Moving forward: Addressing climate change in Canadian marine planning and policy

by

Cara Fogliato

B.A. (International Studies), Simon Fraser University, 2016

Project Submitted in Partial Fulfillment of the
Requirements for the Degree of
Master of Public Policy

in the
School of Public Policy
Faculty of Arts and Social Sciences

SIMON FRASER UNIVERSITY
Spring 2022

Declaration of Committee

Name:	**Cara Fogliato**
Degree:	**Master of Public Policy**
Title:	**Moving forward: Addressing climate change in Canadian marine planning and policy**
Committee:	**Chair:** **Genevieve LeBaron** Professor, Public Policy
	Maureen Maloney Supervisor Professor, Public Policy
	Mark Zacharias Examiner Visiting Professor, Public Policy

Abstract

Today's governments face increasingly wicked challenges in concerns over the marine environment which are exacerbated by climate change. Canada's sectoral approach to departmental mandates and twenty-five-year-old *Oceans Act* (1997) legislation have failed to incorporate climate change in marine planning. To conceptualize this problem, this study focuses on marine spatial planning (MSP) in British Columbia and examines the following research question: how to address the main barriers to the incorporation of climate change in MSP? The methodologies used include a literature review, document review, and case studies. The findings of this study suggest that there are some meta-level key strategies that can help set up more successful incorporation of climate change policy into MSP. These strategies include provisions in legislation, extensive policy guidance, and cross-collaborative governance structures.

Keywords: Marine policy; climate change policy; marine spatial planning; Canada; British Columbia; Fisheries & Oceans Canada

Acknowledgements

To my family and friends, thank you for your ongoing support. I am unable to name all of you, but I hope you know who you are. A special thank you to my parents for your unconditional love and support throughout my entire life. Thank you for pushing me to continue to grow and take on new challenges.

To my capstone supervisors, Nancy Olewiler and Maureen Maloney, thank you for being patient with answering all my questions, guiding me when I was hitting 'road blocks', and providing the reassurance I needed to finish capstone. It was a privilege to work with you both. Also, thank you to my examiner, Mark Zacharias for challenging me with your feedback and questions.

To my partner, Craig Bulloch, who pushed me to pursue a master's degree. I warned you about how challenging the two years ahead would be but you never waivered and supported me through the entire journey. You were not only there when I was frustrated, needed to cry, or needed a hug, but also to celebrate all achievements along the way. Thank you for always reminding me to stop and 'smell the roses'.

To my manager, Rebecca Reid, for believing in me, asking about my goals, and being supportive of me pursuing higher education. I will be forever grateful for not just working with you but also for the learning and mentorship I received from you.

Lastly, to my MPP friends, what a journey this program has been. We experienced a truly 'unprecedented' education during extremely challenging times. From our first Major Survey Project, Turkey Paper, and Case Competition, to the 8-month long capstone process, I appreciate bouncing ideas off you but more importantly, I appreciate the laughter and support you all provide. I learn so much from you all every time we interact and am forever thankful to have formed friendships with people I admire and respect so greatly.

Table of Contents

List of Tables

Executive Summary

Marine spatial planning (MSP) is internationally recognized and provides a practical tool for managing use of marine space while balancing demands of development, protection of the environment and cultural practices (IOC-UNESCO, n.d). In addition to social, economic, and environmental complexities, any plan will also need to consider a changing climate and related climate policies. Governments around the world are facing increasingly wicked challenges related to oceans including fish stock declines, food security, changing ecosystems, and reconciliation with Indigenous Peoples, all exacerbated by climate change. It is anticipated that these issues will only intensify in nature and that conflicts over ocean use will increase. Despite recognition of the importance of this issue, the literature reveals that most countries are rarely incorporating climate change and related policies into their marine plans.

Canada is among the numerous countries developing MSPs and there is increasing recognition that climate change will have profound effects on the marine environment (Prime Minister of Canada Justin Trudeau, 2021). A policy briefing committee recently examined Canada's progress on sustaining marine biodiversity and concluded that Canada has made little progress in the areas of (1) incorporating climate change in decisions on fisheries, oceans, or marine biodiversity; and (2) marine spatial planning to mitigate conflict as ocean-use pressures increase (Hutchings *et al.*, 2019, p. 2). **To conceptualize this problem, this study focuses on MSP in British Columbia and examines the following policy problem: Canada is not adequately incorporating climate change impacts and projections into marine planning.**

This research uses a mixed methods qualitative approach (consisting of a literature review, case studies, and document review) to gather information for analysis and develop policy recommendations. To note: the research on climate change science in relation to MSP is vast; however, it is beyond the scope of this paper which focuses specifically on climate change as a policy component of MSP. Distributional considerations and Indigenous considerations are also paramount to this topic; however, given the limited scope of this capstone, both are unable to be included in consideration.

The findings suggest that Canada's sectoral approach to departmental mandates and twenty-five-year-old *Oceans Act* (1997) legislation have failed to incorporate climate

change in marine planning. Although this problem is complex and requires multiple policy actions (at different levels), implementation of cross-governmental collaboration (in the form of a secretariat or interdepartmental steering committee for example) would constitute a big step forward for Canada in effectively incorporating climate change in marine planning. Complementary options include amending current legislation and providing extensive policy guidance which can be developed and approved by the new collaborative governance structure. The recommendations of this paper align with recent recognition and commitment in the latest departmental mandate letter from the Prime Minister to “modernize the *Oceans Act* to explicitly consider climate change impacts on marine ecosystems and species in regional ocean management, ensuring the Act provides for measurable progress indicators and objectives, and create a national, interdisciplinary working group focused on climate-resilient ocean conservation planning” (Prime Minister of Canada Justin Trudeau, 2021).

Chapter 1.

Introduction

Given “Canada has the world’s longest coastline, stretching more than 202,080 kilometers (125,000 miles) around its borders”, marine planning is vital to ensuring proper management of Canada’s expansive coasts and oceans (Marine Planning, 2022a). Marine spatial planning (MSP) is internationally recognized and provides a practical tool for managing use of marine space while balancing demands of development, protection of the environment and cultural practices (IOC-UNESCO, n.d). Despite recognition of the importance of this issue, the literature reveals that most countries are rarely incorporating climate change and related policies into their plans.

In Canada, there is increasing recognition that climate change is an existential threat and will have profound effects on the marine environment (Prime Minister of Canada Justin Trudeau, 2021). It is anticipated that issues affecting the marine environment will only intensify in nature and that conflicts over ocean use will increase. Therefore, it is essential that MSP take into account the current and future impacts of climate change in combination with other drivers of change. Important to note, is that the research on climate change science in relation to MSP is vast; however, it is beyond the scope of this paper which focuses specifically on climate change as a policy component of MSP.

Three decades ago, Canada was once seen as a leader in oceans management. Since then, Canada has made good progress in areas such as ocean stewardship, and biodiversity and conservation, as well as, surpassing the goal of protecting 10% of marine coastal areas by 2020 (Hutchings *et al*., 2019). However, the government has made little progress in the areas of (1) incorporating climate change in decisions on fisheries, oceans, or marine biodiversity; and (2) marine spatial planning to mitigate conflict as ocean-use pressures increase (Hutchings *et al*., 2019, p. 2). In the 2019-20 departmental plan, Fisheries & Oceans Canada (DFO) committed to looking to initiate MSP in five new areas of the country. To conceptualize this problem, this study focuses on MSP in British Columbia (BC) and examines the following policy problem: Canada is

not adequately incorporating climate change impacts and projections into marine planning.

This paper uses a mixed methods qualitative approach (consisting of a literature review, jurisdictional scan and case studies, and document review) to gather information for analysis and develop policy recommendations. Chapters 2 and 3 provide background information on MSP, climate change, and challenges of incorporation. Chapter 4 describes the methodologies used. Chapter 5 provides context for MSP and climate change and related policies. Chapter 6 and 7 provide information and key findings from the case studies. Chapter 8 generates policy options from the research. Lastly, Chapters 9 through 11 analyze the proposed policy options, provide recommendations and implementation considerations, and discuss areas for further research and concluding thoughts.

Chapter 2.

Background: MSP, Climate Change, & Challenges of Incorporation

2.1. What is MSP?

MSP is internationally recognized and provides a practical tool for managing use of marine space while balancing demands of development, protection of the environment and cultural practices (IOC-UNESCO, n.d). Santos *et al.* (2020) argue that **"**there is no one single definition for the term MSP and it can take on different forms in diverse areas of the world" (p. 2). However, there appear to be common pillars upon which MSP is built including conservation, economic, and cultural components. Broken down by sector, this can include: fisheries, energy, tourism, navigation, security with "the ultimate goal of MSP to foster economic growth related to maritime sectors in a sustainable way" (Santos *et al*., 2014, p. 62). MSP is broadly thought of as a holistic tool for supporting ecosystem-based management of the world's oceans (Ansong *et al.,* 2017, UNEP 2017, as cited in Rilov *et al.*, 2020, p. 4). It is often envisioned and implemented as large regional boundaries such as the well known Great Barrier Reef (Flannery *et al.*, 2016). Ideally MSP should be "integrated, future-oriented, participatory, adaptive, ecosystem-based, and area-based" and should answer three main questions (1) where are we today?; (2) where do we want to be?; and (3) how do we get there? (Ehler, n.d, p. 41).

MSP is typically deployed by government authorities (such as departments or agencies). When MSPs are prepared by national-level authorities, the plans typically cover exclusive economic zones; when plans cover territorial or coastal waters, they are typically prepared by sub-national authorities (Dr. Jay, 2017). The literature does discuss MSP in the context of international waters; however, the focus of this paper is on MSPs deployed at the national and sub-national levels.

2.2. How did MSP Develop?

Santos *et al.* (2020) explain that "in the 1990s a management process commonly known as MSP emerged" (p. 2). However, there were many developments in the marine

policy area that led to the wide adoption of MSP. The emergence of MSP first sprouted from the *United Nations Convention on the Law of the Sea* and the *Convention on Biological Diversity* which established the importance of Marine Protected Areas (MPAs) (Rilov *et al.*, 2020, p. 3). An MPA can be defined as “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” (Anon, n.d.). Over time, the international community witnessed a shift in the discussion from singular MPAs to what is known today as MPA networks: a “collection of individual marine protected areas that operates cooperatively and synergistically, at various spatial scales, and with a range of protection levels, in order to fulfill ecological aims more effectively and comprehensively than individual sites could alone" (Government of Canada, Fisheries and Oceans Canada, 2017b). Simply put, an MPA network is a collection of singular MPAs interacting together with the goal of meeting larger objectives that a singular MPA cannot achieve alone (Watson *et al.*, 2021). Important to note is that MPAs, or even a network of MPAs, may be one output of MSP; however, MSP is broader with multiple objectives to fulfill such as economic and cultural factors (Santos *et al.,* 2020).

In the early 2000s, the broader concept of ecosystem-based marine management developed, incorporating the concept of MPA networks within it (Rilov *et al.*, 2020). In the 21st century, MSP has “become the most commonly endorsed management regime for sustainable development in the marine environment” (Jay *et al.*, 2013 as cited in Flannery *et al.*, 2016, p. 121). Approximately 70 countries have MSPs in development with only 25 plans that are in the implementation phase (Santos *et al.*, 2020, p. 2).

2.3. Why is MSP being used?

Today’s governments face increasingly wicked challenges in concerns over the marine environment including fish stock declines, food security, changing ecosystems, and reconciliation with Indigenous Peoples, all exacerbated by climate change. For example, Carr L. (2019) found that “the global demand for seafood now exceeds 167m tonnes annually, with nearly 70% of production destined for direct human consumption” (as cited in FAO, 2016) and that “the world’s commercial fisheries, 58% of which are considered to be fully fished while another 32% are classified as biologically

unsustainable and overfished, land 94m tonnes" (Carr, L., 2019, p. 1). Fragmented management of oceans is not conducive to the sustainability of the ocean's resources nor environment. Therefore, many governments have turned to MSP as a tool for balancing these competing anthropogenic demands.

The bulk of the literature suggests that MSP is typically used for climate adaptation. However, some point out that MSP can be used as a form of climate change mitigation as well. For example, Santos *et al.* (2020) report that:

> "MSP can also contribute to climate mitigation by prioritizing the allocation of space (or facilitating the attribution of permits to the use of such space) to ocean uses and activities that choose to use new eco-efficient technologies and power sources that tend to zero emissions (for example, fuel-efficient shipping, electric engines, solar and wind power)—this way counteracting the normal contribution of such uses (for example, shipping, fisheries or tourism) to accelerating GHG emissions (Fig. 3, arrow 9) (p. 7).

Given the high level focus in this paper of Canada's approach to MSP, both climate change adaptation and mitigation are considered.

2.4. Advocates & Critics of MSP

Many proponents of MSP argue it "enables sectoral integration, incorporates hierarchical policies from the supra-national to the local, and seeks to anticipate and address future resource demands in a sustainable manner" (Claydon, 2006 as cited in Flannery *et al.*, 2016, p. 123). However, the literature also suggests that over time, the conservation component of MSP has been replaced with an increased focus on managing human disputes over marine space use (Merrie and Olsson 2014, as cited in Rilov *et al.*, 2020, p. 4). Further, the global ocean economy is growing and reliance is shifting from fishing and shipping to up-and-coming industries such as aquaculture, renewable energies, and tourism (NSM government, 2018). Therefore, MSPs tend to align with blue growth plans. Blue growth or blue economy strategies conceptualize marine environments as spaces for economic development (Rilov *et al.*, 2020). The 'blue economy' globally is growing; "the European Commission estimated that by 2030, this 'blue economy' is expected to be worth more than EUR 1.3 trillion in terms of value added and employment, more than double its current value" (State of New South Wales: Department of Industry, 2018, p. 69). This raises the question, as Santos *et al.* (2014) put forth, what is the long-term adequacy of MSP in terms of actually addressing

sustainability; “is it relying on hard or soft sustainability concepts… does it prioritize the achievement of [good environmental status] or rather blue growth?” (p. 61). There is skepticism when answering these questions; however, much of the literature suggests that if MSP is designed off an ecosystems-based approach, it can have positive impacts for marine conservation (Fraschetti *et al.*, 2018, Rilov *et al.* 2020). This reasoning remains a large justification for why MSP is being deployed by many countries.

The literature also flags concerns around the potential distributional effects of MSP. For example, Flannery *et al.* (2016) explain how “there has been comparatively little assessment of the potential negative impacts and possible distributive impacts that may arise from adoption” of MSP (p. 121). As discussed above, Carr L. (2019) points out that MSP has strong links to blue economy strategies, prioritizing economic growth, which in turn, will exacerbate conflict over shared marine space. Therefore, who will stand to benefit and lose from MSP remains a key question. Attention must be paid to the potential array of distributive effects of MSP. This is especially apparent in the face of climate change, as it’s often those who are least responsible for climate change, that are the most impacted or vulnerable to its effects.

2.5. Climate Change & the Marine Environment

Oceans and the marine environment continue to face significant threats and impacts from climate change. The Intergovernmental Panel on Climate Change *2019 Special Report on the Ocean and Cryosphere in a Changing Climate*, details that:

> “coastal ecosystems are affected by ocean warming, including intensified marine heatwaves, acidification, loss of oxygen, salinity intrusion and sea level rise, in combination with adverse effects from human activities on ocean and land (high confidence). Impacts are already observed on habitat area and biodiversity, as well as ecosystem functioning and services (high confidence)” {4.3.2, 4.3.3, 5.3, 5.4.1, 6.4.2, Figure SPM.2} (p. 13),

and that:

> “changes in the ocean have impacted marine ecosystems and ecosystem services with regionally diverse outcomes, challenging their governance (high confidence). Both positive and negative impacts result for food security through fisheries (medium confidence), local cultures and livelihoods (medium confidence), and tourism and recreation (medium confidence). The impacts on ecosystem services have negative consequences for health and well-being (medium confidence), and for

> Indigenous peoples and local communities dependent on fisheries (high confidence)" (IPCC, 2019, p. 16).

Given the dependence all humans have with the ocean and cryosphere, it is essential that MSP consider climate change in marine planning.

Climate change will also likely lead to increased conflicts over marine resources, as well as overlap of ecosystem boundaries with static boundaries (such as oil, gas, or potential wind energy sites); this generates the need to address emerging conflict in spaces where conflict had not existed before (Carr, L., 2019). Regardless of the specific impacts of climate change on marine environments:

> "an overall scientific consensus has emerged, which concludes that a) the global ocean drives global climate and provides valuable services to humanity with respect to climate regulation, b) oceans are currently affected by climate change and many ecological and human communities are at high risk of impacts before 2100, c) significant CO_2 reductions are immediately required to prevent further damage to ocean ecosystems and human settlements, and d) the longer the delay in reducing CO_2 emissions the opportunities for protection, adaptation and remediation diminish" (Gattuso *et al.*, 2015 as cited in Zacharias & Ardron, 2020, p. 168).

This is why "properly incorporating climate change into [any] MSP framework will allow for better preparedness, improved response capacity and, ultimately, a reduced vulnerability of marine socio-ecological systems" (Climate Adapt, 2021). Research suggests that MSP is a tool that can fill the gap of the current piecemeal approach: managing our oceans in a holistic way through providing a mechanism for strategic and integrated planning of a marine environment (Flannery *et al.*, 2016, p. 123). However, there are many challenges and barriers when it comes to incorporating climate change policy into MSP. This relationship is discussed in greater detail below.

2.6. MSP and Climate Change

Although MSP is being developed in approximately 70 countries, there are many hurdles that MSP needs to overcome including: political, social, and economic factors (Santos *et al.*, 2016)**.** In addition to these complexities, any plan will also need to consider a changing climate and related climate policies. Santos *et al.* (2020) argue that "spatial planning is vital to balancing multiple human demands and facilitating climate change mitigation and adaptation" (as cited in UNESCO, 2021, p. 5). Yet, Santos *et al.*

(2020) found that although MSP is proven to be a way to reduce the impacts of climate change in the ocean environment, it is rarely included in marine planning. This is why many authors are calling for bolder decisions from countries within their marine climate plans (UNESCO, 2021).

There is growing recognition that oceans can play a vital role in addressing major global issues hunger and malnutrition and climate change. Therefore, some countries recognize the connections MSP can have with the United Nations Sustainable Development Goals (SDG). For example, MSPs have been connected to Goal 7 on affordable and clean energy, Goal 13 on climate action and Goal 14, life below water (UNESCO, 2021, p. 5). The opposite is true as well, for example:

> "the extent to which some of the other SDGs are achieved will have major implications for the state of the marine environment in the future. This applies particularly to SDG 13 on climate action and SDG 12 on responsible consumption and production" (Norwegian Ministry of Climate and Environment, 2020, p. 13).

This raises the question: why are countries not adequately including climate change policy within their MSPs? The next section outlines some of the major challenges that MSP planners, managers, and adopters face.

2.7. Challenges of Incorporation

There are several main reasons for why the majority of countries are rarely incorporating climate change and related policies into their plans. Santos *et al.* (2020) outline six main reasons in their paper *Integrating Climate Change in Ocean Planning:*

- *New Concept:* original MSP frameworks did not reference a changing climate; ocean use planning for the future is a relatively new concept;
- *Short-term nature:* the incorporation of climate change may require new skills or may fall lower on the priority list of managers due to the nature of affects seeming in the distant future;
- *Data gaps:* exist in terms of climate change science predictions;
- *Reactive vs. proactive*: planning and management tend to be reactive as opposed to proactive;

- *Adaptive Management*: the majority of marine management approaches (including MSP) are static, not taking into account the dynamic nature of the ocean;
- *Governance*: the nature of institutional or jurisdictional governance and power relations can impede adaptive governance frameworks

  (Santos *et al.*, 2020).

These barriers are explored in greater detail in the following chapters and are used to analyze the case studies in Chapter 6.

Beyond these six challenges, Whitney & Ban (2019), in *Barriers and opportunities for social-ecological adaptation to climate change in Coastal British Columbia,* collected data on perceived understandings of adaptions for climate change from coastal marine practitioners in BC. They found four main barriers and potential opportunities for climate change adaption in marine management: “political action, reducing scientific uncertainty, improving communication, and increasing capacity (both funding and staff)” (Whitney & Ban, 2019, p. 1). These main barriers are helpful in understanding the context specifically to BC and Canada which is explored in Chapter 5.

Chapter 3.

Challenges of Incorporation in Greater Detail

3.1. New Concept

One of the challenges of incorporating climate change into MSP is that at the time when MSP came into existence (the 1990s), there was no reference to climate change within the process and ocean use planning, in general, was a fairly new concept (Santos *et al.*, 2020). Decades later, the international community recognizes the importance of incorporating future conditions into ocean use planning. However, the lack of incorporation of climate change policy within MSP may be partially explained by how MSP originated.

3.2. Short-term Nature of Planning

Another major challenge of incorporating climate change policy within MSP is the short-sightedness, or lack of incorporating long-term planning within MSP. The process often seems more focused on activities under the status quo, compared with future uses. Further, it appears that sustainability is still loosely defined in a blue growth context which risks emphasizing economic growth (as opposed to conservation). Rilov *et al*. (2020) provide the example of how 'Blue Economy Strategies' often promise jobs and innovation in the short-term which may prove to be in direct conflict with sustainability of the marine environment over the long-term. Further, Flannery *et al.* (2016) point out that "the European Commission's… Blue Growth strategy (COM/2012/494) recognizes the huge potential of offshore wind and ocean energy (wave and tidal), yet planning and consenting requirements remain key hurdles for project development" (p. 149). This results in many countries not taking into account the future of the energy sector in their MSPs. Given the 'transition to zero' of carbon emissions that many countries are aiming for, incorporating alternative energy modes into MSP will prove increasingly important including:

- offshore wind power;
- marine bioprospecting;

- extraction of minerals;
- carbon storage; and
- hydrogen production.

Carr L. (2019) argues that current models of economic decision-making continue to dominate how government decisions are made. This risks preferring provisioning services, which provide tangible goods (such as food, fuel, resources, etc.) over regulating or supporting services (climate regulation, natural hazard protection, etc.; and water cycling, provision of habitat, etc.), leading to favoring short-term growth and not fully valuing or paying for future environmental implications (Lester *et al.*, 2013; Qiu and Jones, 2013, as cited in Carr, L., 2019).

3.3. Data Gaps

There is a lack of data when it comes to much of the science behind how climate change will affect marine environments in the future. For example, Carr L. (2019) points out that “while governance and ocean management are clearly major determinants of how healthy and sustainable we should expect our oceans to be, data for such metrics are often scarce” (p. 11). Therefore, many practitioners of MSP are hesitant to include climate change policy within MSP frameworks, when the data or science is unclear.

3.4. Reactive vs. Proactive

Environmental management in general (beyond the marine environment) struggles from the reactive versus proactive dilemma. Santos *et al.* (2014) point out that the majority of management methods lean towards more reactive ways of addressing environmental concerns. This holds true for the marine environment as well and is also linked to risk and uncertainty. It is difficult to know how bad things can be until they happen, such as the climate disasters BC saw in 2021. Unfortunately, these events are happening more frequently, increasing the risk of inaction. One of the tools for more proactive management of the marine environment is adaptive management (discussed below).

3.5. Adaptive Management

Scientists have warned humanity that even if drastic changes to mitigate climate change are made today, the environment would continue to change from the effects of CO_2 emissions released to date (Whitney & Ban, 2019). Therefore, the argument stands that efforts need to be simultaneously focused on mitigation and adaption. This section briefly discusses adaptive management in the context of MSP, including the number of implementation challenges that arise. However, it is beyond the scope of this paper to dive deeper into this topic.

Santos *et al.* (2016) suggest that "global climate change will present an additional, evolving challenge that requires flexible and adaptive ocean planning" (p. 730). Santos *et al.* (2014) define adaptive management as "a management approach that focuses on systematic learning of a given ecosystem through experimentation, monitoring and evaluation, and subsequent adaptation of management and policy options based on obtained results" (p. 63). There is overwhelming consensus in the literature that adaptive management is key to incorporating climate change into MSP; however, there is also strong recognition of its implementation challenges (Hobday, 2011; Pinsky, 2020; Whitney & Ban, 2019; O'Regan *et al.*, 2021; Santos *et al.*, 2020; Santos *et al.*, 2014). These challenges arise for a number of different reasons:

- Generally, implementation can be challenging, complex and subjective (Santos *et al.*, 2020).
- Broad implementation gaps can include "lack of government action, uncertainty in scientific understanding and data availability, communication and misinformation, and capacity, including education and training" (Whitney & Ban, 2019, p. 6).
- Resistance to proactive adaption can occur when the benefits and costs are not clearly identified (Pinsky *et al.*, 2020, p. 4).
- Gaps can exist in policy action, management understanding, and management action (Whitney & Ban, 2019).
- Concerns exist around the "lack of clear objectives on climate change adaptation planning, the lack of coordination on outreach and education among communities along the BC coast, and uncertainty about how to progress considering the lack of capacity" (Whitney & Ban, 2019, p. 6).

- "Absence of a well-established framework for… implementation, together with a relatively small number of implementation cases" is another challenge (Santos *et al.*, 2014, p. 63).

Although an important practice, adaptive management can prove challenging at the implementation stage for the reasons described above. However, as Young *et al.* (2007) point out "like good relationships, governance systems [and planning processes] require constant attention and a capacity to adapt to changing circumstances to perform well and to remain resilient over time" (as cited in Santos *et al.*, 2014, p. 64). Lastly, governance challenges are discussed.

3.6. Governance

Governance can be described as "the evolving processes, relationships, institutions and structures by which a group of people, community or society organize themselves collectively to achieve the things that matter to them" (Hunt and Smith, 2006 as cited in Flannery *et al.*, 2016, p. 130). The literature identifies governance challenges both at the international and domestic levels.

At the international level, Flannery *et al.* (2016) argue that "globalization, weak governance and increasing industrialization of the seas are having a substantial impact on the sustainability of many types of marine resources, giving rise to major challenges for conservation and governance" (p. 122). These challenges are faced by many Nations and governments and exacerbate challenges within marine planning.

This paper focuses on the national level of governance over MSP. At the national level, governance (in Western countries) has been traditionally built around specific, individual activities or species. This may be partially explained by the design of Western knowledge. Flannery *et al.* (2016) point out that Western knowledge systems are typically linear or sequential, as opposed to more circular systems of knowledge used by Indigenous Peoples. The Western 'silo' governance design has contributed greatly to the degradation of the world's marine environments leading to the decline in stocks or complete collapse of fisheries (Pinsky *et al.*, 2020). Beyond declines or collapsed fish stocks, there are many other environmental indicators signifying to governments that current practices are failing to "conserve vital ocean-based resources, potentially leading to consequences that include ecosystem tipping points, or dramatic shifts in structure

and function that are often hard to reverse" (Selkoe *et al.*, 2015 as cited in Flannery *et al.*, 2016, p. 123). Because MSP attempts to provide a more holistic approach to managing marine environments, it can be seen as a beneficial tool to mitigating the problems of traditional modes of governance. That being said, governance within MSP is not without its challenges. This paper returns to these challenges in greater detail, including how they relate to the incorporation of climate change policy within MSP.

Chapter 4.

Methodology

This paper uses a mixed methods qualitative approach to gather information for analysis and develop policy recommendations to help Canada better incorporate climate change in marine planning. The primary methodological approaches are a literature review, and jurisdictional scan and case study examples, supplemented by a policy document review. The goal of this research is to identify:

- the main challenges and/or barriers of incorporating climate change into MSP;
- countries that are incorporating climate change policy into MSP and where applicable, how they incorporate it; and
- potential policy options for the federal government to consider.

4.1. Literature Review

The literature review provides information on MSP and the challenges and barriers to incorporating climate change. Findings from the literature are used to inform the background section (Chapter 2 & 3) of the report, and support information and analysis throughout the remainder of the report.

4.2. Jurisdictional Scan: Case Studies

A jurisdictional scan and case study methods examines countries that are currently incorporating climate change into MSP and how they compare the North Coast of BC. Rilov *et al.* (2020) identify three countries that currently incorporate climate change into their MSPs – Sweden, United Kingdom, and Netherlands which could be considered for further research. However, the main cases examined in this research include Victoria and New South Wales, Australia; Washington, United States; and Norway due to their comparability to the Canadian context. Sources reviewed include:

- Academic articles;
- Government websites, reports, and planning documents; and

- Existing guidance and policy documents from other jurisdictions.

Alaska, United States, New Zealand, and Tasmania, Australia were also examined in the jurisdictional scan; however, they are not used as case studies for the following reasons:

- Alaska is involved with the Arctic Council MSP process which is significantly different than the context for BC.
- The New Zealand government has not formally endorsed MSP.
- Tasmania, Australia started planning for MSP; however, progress was put on hold in 2014 and is incomplete.

4.3. Policy Document Review

Current policy opportunities and barriers at the provincial (BC) and federal levels related to climate change and marine policy are assessed. This includes review of the following reports, papers, and websites:

- Clean BC: Roadmap 2030
- Climate Preparedness and Adaptation Strategy
- DFO documents: *Oceans Act*, Blue Economy Strategy Engagement Paper, Canada's National Oceans Strategy, and an overview of Canada's main ocean commitments
- Pan Canadian Framework on Clean Growth and Climate Change
- Throne Speech (2021)

Lastly, the international context is briefly considered.

4.4. Limitations

No formal expert interviews were conducted. The research ideally would include consultation and engagement with other affected parties. Particularly missing is information from Indigenous peoples which would take relationship building. Canada has seen an increasing resurgence and assertion of Indigenous rights which is altering governance and historical conservation and resource management practices (Watson *et al.*, 2021). The literature suggests that the government and MSP practitioners should be mindful of Canada's colonial history with Indigenous Peoples to ensure that MSP does

not become another colonialist practice. Given Canada's priority and commitment to reconciliation with Indigenous Peoples, it is anticipated that joint decision-making (or Nation-to-Nation decision-making) would be a starting point for discussions involving MSP.

The literature also flags concerns around the potential distributional effects of MSP (as mentioned in section 2.4). One tool for examining the distributional and intersecting effects of MSP is Gender Based Analysis Plus (GBA+). GBA+ may be useful for examining the wide array of impacts from climate change, the knowledge and lack of examination of potential distributional impacts of MSP, as well as, the scope of MSP which lends itself to affect many different communities and peoples. Given it is often those most vulnerable to (and the least responsible for) the impacts of climate change, conducting GBA+ on this research topic is recommended and may prove insightful for any future research.

Chapter 5.

British Columbia, Canada & MSP

5.1. Marine Policy Background

In Canada, the goal of MSP broadly is to balance conservation, economic, and cultural interests (Government of Canada, Fisheries and Oceans Canada, 2021). Canada has begun work on MSP in three bioregions: the Newfoundland and Labrador shelves; the Scotian Shelf-Bay of Fundy and the Estuary and Gulf of St. Lawrence, as well as, off BC's Pacific North Coast (Government of Canada, Fisheries and Oceans Canada, 2021). In total, the 2019-20 Departmental Plan commits DFO to initiate MSP in five marine areas (Government of Canada, Fisheries and Oceans Canada: Departmental Plan, 2019b).

In 2009 recommendations were put forth by the Royal Society of Canada in a report to address Sustaining Canadian Marine Biodiversity. A decade later, a policy briefing committee examined this report and concluded that Canada continues to face "wicked problems" related to sustaining marine biodiversity in the face of climate change. This committee reported that Canada made good progress in areas of ocean stewardship, biodiversity and conservation, as well as, surpassing the goal of protecting 10% of marine coastal areas by 2020 (Hutchings *et al.*, 2019). However, the committee further concluded that the government made little progress in the areas of:

- incorporating climate change in decisions on fisheries, oceans, or marine biodiversity; and
- marine spatial planning to mitigate conflict as ocean-use pressures increase

(Hutchings *et al.*, 2019, p. 2).

Therefore, two (out of a total of 5) recommendations were created to be the focus moving forward. The two recommendations, forming the basis of this research, are to:

- ensure climate change impacts and projections are incorporated into decision-making and planning processes related to oceans; and
- advance and implement marine spatial planning

(Hutchings *et al.*, 2019, p. 4).

These two recommendations demonstrate value in exploring how climate change policy in Canada addresses (or not) climate change impacts on marine ecosystems in relation to MSP.

5.2. Climate Change and British Columbia

The Province of BC, in the *Clean BC Roadmap to 2030*, summarizes the relationship between climate change and the province well in saying “while we are living through a time of uncertainty and overlapping crises, the greatest challenge we face now and into the future is climate change. The threat is no longer decades or even years away. The impacts are all around us” (British Columbia, 2021, p. 2). BC witnessed first-hand the following devastating events in 2021 alone:

- A heat dome
- The 3rd worst wildfire season
- A bomb cyclone
- Atmospheric rivers
- Devastating mud slides and flooding

Important to note is that despite any efforts domestically or abroad to reduce carbon pollution, Canada “is already locked into dramatic and long-lasting changes in weather and climate as a result of current and past emissions” (Ness, 2020). Given the anticipated consequences of climate change on BC and it’s marine environment (see section 2.4 for a description of the effects), as well as, the fact that oceans are major sinks for atmospheric carbon dioxide, the incorporation of climate change policy within marine planning is vital. Unfortunately, “a recent analysis of 39 BC communities found that while 25/39 Official Community Plans do explicitly address climate change, their strengths lay in policies and goal-setting rather than implementation, and mitigation goals far outweigh adaptation goals or policies” (Baynham and Stevens, 2014 as cited in Whitney & Ban, 2019, p. 9). The next section explores Provincial, Federal, and First Nation initiatives related to MSP in BC.

5.3. Provincial, Federal and First Nation Initiatives Related to MSP in BC

Table 1: Provincial, Federal, and First Nation initiatives related to MSP in BC

Initiative	Responsible Jurisdiction	Brief Description of Initiative
Canada's Oceans Strategy	Canada	Created from a call in the *Oceans Act*. Based on 3 main principles (1) Sustainable Development; (2) Integrated Management; and (3) Precautionary Approach (Canada, ed. 2002).
MPA Network Northern Shelf Bioregion	Canada, Province, First Nations	All three responsible jurisdictions are working together "to develop a marine protected area network in the Northern Shelf, which extends from the top of Vancouver Island (Quadra Island/ Bute Inlet) and reaches north to the Canada – Alaska border" (MPA Network, n. d.).
The Pacific North Coast Integrated Management Plan (PNCIMA) (fully endorsed in 2017)	Canada, Province, and First Nations	"The intended role of the PNCIMA plan is to provide an overarching marine [Ecosystem-Based Management] EBM framework that is available to guide marine planning and management at other scales" (Pacific North Coast Integrated, Management Area (PNCIMA) Initiative, 2017, p. 29).
Marine Plan Partnership for the North Pacific Coast (MaPP)	Province and 17 member First Nations	The broad plan is developed and partners are further implementing marine use plans for four areas of BC's North Pacific Coast (MaPP, 2022).
Management Plans for 4 sub regions: Haida Gwaii, North Coast, Central Coast, & North Vancouver Island	Province and 17 member First Nations	The four management plan sit under MaPP; the plans provide recommendations for key areas of marine management: uses, activities and protection (MaPP, 2022).
Fisheries Reconciliation Table	First Nations and Canada	Through Coastal First Nations and the North Coast-Skeena First Nations Stewardship Society, First Nations communities have come together to build a Fisheries Reconciliation Table with Canada (Coastal First Nations, n.d.,a).

5.4. MSP in BC

In Canada, the *Oceans Act* gives authority to DFO to "plan for and implement MSP relative to marine protected areas, fisheries, aquaculture, habitat protection, and pollution prevention" (Flannery *et al.*, 2016, p. 139). DFO is divided into seven regions, as well as, the national capital region. BC is part of the Pacific Region which encompasses BC and Yukon. There is a significant regional presence in DFO: "over 75 per cent of employees work in the regions delivering services to Canadians"

(Government of Canada, Fisheries & Oceans Canada, 2020). In BC, marine plans exists in the North Pacific Coast ranging from Campbell River to the Alaska border (The Nature Conservancy, 2022). The Pacific North Coast Integrated Management Area (PNCIMA) process is targeted at developing a strategic plan for the entire area; however, there are other plans at various scales within the same area as PNCIMA (Pacific North Coast Integrated, Management Area (PNCIMA) Initiative, 2017). For example, the MaPP and PNCIMA areas share the same footprint. The MaPP draws on the PNCIMA plan (for example, by adopting the ecosystem-based management framework established through the PNCIMA process). Many MPAs in BC are also linked to the PNCIMA plan (Pacific North Coast Integrated, Management Area (PNCIMA) Initiative, 2017). The planning of PNCIMA started in 2008 and as of August 2021, DFO announced that activities are still underway “to lay a solid groundwork for PNCIMA by collecting and cataloguing data and relevant information” (Government of Canada, Fisheries and Oceans Canada, 2008).

The PNCIMA plan broadly recognizes that climate change and related impacts will be a main challenge to marine sustainability (Pacific North Coast Integrated, Management Area (PNCIMA) Initiative, 2017). However, after broad recognition, climate change is less explicitly mentioned throughout the plan. The plan focuses heavily on ecosystem-based management which “is adaptive and responsive in its approach to the management of human activities. It includes mechanisms for assessing the effectiveness of management measures and changing such measures as necessary to fit local conditions” (Pacific North Coast Integrated, Management Area (PNCIMA) Initiative, 2017, p. 35). Although the plan has a strong adaptive focus, there is little mention of proactive versus reactive approaches to address the impacts of climate change.

The PNCIMA governance model is unique in that it incorporated many levels of government: Federal (including several different departments), First Nations, Provincial, and local government. The PNCIMA plan also prioritizes closing data gaps through ‘Goal 4: Improved understanding of complex marine ecosystems and changing marine environments’. However, the strategies are limited to general ways to address data gaps and are not specific to climate change. Interestingly, “implementation of the plan will take place within existing programs and resources, where possible, and may ultimately lead to the identification of new work which will be implemented as resources permit” (Pacific

North Coast Integrated, Management Area (PNCIMA) Initiative, 2017, p. 6). Therefore, if emphasis on climate change policy is not included in existing initiatives, it may also be lacking in implementation of PNCIMA. The next section explores climate change policy in BC in relation to the marine environment.

5.5. Overview of Current BC-Related Climate Change Policy

This chapter reviews the documents listed in section 4.3 to help inform current climate change policy in BC at the provincial and federal levels. International policies are also briefly considered in section 5.5.3 and the final section in this chapter summarizes the overall findings.

5.5.1. Provincial

The Clean BC Roadmap looks at eight critical areas within the BC economy, that either generate emissions or can facilitate solutions to reduction in fossil fuels, with the purpose of setting the direction to deliver cleaner solutions faster (Clean BC, 2021). The strategy builds on the work already underway in BC to adapt to climate change, lower long-term costs of impacts and help keep communities safe, ensuring government programs and policies continue to achieve their goals as the climate changes (Clean BC, 2021, p. 24). To note from the roadmap are the following Strategies and Frameworks to anticipate in the coming years:

- BC's Climate Preparedness and Adaptation Strategy in 2022
- Circular Economy Strategy in 2022
- Workforce Readiness Framework (date unknown)

The Climate Preparedness and Adaptation Strategy is a high level strategy that (1) details the steps the Province will take up to 2022 in response to the impacts of climate change; and (2) outlines proposed next steps to 2025 (Strategy, Ministry of Environment and Climate Change, n.d.). This strategy is clear about the need to expand data networks on climate change, it recognizes unique challenges coastal communities face, and advocates for existing stewardship initiatives and policies to be updated to better consider climate change (including application of an adaptation lens) (British Columbia, n.d.). An important piece of legislation in BC is the *Climate Change Accountability Act*

which “requires the most current information on climate risks to be shared every year and a new assessment of climate risks to be done every five years to inform ongoing action” (British Columbia, n.d., p. 20). Also important is that BC is planning to develop an “ocean acidification action plan, including research and partnerships to support marine resilience, healthy ecosystems and communities” (British Columbia, n.d., p. 37).

5.5.2. Federal

Canada’s Main Ocean Commitments to address and adapt to the impacts of climate change are:

- The $1.5 billion Oceans Protection Plan
- A modernized Fisheries Act
- New marine protected areas
- Canada’s commitment “to protect 25 per cent of our oceans by 2025 while working towards 30 per cent by 2030”
- The development of ocean accounts to increase understanding of the value of oceans

(Canada and Department of Fisheries and Oceans, 2021, p. 1).

The Blue Economy Strategy Engagement Paper (2021) was created to explore how a potential blue economy strategy could support “economic well-being of coastal and Indigenous communities”, how Canada wants to position their “blue economy for growth and success”, and current and emerging sector and trends (Canada and Department of Fisheries and Oceans, 2021, p. 5). The engagement process closed in June of 2021 and the official strategy has yet to be released. The paper recognizes the severity of the issue of climate change calling it the “biggest long-term threat of our generation”, but also recognizes it as the greatest economic opportunity for Canada (Canada and Department of Fisheries and Oceans, 2021, p. 9). The paper also recognizes the role oceans can play as carbon sinks; along with the data challenges about oceans and the marine environment in general. A key component, as it relates to MSP and climate change policy, is the emphasis on growing the marine clean technology sector, noting up-and-coming industries.

The ***Oceans Act*** **(1997)** established marine protection laws in Canada. The *Act* calls for the "Minister of Fisheries and Oceans to lead and implement integrated management planning for all activities in or affecting estuaries, coastal waters and marine areas, in collaboration with federal, provincial and territorial governments, affected First Nations organizations, coastal communities and stakeholders" (Pacific North Coast Integrated, Management Area (PNCIMA) Initiative, 2017, p. 8). The *Act* was updated in 2019 to include new provisions around MPAs, enforcement, the Precautionary Principle, and 'freezing the footprint' (Government of Canada, Fisheries and Oceans Canada, 2019a)

Canada's National Oceans Strategy (2002) was created as a deliverable from the *Oceans Act* and was intended to guide management practices of estuarine, coastal and marine ecosystems in the country (Canada, ed. 2002).

The Pan-Canadian Framework on Clean Growth and Climate Change (2016) provides commitment by Canada to do its part to reduce emissions and build resilience to adapt to impacts of climate change in agreement with the provinces and territories (Government of Canada, n.d.). The framework recognizes that coastal communities are particularly vulnerable. In terms of factors to be considered, the framework does mention developing policies that consider the benefits related from ecosystems and biodiversity.

From the **Throne Speech (2021)** it is worth noting the anticipated changes that will come which include reference to "Canada's first-ever National Adaptation Strategy" (Canada. Governor General, 2021, p. 16).

5.5.3. International

In addition to the provincial and federal documents described above, a few considerations are provided below for international context. The United Nations has "proclaimed 2021-2030 as a Decade of Ocean Science for Sustainable Development to support global efforts to reverse the decline in ocean health and create improved conditions for sustainable development in the ocean" (Canada and Department of Fisheries and Oceans, 2021, p. 18). Canada has signed on to the United Nations Framework Convention on Climate Change which includes Article 4 committing "all parties to the following key action… incorporate climate change into national plans" (Zacharias & Ardron, 2020, p. 172). The recognition of the interconnectedness between

climate change and ocean issues did not become prevalent internationally until 2018 when “Fiji as President of COP23 did much to raise awareness of the interconnectedness of all the realms on the earth, launching the Ocean Pathway Partnership” (Zacharias & Ardron, 2020, p. 175). It can be anticipated that United Nations Framework Convention on Climate Change conferences of the parties will be more frequent in the coming years and decades which in turn, will result in more changes around climate change and marine policy.

5.5.4. Summary of Document Review Findings

The document review reveals that many new strategies and plans are anticipated in the coming years, both at the provincial and federal levels. With these documents will come new plans, policies, and legislation around climate change and the marine environment. This highlights the need for adaptive MSP that not only accounts for climate change today, but also for the future.

The BC government has developed high level strategies for addressing climate change, including adaptation in the province, and has brought in important legislation on climate change through the *Climate Change Accountability Act*. Within these documents, the Province recognizes the impacts climate change will have on its coastal communities and nods to the importance of oceans and marine environments. That being said, the documents reviewed are not specifically targeted at climate change and ocean governance; therefore, this is something still lacking for the region of BC.

At the federal level, the Pan-Canadian Framework on Clean Growth and Climate Change does recognize the vulnerability of coastal communities to climate change and also recognizes the benefits derived from healthy ecosystems and biodiversity. Further, the plan does leave much discretion and flexibility to provinces to design their own policies under this framework. However, this framework is less targeted to the marine environment.

When Canada released the *Oceans Act* (1997) it was seen as an international leader in ocean governance. Since then, Canada has made slow progress on implementation. Further, the twenty-five-year-old legislation and twenty-year-old National Strategy were not created to incorporate climate change policy in marine planning.

Therefore, overriding legislation around climate change is still lacking for a marine-specific context.

Similarly to BC, Canada has a number of initiatives anticipated in the coming years that will need to align with MSP. The Blue Economy Strategy is of particular interest given the caution from the literature which raises the concern of emphasizing economic growth over conservation.

On the international front, given the world is focusing heavily over the next ten years on ocean science and sustainable development, pressure and expectations from the international community will likely increase on these issues. This will result in more changes around marine and climate change policy. Canada would benefit from not only remaining nimble to these changes but also being proactive in leadership around changing marine climate policy.

Chapter 6.

Case Studies: a Review of International Approaches

This Chapter examines the following states and countries: Victoria and New South Wales (NSW), Australia; Washington, United States; and Norway. Australia, the United States, and Norway are chosen due to their comparability to the Canadian context: Australia due to similar characteristics; Washington, United States due to geographical proximity; and Norway due to their historical reliance on the fishing industry, as well as, their leadership in ocean management. There are other countries that could be examined for future research on this topic (as suggested in section 4.2).

The level of jurisdiction at which MSP is designed, implemented, and monitored varies among countries. In Canada, MSP sits at the federal level with strong regional involvement. However, other countries (such as Australia and the United States) situate MSP at the state level of jurisdiction. Therefore, this paper researches MSPs at the level where jurisdiction resides. Although MSP sits at the federal level of jurisdiction in Canada, Regions are heavily involved. The Pacific Region is as large as some directorates in Ottawa. Therefore, the applicability of these other countries to the Canadian context still remains given how involved the region is in MSP. As illustrated through the literature, a major shortfall of many MSPs is the lack of incorporation of climate change within their plans. This section examines whether included jurisdictions have been able to mitigate the six main challenges of incorporation of climate change as shown in table 2.

Table 2: Challenges of incorporation of climate change

Challenge	Description
New Concept	original MSP frameworks did not reference a changing climate; ocean use planning for the future is a relatively new concept
Short-Term Nature of Planning	incorporation of climate change may require new skills or may fall lower on the priority list of managers due to the nature of affects seeming in the distant future
Data Gaps	exist in terms of climate change science predictions
Reactive vs. Proactive	planning and management tend to be reactive as opposed to proactive
Adaptive Management	the majority of marine management approaches (including MSP) are static, not taking into account the dynamic nature of the ocean
Governance	the nature of institutional or jurisdictional governance and power relations can impede adaptive governance frameworks

Source: Santos *et al*., 2020
(See Chapter 3 for more details).

6.1. Australia

Nationally, Australia has developed marine bioregional plans for four regions: South-west, North-west, North and Temperate East. These plans are intended to:

> "help improve the way decisions are made under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act), particularly in relation to the protection of marine biodiversity and the sustainable use of our oceans and their resources by our marine-based industries" (Department of Agriculture, Water and the Environment, 2021).

However, MSP is mainly developed and deployed at the state level. The Victoria and NSW State government MSPs are of particular interest to this research because of how they incorporate climate change into their plans. The Australian government broadly recognizes climate change as a main priority given "the extent of predicted impacts on conservation values in the region, particularly the cumulative nature of these impacts" (Commonwealth of Australia, 2012, pg. 44). Further, one of the government's main strategies is to support research to better understand the impacts of climate change on marine species and environments (Commonwealth of Australia, 2012, p. 50). However, it is at the state level where recognition of climate change as a priority is transformed into tangible policy.

6.1.1. Victoria State

In Victoria, Australia a key piece of legislation for MSP is the *Marine and Coastal Act* (2018), which "sets objectives and guiding principles for the planning and management of the state's marine and coastal environment" (State of Victoria Department of Environment, Land, Water and Planning, 2020, p. 6). Objectives of the *Act* are to:

- "promote the resilience of marine and coastal ecosystems, communities and assets to climate change"; and
- "respect natural processes in planning for and managing current and future risks to people and assets from coastal hazards and climate change"

  (State of Victoria Department of Environment, Land, Water and Planning, 2020, p. 20).

Incorporating climate change into the objectives of the *Act* mitigates the 'new concept' barrier. During the development stage of the *Act*, climate change was identified as one of the main drivers for change in the marine environment (along with population growth and ageing infrastructure) (State of Victoria Department of Environment, Land, Water and Planning, 2020). This demonstrates a strong recognition of the linkage between climate change and marine and coastal management.

Not only does the *Marine and Coastal Act* require a Marine and Coastal Policy (to establish policies for planning and management), it also requires the Marine and Coastal Policy to include a MSP framework which outlines the necessary stages for achieving well-integrated management of the marine environment (State of Victoria Department of Environment, Land, Water and Planning, 2020). The Marine and Coastal Policy (under which the MSP framework sits) recognizes climate change as a threat to ocean and coastal health and that adverse impacts should be minimized on the marine environment (State of Victoria Department of Environment, Land, Water and Planning, 2020). Similar to the main drivers of change in the *Marine and Coastal Act*, the overall purpose of the policy document is to provide "strategic direction and specific considerations for planning, management and decision making to address the impacts from climate change, population growth and ageing infrastructure" (State of Victoria Department of Environment, Land, Water and Planning, 2020, p. 14). The Policy specifically states that:

> "an important focus… is to manage the health of the marine and coastal environment so that ecosystems, communities and built assets are as resilient as they can be in the face of future changes, which could include natural hazards, climate change, population growth or, most likely, a combination of these factors" (State of Victoria Department of Environment, Land, Water and Planning, 2020, p. 10).

This emphasis on climate change shown throughout the Marine and Coastal Policy is also prevalent within the MSP framework portion of the Policy. Specifically, the intended outcomes of the MSP captures four out of the six main barriers of incorporating climate change into MSP by Santos *et al.* (2020): proactive, future-oriented, adaptive and integrated, and coordinated governance. Further, the Policy states that "prioritising the implementation of marine spatial planning in the identified marine planning areas will be guided by… altering ecological processes, or uses and activities, in response to the impacts of climate change" (Victoria Department of Environment, Land, Water and Planning, 2020, p. 74). This is critical because although intended outcomes may be well-intentioned, without proper mechanisms for implementation, the barriers to incorporation of climate change may still exist.

6.1.2. New South Wales State

A key piece of legislation for MSP in NSW is the *Coastal Management Act* (2016). This *Act* supports the *Marine Estate Management Act* (2014) under which the Department of Industry has developed a Marine Estate Management Strategy (2018) in response to previous statewide threat and risk assessments. Climate change is recognized as a priority threat in these previous risk assessments, demonstrating that the NSW government recognizes the importance of climate change in marine planning. The Marine Estate Management Strategy sets the:

> "overarching framework for the NSW Government to coordinate the management of the marine estate over the next decade in accordance with the objects of the Marine Estate Management Act 2014 and the NSW Government's vision for the marine estate. The Strategy outlines how we can manage threats to the environmental assets, as well as to the social, cultural and economic benefits the community derives from the marine estate. It identifies evidence-based management priorities and sets policy directions to manage the marine estate as a single continuous system. The Strategy uses the best available evidence, as well as input from scientists, the community, Aboriginal people, industry, government and non-government organizations" (Marine Estate Management Strategy, 2018, p. 5).

The Marine Estate Management Strategy has the following mechanism for evaluation: “a five-year health check [which] will measure progress of how the initiatives are performing against the key performance indicators and whether the risk of the threats identified in 2017 have changed” (State of New South Wales: Department of Industry, 2018, p. 5). This health check and identification of new threats provides the ability to adapt the plan to a changing climate.

The Strategy also has nine key management initiatives with the purpose of improving environmental and/or community benefits (socially, culturally, and economically). The third key management initiative is Planning for Climate Change which links to the NSW Climate Change Policy Framework of 2016; the Framework details the state’s responsibility for emissions reductions, as well as, for making NSW more adaptable and resilient to climate change impacts (State of New South Wales: Department of Industry, 2018). Key results of including Planning for Climate Change as a key management initiative includes:

- Identify opportunities to address climate change
- Enabling adaptation strategies
- Educate community on future climate change impacts
- Build resilience within communities
- Lower costs recognized from proactive versus reactive approach

(State of New South Wales: Department of Industry, 2018).

The key management initiatives capture two out of the six main barriers of incorporating climate change into MSP by Santos *et al.* (2020): proactive and adaptive.

The third key management initiative also has multiple mechanisms to address the priority threats identified as shown below:

- “Policy/Program/Planning
- Education/Awareness
- Research/Monitoring/ Mapping
- On-ground Works

- Collaboration”

(State of New South Wales: Department of Industry, 2018, p. 31).

Regulation/Compliance/Incentives and Data/Reporting mechanisms are not available for management initiative 3 (Planning for Climate Change). Without the regulation/compliance/incentive mechanisms, planning for climate change may not be as heavily enforced and assessed as necessary. Without Data/Reporting mechanisms, the data gaps that exist in terms of climate change science will persist. In summary, NSW has developed clear indicators linking climate change priorities within MSP, as well as to the Climate Change Policy Framework and Strategic Plan; however, the plan only covers three of the six main barriers to incorporating climate change within MSP.

6.2. United States

In 2010, under the Obama administration, an executive order was signed establishing a national policy for coastal and MSP across the country (Carr, S., 2010). Before this order, ocean policy in the United States was not well-integrated with over 140 federal laws related to the marine environment (Carr, S., 2010). Under the new order a National Ocean Council was created to coordinate planning of marine activities which were:

> “carried out on a phased basis across nine regional planning areas. Each regional process will report to the interagency National Ocean Council, which will also certify that the resulting plans are consistent with national policy. The plan for each region will be developed cooperatively among federal, state, tribal, and local authorities” (Carr, s., 2010, p. 1).

In 2013 the National Ocean Council created the National Ocean Policy Implementation Plan. Similar to Canada, implementation of the MSP policy is carried out heavily on a regional basis. However, the definition of MSP used in the United States differs from Canada being: "a comprehensive, adaptive, integrated, ecosystem-based, and transparent spatial planning process, based on sound science, for analyzing current and anticipated uses of ocean, coastal, and Great Lakes areas” (Carr, S., 2020, p.1). In relation to climate change, the National Ocean Policy Implementation Plan report details that:

> "agencies will develop methods, best practices, and guidance for assessing the vulnerability and resiliency of resources to a changing climate, building off existing efforts such as the National Climate Assessment" (National Ocean Council, 2013, p. 17).

Using existing climate change policy guidance, rather than creating a separate document for climate change in the marine environment, is similar to the approach NSW has taken.

6.2.1. Washington State

Washington State first passed legislation related to MSP in 2010 which directed the Governor's Office to provide recommendations for both implementation and establishment of a framework for MSP (Marine Planning, 2022b). There are two out of four key outputs required of the MSP that address several of the challenges of incorporation of climate change. The first required output is "guidance for new ocean uses along Washington's coast, such as renewable energy projects and offshore aquaculture" demonstrating longer-term planning and anticipation of up-and-coming industries as a result of climate change (Marine Planning, 2022b, n.p.). The second required output, "baseline data on coastal uses and resources to capture current conditions and future trends", demonstrates the attempt to narrow the knowledge gap in terms of climate change science predictions (Marine Planning, 2022b). These required outputs set the stage for inclusion of climate change into MSP in Washington.

The report titled *Marine Spatial Plan for Washington's Pacific Coast* (2017) by the Department of Ecology, generally recognizes that climate change will impact the ocean and also recognizes the role that MSP can play in incorporating climate change. The report states:

> "as climate change continues and the impacts are felt throughout the MSP Study Area and beyond, demand for the new ocean uses addressed in this MSP may be affected. New uses may be seen as a way to offset the impacts of climate change. Offshore renewable energy could be one method of meeting increasing energy demands while decreasing emissions of greenhouse gases... The effects of climate change on the ecological and human communities and existing uses of the MSP Study Area will need to be considered and addressed as any new uses for the area are considered" (Washington State Department of Ecology, 2017, p. 2-286).

This demonstrates strong recognition of the need to be adaptive and future-oriented. It also demonstrates that ocean planning can be used as a form of climate change mitigation which is less commonly discussed in the literature. There was also a key principal included in the plan to address "potential impacts of climate change sea level rise upon current and projected marine water uses and shoreline and coastal impacts" demonstrating clear understanding of a changing climate (Marine Planning, 2022b). This principal is further captured in Goal 4: "Develop an integrated decision-making process which supports proactive, adaptive, and efficient spatial planning" (Washington State Department of Ecology, 2017, p. 1-7). Specific objectives under goal 4 that relate to incorporation of climate change include:

- "Address how climate change may influence plan scenarios and potential impacts of new uses" demonstrating proactivity, longer-term planning, and (Washington State Department of Ecology, 2017, p. 1-6);
- "Engage local, state, federal and tribal governments in all phases of the marine spatial planning process to ensure relevant management information and requirements are integrated into the process" demonstrating the attempt to mitigate jurisdictional governance barriers to incorporation of climate change (Washington State Department of Ecology, 2017, p. 1-6); and
- "Engage scientific experts in review of data and methods. Develop standards for data collection and analysis" demonstrating attempts to close the data gaps that exist in terms of climate science (Washington State Department of Ecology, 2017, p. 1-7).

Further, Goal 5 also relates to incorporation of climate change within MSP as it relates to future-oriented/longer-term planning, as well as, proactive planning and management around climate change:

- "Develop coastal decision-making tools, analyses & recommendations to determine appropriate and compatible roles for future activities within the study area, including siting of offshore renewable energy" (Washington State Department of Ecology, 2017, p. 1-7); and
- "Identify appropriate mitigation measures to address adverse impacts posed by proposed future uses of Washington's coastal waters" (Washington State Department of Ecology, 2017, p. 1-8).

Offshore renewable energy is a prime example of how the Washington MSP has created a mechanism to ensure that the process for new proposals are streamlined, making it easier to coordinate among multiple governments/regulations. The mechanism is through the requirement of a MSP framework that coordinates the process from state to

local government (Washington State Department of Ecology, 2017, p. 2-194). This case is helpful in illustrating some ways to incorporate climate change in MSP.

6.3. Norway

Norway has resource-rich ocean areas six times larger than their land area creating the demand for MSP (Government of Norway, Ministry of Climate & Environment, 2021). Similarly to Canada, the country has historically relied heavily on the fishing industry. Approximately a decade ago, Norway developed MSPs for the Barents Sea (North), the Norwegian Sea (West), and the North Sea and Skagerrak (south) (Government of Norway, Ministry of Climate & Environment, 2021). More recently, the Norwegian Ministry of Climate and Environment published a white paper, Norway's integrated ocean management plans (2020), which compiles and analyses all three management plans and includes "a revised management plan for the Barents Sea– Lofoten area and updated management plans for the Norwegian Sea and the North Sea and Skagerrak" (Norwegian Ministry of Climate and Environment, 2020, p. 8). Because the white paper is the most recent document on MSP in Norway, and because of its integrative nature, this paper focuses on the white paper (and the three management areas) as a whole.

Throughout the white paper there is clear and continuous focus on climate change and the impacts it will have on the marine environment in the future, as well as, prioritization given to mitigating climate change through reducing greenhouse gas emissions:

> "it will be vital for the public administration both to make use of all ocean-based options for reducing greenhouse gas emissions and to tackle any environmental impacts this may have" (Norwegian Ministry of Climate and Environment, 2020, p. 10).

Further, the white paper incorporates longer-term planning to address the impacts of climate change:

> "development of Norway's ocean management system must be based on an understanding of how climate change and other large-scale processes are affecting and will change Norway's marine areas and how they are used" (Norwegian Ministry of Climate and Environment, 2020, p. 9).

The Norway plan also recognizes the importance of requiring “research to understand climate change and its impacts on the oceans, and monitoring to make it possible to detect changes at an early stage (Norwegian Ministry of Climate and Environment, 2020, p. 10). The plan has done well to align with other national Strategies such as the strategy for green competitiveness (2018) and the National strategy for research and development of new, climate-friendly energy technology. Targets and measures have been set for the plan and include measures specially relating to “climate change, good environmental status and sustainable use” (Norwegian Ministry of Climate and Environment, 2020, p. 11). The white paper recognizes the challenges that fragmented governance systems can pose; therefore, Norway has taken a cross-sectoral approach to their management plans. Headed by the Ministry of Climate and Environment, the interministerial Steering Committee for integrated ocean management is responsible for coordination of work on the plans (Government of Norway, Ministry of Climate & Environment, 2021). The Committee and plans are integrative in the sense that many other Ministers are involved.

In the white paper the government has a section on adaption taking into account the dynamic nature of the ocean due to the impacts of climate change:

- “work to ensure climate-resilient management of living marine resources and marine biodiversity so that it is possible to maintain viable populations and ecosystem services as far as possible in a changing climate, and so as to safeguard natural carbon sinks;
- monitor changes in the implications of climate change for marine ecosystems and ocean industries and use the management plans to report on status, trends and implemented and planned measures;
- as part of work on the management plans, conduct a risk analysis for the management plan areas of direct and indirect effects of climate change on marine ecosystems and other relevant factors under different emission scenarios;
- further develop the knowledge base for climate change adaptation in ocean industries and ocean-dependent sectors of society;
- continue to monitor acidification and climate trends and the impacts on vulnerable calcifying organisms such as plankton and corals;
- enhance knowledge of the effects of climate change and ocean acidification on marine ecosystems and how they interact with other pressures”

(Norwegian Ministry of Climate and Environment, 2020, p. 144).

Norway's strong recognition of future climate change impacts, along with plans to address them, signals proactive planning.

In summary, Norway's recent white paper recognizes the "crucial links between climate policy, mitigation measures and efforts to ensure integrated ocean management in Norwegian waters" (Norwegian Ministry of Climate and Environment, 2020, p. 74). In turn, the white paper demonstrates strong incorporation of climate change policy within MSP due to focusing on mitigating the six main barriers of incorporation.

6.4. Summary of Case Study Findings

The case studies illustrate several important concepts about the incorporation of climate change into MSP. First, there is no one set path to be taken; different jurisdictions will need to account for their own context-specific information. Second, the incorporation of climate change policy into MSP cannot be achieved by a one-time policy action. Instead, there are a variety of policy options available that would best be explored at different stages throughout the ongoing MSP process. Third, the case studies reveal that there can be both mitigation- and adaptation-based strategies for incorporating climate change policy into MSP. However, the findings do suggest that there are some meta-level key takeaways that can help set up more successful incorporation of climate change policy into MSP. These key takeaways, and how they apply to Canada, will be discussed in the following chapters.

Chapter 7.

Supporting the Incorporation of Climate Change Policy in MSP

7.1. Key Findings of Case Studies

The cases described in Chapter 6 are helpful for drawing on strengths and weaknesses in other jurisdictions in regards to the incorporation of climate change policy in MSP. This section draws out the key takeaways from the case studies, in order to compare and contrast what is working well and what could be improved on in the Pacific Region and Canada more broadly. Important to note, is that an array of different measures could be considered. However, in comparing the case studies to the Canadian context, differences in meta strategies were revealed. Given how new MSP is, and that the Canadian government has committed to looking to initiate MSP in five new areas of the country, it is timely to focus on national strategies (as opposed to focusing on individual measures).

7.1.1. Limitations of MSP in Addressing Climate Change

It is not easy to fully incorporate climate change into MSP. It is also important to recognize the limitations of MSP in addressing climate change. First, MSPs are typically not legislative in nature; therefore, there is little legal accountability from them. Second, one of the major key takeaways from the research is that MSP alone, is not sufficient to address the issues of climate change within the marine environment. However, the case studies do demonstrate that MSP can be one tool (from a larger tool box) to further efforts to address climate change.

7.1.2. MSP as One Form of Climate Mitigation

The case studies illustrate that ocean planning can be used as a form of climate change mitigation (less commonly discussed in the literature compared to adaptation). This was seen in the case study of Washington which required an initial output in the form of guidance for up-and-coming industries that would utilize ocean space along

Washington's coast (for example, renewable energy projects). This demonstrates longer-term planning and anticipation of up-and-coming industries as a result of climate change. This prioritization could help to align with other government initiatives such as 'Blue Economy Strategies' (as discussed in section 5.5.2). One caution, as noted in the literature review, is to examine whether MSPs are prioritizing economic growth or conservation.

7.1.3. Jurisdictional & Legislative Differences

Review of Australia and the United States as case studies shows that MSP is a priority of the federal government; however, jurisdiction of MSP resides at the state level. One of the reasons for this is the division of powers in the constitution giving more power to states. Therefore, MSP sits under acts that were created at the state level. The legislation links marine planning with addressing climate change, through creation of an act specific to a coastal area. For example, Victoria and NSW have a *Marine and Coastal Act* (2018) and *Coastal Management Act* (2016) respectively. Important to note, both *Acts* are relatively new, compared with the *Oceans Act* created in 1997. Both *Acts* emphasize climate change as a main driver of change in the marine environment. Rather than being a 'side project' within another act, creation of an act specific to one geographical area allows for a designated home for the various coastal and marine challenges facing that area. Because the *Oceans Act* was created 25 years ago, emphasis and links to climate change as a main driver of change in the marine environment are currently absent.

7.1.4. Use of Extensive Policy Guidance

Several of the case studies also utilized a policy document (in addition to legislation and frameworks). The strength of this approach is that extensive policy guidance can place emphasis on the incorporation of climate change into MSP which may be missing from legislation and/or frameworks. The policy document could be used to address big questions about the future of Canada's oceans and to link the main barriers of climate change and how to address them in MSP. For example, the recent white paper written by the Norwegian government underpins climate change through the entire document, providing greater emphasis on the incorporation of climate change policy within marine planning. However, the case studies also demonstrate that a policy

document is not sufficient alone, as any guidance within it, is confined to existing legislation and mandates. Further, it is important to ensure this guidance is transferred into the MSP through creation, implementation, and monitoring. This includes moving beyond simply 'intended outcomes' and incorporating proper mechanisms for implementation, monitoring and evaluation. Intended outcomes may be well-intentioned; however, without proper mechanisms for implementation, the barriers to incorporation of climate change may still exist.

7.1.5. Linkage of MSPs to Existing Climate Change-Related Policy

The case studies of the NSW, Australia, Washington, United States, and Norway revealed that there is a preference to link MSPs and related policy documents to existing climate change-related strategies/frameworks (as opposed to creating entirely new strategies/frameworks to address climate change and the marine environment). For example, Norway's plan is integrative of other national climate change documents such as the National strategy for research and development of new, climate-friendly energy technology. A potential gap of this approach could be that existing climate change strategies are not specific enough to address issues in the marine environment.

7.1.6. Variation in Departments Responsible for MSP

Another key takeaway from the case studies is which department/ministry is mandated with MSP. For example, in NSW, the Department of Industry has developed a Marine Estate Management Strategy (2018) under which MSP sits. This would likely apply a drastically difference lens compared with other departments such as DFO. A different example was demonstrated from Norway which has chosen to get many different Ministers involved in the MSP committee and planning processes. Therefore, different ministers (or multiple ministers) can be involved in or leading MSP which would result in multiple lens' being applied to planning. This could result in a more holistic approach to MSP.

Table 3: Case Studies - Main Strengths & Weaknesses

Strengths	Weaknesses
Ocean planning to address climate change can be in the form of both mitigation and adaptation. An example of a mitigation-based strategy is planning for 'up-and-coming' renewable energy projects. • This could help to align with other government initiatives such as 'Blue Economy Strategies'.	Possible issues within prioritization could arise. For example, prioritizing economic growth versus conservation or sustainability. Consideration is also needed of distributional impacts.
Marine and coastal acts have been created within the last six years, specific to state-level marine jurisdiction. • This legislation emphasizes climate change as a main driver of change in the marine environment.	Legislation is not sufficient alone.
Additional policy documents are used to provide guidance on the incorporation of climate change policy. • These documents can provide emphasis on climate change which may be missing from legislation or MSP frameworks. There is a potential to link the main barriers of climate change within the policy document.	Documents are not sufficient alone; there is a need to transfer/maintain this guidance through creation and implementation of the MSP. • It is important to move beyond 'intended outcomes' and incorporate proper mechanisms for implementation, monitoring and evaluation.
Linkage of MSPs and related policy documents to existing climate change-related policy/strategies/frameworks is preferred.	There could be potential gaps in existing climate change policy/strategies/frameworks specific to the marine environment.
Different cases have different ministers (or multiple ministers) involved in or leading MSP which results in a different lens being applied to planning. • Could result in a more holistic approach to MSP.	Possibility of issues within prioritization. For example, prioritizing economic growth versus conservation or sustainability.

Chapter 8.

Policy Options

Based on the literature review, policy document review, and case studies, there are a variety of policy options available. However, the findings of this study suggest that there are some meta-level key strategies (as suggested above) that will help set up more successful incorporation of climate change policy into MSP. Therefore, as opposed to micro or target-based policy options that could be included in a MSP framework, these policy options are focused on overarching or more macro-level options that are applicable to the DFO and Canada. Similarly, the recommended policy options are targeted at the national DFO level, as opposed to the regional level. However, it is important that regional input and involvement occur through development of the policies. This approach aligns with the recommendations put forth in 2019 by the policy briefing committee (as discussed in section 6.1.) for Canada to focus on (1) ensuring "climate change impacts and projections are incorporated into decision-making and planning processes related to oceans; and (2) advancing and implementing marine spatial planning" (Hutchings *et al.*, 2019, p. 4). At this time, the following options are best to explore: provision(s) in legislation, extensive policy guidance, and a cross-governmental collaborative approach. Each policy option is discussed in greater detail below.

8.1. Policy Option 1: Provision(s) in Legislation

Canada was one of the first countries to come out with, what was at the time, a comprehensive *Oceans Act* and Canada was seen as a leader on the international stage. The *Oceans Act* was intended to address the previous "piecemeal approach to oceans management, by moving to a new approach founded in the concepts of sustainable development and ecosystem-based management" (Jessen, 2011, p. 20). However, in the three decades since, there has not been rapid transition to the legislation. As mentioned in section 6.1, a policy briefing committee examined Canada's progress on this issue and determined that little progress had been made over the last ten years (Hutchings *et al.*, 2019). This could be connected to the fact that there are no legislative requirements in the *Oceans Act* to specifically address this issue. Amendments to the *Oceans Act* that have been made include:

> "freezing the footprint [which] means not increasing the allowed human activities beyond the ongoing activities in a marine area identified in the regulations for the MPA. Ongoing activities would continue and any new activities would be prohibited; some activities regulated under federal fisheries legislation or the Canada Petroleum Resources Act may be restricted further" (Government of Canada, Fisheries and Oceans Canada, 2019a).

First, this provision is specific to MPAs which are only one component of a broader MSP agenda. Second, the provision does not allow for phasing out of certain industries; the provision is only capable of maintaining current activities and prohibiting new ones. Therefore, a gap still remains in relation to the incorporation of climate change in MSP.

As mentioned in Section 8.1.3, Australia has divisions of power in the constitution that gives more power to the states. Therefore, MSP is able to sit under legislation created by the states. In Victoria and NSW, Australia, these pieces of legislation were created within the last six years in response to heightened interest in both MSP and the incorporation of climate change in marine planning. Unfortunately, creating new legislation in BC to mirror those of Victoria and NSW would be less feasible to implement at the federal level. DFO could look to work with the Province of BC in developing a costal act or strategy (something to consider in future research and work).

Because MSP and the incorporation of climate change in marine planning are relatively new concepts, the *Oceans Act* has not yet caught up to adequately address this issue. Although it is not recommend to create new legislation at the federal level, DFO would benefit from consideration of provisions to the *Oceans Act* in order to meet the recommendations set forth by the policy briefing committee. For example, in Victoria, Australia the *Marine and Coastal Act* (2018) includes more substantive guiding principles for the planning and management of the marine and coastal environment. This is in comparison to Canada's National Strategy which is only based on three principles:

> (a) sustainable development, that is, development that meets the needs of the present without compromising the ability of future generations to meet their own needs; (b) the integrated management of activities in estuaries, coastal waters and marine waters that form part of Canada or in which Canada has sovereign rights under international law; and (c) the precautionary approach, that is, erring on the side of caution" (*Oceans Act 1997*, p. 15).

There is a continuum of provisions, some which will be seen as more extensive than others, however, all should be considered. Examples of additional principles that could be added to the *Oceans Act* include adaptive management and/or proportionate and risk-based planning approaches (which allows for more proactive decision-making around climate change). Other provisions could include outright prohibition or a phase out approach on activities contributing to climate change; or planning or prioritizing for future renewable ocean industries. MSP can be used as the tool for implementing this legislation. Legislating provisions around the incorporation of climate change in marine planning would set Canada up to better incorporate climate change impacts and projections into decision-making and planning processes such as MSP.

8.2. Policy Option 2: Extensive Policy Guidelines

Similarly to the context provided for policy option 1, the *Oceans Act* (1997) was seen (at the time of its release) as a comprehensive piece of legislation for the marine environment. In the decades since, there has been increasing awareness that oceans continue to face significant threats and impacts from climate change. However, during this same time, there has not been rapid transition to the legislation. Because MSP sits under the authority of the *Oceans Act*, there is no overarching guidance to consider how ocean planning should address and incorporate climate change.

This is further demonstrated in the example of the PNCIMA plan for the North Coast of BC which broadly recognizes that climate change and related impacts are a main challenge to marine sustainability (Pacific North Coast Integrated, Management Area (PNCIMA) Initiative, 2017). However, after broad recognition, addressing climate change is not fully integrated throughout the plan. The outcome of both the *Oceans Act* and PNCIMA not prioritizing climate change in marine planning, does not set Canada up to meet recommendations put forth in 2019 by the policy briefing committee (as discussed in section 6.1.). An extensive policy document, focused on providing guidance for how climate change policy can be incorporated in MSP, could provide a missing link for Canada to better ensure that climate change impacts and projections are incorporated into decision-making and planning processes related to oceans. It is timely for DFO to consider creation of extensive policy guidance as it would help inform any new MSP work.

Development of extensive policy guidelines is demonstrated in other jurisdictions (as described in Chapters 6 and 7). The Norwegian paper was the most encompassing document regarding the incorporation of climate change in marine planning and would provide a good starting point for Canada in developing an additional policy document for situation climate change within MSP. A more specific example is demonstrated in the case of Washington, United States which has a law that "explicitly identifies renewable offshore energy and marine conservation as primary management objectives to be addressed" (Marine Planning, 2022b). Further, one of the major deliverables of the Washington MSP is to provide guidance on ocean use for up-and-coming industries such as renewable energy projects. This is an example of one potential component of extensive policy guidance that DFO could create to help inform MSP. There are many topics and issues that the extensive policy guidance could address; however, it is recommended that the policy guidance start with addressing the six main challenges of the incorporation of climate change in MSP (as described in Chapter 3).

8.3. Policy Option 3: Cross-Governmental Collaborative Structure

Climate change is not only recognized as a major force causing changes in the marine environment, its effects are not defined to one sector nor department. Government's today are increasingly experiencing "wicked" challenges related to climate change that are cross-sectoral in nature: meaning they affect the mandates of more than one department. Unfortunately, governmental departments are traditionally set up on a sectoral basis. The literature points to the problematic nature of sectoral approaches to MSP and the need for more collaborative governance structures.

In the case of Canada, the *Oceans Act* gives authority to DFO to "plan for and implement MSP relative to marine protected areas, fisheries, aquaculture, habitat protection, and pollution prevention"; however, "other federal oceans-mandated ministers have sectoral authority to implement MSP for maritime transport, submarine cables, oil and gas exploration and development, renewable energy, ocean dumping, marine conservation areas, and marine wildlife areas" (Flannery *et al*., 2016, p. 139). Because the incorporation of climate change in MSP involves multiple different Ministerial mandates, Canada would benefit from a cross-sectoral, collaborative governance structure for MSP. Canada has an interest in both conservation and blue

growth. To achieve a balance between the two, more integrated management is required which takes into account the latest knowledge of each sector and department. This would be in the form of an Intergovernmental Steering Committee or Secretariat for example, and would help foster policies that are coherent among multiple departments. The key deliverable of the new structure would be the incorporation of climate change into MSP.

One of the main benefits of this approach is that best practices can be established with all sectors at the table. This policy option is a large undertaking; however, DFO has existing examples and structures to build upon (both within DFO and illustrated through the cases). Further, adequately addressing climate change in MSP cannot be achieved with small actions alone. Mechanisms will be required for coordination and addressing new conflicts.

Chapter 9.

Analysis of Approaches to the Incorporation of Climate Change in MSP

9.1. Evaluation Criteria

In order to vigorously asses the proposed policy options a number of objectives, criteria, and measures were developed (see Table 4). Sustainability is the primary objective, with cross-governmental collaboration, administrative ease, and level of acceptance as the secondary management objectives. Based on the measures, a rating is assigned for each objective under each policy option. These criteria and measures are intended to demonstrate that the interests are met for the Government of Canada and DFO.

Table 4: Summary of Evaluation Criteria

Objective	Criteria	Measure	Rating
Sustainability (X3)	Incorporation of climate change impacts and projections into decision-making and planning processes	Extent to which the policy improves the incorporation of climate change impacts and projections into decision-making and planning processes of MSP	Low level of incorporation Moderate level of incorporation High level of incorporation
Cross-Governmental Collaboration (X2)	Ability to coordinate interdepartmentally (among federal departments)	Provides mechanisms for collaborative governance	Provides sufficient mechanisms Provides some mechanisms Provides insufficient mechanisms
	Note: the ability to coordinate among governments (federally, provincially, and with First Nations) is critical, but resides at the Regional level given strong involvement and unique needs of Regions.		
Administrative Ease (X2)	Ease of implementation	Based on changes/development of policies/programs and level of coordination with stakeholders	Challenging Manageable Easy
Level of Acceptance (X1)	Extent to which advocacy groups, the general public, and industry support the policy	Level of intensity of views on proposed option	Intensely negative Divided or neutral Intensely positive

There are two important notes on criteria that are not included here. First, equity is not included as a criteria given the macro level of the policies; however, any design and implementation of the policies will need to consider equity (for example, in the form of GBA+ analysis). Second, cost is also not included as an objective because the initial costs of all three policy options will be much less than the down stream cost effects. However, the exact downstream costs are hard to delineate at this time depending on how each policy option is designed and implemented. Detailed descriptions of each objective follow.

9.1.1. Sustainability

There is no one definition for sustainability; however, the term can be broadly defined as meeting our own needs without compromising the ability of future generations to meet their needs. Given climate change and related impacts pose one of the greatest risks to humanity, this objective will focus on ensuring climate change impacts and projections are incorporated into decision-making and planning processes related to oceans with specific emphasis on MSP. The measure will be the extent to which the policy improves the incorporation of climate change impacts and projections into decision-making and planning processes of MSP. This objective is weighted the heaviest with a ‘x’s 3’ weighting. The rating will indicate a low, moderate, or high level of incorporation for each policy.

Objective	Criteria	Measure	Rating
Sustainability (X3)	Incorporation of climate change impacts and projections into decision-making and planning processes	Extent to which policy improves the incorporation of climate change impacts and projections into decision-making and planning processes of MSP	Low level of incorporation Moderate level of incorporation High level of incorporation

9.1.2. Cross-Governmental Collaboration

Cross-governmental collaboration is the first management objective considered. It is defined by the ability to coordinate interdepartmentally (among federal departments). This objective is measured by the mechanisms provided for collaborative governance.

The rating examines whether the policy options provide sufficient, some, or insufficient mechanisms for collaboration.

Note: the ability to coordinate among governments (federally, provincially, and with First Nations) is also critical, but resides at the regional level given strong involvement and unique needs of regions. As mentioned in section 4.4, given Canada's priority and commitment to reconciliation with Indigenous Peoples, it is anticipated that joint decision-making (or Nation-to-Nation decision-making) would be a starting point for discussions involving MSP. Therefore, First Nation and Provincial involvement is critical for regional planning and implementation of MSP.

Objective	Criteria	Measure	Rating
Cross-Governmental Collaboration (X2)	Ability to coordinate interdepartmentally (among federal departments)	Provides mechanisms for collaborative governance	Provides sufficient mechanisms Provides some mechanisms Provides insufficient mechanisms
	Note: the ability to coordinate among governments (federally, provincially, and with First Nations) is critical, but resides at the Regional level given strong involvement and unique needs of Regions.		

9.1.3. Administrative Ease

Another important management objective is administrative ease. There are two important considerations under this objective (1) ease of implementation based on changes/development of policies/programs; and (2) level of coordination with stakeholders. The rating is based on how challenging, manageable, or easy the policy is to implement.

Objective	Criteria	Measure	Rating
Administrative Ease (X2)	Ease of implementation	Based on changes/development of policies/programs and level coordination with stakeholders	Challenging Manageable Easy

9.1.4. Level of Acceptance

Level of acceptance is an important consideration for analysis given how many different types of people and groups MSP will impact. Major stakeholders include: environmental advocacy groups, the general public, and industry (both traditional and

up-and-coming). The measure for level of acceptance is based off of the level of intensity of views anticipated from the proposed policy. If stakeholders are anticipated to be generally supportive of the policy, the rating is 'supports'. If stakeholders are anticipated to be broadly against the policy, the rating is 'unsupportive'. Divided or neutral indicates a middle ground. Therefore, consultation will likely be an important component of design and implementation.

Objective	Criteria	Measure	Rating
Level of Acceptance (X1)	Extent to which advocacy groups, the general public, and industry support the policy	Level of intensity of views on proposed option	Unsupportive Divided or neutral Supports

9.2. Analysis

This section analyzes the three proposed policy options using findings from the literature, case studies, and document review. The objectives, criteria, measures, and ratings (described in Table 4) were used for comparing the options. Analysis of each option includes a summary of results. The final recommendation and implementation considerations are discussed in the next chapter.

9.2.1. Analysis: Provision(s) in Legislation

The findings from the case studies suggest that more current legislation is useful in paving the path towards the incorporation of climate change in MSP. As described in section 8.1, both marine planning and climate change have evolved greatly in the last several decades; however, Canada's current legislation, the *Oceans Act*, has been slow to evolve (Jessen, 2011). This is especially true in the case of incorporating climate change impacts and projections into legislation and decision-making.

It is anticipated that provisions to the *Oceans Act* would help mitigate some of the main challenges to the incorporation of climate change in MSP (as described in Chapter 3). For example, provisions in legislation could ensure that MSP frameworks not only reference climate change, but could also provide legal means to prioritize mitigation and/or adaptation of climate change in MSP. The case studies reveal that there is a preference to link MSPs and related policy documents to existing climate change-related

strategies/frameworks (as opposed to creating entirely new strategies/frameworks to address climate change and the marine environment). Provisions to the *Oceans Act* (a described in section 8.1) would aid in incorporating climate change while allowing for MSPs to link in other existing climate change-related strategies/frameworks.

Provisions to the *Oceans Act* are also expected to provide a strong signal and more certainty to industry and the markets as to the future of ocean uses. This would help to mitigate the concern raised in the literature about MSPs prioritizing economic growth over conservation or sustainability. In the case of BC, it would also allow for Canada, the Province, and First Nations to work together, and with industries, to transition to cleaner technologies. This policy option can also help to reduce arbitrary decision-making as all marine areas within Canada will be abiding by the same legislative provisions. However, this policy option would likely affect other federal departments, requiring considerable coordination due to overlap in departmental mandates. The provisions would also cause a 'trickle down' effect of multiple administrative and management considerations; therefore, it is anticipated that new forms of governance will be needed to address the coordination needs of this policy. Legislating consideration of climate change in MSP could align with the Government of Canada's broader commitment to achieve net-zero emissions by the year 2050.

Lastly, it is anticipated that environmental advocacy groups and renewable energy industries would strongly support this policy option. However, DFO and Canada would likely receive intensely negative concerns from traditional industries and potentially the general public in regards to the economy, jobs, and livelihoods. Communication, consultation, and 'just transition' plans will be critical accompaniments of any development on this option.

Table 5: Evaluation of Provision(s) in Legislation

Objective	Strengths & Weaknesses	Rating
Sustainability (X3)	✓ Strong signal from Canada as to future of ocean use and future of government policy ✓ Aligns with Canada's commitment to achieve net-zero emissions by the year 2050) ✓ Provides legislative weight to the policy problem; can reduce risk of arbitrary decision-making ✓ Would allow for the incorporation of climate change policy as a key deliverable of MSP X Does not provide guidance on prescriptive action of how to incorporate climate change in MSP	High Level of Incorporation
Cross-Governmental Collaboration (X2)	✓ Could address some cross-sectoral discrepancies in legislation X Does not inherently provide mechanisms for collaborative governance (but could be a catalyst for creation)	Provides some mechanisms
Administrative Ease (X2)	✓ Can align with existing climate change policy and could help inform blue economy strategy X Trickle-down of administrative effects after legislation is passed; manageable to challenging administratively depending on legislative provisions passed X Considerable coordination with stakeholders required X Encroaching on other departmental mandates & legislation; would require considerable coordination X Likely a multiple year implementation period (provisions to *Oceans Act* are traditionally slow to pass)	Challenging
Level of Acceptance (X1)	✓ Intensely positive views from advocacy groups ✓ Support from renewable energy industries X Anticipated that traditional industries would voice intensely negative views including concerns about the economy and their respective sectors - General public would likely be divided or neutral; some would agree more needs to be done on climate change while others would hold negative views due to potential impacts to jobs	Divided or neutral

9.2.2. Analysis: Extensive Policy Guidance

The findings from the case studies suggest that updated or more current policy documentation is useful in paving the path towards the incorporation of climate change in MSP. Both marine planning and climate change have evolved greatly in the last several decades; however, there is no overarching guidance to consider how ocean planning should address climate change. Therefore, extensive policy guidance would increase the likelihood of the incorporation of climate change within MSP.

This policy does not have legislative weight behind it; therefore, it would be up to managers/practitioners to incorporate the guidance into MSP. This option would provide a signal, however a weaker one, to both the Province and industry in regards to the future of marine planning by showing that it is on the priority list for exploration and consideration. This option does not address cross-cutting marine issues inherent to climate change. However, this policy could provide further guidance on how MSP can incorporate aspects of climate change including addressing main barriers of the incorporation of climate change.

In terms of cross-governmental collaboration, this option would require the lowest level of interdepartmental communication due to working within existing legislation and governance arrangements. However, this option does not address cross-sectoral discrepancies, nor governance issues, highlighted in the literature, as it does not provide mechanisms for collaborative governance.

This policy option would be the easiest to implement, compared to policy options 1 and 3, as it would be the quickest to develop and is the least administratively complex. Although this option is recommended specifically for DFO nationally, it is important that region-specific context is incorporated. Regions could also build off the national guidance to further elaborate on any Region-specific context. This policy option can also strategically link with existing climate change policies, frameworks, and/or plans. Extensive policy guidance could provide a cohesive approach towards the many different marine and climate change-related documents. It would also likely be the least burdensome in terms of coordination with stakeholders.

Lastly, it is anticipated that both industry and the general public would support this option given it would be least disruptive to industry and jobs. Level of support from

renewable energy industries is inconclusive depending on whether the guidance addresses (or not) up-and-coming industries within the guidance. Lastly, this option does not align as well with calls for action from environmental advocacy groups; therefore, these groups would likely call on the government to do more than this policy option alone.

Table 6: Evaluation of Extensive Policy Guidance

Objective	Strengths & Weaknesses	Rating
Sustainability (X3)	✓ Would increase likelihood that incorporation of climate change is a key deliverable of MSP - Moderate signal from Canada as to future of ocean use X No legislative requirement X Does not solve cross-cutting climate change issues X Does not reduce risk of arbitrary decision-making	Moderate (to low) level of incorporation
Cross-Governmental Collaboration (X2)	- Could signal/provide guidance on potential cross-governmental collaboration X Does not address cross-sectoral discrepancies from literature X Does not inherently provide mechanisms for cross-governmental collaboration	Provides insufficient mechanisms
Administrative Ease (X2)	✓ Can be developed quicker and generally less complex ✓ Regions could pull from new national policy guidance to ensure flexibility in incorporating regional context in implementation ✓ Can align with existing strategies and plans ✓ Can build off work of Canada's Oceans Strategy ✓ Can strategically link with existing climate change policy ✓ Could help inform blue economy strategy ✓ Manageable coordination with stakeholders required	Easy
Level of Acceptance (X1)	✓ Support from Industry & general public due to likelihood of less impacts on jobs and on traditional industries - Inconclusive on level of support from renewable energy industries (depending on whether the guidance addresses (or not) up-and-coming industries X Does not align as well with calls for action from advocacy groups; would likely push for Canada to do more	Positive

9.2.3. Analysis: Cross-Governmental Collaborative Structure

A common theme from the literature and case studies is the importance of more collaborative governance approaches for MSP. Ideally, MSP is holistic in nature and acts as a tool for strategic sectoral and jurisdictional integration. In practice, however, MSP can often emphasize certain interests over others (such as economic growth over conservation). Governance in most Western countries has been traditionally built around specific, individual activities. This is true of the Canadian federal government as described in section 8.3. This means that a cross-sectoral approach is needed for MSP to effectively incorporate climate change.

Implementing a cross-governmental collaborative structure (as discussed in section 9.2.3) is anticipated to be the most effective option in addressing the cross-sectoral and collaborative governance concerns raised in the literature. It is the only policy option which provides a platform and mechanisms for collaborative governance. This approach could also lead to strategic linkages with existing climate change policy. However, there are major challenges in implementation. It would be a massive undertaking for the lead central agency/department to set-up and coordinate and would likely be time-consuming. This option may also be challenged institutionally due to the history of sectoral approaches.

It is anticipated that this policy option would be mixed when it comes to level of acceptance. Traditional industries and the general public would likely support a cross-sectoral approach if they felt their unique needs would be addressed. However, these groups may also be concerned about the implications for sectors, the economy, and jobs. Environmental advocacy groups are anticipated to support improved coordination from governments; however, these groups may be skeptical of blue growth versus conservation priorities. Therefore, communication, consultation, and engagement are key components of any move towards a cross-sectoral approach.

Important to note is that even if policy option 1 (provisions to legislation) is approved, a cross-governmental collaborative structure will be useful (and likely necessary) in order to address overlap in departmental mandates and activities. Further, a collaborative governance structure can be developed during the anticipated lengthy process in getting provisions to the *Oceans Act* passed.

Table 7: Evaluation of Cross-Governmental Collaboration

Objective	Strengths & Weaknesses	Rating
Sustainability (X3)	✓ Would increase likelihood that climate change is incorporated into decision-making and planning of MSP ✓ Can reduce risk of arbitrary decision-making ✓ Attempts to mitigate cross-cutting climate change issues - Moderate to strong signal from Canada as to future of ocean use X No legislative requirement	High level of incorporation
Cross-Governmental Collaboration (X2)	✓ Provides a platform and mechanisms for more collaborative governance ✓ Addresses cross-sectoral discrepancies discussed in literature ✓ Addresses collaborative governance issues in literature; multiple perspectives incorporated	Provides sufficient mechanisms
Administrative Ease (X2)	✓ Can strategically link with existing climate change policy ✓ Could help inform blue economy strategy X A massive undertaking for DFO; time-consuming and complex X Complex and new undertaking for other departments X Considerable changes to programs X Moderate to high consultation with stakeholders	Challenging
Level of Acceptance (X1)	- Divided or neutral support anticipated from industries (may be concerned about future of industry but would likely feel different perspectives will be taken into consideration) - Divided or neutral support anticipated from general public (may support better coordination from governments on climate change and marine planning but may be concerned about jobs) - Divided or neutral support anticipated from advocacy groups (would likely support improved coordination from governments on climate change and marine planning but may be skeptical of blue growth versus conservation priorities)	Divided or neutral

9.2.4. Summary of Analysis

Table 8: Summary of Evaluation

Objectives & Considerations	Policy Options #1: Provision(s) to Legislation	Policy Options #2: Extensive Policy Guidance	Policy Options #3: Cross-Governmental Collaborative Structure
Key Objective			
Sustainability (X3)	High Level of Incorporation	Moderate level of incorporation	High level of incorporation
Secondary Considerations			
Cross-Governmental Collaboration (X2)	Provides some mechanisms	Provides insufficient mechanisms	Provides sufficient mechanisms
Administrative Ease (X2)	Challenging	Easy	Challenging
Level of Acceptance (X1)	Divided or neutral	Positive	Divided or neutral

Chapter 10.

Recommendations and Implementation Considerations

10.1. Primary Recommendation: Cross-governmental Collaboration

Given the results from the evaluation in Section 9.2.4, it is recommended that policy option 3, a cross-governmental collaborative structure, be the focus for implementation by DFO as the lead department. Although this policy problem is extremely complex and requires multiple policy actions (at different levels), implementation of cross-governmental collaboration (in the form of a secretariat or steering committee for example) would be a big step forward for Canada in effectively incorporating climate change in marine planning. The analysis demonstrates that both policy option 1 and 3 (provisions in legislation and a cross-governmental collaborative structure respectively), are the most effective options for incorporating climate change in MSP. However, the primary recommended policy option also provides a platform and sufficient mechanisms for cross-governmental collaboration to occur. The analysis would likely prove useful to mirror at regional levels within Canada; however, the focus of this policy option is on implementation nationally.

10.2. Complementary Recommendations

Important to note is that all three policy options have the potential to work in conjunction with each other. This is because where one falls short on a certain criteria, the other rates best at that same criteria. Therefore, policy option 3 is the primary recommendation. However, Policy option 1, provisions to legislation, is recommended as the next step to be analyzed further by the new collaborative governance structure in order to put recommendations forward on exact provisions to legislation. Option 2, extensive policy guidance, can be considered as a complementary recommendation once the cross-collaborative structure is developed and provisions to legislation are decided upon.

10.3. Implementation Considerations

Although incorporating climate change in MSP requires strong, collaborative governance, cross-departmental coordination is not an easy task. Canada has recognized the need for more integrated approaches to marine planning for decades. However, in practice, most approaches have remained as siloes. Establishing a cross-departmental collaborative structure (in the form of a secretariat or interdepartmental committee for example) is the first step in tackling this persistent issue. This section describes a few examples for DFO to consider in establishing this structure.

As discussed in section 6.3, Norway has recently changed their marine planning process to move away from the traditional sector approach towards involving many different Ministers in the process. This is achieved through a Steering Committee which is responsible for providing strategic direction. Membership includes the Ministry of Climate and Environment, Ministry of Local Government and Modernization, Ministry of Trade, Industry and Fisheries, Ministry of Petroleum and Energy, and the Ministry of Transport. Canada could look to Norway as an existing model on which to build.

Canada can also learn and build from lessons within its own jurisdictions. For example, there are several cross-sectoral initiatives in the Arctic. A recent initiative called 'Northern Low-Impact Shipping Corridors in the Canadian Arctic', "launched by Transport Canada under the Oceans Protection Plan and supported by the Canadian Coast Guard and Hydrographic Services – uses spatial planning to minimize effects of marine shipping and guide regulatory decision-making and governance in Arctic waterways" (Clear Seas, 2022, n.p.).

As described in section 9.3, DFO can coordinate with the PNCIMA steering committee which facilitates federal, provincial, and First Nations partners to bring to the table their respective priorities and mandates to marine planning in the North Coast of BC (Government of Canada, Fisheries and Oceans Canada, 2017a). The key difference is that the recommended policy option calls for integration across sectors/departments at the national level. This is because, regional implementation is fairly confined to national-level direction and policies. It is anticipated that the national cross-governmental collaborative structure would need to coordinate with regional-level structures

(encompassing ‘working-level’ federal, provincial and First Nations partners), as in the case of PNCIMA.

Another example is the Oceans Protection Plan under which the Minister of Transport, DFO and the Canadian Coast Guard, Environment and Climate Change Canada, Natural Resources and Public Services and Procurement have worked together to deliver over 50 initiatives since launch of the Oceans Protection Plan in 2016 (Transport Canada, 2021).

Lastly, Clear Seas (2022) suggest that “Canada’s whole-of-government framework and commitment to reconciliation with Indigenous Peoples can provide some foundation for cooperation among multiple levels of government while using MSP” (n.p.).

In terms of climate change policy at the provincial and federal levels, there have been fairly recent developments of high level strategies for addressing climate change. The documents reviewed are not targeted specifically at climate change and ocean governance; therefore, this is something still lacking for the region of BC. There are also many new strategies and plans anticipated in the coming years, both at the provincial and federal levels, that any MSP (and marine policy more broadly) would benefit from aligning with. Some of these include BC’s Climate Preparedness and Adaptation Strategy and Circular Economy Strategy, both in 2022, as well as, DFO’s Blue Economy Strategy currently being developed. It would be beneficial for the new cross-governmental collaborative structure to find alignment with current and future national climate change strategies/frameworks, as well as, to allow to provincial alignment at the regional level.

Chapter 11.

Conclusion

11.1. Future Research

This research integrates lessons learned and analysis from the literature review, case studies, and the document review. However, formal interviews were not conducted. This research would further benefit from interviewing the following types of people: government decision-makers, subject matter experts, Indigenous organizations, Industry representatives, and environmental advocacy groups. Quantitative data was also not included in the methodologies; therefore, further research in this area may benefit from quantitative analysis. As mentioned in section 9.1, both equity and cost were not included as objectives in the evaluation; any future research on this topic would benefit from consideration of these two objectives.

Indigenous considerations and distributional impacts are also paramount to this topic (discussed in section 4.4); however, given the limited scope of this capstone, both are unable to be included in consideration. These considerations are important for any future research. The Coastal First Nations have provided suggestions for areas of opportunity for collective action including “supporting Indigenous-led conservation and stewardship, including Indigenous Guardians. This should be a core part of Canada’s efforts to meet its new commitments to protect 25 per cent of lands and waters by 2025 and 30 per cent by 2030, and should be incorporated in Canada’s post-pandemic economic recovery plan” (Coastal First Nations, n.d.b).

The research also revealed other policy options available at different jurisdictional levels. One option illustrated in the case studies is the use of coastal and marine legislation and/or strategies specific to a geographical area. This is something advocacy groups are also calling for (such as CPAWS (2020) calls for a Blueprint for the Coast). Therefore, the federal government could consider engaging the province and First Nations on further options more specific to provincial jurisdiction.

Lastly, this research and analysis focuses on national-level strategies that can help set up more successful incorporation of climate change policy into MSP in Canada.

The analysis and policy recommendations can assist in addressing some complex and future-oriented questions about the role of climate change in marine planning such as: how will MSP include climate change as a dimension of planning; how can MSP help Canada achieve it's commitment of net-zero emissions by 2050; and how can MSP help accelerate a clean technology economy?

11.2. Concluding Thoughts

This research aims to address the barriers of incorporating climate change and related policies in Canadian marine policy and planning. UNESCO/IOC (2021) argues that "bolder decisions need to be taken by all countries in their climate plans, focusing on both land and ocean-based actions" (n.p.). The analysis from this research concludes the same is true for Canada. As the population of BC knows first-hand, climate change is no longer a threat to both Canadians and the marine environment; the impacts are happening now. Although this policy problem is extremely complex and requires multiple policy actions (at different levels), implementation of cross-governmental collaboration (in the form of a secretariat or interdepartmental steering committee for example) would be a big step forward for Canada in effectively incorporating climate change in marine planning. Complementary options include provisions to legislation and extensive policy guidance which can be developed and approved by the new collaborative governance structure. The recommendations of this paper align with recent recognition and commitment in the latest departmental mandate letter from the Prime Minister to "modernize the *Oceans Act* to explicitly consider climate change impacts on marine ecosystems and species in regional ocean management, ensuring the *Act* provides for measurable progress indicators and objectives, and create a national, interdisciplinary working group focused on climate-resilient ocean conservation planning" (Prime Minister of Canada Justin Trudeau, 2021). Canada has the opportunity to restore its leadership on the international stage in regards to ocean planning and governance. However, it cannot achieve this without taking bold action to better incorporate climate change in marine planning.

References

Anon. n.d. “MPA Network - Home.” Retrieved November 2, 2021 (http://mpanetwork.ca/bcnorthernshelf/).

British Columbia. (2021). CleanBC Roadmap to 2030. Retrieved from https://www2.gov.bc.ca/assets/gov/environment/climate-change/action/cleanbc/cleanbc_roadmap_2030.pdf

British Columbia. (n.d.) Climate Preparedness and Adaptation Strategy: Draft Strategy and Phase 1 Actions for 2021-2022. Retrieved February 9 2022.

Canada, ed. 2002. *Canada’s Oceans Strategy: Policy and Operational Framework for Integrated Management of Estuarine, Coastal, and Marine Environments in Canada*. Ottawa: Fisheries and Oceans Canada, Oceans Directorate.

Canada. Governor General. 2021. “Building a Resilient Economy: A Cleaner & Healthier Future for Our Kids. Speech from the Throne to Open the First Session of the Forty-Fourth Parliament of Canada.”

Canada and Department of Fisheries and Oceans. 2021. *Blue Economy Strategy: Engagement Paper : Your Oceans, Your Voice, Your Future.*

Carr, Dr Liam M. 2019 May. “Marine Spatial Planning in a Climate of Uncertainty – An Irish Perspective.” *Irish Geography* 52(1). DOI: 10.2014/igj.v52i1.1375

Carr, S. 2010 August. New US Ocean Policy Calls for Marine Spatial Planning. Retrieved November 23 2021 (https://octogroup.org/news/new-us-ocean-policy-calls-marine-spatial-planning/?highlight=New%20US%20Ocean%20Policy%20Calls%20for%20Marine%20Spatial%20Planning)

Clear Seas. 2022. “Is Marine Spatial Planning the Key to Safer and Healthier Oceans?” *Clear Seas*. Retrieved February 25, 2022 (https://clearseas.org/en/blog/is-marine-spatial-planning-the-key-to-safer-and-healthier-oceans/).

Climate Adapt. 2021. “Marine Spatial Planning under a Changing Climate — Climate-ADAPT.” Retrieved November 7, 2021 (https://climate-adapt.eea.europa.eu/metadata/projects/marine-spatial-planning-under-a-changing-climate).

Coastal First Nations. n.d. “A First Nation Fisheries Reconciliation Table with Canada”. *Coastal First Nations: Great Bear Initiative*. Retrieved February 25, 2022 (https://coastalfirstnations.ca/our-sea/).

Coastal First Nations. n.d. “Our Sea - Marine Planning.” *Coastal First Nations: Great Bear Initiative*. Retrieved February 25, 2022 (https://coastalfirstnations.ca/our-sea/).

Coastal First Nations. n.d. “Pacific North Coast Integrated Management Area (PNCIMA)”. *Coastal First Nations: Great Bear Initiative*. Retrieved February 25, 2022 (Pacific North Coast Integrated Management Area (PNCIMA) - Coastal First Nations).

Commonwealth of Australia. 2012. *Marine Bioregional Plan for the South-West Marine Region*. Environmental Protection and Biodiversity Conservation Act 1999.

CPAWS. 2020. “BC Needs a Blueprint for the Coast | CPAWS-BC.” *CPAWS British Columbia*. Retrieved February 25, 2022 (https://cpawsbc.org/blueprint-for-the-coast/).

Department of Agriculture, Water and the Environment. 2021. “Marine Bioregional Plans - DAWE.” *Marine Bioregional Plans*. Retrieved December 13, 2021 (https://www.awe.gov.au/environment/marine/marine-bioregional-plans).

Dr. Jay, S. 2017 November. Issue Paper: Marine Spatial Planning, Assessing the Net Benefits and Improving Effectiveness. *GGSD Forum*. Retrieved March 9 2022 (https://www.oecd.org/greengrowth/GGSD_2017_Issue%20Paper_Marine%20Spatial%20Planning.pdf)

Eger, Sondra L., Robert L. Stephenson, Derek Armitage, Wesley Flannery, and Simon C. Courtenay. 2021. “Revisiting Integrated Coastal and Marine Management in Canada: Opportunities in the Bay of Fundy.” *Frontiers in Marine Science* 8.

Ehler, C. (with Ocean Visions). N.d. Part Two Marine Spatial Planning in the Arctic: A first step toward ecosystem-based management. A technical report of the Aspen Institute Dialogue and Commission on Arctic Climate Change. Retrieved February 25 2022. (Part-II-Marine-Spatial-Planning.pdf (aspeninstitute.org))

Flannery, Wesley, Geraint Ellis, Geraint Ellis, Wesley Flannery, Melissa Nursey-Bray, Jan P. M. van Tatenhove, Christina Kelly, Scott Coffen-Smout, Rhona Fairgrieve, Maaike Knol, Svein Jentoft, David Bacon, and Anne Marie O’Hagan. 2016. “Exploring the Winners and Losers of Marine Environmental Governance/Marine Spatial Planning: *Cui Bono* ?/‘More than Fishy Business’: Epistemology, Integration and Conflict in Marine Spatial Planning/Marine Spatial Planning: Power and Scaping/Surely Not All Planning Is Evil?/Marine Spatial Planning: A Canadian Perspective/Maritime Spatial Planning – ‘ *Ad Utilitatem Omnium* ’/Marine Spatial Planning: ‘It Is Better to Be on the Train than Being Hit by It’/Reflections from the Perspective of Recreational Anglers and Boats for Hire/Maritime Spatial Planning and Marine Renewable Energy.” *Planning Theory & Practice* 17(1):121–51. doi: 10.1080/14649357.2015.1131482.

Fraschetti, Simonetta, Carlo Pipitone, Antonios D. Mazaris, Gil Rilov, Fabio Badalamenti, Stanislao Bevilacqua, Joachim Claudet, Hrvoje Carić, Karsten Dahl, Giovanni D'Anna, Darius Daunys, Matthew Frost, Elena Gissi, Cordula Göke, Paul Goriup, Giuseppe Guarnieri, Drasko Holcer, Bojan Lazar, Peter Mackelworth, Sonia Manzo, Georg Martin, Andreas Palialexis, Marina Panayotova, Dimitra Petza, Bob Rumes, Valentina Todorova, and Stelios Katsanevakis. 2018. "Light and Shade in Marine Conservation Across European and Contiguous Seas." *Frontiers in Marine Science* 5:420. doi: 10.3389/fmars.2018.00420.

Government of Canada. (n.d.). Pan-Canadian Framework on Clean Growth and Climate Change. Retrieved February 9, 2022 https://publications.gc.ca/collections/collection_2017/eccc/En4-294-2016-eng.pdf

Government of Canada, Fisheries and Oceans Canada. 2008. "Pacific North Coast Marine Integrated Management Area | Pacific Region | Fisheries and Oceans Canada." Retrieved February 9, 2022 (https://www.pac.dfo-mpo.gc.ca/publications/docs/pncima-eng.html#foundation).

Government of Canada, Fisheries and Oceans Canada. 2017. "Pacific North Coast Integrated Management Area Plan." Retrieved February 25, 2022 (https://www.dfo-mpo.gc.ca/oceans/publications/pncima-zgicnp/page05-eng.html#1-4).

Government of Canada, Fisheries and Oceans Canada. 2017. "Canada-British Columbia Marine Protected Area Network Strategy." Retrieved November 2, 2021 (https://www.dfo-mpo.gc.ca/oceans/publications/mpabc-cbzpm/page04-eng.html).

Government of Canada, Fisheries and Oceans Canada. 2019. "Changes to the Oceans Act." Retrieved January 22, 2022 (https://www.dfo-mpo.gc.ca/oceans/act-loi/index-eng.html).

Government of Canada, Fisheries and Oceans Canada. 2019. "Departmental Plan 2019-20." Retrieved February 25, 2022 (https://www.dfo-mpo.gc.ca/rpp/2019-20/dp-eng.html).

Government of Canada, Fisheries and Oceans Canada. 2019. "Reaching Canada's Marine Conservation Targets." Retrieved January 22, 2022 (https://www.dfo-mpo.gc.ca/oceans/conservation/plan/index-eng.html).

Government of Canada, Fisheries and Oceans Canada. 2020. "Overview of Departmental Regions". Retrieved March 12, 2022 (https://www.dfo-mpo.gc.ca/transparency-transparence/mtb-ctm/2019/binder-cahier-1/1A4-regional-regionale-eng.htm).

Government of Canada, Fisheries and Oceans Canada. 2021. "Marine Spatial Planning." Retrieved November 2, 2021 (https://www.dfo-mpo.gc.ca/oceans/management-gestion/msp-psm/index-eng.html

Government of Norway, Ministry of Climate & Environment. 2021. “Management Plans for Marine Areas.” *Government.No*. Retrieved January 22, 2022 (https://www.regjeringen.no/en/topics/climate-and-environment/biodiversity/innsiktsartikler-naturmangfold/forvaltningsplaner-for-havomrada/id2076485/).

Hobday, Alistair J. 2011. “Sliding Baselines and Shuffling Species: Implications of Climate Change for Marine Conservation: Shifting Baselines, Climate and Marine Conservation.” *Marine Ecology* 32(3):392–403. doi: 10.1111/j.1439-0485.2011.00459.x.

Hutchings, Jeffrey A., Julia K. Baum, Susanna D. Fuller, Josh Laughren, and David L. VanderZwaag. 2020. “Sustaining Canadian Marine Biodiversity: Policy and Statutory Progress” edited by J. M. Blais. *FACETS* 5(1):264–88. doi: 10.1139/facets-2020-0006.

IPCC, 2021: Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu and B. Zhou (eds.)]. Cambridge University Press. In Press.

MaPP. 2022. Marine Plan Partnership for the North Pacific Coast (MaPP). Retrieved March 9 2022 (MaPP | Marine Plan Partnership for the North Pacific Coast (mappocean.org))

Marine and Coastal Act 2018. No. 26 (Vic) (Austl.). Retrieved February 25, 2022 (Marine and Coastal Act 2018 (legislation.vic.gov.au)).

Marine Planning. 2022. “Canada | Marine Planning.” Retrieved February 25, 2022. (Canada | Marine Planning)

Marine Planning. 2022. “Washington | Marine Planning.” Retrieved January 22, 2022 (https://marineplanning.org/projects/north-america/us-washington/).

MPANetwork. No date. British Columbia Northern Shelf Bioregion. Retrieved March 9 2022 (MPA Network - Home).

MSPGlobal2021. 2021. “MSP around the World.” *MSP Roadmap*. Retrieved January 22, 2022 (https://www.mspglobal2030.org/msp-roadmap/msp-around-the-world/).

National Ocean Council. 2013, April. National Ocean Policy Implementation Plan. Retrieved January 20 2022 (national_ocean_policy_implementation_plan.pdf (archives.gov)).

The Nature Conservancy. 2022. “Canada | Marine Planning.” *Marine Spatial Planning*. Retrieved February 9, 2022 (https://marineplanning.org/projects/north-america/canada/).

Ness, R. 2020. “Prior Preparation Pays off - Canadian Institute for Climate Choices - Blog.” *Canadian Institute for Climate Choices*. Retrieved February 25, 2022 (https://climatechoices.ca/prior-preparation-pays-off/).

Norwegian Ministry of Climate and Environment. 2020. Report to the Storting (white paper). Norway’s integrated ocean management plans. Barents Sea–Lofoten area; the Norwegian Sea; and the North Sea and Skagerrak. (https://www.regjeringen.no/contentassets/5570db2543234b8a9834606c33caa900/en-gb/pdfs/stm201920200020000engpdfs.pdf)

Oceans Act 1997 (S.C.) c.31 (Canada). Retrieved from https://laws-lois.justice.gc.ca/PDF/O-2.4.pdf

O’Regan, Sacha M., Stephanie K. Archer, Sarah K. Friesen, and Karen L. Hunter. 2021. “A Global Assessment of Climate Change Adaptation in Marine Protected Area Management Plans.” *Frontiers in Marine Science* 8:711085. doi: 10.3389/fmars.2021.711085.

Pacific North Coast Integrated, Management Area (PNCIMA) Initiative. 2017. “Pacific North Coast Integrated Management Area Plan.”. Retrieved (40743032.pdf (dfo-mpo.gc.ca)).

Patrizzi, Nayla S., and Ricardo Dobrovolski. 2018. “Integrating Climate Change and Human Impacts into Marine Spatial Planning: A Case Study of Threatened Starfish Species in Brazil.” *Ocean & Coastal Management* 161:177–88. doi: 10.1016/j.ocecoaman.2018.05.003

Pinsky, M. L., L. A. Rogers, J. W. Morley, and T. L. Frölicher. 2020. “Ocean Planning for Species on the Move Provides Substantial Benefits and Requires Few Trade-Offs.” *Science Advances* 6(50):eabb8428. doi: 10.1126/sciadv.abb8428.

Prime Minister of Canada Justin Trudeau. 2021. “Minister of Fisheries, Oceans and the Canadian Coast Guard Mandate Letter.” (https://pm.gc.ca/en/mandate-letters/2021/12/16/minister-fisheries-oceans-and-canadian-coast-guard-mandate-letter)

Rilov, Gil, Simonetta Fraschetti, Elena Gissi, Carlo Pipitone, Fabio Badalamenti, Laura Tamburello, Elisabetta Menini, Paul Goriup, Antonios D. Mazaris, Joaquim Garrabou, Lisandro Benedetti-Cecchi, Roberto Danovaro, Charles Loiseau, Joachim Claudet, and Stelios Katsanevakis. 2020. “A Fast-moving Target: Achieving Marine Conservation Goals under Shifting Climate and Policies.” *Ecological Applications* 30(1):e02009-n/a. doi: 10.1002/eap.2009.

Jessen, Sabine. 2011. “A Review of Canada’s Implementation of the Oceans Act since 1997—From Leader to Follower?” *Coastal Management* 39(1):20–56. doi: 10.1080/08920753.2011.544537.

Santos, Catarina Frazão, Tiago Domingos, Maria Adelaide Ferreira, Michael Orbach, Francisco Andrade. (2014). How sustainable is sustainable marine spatial planning? Part I—Linking the concepts, Marine Policy, Volume 49, Pages 59-65, ISSN 0308-597X, https://doi.org/10.1016/j.marpol.2014.04.004. (https://www.sciencedirect.com/science/article/pii/S0308597X14001158)

Santos, Catarina Frazão, Tundi Agardy, Francisco Andrade, Manuel Barange, Larry B. Crowder, Charles N. Ehler, Michael K. Orbach, and Rui Rosa. 2016. “Ocean Planning in a Changing Climate.” *Nature Geoscience* 9(10):730–730. doi: 10.1038/ngeo2821.

Santos, Catarina Frazão, Tundi Agardy, Francisco Andrade, Helena Calado, Larry B. Crowder, Charles N. Ehler, Sara García-Morales, Elena Gissi, Benjamin S. Halpern, Michael K. Orbach, Hans-Otto Pörtner, and Rui Rosa. 2020. “Integrating Climate Change in Ocean Planning.” *Nature Sustainability* 3(7):505–16. doi: 10.1038/s41893-020-0513-x.

State of New South Wales: Department of Industry. 2018. NSW Marine Estate Management Strategy 2018-2028. Retrieved February 25 2022. (https://www.marine.nsw.gov.au/__data/assets/pdf_file/0005/1352831/Marine-Estate-Management-Strategy-2018-2028.pdf).

State of Victoria Department of Environment, Land, Water and Planning. (2020). Marine and Coastal Policy. Retrieved from https://www.marineandcoasts.vic.gov.au/__data/assets/pdf_file/0027/456534/Marine-and-Coastal-Policy_Full.pdf

Strategy, Ministry of Environment and Climate Change. n.d. “Climate Preparedness and Adaptation.” Retrieved February 9, 2022 (https://www2.gov.bc.ca/gov/content/environment/climate-change/adaptation).

Transport Canada. 2021. “Statement - Government of Canada Marks the Fifth Anniversary of the Oceans Protection Plan.” Retrieved February 25, 2022 (https://www.newswire.ca/news-releases/statement-government-of-canada-marks-the-fifth-anniversary-of-the-oceans-protection-plan-804571810.html).

UNESCO-IOC. 2021. MSPglobal Policy Brief: Climate Change and Marine Spatial Planning. Paris, UNESCO. (IOC Policy Brief no 3)

Watson, Maryann S., Anne-Marie Jackson, Georgia Lloyd-Smith, and Christopher D. Hepburn. 2021. “Comparing the Marine Protected Area Network Planning Process in British Columbia, Canada and New Zealand – Planning for Cooperative Partnerships with Indigenous Communities.” *Marine Policy* 125:104386. doi: 10.1016/j.marpol.2020.104386.

Whitney, Charlotte K., and Natalie C. Ban. 2019. “Barriers and Opportunities for Social-Ecological Adaptation to Climate Change in Coastal British Columbia.” *Ocean & Coastal Management* 179:104808. doi: 10.1016/j.ocecoaman.2019.05.010.

Zacharias, M. & Ardron, J. 2020. *Marine policy : an introduction to governance and international law of the oceans / Mark Zacharias and Jeff Ardron.* (Second edition.). Routledge.