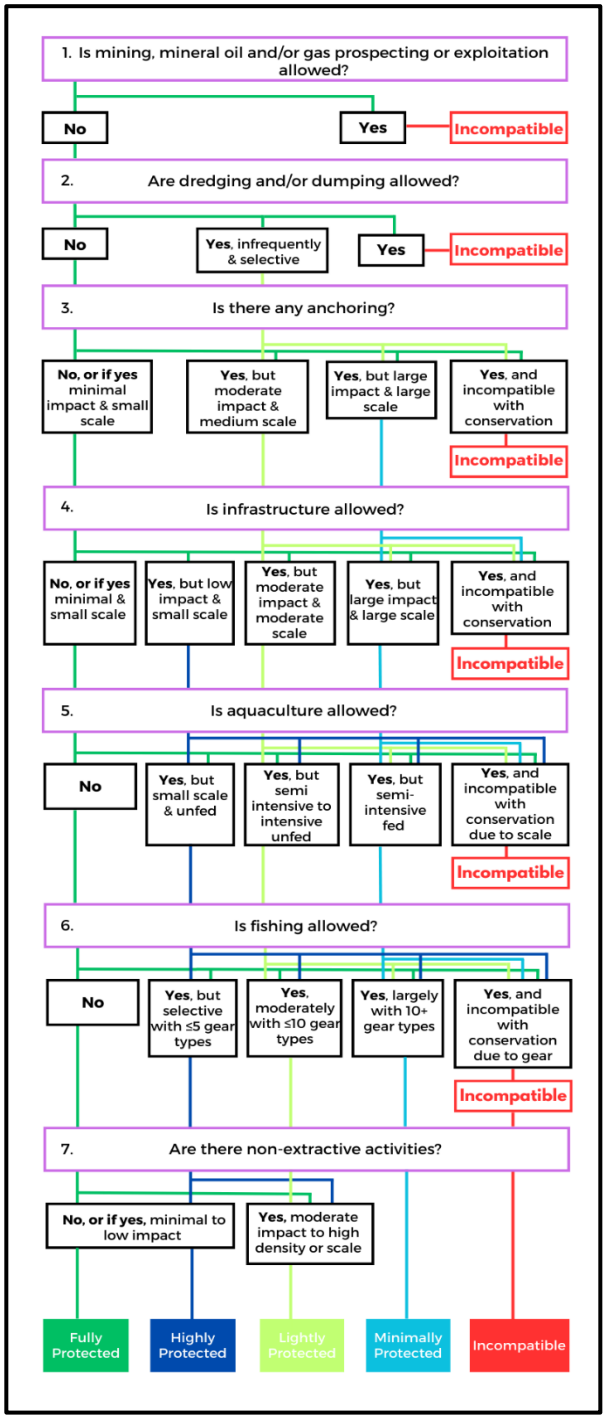

Figure 16. MPA Guide decision tree. The following decision tree was used to assess the protection levels of Atlantic MPAs, specifically by responding to the presence of human activities with evidence-based answers. The following decision tree was adapted from Grorud-Colvert et al., 2021.

Appendix B: MPA Guide Decision Tree Charts

Table B1. Decision tree table for Banc-des-Americains. The following table provides the break down for Banc-des-Americains' protection level evaluation, as per the MPA Guide decision tree. The table contains the regulatory evidence and GIS evidence that was used to conclude each question's answer, as well as the overall level of protection. Banc-des-Americains was found to be incompatible with the conservation of nature due to lenient dumping regulations.

	1. Is mining, mineral oil and/or gas prospecting or exploitation allowed?	**2. Is there dumping or dredging?**	**3. Is there any anchoring?**	**4. Is infrastructure allowed?**	**5. Is aquaculture allowed?**	**6. is fishing allowed?**	**7. Are non-extractive activities allowed?**	**MPA Level of Protection**
Banc-des-Americains	No.	Yes. Incompatible with the conservation of nature.	Yes, but only moderate impact, medium scale, moderate duration.	No infrastructure of any kind.	No aquaculture of any kind.	Any gear that is incompatible with biodiversity conservation, including industrial.	Yes, only minimal to low impact, low density and/or scale.	Incompatible with the conservation of nature.
Regulation/Law/Written Evidence	- Prohibited to carry out any activity that disturbs, damages, destroys, or removes any living thing or part of its habitat (SOR/2019-50) . - Currently no mining, exploration proposed or active in MPA (Oceans Act: Banc-des-Americains Marine Protected Area Regulations, 2018, p. 2706) .	- If vessel of 400 gross tonnes, or carriers more then 15 people, it must not discharge sewage or greywater (SOR/2019-50). - Organic and inorganic matter released from vessels, including untreated waste water (Faille et al., 2019).	- No anchoring in zone 1, no restrictions on zone 2 (SOR/2019-50).	- No mention of infrastructure in regulations.	- No mention of aquaculture in regulations.	- prohibited any activity that disturbs, damages, destroys, or removes from the MPA any living marine organism or part of its habitat (SOR/2019-50) - Aboriginal fishing OK (not commercial) (SOR/2019-50). - Exceptions: commercial fishing in zone 2 for select species via trap, longline, handline, angling. Recreational fishing in zone 2 via handline or angling (SOR/2019-50).	- Activity applications can be submitted for education, tourism, monitoring, etc. (SOR/2019-50) - Currently 5 tourism companies operating within the MPA (Oceans Act: Banc-des-Americains Marine Protected Area Regulations, 2018, p. 2706)	
GIS Evidence	- Seismic activity close to MPA boundaries, dated 1968 (CNSOPB, 2023).	- Active and inactive sea dumping site ~11 km from border of zone 2 (Active and Inactive Disposal at Sea Sites in Canadian Waters, 2018).	- GFW data Zone 1: 211 hours of vessel presence (01/01/23-08/01/23). Vessels include passenger, cargo, research, seismic (Excel data Z1 - Global Fishing Watch, 2023) - GFW data ZONE 2A: 581 hours of vessel presence (01/01/23-08/01/23). Vessels include passenger, cargo, research, seismic. (Excel data Z2A– Global Fishing Watch, 2023). - GFW data ZONE 2B: 933 hours of vessel presence (01/01/23-08/01/23). Vessels include cargo, passenger, fishing, seismic. (Excel data Z2B – Global Fishing Watch, 2023)	- No applicable data.	- Aquaculture site nearby, but not in MPA boundaries (Statistics Canada, 2022).	- GFW data zone 2A: 137 hours of apparent fishing efforts (01/01/23-08/01/23). Fishing gear consisted of fixed gear (traps, anchored gillnets) (Excel data FZ2A – Global fishing Watch, 2023) - GFW data zone 2B: 223 tracked hours of apparent fishing efforts (01/01/23-08/01/23). Fishing gear includes trawling, longline, pole. (Excel data FZ2B – Global Fishing Watch, 2023).	- Cap adventure (from GFW) and tracked on marinetraffic.com. Tourism company offers whale and dolphin sighting tours. Present in zone 1 & 2 (Marinetraffic.com, 2023)	
Additional Comments: Management plan currently under development. A lot of resources are available only in French.								

Table B2. Decision tree table for Basin Head. The following table provides the break down for Basin Head's protection level evaluation as per the MPA Guide decision tree. The table contains the regulatory evidence and GIS evidence that was used to conclude each question's answer, as well as the overall level of protection. Basin Head was found to be Incompatible with the conservation of nature due to nutrient loading from surrounding agriculture operations.

	1. Is mining, mineral oil and/or gas prospecting or exploitation allowed?	**2. Is there dumping or dredging?**	**3. Is there any anchoring?**	**4. Is infrastructure allowed?**	**5. Is aquaculture allowed?**	**6. is fishing allowed?**	**7. Are non-extractive activities allowed?**	**MPA Level of Protection**
Basin Head	No.	Yes. Incompatible with the conservation of nature.	Yes, but only small scale, short duration anchoring with low impact.	Yes, but minimal impact, small scale for specific purposes.	No aquaculture of any kind.	Any gear that is incompatible with biodiversity conservation, including industrial.	Yes, only minimal to low impact, low density, and small scale.	Incompatible with the conservation of nature.
Regulation/Law/Written Evidence	- Shall not disturb, damage, destroy or remove from the area, living marine organisms or part of its habitat (SOR/2005-293) - All of PEI to ban sand mining since 2008/09 to stop coastal erosion (CBC, 2009).	- shall not carry out any activity including depositing, discharging, or dumping of any substance…(SOR/2005-293) - Historically, eutrophication a threat due to input from groundwater and streams. Hypoxic events documented in 2021, results highly variable. Recommended to measure nitrogen loading. Agriculture operations surrounding Basin Head source of runoffs (DFO, 2022b). - Basin Head entrance channel was dredged but has been unsuccessful and continues to fill. Currently research is trying to understand sediment sources (DFO, 2022b).	- No motorized vessels permitted in zone 1. Motorized vessels permitted in zone 2, but only to launch and travel to zone 3. Motorized and non-motorized vessels permitted in zone 3 (DFO, 2022a).	- maintenance, repair or removal of bridge, wharf, boat launch in zone 2 and 3 permitted (SOR/2005-293) - New floating dick, picnic area on the shores of Basin Head (unclear what zone). Some educational additions (plaques, etc.) (CBC, 2019). -Existing dock seems to be made of mostly wood. (Corbett, 2020)	- Irish Moss currently being artificially cultures in laboratories. Potentially a sustained effort if decline continues (DFO, 2009).	- any activity that disturbs, damages, or destroys or removes any living marine organism or any part of its habitat (SOR/2005-293). - Aboriginal fishing OK (SOR/2005-293). - Recreational fishing and commercial fishing in zone 2 and 3 permitted, if in accordance with other relating acts (SOR/2005-293). -Trawling in zone 3 not permitted due to protection of lobster populations via SFA 24, scallop buffer zone means no scallop dragging (DFO, 2019).	- Activity applications can be submitted for education, tourism, monitoring, etc. Must be monitoring or to raise public awareness on the area if in zone 1 (SOR/2005-293). -No swimming, diving, or motorized vessels in zone 1. Swimming, diving, and motorized vessel launching allowed in zone 2. Swimming, diving, motorized vessel navigation allowed in zone 3 (SOR/2005-293). - Popular spot to jump off bridge and swim (Fraser, 2016).	
GIS Evidence	- No intersections with oil well data, however 2D seismic program near zone 3, from approx. 1970s (CNSOPB, 2023).	- No intersections (Active and Inactive Disposal at Sea Sites in Canadian Waters, 2018).	- Very little vessel activity (4 hours) in zone 3 (01/01/23-08/01/23). Of that 4 hours, 3 hours were from search and rescue (SAR) vessels. No activity in zone 1 or 2 (Excel Data Z3 – Global Fishing Watch, 2022).	- No intersecting GIS data (i.e., buoys, lights, navigations stations, etc.) (DFO, 2023)	- No aquaculture in or around MPA (DFO, 2023).	- No global fishing watch data in 2023 in any zone (Global Fishing Watch, 2023)	- No applicable datasets.	
Additional Comments: Purpose is to protect unique strain of Irish moss in Basin Head. Lots of invasive green crab, responsible for some Irish moss loss.								

Table B3. Decision tree table for Eastport. The following table provides the break down of Eastport's protection level evaluation, as per the MPA Guide decision tree. The table contains the regulatory evidence and GIS evidence that was used to conclude each question's answer, as well as the overall level of protection. Eastport was found to be highly protected due to its only harmful activity being minimal and highly regulated fishing that occurs from local residents.

	1. Is mining, mineral oil and/or gas prospecting or exploitation allowed?	**2. Is there dumping or dredging?**	**3. Is there any anchoring?**	**4. Is infrastructure allowed?**	**5. Is aquaculture allowed?**	**6. is fishing allowed?**	**7. Are non-extractive activities allowed?**	**MPA Level of Protection**
Eastport	No.	No.	No anchoring of any kind.	No infrastructure of any kind.	No aquaculture of any kind.	Yes, but infrequent use only a few (5 or fewer) gear types that are highly selective and low impact.	No non-extractive activities of any kind.	Highly Protected
Regulation/Law/Written Evidence	- Prohibited to carry out any activity that disturbs, damages, destroys, or removes any living thing or part of its habitat (SOR/2005-294).	- prohibited to carry out any activity including depositing, discharging, dumping…(SOR/2005-294).	- Prohibited to carry out any activity that disturbs, damages, destroys, or removes living this or its habitat (SOR/2005-194). - No clear exemptions form vessel navigation/anchoring in MPA (SOR/2005-294)	- Buoys and signs in consideration for educational/informative purposes, but due to the winters and need for them to be removed seasonally, they were decided against (DFO, 2013a)	- Aquaculture sites prohibited within MPA, but there is potential for aquaculture in a large adjacent area (Regulatory Impact Analysis Statement: SOR/2005-294, 2005).	- Aboriginal fishing OK (SOR/2005-294) - Prohibited to carry out any activity that disturbs, damages, destroys, or removes any living thing or any part of its habitat (SOR/2005-294) - Surrounding Eastport Lobster Management Area prohibits harvests during mating seasons, has 150 trap limits, traps are to be specific dimensions, there is mandatory release of egg bearing females and v-notching. Only local residents are allowed to fish in management area (DFO, 2013a). -Various monitoring programs on lobster, wolffish (DFO, 2013a).	- Activity application can be submitted for education or scientific allowance (SOR/2005-294)	
GIS Evidence	- No intersecting data (CNLOPB, 2023).	- No intersecting data (Active and Inactive Disposal at Sea Sites in Canadian Waters, 2018)	- One hour of vessel activity around Round Island – Eastport (01/01/23-08/01/23). Vessel was a SAR (Excel data ZRI – Global Fishing Watch, 2023) - No GFW data for duck island – Eastport MPA .	- No applicable GIS dataset.	- No intersecting aquaculture sites (Department of Fisheries and Land Resources. 2017)	- No data from GFW (Global Fishing Watch, 2023)	- No applicable GIS dataset.	
Additional Comments: Purpose is for lobster conservation, both MPA sections are within a 400 km conservation area called Eastport peninsula lobster management area. The Eastport MPA Management plan ended in 2018. MPA is also criticized for being too small; not contributing to regional conservation goals.								

Table B4. Decision tree table for Gilbert Bay. The following table provides the break down of Gilbert Bay's protection level evaluation, as per the MPA Guide decision tree. The table contains the regulatory evidence and GIS evidence that was used to conclude each question's answer, as well as the overall level of protection. Gilbert Bay was determined to be minimally protected, due to low amounts of infrastructure and anchoring, and significantly destructive fishing.

	1. Is mining, mineral oil and/or gas prospecting or exploitation allowed?	**2. Is there dumping or dredging?**	**3. Is there any anchoring?**	**4. Is infrastructure allowed?**	**5. Is aquaculture allowed?**	**6. is fishing allowed?**	**7. Are non-extractive activities allowed?**	**MPA Level of Protection**
Gilbert Bay	No.	No.	Yes, only small-scale, and short duration with low impact.	Yes, but minimal impact, small scale for specific purposes.	No aquaculture of any kind.	Yes, high number (more then 10) gear types that are large impact, but not industrial.	Yes, only minimal to low impact, low density and/or small scale.	Minimally Protected
Regulation/Law/Written Evidence	- Shall not disturb, damage, destroy or remove any living marine organism or any part of its habitat (SOR/2005-295) -Oil and gas exploration in the future not specifically addressed; "…but do not foreclose on all opportunities in perpetuity" potentially alluding to future exploration in the future (Regulatory Impact Analysis Statement: SOR/2005-295, 2005).	- Shall not deposit, discharge or dump any substance (SOR/2005-295)	- Shall not disturb, damage, destroy or remove any living marine organism or any part of its habitat (SOR/2005-295) - Vessels larger then 35 ft. are restricted from zone 2 through variation order due to scallop fishery shortage (Regulatory Impact Analysis Statement: SOR/2005-295, 2005)	- With the right approvals, maintenance/repair of wharfs allowed in zone 1. Construction, maintenance/repair of wharfs allowed in zone 2. Construction, maintenance/repair on wharf, causeway, or bridge in zone 3 (SAR/2005-295) - Signs installed at each zone to indicate to users what zone they're in with allowances, etc. (DFO, 2013b)	- No mention of aquaculture in regulations.	- Aboriginal fishing OK (SOR/2005-295). - Fishing for seals permitted in all 3 zones (SOR/2005-295). - Recreational angling for arctic char, salmon, and trout in zone 1. Recreational fishing via angling and gillnetting for any species besides Atlantic cod permitted in zone 2 and 3 (DFO, 2013b). - Commercial fishing in zone 2 or 3 permitted except for Atlantic cod; gillnet fisheries and scallop dredging are permitted (DFO, 2013b) -Studies on cod populations permitted (Janes et al., 2009). - Open scallop fishery in zone 2 or 3; no quota and any boat less then 35 ft. and licensed with DFO can harvest scallops. Trawling is permitted (Wroblewski et al., 2009). - Article highlights new way to catch cod using cod pots. Says "a new approach to protecting gilbert bay cod is to promote the use of cod pots by commercial harvesters fishing near the MPA. Gillnets don't discriminate between which fish they catch and when they're caught they're dead." (The Navigator Magazine, 2018)	- Person may carry out prohibited activities if for scientific or education purposes. Must undergo application process (SOR/2005-295). - Traditional indigenous activities permitted (Regulatory Impact Analysis Statement: SOR/2005-295, 2005).	
GIS Evidence	- No intersecting data (CNLOPB, 2023).	- No intersecting sites (Active and Inactive Disposal at Sea Sites in Canadian Waters, 2018).	- 5 hours of vessel presence in zone 3. 3 of those hours are from fishing boats, 1 hour is from a SAR and 1 from a tender vessel (GFW Excel data – Global Fishing Watch, 2023) - No GFW data in any other zones.	- No applicable GIS dataset.	- No intersecting aquaculture sites (Department of Fisheries and Land Resources, 2017).	- No tracked fishing hours by GFW in 2023. Some fishing in the mouth of Alexis Bay which is about 7 km from zone 3 of Gilbert Bay MPA (GFW regional screenshot – Taken on Sept. 20, 2023)	- No applicable GIS datasets.	
Additional Comments: Purpose it to conserve and protect Gilbert Bay Cod and its habitat. Climate change is a worry because gilbert bay cod need sub-zero coastal waters to survive. Management plan ended in 2018.								

Table B5. Decision tree table for The Gully. The following table provides the break down of The Gully's protection level evaluation, as per the MPA Guide decision tree. The table contains the regulatory evidence and GIS evidence that was used to conclude each question's answer, as well as the overall level of protection. The Gully was determined to be incompatible with the conservation of nature due to it's oil/gas prospecting, dumping regulations and excessive fishing.

	1. Is mining, mineral oil and/or gas prospecting or exploitation allowed?	**2. Is there dumping or dredging?**	**3. Is there any anchoring?**	**4. Is infrastructure allowed?**	**5. Is aquaculture allowed?**	**6. is fishing allowed?**	**7. Are non-extractive activities allowed?**	**MPA Level of Protection**
The Gully	Yes.	Yes.	Yes, but large impact.	Yes, but minimal impact, small scale for specific purposes.	No aquaculture of any kind.	Any gear that is incompatible with biodiversity conservation, including industrial.	Yes, only minimal to low impact, low density, and small scale.	Incompatible with the conservation of nature.
Regulation/Law/ Written Evidence	- Prohibited to disturb, damage or destroy any living marine organism or part of its habitat, including the subsoil to a depth of 15 m of the seabed (SOR/2004-112). -Prohibited to carry out any activity including depositing, discharging, or dumping any substance in the MPA or in the vicinity of the area that is likely to result in the disturbance, damage, destruction, or removal of marine life (SOR/2004-112). - Areas near the gully have been given the right to significant discovery licenses. These grant the right to drill, test and produce offshore petroleum (As of 2017) - Canada-Nova Scotia offshore petroleum board (CNSOPB) require environmental assessment before drilling (Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act, 1988). - Recent offshore petroleum drilling activity in close proximity to the gully has ceased; decommissioned at the end of 2020 (DFO, 2022c). - No active exploratory licenses as of Jan. 17, 2022 (CNSOPB, 2022).	- No depositing, discharging, or dumping of any substance in the Gully or within the vicinity (SOR/2004-112) - Deposition (as referenced in paragraph 4) does not apply if the disturbance is limited to zone 3, and only occurs within zone 3 which is a natural variation zone of the ecosystem (SOR/2004-112)	- Prohibited to disturb, damage, or destroy any living marine organism or part of its habitat, including the subsoil to a depth of 15 m of the seabed. No additional mention of anchoring (SOR/2004-112). - 118 days where there was at least one commercial vessel in the gully. Occasionally two vessels a day (DFO, 2022c).	- Weather station at sable island, as well as buoy sites near by (DFO, 2010).	- No mention of aquaculture in regulations.	- Entire MPA closed to recreational fishing (DFO, 2017a). - Commercial hook & line fishing allowed in zone 2 & 3 for select species. There are a few fisheries that use longlines and pelagic longlines (DFO, 2017a). - Fisheries operate close by; crap traps, hagfish traps along the slopes, scallop dredging (DFO, 2017a). - Organisms may be removed from zone 2 or 3 with valid license; include swordfish, tuna, shark or groundfish (halibut) (SOR/2004-112). - Research vessel periodically using trawl gear within MPA (DFO, 2010). - Unauthorized fishing inadequately recorded (DFO, 2010).	- Activity applications can be submitted for research, monitoring, and tourism (SOR/2004-112). -tourism companies occasionally spend time in the gully to observe marine animals and seabirds. Academics occasionally travel with these tours to collect cetacean sightings and information on bottlenose whales (DFO, 2014). - Marine scientific investigations by foreign governments permitted under the compliant research consent by the minister of global affairs Canada (DFO, 2017a).	
GIS Evidence	- In active and active well sites extremely proximity to the gully. Active gas show in the gully (CNSOPB, 2023). - Current call for bids are literally right beside the gully (1.18 km away). Call for bids end sept. 19, 2023. If granted, will begin Jan 15, 2024. (CNSOPB, 2023).	No intersections via GIS dataset (Active and Inactive Disposal at Sea Sites in Canadian Waters, 2018).	- GFW Data zone 1: 160 hours of vessel presence (01/01/23-09/01/23). Vessel types include fishing, seismic, passenger, cargo. 50 vessels total (Excel data Z1 – Global Fishing Watch, 2023).	- GFW tracked several buoy presences in zone 1 and 2 (Excel data Z1 – Global Fishing Watch, 2023) (Excel Data Z2 – Global Fishing Watch, 2023)	- No aquaculture sites within the gully (Department of Fisheries and Aquaculture – Government	- GFW data zone 1: 15 hours of apparent fishing efforts from 8 vessels (0101/23-09/01/23). Gear types include longline, trapping, gillnet, and angling (Excel data Z1 –	- No applicable GIS dataset.	

			-GFW data zone 2: 661 hours of vessel presence (01/01/23-09/01/23). Vessel types include fishing, seismic, cargo. 144 vessels total (Excel data Z2 – Global Fishing Watch, 2023) - GFW Data zone 3 west: 77 hours of vessel presence (01/01/23-09/01/23). Vessel types include fishing, cargo, tankers. 37 vessels total (Excel data Z3W– Global Fishing Watch, 2023). - GFW Data zone 3 east: 57 hours of vessel presence (01/01/23-09/01/23). Types include cargo, fishing, and passenger. 37 vessels total (Excel Data Z3E – Global Fishing Watch, 2023).	- Potentially submarine cable in or close by. Cannot extract data set, can only use map therefore uncertain if there is precise overlap (Telegraphy, 2023)	of Nova Scotia, n.d.).	Global Fishing Watch, 2023). - GFW data zone 2: 347 hours of apparent fishing efforts from 14 vessels (01/01/23-09/01/23). Gear types include set gillnet, drift longline, set longline, angling and trapping (Excel data Z2 – Global Fishing Watch, 2023). - GFW data zone 3 west: 36 hours of apparent fishing activity by 7 vessels (01/01/23-09/01/23). Gear types include gillnet, drift longline, set longline and angling (Excel data Z3W – Global Fishing Watch, 2023). - GFW data zone 3 east: 10 hours of apparent fishing by 5 vessels (01/01/23-09/01/23). Gear type include drift longline, set longline, trap and angling (Excel data Z3E – Global Fishing Watch, 2023)		
Additional Comments: Purpose is to protect the health and integrity of the gully ecosystem. Zone 1 was legally declared in 2010 under the species at risk act as a critical habitat for the endangered Scotian shelf population of northern bottlenose whales (species has about 140 individuals left). Noise pollution is though to be an issue considering how many whales populate the area with near by petroleum industry.								

Table B6. Decision tree table for Laurentian Channel. The following table provides the break down of Laurentian Channel's protection level evaluation, as per the MPA Guide decision tree. The table contains the regulatory evidence and GIS evidence that was used to conclude each question's answer, as well as the overall level of protection. Laurentian Channel was determined to be incompatible with the conservation of nature due to its heavy navigation/anchoring potential and intense fishing.

	1. Is mining, mineral oil and/or gas prospecting or exploitation allowed?	**2. Is there dumping or dredging?**	**3. Is there any anchoring?**	**4. Is infrastructure allowed?**	**5. Is aquaculture allowed?**	**6. is fishing allowed?**	**7. Are non-extractive activities allowed?**	**MPA Level of Protection**
Laurentian Channel	No.	No.	Yes, and it is incompatible with conservation.	Yes, but moderate impact, medium scale.	No aquaculture of any kind.	Yes. Incompatible with the conservation of nature.	Yes, only minimal to low impact, low density, and small scale.	Incompatible with the conservation of nature.
Regulation/Law/ Written Evidence	- Prohibited to carry out any activity in the marine protected area that disturbs, damages, destroys or removes from the MPA; any living organism or part of its habitat (SOR/2019-105). - Oil production and exploration license expired in 2014 (Regulatory Impact Analysis Statement: SOR/2019-105, 2019). - Natural Resources Canada did analysis on the MPA and found it to have substantial conventional natural gas and unconventional gas hydrate with less oil potential. Current technological and economic factors limit the potential for extract (Regulatory Impact Analysis Statement: SOR/2019-105, 2019). - CNFLOPB had 3 project proposals for seismic activities targeted for areas within the MPA but does not have active exploratory licenses or active wells. Also, no intersection with call to bid parcels that are closing in Nov. 2023 (Regulatory Impact Analysis Statement: SOR/2019-105, 2019). - In spring 2019,Canada Gov. announced that regulations will prohibit future oil and gas as well as seismic surveys within the MPA (Regulatory Impact Analysis Statement: SOR 2019-105, 2019).	- Prohibited to carry out any activity that disturbs, damages, destroys or removes from the MPA; any living organism or part of its habitat (SOR/2019-105).	- Marine Navigation permitted if there's no anchoring in Zone 1A or 1B. No mention of anchoring in zone 2 (SOR/2019-205). - Gulf of St. Lawrence, as well as main shipping lanes pass through the MPA. Vessels include merchant, cruises, fishing. 4800-12299 vessels travel through the MPA with goods annually (Regulatory Impact Analysis Statement: SOR/2019-105, 2019).	- Installation, repair and maintenance of submarine cables in zones 2A and 2B will continue as long as they are not likely to destroy habitat (SOR/2019-105). - Submarine cables still present although most are inactive, still could crush corals if moved, etc. Potentially a threat in sensitive areas (Regulatory Impact Analysis Statement: SOR/2019-105, 2019).	- No specific exemption from aquaculture in regulations (SOR/2019-105).	- Aboriginal fishing OK but Miawpukek does not fish within MPA, therefore limited (Regulatory Impact Analysis Statement: SOR 2019/105, 2019). - Commercial and recreational fishing prohibited; fishing historically has caused a lot of damage to biodiversity via trawling, longlines, gillnets and pot gears (Regulatory Impact Analysis Statement: SOR/2019-105, 2019).	- Scientific monitoring or education permitted through activity application process (SOR/2019-105).	
GIS Evidence	- No direct intersections with oil data (bore holes, wells, etc.). There are historic 2D seismic surveys that go through the MPA, most are from the 70s (CNSOPB, 2023).	- No intersections in dataset (Active and Inactive Disposal at Sea Sites in Canadian	- GFW Zone 1A: 546 hours of vessel presence from 251 vessels (01/01/23-09/01/23). Vessel types include cargo, fishing, passenger, trawlers and oil tankers (Excel Data Z1A – Global Fishing Watch, 2023).	- 4 active submarine cables that are currently in service (Telegraphy, 2023).	- No intersecting aquaculture sites (Department of Fisheries and Land	- GFW Zone 1A: approximately 21 hours of fishing from 5 vessels (01/01/23-09/01/23). Gear types included fixed gear and trawler (Excel Data		

		Waters, 2018).	- GFW Zone 1B: 141 hours of vessel presence by 87 vessels (01/01/23-09/01/23). Vessel types include cargo, passenger, fishing, research, and oil tankers (Excel Data Z1B – Global Fishing Watch, 2023). - GFW Zone 2A: 2, 240 hours of vessel presence from 402 vessels (01/01/23-09/01/23). Vessel types include cargo, fishing, passenger, and oil tanker (Excel Data Z2A – Global Fishing Watch, 2023). - GFW Zone 2B: 1, 952 hours of vessel presence from 466 vessels (01/01/23-09/01/23). Vessel types include cargo, carrier, passenger, seismic, and oil tankers (Excel Data Z2B – Global Fishing Watch, 2023).		Resources, 2017).	FZ1A – Global Fishing Watch, 2023). - GFW Zone 1B: no fishing hours. - GFW Zone 2A: approximately 50 hours of fishing from 6 vessels (01/01/23-09/01/23). Gear include set gillnet, trawler and fixed (Excel Data FZ2A – Global Fishing Watch, 2023). - GFW Zone 2B: Approximately 56 hours from 6 vessels (01/01/23-09/01/23). Gear types include fixed gear and trawler (Excel data FZ2B – Global Fishing Watch, 2023).		
Additional Comments: Purpose is to protect corals and sea pens, as well as general biodiversity. Management plan currently under development.								

Table B7. Decision tree table for Musquash Estuary. The following table provides the break down of Musquash Estuary's protection level evaluation, as per the MPA Guide decision tree. The table contains the regulatory evidence and GIS evidence that was used to conclude each question's answer, as well as the overall level of protection. Musquash Estuary was determined to be lightly protected due to its general allowance of most low impact activities, such as educational infrastructure, moderate fishing, and minimal non-extractive activities.

	1. Is mining, mineral oil and/or gas prospecting or exploitation allowed?	2. Is there dumping or dredging?	3. Is there any anchoring?	4. Is infrastructure allowed?	5. Is aquaculture allowed?	6. is fishing allowed?	7. Are non-extractive activities allowed?	MPA Level of Protection
Musquash Estuary	No.	Infrequent for select purposes.	Yes, only small scale, short duration anchoring with low impact.	Yes, only minimal impact, small scale for specific purposes.	No aquaculture of any kind.	Yes, but moderate number (10 or fewer) gear types with moderate impact.	Yes, only minimal to low impact, low density and/or scale.	Lightly Protected.
Regulation/Law/Written Evidence	- Prohibited to carry out any activity that disturbs, damages, destroys, or removes any living thing or part of its habitat (SOR/2006-354) - Mining allowed to occur in the watershed outside of the loch boundaries (DFO, 2017b)	- prohibited to carry out any activity including depositing or causing any substance to be deposited, discharged, or dumped (SOR/2006-354). - Agriculture and forestry allowed to occur in watershed outside of the loch Alva protected area boundaries (DFO, 2017b). -Allowed to maintain navigational channel in zone 2A (SOR/2006-354).	- Vessel travel prohibited in zone 1. Travel permitted in zone 2 at speed no greater then 5 knots. Travel permitted in zone 3 at speed no greater then 8 knots (SOR/2006-354). - Moderate vessel activity; less then 10 local lobster vessels that regularly use the MPA during fishing season. No public boat launch but there is small activity of vessels for recreational purposes (DFO, 2017b).	- There are currently boardwalks, interpretation/educational signs, and enhancement of coastal features on the intertidal areas (DFO, 2017b). - Allowed to construct a boat launch, or maintain, repair or remove a wharf or boat launch, as well as maintain a navigation channel in zone 2A (SOR/2006-354).	- Aquaculture allowed to happen outside the loch Alva protected area boundaries (but still in the watershed (DFO, 2017b).	- Aboriginal fishing OK (SOR/2006-354). - Recreational fishing is permitted is fishing for scallops, clams manually or fishing for any species using a dipnet or angling (SOR/2006-354). - Commercial fishing permitted if fishing for elvers and eels using hand-deployed fyke or dip net in zone 1. Fishing for lobster using traps, and for herring using weir, beach seine, bar seine if drag seine in zone 2A, 2B or 3 permitted. Fishing for scallops in zone 3, as well as manually fishing for clams in any zone permitted (SOR/2006-354). - Dulse harvesting in 2A, 2B and 3 recreationally and commercially permitted (SOR/2006-354). - Lobster is the main fishery but seasonal. Small scallop fishery as well seasonally (DFO, 2017b).	- Activity applications can be submitted for education, tourism, monitoring, etc. (SOR/2006-354). - Swimming, canoeing, kayaking, scuba diving all permitted within the MPA (DFO, 2017b). -Hiking trails monitored by NCC (DFO, 2017b). - Annual Musquash paddle led by experienced guide through the MPA (DFO, 2015).	
GIS Evidence	- No intersecting concerns (CNSOPB, 2023).	- No intersection with dumping sites (Active and Inactive Disposal at Sea Sites in Canadian Waters, 2018).	- GFW Zone 1: no vessel presence. - GFW Zone 2A: 12 hours by 2 vessels (01/01/23-09/01/23). 8 of these hours were by a fishing vessel and 4 were from a SAR (Excel Data Z2A – Global Fishing Watch, 2023).	- No applicable data.	- Aquaculture sites nearby but none in MPA (New Brunswick Department of Natural Resources, n.d.).	- No GFW data.	- No applicable data.	

			-GFW Zone 2B: No vessel presence. - GFW Zone 3: 3 hours of vessel presence. Vessel types include a small-scale fishing dredger and SAR (Excel Data Z3 – Global Fishing Watch, 2023). - One anchorage site intersection (Open Government, 2020).					
Additional Comments: Purpose is to maintain the productivity and biodiversity including the physical and chemical properties of the ecosystem. Waters of the estuary below the ordinary water mark at low tide are a federal MPA. The crownlands and water between low tide and ordinary water mark are known as intertidal area.								

Table B8. Decision tree table for St. Anns Bank. The following table provides the break down for St. Anns Bank protection level evaluation, as per the MPA Guide decision tree. The table contains the regulatory evidence and GIS evidence that was used to conclude each question's answer, as well as the overall level of protection. St. Anns Bank was found to be incompatible with the conservation of nature due to non-existent dumping regulations, great amounts of damaging vessel navigation (i.e., from oil tankers) and mass amounts of fishing with destructive gears.

	1. Is mining, mineral oil and/or gas prospecting or exploitation allowed?	**2. Is there dumping or dredging?**	**3. Is there any anchoring?**	**4. Is infrastructure allowed?**	**5. Is aquaculture allowed?**	**6. is fishing allowed?**	**7. Are non-extractive activities allowed?**	**MPA Level of Protection**
St. Anns Bank	No.	Yes.	Yes, incompatible with the conservation of nature.	No infrastructure of any kind.	No aquaculture of any kind.	Any gear that is incompatible with biodiversity conservation, including industrial.	Yes, only minimal to low impact, low density and/or scale.	Incompatible with the conservation of nature.
Regulation/Law/Written Evidence	- Prohibited to carry out any activity that disturbs, damages, destroys, or removes from the MPA (SOR/2017-106). - Regulations prohibit oil and gas extraction, no known oil projects to be on going nearby in the future. However, the MPA is under CNSOPB and could be at risk to petroleum in the future (Regulatory Impact Analysis Statement: SOR/2017-106, 2017).	- No explicit prohibition of deposition (SOR/2017-106). - Ballast water exchanges were assessed as a low risk to conservation measures (Regulatory Impact Analysis Statement: SOR/2017-106, 2017).	- Navigation permitted anywhere within MPA (SOR/2017-106).	- No regulations on infrastructure (SOR/2017-206).	- No regulations on aquaculture (SOR/2017-106).	- Aboriginal fishing OK (SOR/2017-106). - Commercial and recreational fishing permitted in zone 2 if by pot, trap, reel & rod, harpoon, bottom longline, handline, gillnet and diving (SOR/2017-106). - Commercial and recreational fishing permitted in zone 3 & 4 by pot, trap, rod & reel, harpoon, bottom longline, and handline (SOR/2017-106).	- Scientific, monitoring, educational or tourism activities permitted through activity plan (SOR/2017-106).	
GIS Evidence	- No direct intersection with oil data, but there has been 2D seismic surveys done but they are from the 70s (CNSOPB, 2023).	- No active dumping sites in or near MPA (Active and Inactive Disposal at Sea Sites in Canadian Waters, 2018).	- GFW Zone 1: 2,801 hours of vessel presence from 579 vessels (01/01/23-09/01/23). Vessel types include oil tankers, cargo, fishing, passenger and carrier (Excel Data Z1 – Global Fishing Watch, 2023). - GFW Zone 2: 1,096 hours of vessel presence from 272 vessels (01/01/23-09/01/23). Vessel types include cargo, fishing, passenger, seismic, oil tankers and carrier. (Excel Data Z2 – Global Fishing Watch, 2023). - GFW Zone 3: 76 hours of vessel presence from 50 vessels (01/01/23-09/01/23). Vessel types include cargo, oil tanker,	- No applicable data.	- No intersections with aquaculture sites (Department of Fisheries and Aquaculture – Government of Nova Scotia, n.d.).	- GFW Zone 1: 25 hours of fishing from 4 vessels (01/01/23-09/01/23). Gear types include fishing and trawler (Excel data FZ1 – Global Fishing Watch, 2023). -GFW Zone 2: 41 hours of fishing from 5 vessels. Gear types include	- No applicable data.	

			fishery patrol, fishing and passenger (Excel data Z3 – Global Fishing Watch, 2023). - GFW Zone 4: 253 hours of vessel presence between 125 vessels (01/01/23-09/01/23). Vessel types include cargo, fishing, passenger and carrier (Excel data Z4 – Global Fishing Watch, 2023).			set longline, seins, set gillnets, and general fishing (Excel data FZ2 – Global Fishing Watch, 2023). - No GFW data for zone 3 & 4.		
Additional Comments: purpose is to conserve and protect all major benthic, demersal, and pelagic habitats within MPA. Management plan is under development.								