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Canada and ocean climate adaptation: tracking law and policy responses, charting future directions

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This research article provides a law and policy summary of climate change adaptation initiatives in Canada at the ocean-climate nexus. Three levels of governance are examined (national, provincial, and Indigenous) with a focus on the Atlantic region. The research method was the review of relevant and newly amended laws, regulations and policy statements, and related commentaries. The roles of the federal government are first described with key developments including the launch of a Climate Adaptation Platform in 2012 to share adaptation experiences and information and release of a *National Adaptation Strategy* and accompanying *Adaptation Action Plan* in November 2022. Federal adaptation efforts in the areas of fisheries, aquaculture and shipping are also reviewed along with progress in establishing marine protected areas (MPAs) and other effective area-based conservation measures. Provincial adaptation initiatives are next summarized with a focus on the four Atlantic provinces. Those provinces have established a regional hub, CLIMAtlantic, to provide climate information and advance climate-related research and training. Each province has developed a climate action plan which includes climate adaptation priorities. Indigenous-led climate engagement and adaptation initiatives are finally described including the publication in 2019 of a *National Inuit Climate Change Strategy*, regional initiatives of the Atlantic Policy Congress of First Nations Chiefs Secretariat, and the development of climate adaptation plans by select First Nation communities in the Atlantic region. The paper concludes by discussing future law and policy directions to make Canada more "climate ready." Adoption of climate adaptation strategies for governmental departments and agencies with ocean and coastal responsibilities should be a priority. Incorporating climate change adaptation responsibilities through legislative and regulatory changes also needs to be considered, for example, by amending Canada's *Oceans Act* to recognize the role of oceans in climate adaptations and mitigation, to authorize the designation of MPAs as climate refuges and to require adaptive and dynamic MPA management plans through strict monitoring and timely review provisions. Indigenous peoples must be effectively included in all climate adaptation discussions and planning.

KEYWORDS

climate adaption, fisheries, MPAs, indigenous rights, Canada, law and policy

1 Introduction

Getting a firm grip on how Canada is addressing climate adaptation through ocean and coastal governance is not easy for various reasons. First, Canada is a federal state and thus a fragmented array of adaptation laws, policies and actions exist at national, provincial, territorial, municipal and community levels, including at the scale of Indigenous governance (Mercer Clarke et al., 2016). Second, climate adaptation responsibilities are spread across numerous departments and agencies (McKenzie and Kuehl, 2021) and many sectors including fisheries, aquaculture and shipping (Lemmen et al., 2021). Third, Canada fronts on three oceans, Atlantic, Pacific and the Arctic, each presenting their own adaptation challenges (Fisheries and Oceans Canada, 2020). For example, in the wake of decreasing sea ice thickness and cover, the Arctic is faced with adapting to increased shipping activities (Huntington et al., 2022) and changing fisheries (Lam et al., 2016). Warming is happening three times faster in Canada's North than the global average (Environment and Climate Change Canada, 2021a).

A fourth slippery aspect of climate adaptation in Canada is the multiple approaches to adaptation. "Hard" engineering approaches include building of seawalls and raising of bridges and roads (Dietz and Arnold, 2021). "Soft" approaches include protecting and restoring coastal wetlands (Dietz and Arnold, 2021) and establishing marine protected areas (MPAs) to enhance resilience of ecosystems (Secretariat of the Convention on Biological Diversity, 2019). Lessening the environmental stresses from key human uses, such as fishing and pollution, is a further adaptation approach (Steiner and VanderZwaag, 2021).

Many climate change risks have been identified for Canada's oceans and coastal areas. Key risks include: damage to physical infrastructure; impacts of rising sea levels to coastal communities particularly flooding, saltwater intrusion and erosion; threats to northern communities from reduced and changing sea ice; loss of marine biodiversity and ecosystem services; and decline in some fish species such as salmon and Arctic char (Council of Canadian Academies, 2019)

This article provides a three-part look at how Canada is faring in coastal and ocean adaptation governance. Federal efforts are first described with an overview of Canada's various policy instruments relating to climate adaptation followed by specific snapshots of how adaptation has been addressed in the areas of fisheries, aquaculture and shipping and through the establishment of MPAs and other effective area-based conservation measures (OECMs). A detailed look at how the Atlantic provinces (New Brunswick, Nova Scotia, Newfoundland and Labrador, Prince Edward Island) have responded to climate adaptation is next provided. The Atlantic focus provides a window into provincial adaptation approaches in a part of the country that is heavily dependent on oceans resources including fisheries while also particularly vulnerable to hurricanes and sea-level rise as evident from recent experience with Hurricane Fiona in 2022 (CBC, 2022; Christian Aid, 2022). Thirdly, coastal adaptation initiatives leds by Indigenous communities and organizations in the Atlantic region are summarized, including their efforts to be meaningfully included in adaptation planning undertaken by governments.

A detailed review of local level adaptation efforts and challenges in Canada is beyond the scope of this paper. The provincial summaries that follow emphasize the importance of municipal and community roles, for example, in assessing the vulnerabilities to climate change and ensuring appropriate planning and policy responses. The Federation of Canadian Municipalities has taken a lead in helping more than 600 municipalities prepare for climate change through various programs including the Municipalities for Climate Innovation Program (MCIP) which ran from 2017-2022 (Federation of Canadian Municipalities n.d.). *Canada in a Changing Climate Report* includes chapters describing the special adaptation challenges and opportunities facing cities and towns and rural and remote communities (Warren and Lulham, 2021).

The paper concludes with a discussion suggesting future law and policy directions for making Canada more "climate ready". Those directions include incorporating climate change responsibilities in sectoral legislation, ensuring the future expansion of MPA coverage is climate sensitive, enhancing policy guidance on climate adaptation, and moving dynamic and adaptive ocean management forward. Effective inclusion of Indigenous leadership in adaptation planning is also identified as an essential component of future directions.

The paper does not specifically address Canada's numerous climate mitigation commitments, such as pledges under its 2021 Nationally Determined Contribution under the Paris Agreement to reduce emissions by 40-45% below 2005 levels by 2030 and to reduce emissions to net-zero by 2050 (Government of Canada, 2021a). The paper recognizes that keeping a tight distinction between mitigation and adaptation actions is not always possible. For example, establishment of marine protected areas may serve both mitigation (enhancing carbon storage) and adaptation (increasing resilience of marine species) purposes (Government of Canada, 2021a, 13).

2 Federal adaptation law and policy

2.1 General federal policy instruments and initiatives

The development of Canadian adaptation policies has been incremental. A first overarching policy document, the *Federal Adaption Policy Framework* issued in 2011, set out three high level objectives and criteria for identifying priorities for adaptation actions (Government of Canada, 2011). The Framework gave scant attention to oceans with oceans only mentioned once as being an area where the federal government has fiduciary and direct responsibilities and is well positioned to act (Government of Canada, 2011, 4).

In 2012, Canada's Climate Adaptation Platform was launched under the leadership of Natural Resources Canada (NRCan) as a "network of networks" bringing together participants from many sectors to share adaptation experiences and develop climate adaptation tools and resources (NRCan n.d.). The Adaptation Platform has 14 working groups with the Coastal Management Working Group, co-chaired by NRCan Climate Change Impacts

and Adaptation Division and the Government of Prince Edward Island, devoted to advancing understanding of climate change impacts on coastal ecosystems and providing guidance on how to implement adaptation options (NRCan n.d.). NRCan has co-funded many adaptation projects through the Working Group and a broad range of case studies on nature-based coastal adaptation efforts have been published (e.g. Manuel et al., 2021a; Manuel et al., 2021b; Manuel et al., 2021c) along with various adaptation guidance documents (Saunders-Hastings et al., 2020; Municipal Natural Assets Initiative, 2021).

In 2016, the federal government collaborated with provinces and territories in setting an agenda for implementing mitigation and adaptation commitments under the Paris Agreement. The *Pan-Canadian Framework on Clean Growth and Climate Change* (Government of Canada, 2016) establishes four pillars under which further actions will be taken with three of the pillars focusing on climate mitigation but one devoted to taking "measures to adapt to the impacts of climate change and build resilience" (Government of Canada, 2016, 2) Five thematic areas under the climate adaptation pillar are identified where new actions will be taken to build resilience to change across Canada. The first theme is translating scientific information and Traditional Knowledge into action and two new directions for actions are set out, providing authoritative climate information through a new Canadian Centre for Climate Services and building regional adaptation capacity and expertise (Government of Canada, 2016, 29-30). Under the second theme, building climate resilience through infrastructure, general action commitments include investing in infrastructure to build climate resilience and developing climate resilient codes and standards (Government of Canada, 2016, 31). Under the third theme, protecting and improving human health and well-being, action areas include addressing climate change related health risks such as extreme heat induced illness and climate-driven infectious diseases and supporting healthy Indigenous communities (Government of Canada, 2016, 32). Under the fourth theme, supporting particularly vulnerable regions, four action items are investing in resilient infrastructure to protect vulnerable regions, building climate resilience in the North, supporting community-based monitoring by Indigenous peoples and supporting adaptation in coastal regions (Government of Canada, 2016, 33-34). A fifth adaptation theme is reducing climate-related hazards and disaster risks where the need to take actions to counter the growing frequency and intensity of events such as floods, wildfires, drought, extreme heat, high winds and winter road failures is recognized (Government of Canada, 2016, 35-36).

A sense of progress in taking adaptation actions pursuant to the general directions set by the Pan-Canadian Framework can be gleaned from annual reports required under the Framework (Government of Canada, 2016, 3). A climate assessment initiative launched in 2017, Canada in a Changing Climate: Impacts and Adaptation Issues, has produced various reports including *Canada's Changing Climate Report* (Bush and Lemmen, 2019) and *Canada in a Changing Climate: National Issues* (Warren and Lulham, 2021). In the spring of 2018, a $2 billion Disaster Mitigation and Adaptation Fund (DMAF) was officially launched to support large-scale infrastructure projects that build climate resilience from natural disasters and extreme weather (Government of Canada, 2018). In fall 2018, the Canadian Centre for Climate Services (CCCS) was established which maintains a website on climate information in support of adaptation decision-making (Canadian Centre for Climate Services n.d.). Various adaptation programs have also been developed including the federal government's First Nation Adapt Program, the Indigenous Community-based Climate Monitoring Program, the Building Regional Adaptation Capacity and Expertise Program, the Climate Change Preparedness in the North Program and the Aquatic Climate Change Adaptation Services Program (ACCASP) (Government of Canada, 2020; Government of Canada, 2021b). For 2020, ACCASP was reported to have funded ocean monitoring in all three of Canada's oceans, six joint projects under the ongoing Fisheries and Oceans Canada – US National Oceanic and Atmospheric Administration (NOAA) Ocean Acidification Collaboration and 15 research projects to better understand changing ocean conditions and fisheries and coastal infrastructure (Government of Canada, 2021b, 23).

In 2020, Canada issued a strengthened climate plan, a *Healthy Environment and a Healthy Economy* (Environment and Climate Change Canada, 2020). While the plan is largely focused on further mitigating climate change for example, through cutting energy waste, expanding renewable and clean energy and continuing to put a price on carbon pollution, the plan does make key adaptation commitments. The plan announced Canada's commitment to develop its first-ever National Adaptation Strategy in collaboration with provincial, territorial and municipal governments, Indigenous peoples and other partners (Environment and Climate Change Canada, 2020, 66). In pursuing a goal of protecting 25% of its lands and oceans by 2025, Canada also committed to partner with Indigenous communities in developing Indigenous Protected and Conserved Areas (Environment and Climate Change Canada, 2020, 71).

On November 24, 2022, Canada released its *National Adaptation Strategy* (Government of Canada, 2022a). The Strategy, subject to a 90 day comment period, sets general directions for achieving climate resilience in Canada without a specific focus on oceans. The Strategy establishes a shared vision for Canadian climate adaptation:

All of us living in Canada, our communities, and the natural environment are resilient in the face of a changing climate. Our collective adaptation actions enhance our well-being and safety, promote justice, equity, and reconciliation with Indigenous peoples, and secure a thriving natural environment and economy for future generations (Government of Canada, 2022a, 16).

The Strategy embraces four guiding principles for future adaptation efforts. Those principles are: respect jurisdictions and uphold Indigenous rights; advance equity and environmental justice; take proactive risk-based measures to reduce climate impacts before they occur; and maximize benefits and avoid maladaptation (Government of Canada, 2022a, 17). The Strategy sets goals and objectives for adaptation in five interconnected systems: disaster resilience, health and well-being, nature and biodiversity, infrastructure, and the economy and workers (Government of Canada, 2022a, 18). For example, under the

theme of nature and biodiversity, the goal is to ensure "Biodiversity loss has been halted and reversed and nature has fully recovered allowing for natural and human adaptation where ecosystems and communities are thriving together in a changing climate, with human systems existing in close connection with natural systems" (Government of Canada, 2022a, 24). The four biodiversity objectives are to transform human activities to halt and reverse biodiversity loss and enhance ecosystems connectivity and resilience; to provide opportunities and measures to First Nations, Métis Nation and Inuit governments, organizations, and communities to pursue self-determined priorities for ecosystem stewardship initiatives; to accelerate the use of nature-based solutions; and to monitor, restore and manage the ecosystems most affected by climate change to ensure their continued viability and adaptive capacity (Government of Canada, 2022a, 24).

The Strategy is meant to foster an evolving process. The Strategy will be updated on a five-year cycle and regular progress reports will promote transparency. Federal-provincial and federal-territorial action plans will be developed to respond to differing climate risks and levels of readiness (Government of Canada, 2022a, 34).

A *Government of Canada Adaptation Action Plan* (Government of Canada, 2022b), setting out federal adaptation actions across 22 departments and agencies, complements the Adaptation Strategy but the Action Plan gives limited attention to ocean and coastal issues. The Plan largely announces continuation of many existing adaptation programs and initiatives (Government of Canada, 2022b, Annex 3) with two specific ocean-related actions mentioned. The Marine Protected Areas Program led by Fisheries and Oceans Canada aims to protect 25% of Canada's oceans by 2025 and 30% by 2030. The Aquatic Climate Adaptation Services Program, an internal science-funding effort within Fisheries and Oceans Canada, supports research and monitoring activities meant to inform decisions relating to fisheries and oceans and coastal management. Funding of up to $41 million over five years is dedicated to a new climate-resilient coastal communities program, aimed at developing novel solutions to climate change risks, but little detail is provided (Government of Canada, 2022b, 56).

2.2 Federal adaptation in key sectors

2.2.1 Fisheries management

While climate change impacts on fisheries and marine ecosystems may be factors in setting quotas and other management measures, Canada's *Fisheries Act* leaves considerable discretion whether and how climate change will be addressed in practice (Engler et al., 2023). The Act does not explicitly mention climate change as a factor to be weighed. Amendments to the Act in 2019 (*An Act to amend the Fisheries Act and other Acts in consequence*) allow but do not require the Minister of Fisheries and Oceans to apply precautionary and ecosystem approaches. The Minister must implement management measures to maintain major prescribed fish stocks at sustainable levels taking into account the biology of the fish and the environmental conditions affecting the stock. The Minister is required to develop rebuilding plans for major fish stocks that decline to or below a limit reference point and the plan must take into account the biology of the fish and the environmental conditions affecting the stock. The meaning of "take into account" remains uncertain (Kronlund et al., 2021).

A number of recent studies have documented the lagging nature of climate change incorporation into Canadian fisheries management with a few exceptions, for example for Pacific salmon species (Bryndum-Buchholz et al., 2021). Climate considerations have not been routinely included in the terms of reference for scientific advice from DFO Science (Boyce et al., 2020). In an assessment of the use of climate, oceanographic and ecological considerations in the science advisory processes for 178 stock assessments, only 27% included environmental considerations in the final science advice to fisheries managers (Pepin et al., 2022). Most references in scientific research documents to climate change expressed a lack of understanding about impacts on stock dynamics (Boyce et al., 2021). While a climate change research program initiated in 2011, the Aquatic Climate Change Adaptation Services Program, has produced over 60 studies, only 3% of ACCASP studies were found to be mentioned in documents forming the scientific advice for management decisions (Boyce et al., 2021). A continuing limitation is the lack of explicit records on how science advice, which includes information on environmental variables, is weighted in the decision-making process by fisheries managers (Pepin et al., 2022).

Fisheries and Oceans Canada has been working towards incorporating climate change considerations into fisheries stock assessments. A 2019 Science Advisory Report suggests various ways forward including the adoption of an overarching Climate Change Science Strategy, ensuring each stock assessment report contains a description of whether, what and how climate change information were considered, and developing multi-year to decadal climate and ocean projections at appropriate spatial scales which are currently not available for Canadian waters (DFO, 2019).

Canada has adopted a regional precautionary and adaptive approach to possible future commercial fisheries in the fast-changing Beaufort Sea region with its decreasing ice cover and increasing ocean acidification (Steiner et al., 2019). The Beaufort Sea Integrated Fisheries Management Framework for the Inuvialuit Settlement Region, adopted in 2014 (Fisheries and Oceans Canada et al., 2014), establishes a multi-step decision process for any future commercial fisheries applications (Ayles et al., 2016). Factors to be considered include possible adverse effects on Inuvialuit subsistence fisheries and effects on vulnerable ecosystem components.

A good example of climate adaptation in Canadian fisheries management practice can be seen in the case of the endangered North Atlantic right whale which shifted its summer feeding habitat from the Bay of Fundy and Scotian Shelf into the Gulf of St. Lawrence due to a climate-warming related change in the availability of a major prey species, the copepod *Calanus finmarchicus* (Koubrak et al., 2021). With no protective measures in place to address threats from ship-strikes and fishing gear entanglements in the Gulf, twelve right whales were found dead in 2017 (NOAA, 2023). Since 2018, various fishing measures have been introduced to prevent entanglements (Fisheries and Oceans

Canada, 2022a). A key measure for 2022 was the dynamic closure in the Gulf of St. Lawrence of a defined area about 2000km^2 around the position where a right whale was visually or acoustically detected. That closure applied to non-tended fixed gear fisheries, including lobster and crab, for 15 days. If a right whale was detected again in the area within days 9-15, a season-long closure was implemented (Fisheries and Oceans Canada, 2022b). In 2021, Canada launched the $20 million Whale Safe Gear Adoption Fund to help harvesters transition to whale safe gear (weak breaking points or links) by 2023 (Fisheries and Oceans Canada, 2022a). Reported mortalities have been reduced, for example, there were no documented mortalities of the right whale in Canada in 2018, 2020, 2021 and 2022 (NOAA, 2023).

2.2.2 Aquaculture

How climate and ocean acidification adaptation plays out in the aquaculture sector is especially difficult to fathom due to the complicated federal-provincial jurisdictional picture and limited federal law and policy guidance (Engler et al., 2023). While the federal government has assumed a primary role in regulating aquaculture in British Columbia and Prince Edward Island, leasing and licensing of aquaculture operations has been left in the hands of the other Atlantic provinces (Doelle and Saunders, 2016). A key federal-provincial policy document, *Aquaculture Development Strategy 2016-2019*, does not refer to climate change (Canadian Council of Fisheries and Aquaculture Ministers, 2016). A 2021 mandate letter from the Prime Minister to the Minister of Fisheries and Oceans asks the Minister to continue work to introduce Canada's first-ever Aquaculture Act (Prime Minister Trudeau, 2021) but a discussion paper outlining key elements of proposed legislation is also silent on the challenges raised by climate change and ocean acidification (Fisheries and Oceans Canada, n.d.a).

With marine heatwaves and ocean acidification having already impacted shellfish growers in British Columbia (Westfall and Coletta, 2021; Baker, 2022) adaptation has become a priority in that province. British Columbia is developing an Ocean Acidification and Hypoxia (OAH) Action Plan with goals of addressing knowledge gaps and developing mitigation and adaptation strategies (B.C. Ministry of Agriculture, Food and Fisheries, 2022). A series of four workshops were convened by an advisory committee between November 2012 and March 2022 to assess the state of science, seafood harvester and producer perspectives, coastal community perspectives, and policy and governance considerations. B.C.'s Ministry of Agriculture is working with partners to monitor ocean chemistry and to develop a selective breeding program for climate resilient oysters through the Ocean Acidification Shellfish Industry Seed Supply (OASISS) project (B.C. Government, 2017).

Much less attention has been paid to climate change and ocean acidification impacts on aquaculture in Atlantic Canada and a 2020 study was quite positive regarding the adaptation future (Wilson et al., 2020). American oyster production from aquaculture was projected to improve due to habitat suitability in the region and investments in hatchery infrastructure was viewed as a way to maintain regional production of mollusc species in the face of falling pH or irregular natural recruitment.

2.2.3 Shipping

With sea ice loss in the Arctic and increased shipping (Huntington et al., 2022), one of the major Canadian adaptation challenges is to ensure shipping operations minimize pollution and social impacts in that region. Many shipping adaptation measures have already occurred in the Arctic. For example, in 2010 Canada established the Northern Canada Vessel Traffic Services Zone Regulations for Arctic waters which imposed strict reporting obligations on large vessels and vessels carrying as cargo a pollutant or dangerous goods. Canada took a leading role in developing the Polar Shipping Code through the International Maritime Organization with the Code setting new global standards for Arctic shipping pollution and vessel design, construction, equipment and operations (International Maritime Organisation (IMO) n.d.). A major adaptation initiative still a work in progress is the Northern Low-Impact Corridors (Corridors) initiative being led by the Canadian Coast Guard, Transport Canada and the Canadian Hydrographic Service (Government of Canada, 2021c). The Corridors initiative is seeking to collaboratively develop a governance framework to minimize potential effects of shipping on wildlife, respect culturally and ecologically sensitive areas, enhance navigational safety and guide infrastructure investments on the North. A consultation process involving various stakeholders, governments, Inuit and First Nations was held April 1, 2021 to July 31, 2022. A decision on the establishment of an appropriate governance structure to design and manage the low-impact corridors has yet to be released.

A leading example of adaptive shipping governance in response to climate change induced pressures can be seen in the case of the endangered North Atlantic right whale which extended its distribution into the Gulf of St. Lawrence following a shift in the copepod food source. To respond to problem of ship-strikes on the right whales, Transport Canada has implemented vessel traffic management measures in the Gulf since 2017 (Transport Canada, 2022a). In recent years Transport Canada has relied on a special interim order power added to the *Canada Shipping Act, 2001* in 2018 which allows immediate legal protections when required to address risks to marine safety or to the marine environment. The 2022 Interim Order set out a range of vessel traffic measures in the Gulf of St. Lawrence which included large static zones where vessels more than 13 metres in length were required to travel at speeds not exceeding 10 knots from April 20 to November 15, 2022 and four dynamic shipping zones where speed restrictions would apply for 15 days after at least one right whale was detected in or near a zone (Transport Canada, 2022b). To protect right whales migrating in and out of the Gulf through Cabot Strait, a voluntary slow down for vessels over 13 metres to a speed of 10 knots or less was encouraged from April 20 to June 28, 2022 and again from September 28 to November 15, 2022.

2.2.4 Federal adaptation through MPAs and other effective area-based conservation measures

Canada has been quite progressive in establishing MPAs and OECMs in recent years. Canada has surpassed the 2020 Aichi target 11 under the Convention on Biological Diversity for protecting 10% of coastal and marine areas with approximately 842,821 km^2 or 14.66% of Canada's marine and coastal areas protected and conserved (Fisheries and Oceans Canada n.d.b). While many types of protected areas have been established, including national marine conservation areas, marine portions of national wildlife areas, migratory bird sanctuaries, national parks with marine components and provincial protected areas (Fisheries and Oceans Canada n.d.b), the two main protective tools have been MPAs established under the *Oceans Act* and fisheries area closures that meet OECM criteria and are known as "marine refuges." (Fisheries and Oceans Canada 2022c). There are currently 14 *Oceans Act* MPAs covering roughly 6% of Canada's marine and coastal areas (Fisheries and Oceans Canada n.d.c). Thirty-five marine refuges established through variation orders and/or license condition under the *Fisheries Act* are presently listed where various fishing activities (especially bottom trawling) are prohibited to protect important species and habitats including aggregations of corals and sponges (Fisheries and Oceans Canada n.d.d).

Canada has set further ambitious protected area targets. Canada is committed to conserving 25% of marine and coastal areas by 2025 and 30% by 2030 (Fisheries and Oceans Canada n.d.e).

To avoid the lengthy process of having to establish MPAs through regulations under the *Oceans Act*, Canada amended the Act in 2019 to allow the Minister of Fisheries and Oceans to designate an MPA by order which "freezes the footprint" of human activities up to five years until a regulatory designation occurs or the order is repealed. The Tuvaijuittuq MPA was the first MPA designated by ministerial order in August 2019 and demonstrates well an adaptive MPA approach (Fisheries and Oceans Canada n.d.f). The area off the Northwest Coast of Ellesmere Island, Nunavut in the Arctic Ocean is culturally significant due to the presence of multi-year pack ice and is viewed as a unique and potentially important future summer habitat for ice-dependent species such as walrus, seals and polar bears. The MPA provides interim protection while governments work with Inuit and northern partners to explore the feasibility of longer term protections in the area.

The establishment of further national marine conservation areas (NMCAs) under the leadership of Parks Canada also looms on the horizon but the extent climate change will be factored in remains to be seen. Parks Canada is working towards the creation of 10 new NMCAs by 2025 (Parks Canada n.d.). Parks Canada's Policy on the Establishment and Management of NMCAs, released in 2022, explicitly recognizes that NMCAs may contribute to climate change mitigation by enhancing and conserving blue carbon and may support climate change adaptation by enhancing ecosystem resilience (Parks Canada 2022a, 9). One of the guiding principles of the Policy is for NMCA decision-making to be climate informed, that is, ensuring climate mitigation and adaptation efforts are informed by science, Indigenous knowledge and local perspectives (Parks Canada 2022a, 11).

2.3 Preliminary conclusions

The above summary of federal adaptation law and policy initiatives at the ocean-climate nexus establishes that Canada has indeed taken steps forward, although these appear piecemeal rather than reflecting an integrated approach. The *National Adaptation Strategy* and accompanying Action Plan hold promise especially in identifying the importance of respect for Indigenous rights, which, as will be seen below, is vital in the Canadian context. However, neither the Strategy nor the Plan appear to holistically address key sectors including fisheries management, aquaculture, or shipping.

3 Climate adaptation law and policy in the Atlantic provinces

Atlantic Canada is comprised of four provinces that all border the ocean, therefore providing fertile ground for the study of provincial approaches to climate adaptation at the oceans intersect. Climate adaptation in Atlantic Canada has involved both regional initiatives and individual provincial efforts (Dietz and Arnold, 2021).

3.1 Regional initiatives

A regional approach to climate adaptation was first fostered through the Climate Adaptation Solutions Association (ACASA), a project partnership funded by NRCan involving the four provincial governments and stakeholders. ACASA was active between 2009 and 2016 and produced numerous publications on climate adaptation and promoted adaptation awareness and planning for municipalities (Dietz and Arnold, 2021; Atlantic Climate Adaptation Solutions Association (ACASA) n.d.).

In July 2021, a regional collaborative approach was continued through the establishment of a new regional hub, CLIMAtlanic, to provide climate information, data, tools and training for the four Atlantic provinces (Environment and Climate Change Canada, 2021b). CLIMAtlantic was launched with $1.65 million in federal funding over the next three years and joins a network of other regional climate centres in Quebec, British Columbia and the Prairies with network support provided by the Canadian Centre for Climate Services (Environment and Climate Change Canada, 2021b). Among outputs, CLIMAtlantic has produced a study on municipal responsibilities and liabilities for disclosing and managing climate change flood risks (CLIMAtlantic, 2022) and has developed a networking map allowing individuals and organizations working on climate adaptation to connect and share information (CLIMAtlantic n.d.).

3.2 Provincial efforts

3.2.1 Prince Edward Island

Building on an initial climate change action plan released in 2018 (Government of Prince Edward Island, 2018) and a provincial climate change risk assessment published in 2021 (ICF and Shared Value Solutions, 2021), Prince Edward Island released a specific climate adaption plan in October 2022 committing the government to 28 adaptation actions of a general nature (Department of Environment, Energy and Climate Action, 2022). Key coastal-related adaptation actions include: developing a coastal flood warning system, creating a provincial land-use plan; establishing a municipal climate adaptation program; limiting future development in hazardous and vulnerable coastal areas; promoting nature-based solutions to coastal hazards; and increasing protections for climate-vulnerable species and habitats. The plan pledges to monitor implementation progress for the actions through annual ministerial reports.

3.2.2 Nova Scotia

Following a first climate action plan issued in 2009 (Nova Scotia Department of the Environment, 2009) and a provincial climate risk assessment released in December, 2022 (Nova Scotia Department of Environment and Climate Change, 2022a), Nova Scotia published an updated climate change plan in December 2022 addressing both climate mitigation and adaptation (Nova Scotia Department of Environment and Climate Change, 2022b). Some of the key climate adaptation commitments out of 68 actions include: creating a new fisheries and aquaculture climate change information hub; developing and implementing climate change adaptation strategies for all government departments; supporting the fisheries and aquaculture sector to complete climate change vulnerability assessments and sector-specific adaptation plans; protecting at least 20 percent of Nova Scotia's total land and water mass by 2030 through a new protected area strategy; and creating a new fisheries and aquaculture climate change adaptation fund. The 2022 climate action plan promises annual progress reports and a review and renewal of the plan within five years of its release.

Nova Scotia has also addressed climate adaptation through legislation. The *Environmental Goals and Climate Change Reduction Act*, enacted in 2021, recognizes climate change as a global emergency requiring urgent actions. The Act calls for updating the provincial climate change risk assessment by December 31, 2025 and an update every five years thereafter. The Act further requires climate adaptation planning across every government department. The Act set a deadline of December 31, 2022 for the release of a provincial climate change plan and legally requires a review and renewal of the plan within five years.

In 2019, Nova Scotia passed legislation specifically aimed at climate adaptation in coastal areas, the *Coastal Protection Act*. The purpose of the Act, set out in section 2, is to protect the Province's coast for future generations by preventing development and activity in locations adjacent to the coast that "damage the environment by interfering with the natural dynamic and shifting nature of the coast" or "put residences and buildings at risk of damage or destruction from sea-level rise, coastal flooding, storm surges and coastal erosion." The Act is based on various adaptation principles, listed in section 7, which include the importance of preserving the dynamic nature of the coast to allow for the natural adaptation of coastal ecosystems and the need for risk-informed decisions regarding development in coastal areas given the inevitability of sea-level rise, coastal flooding, storm surge and coastal erosion. The Act is very much framework in nature. The Act provides for the establishment of the Coastal Protection Zone but the boundaries and management measures, such as approval requirements and prohibited activities, will depend on the issuance of regulations which are still at the draft stage. Section 24 of the Act protects the Province from being held liable for changes in land values related to a parcel of land being included in or adjacent to the Coastal Protection Zone.

In 2021, Nova Scotia issued a guide to the proposed regulations under the *Coastal Protection Act* (Nova Scotia Department of Environment and Climate Change, 2021) and undertook public consultations during the summer and early fall (Nova Scotia Department of Environment and Climate Change, 2022c).

The Coastal Protection Zone boundaries are proposed to extend in the range of 80 to 100 meters inland from the high-water mark and to extend seaward from the high-water mark without a specified distance (Province of Nova Scotia 2021). New building permit requirements are expected to apply within the zone to houses, cottages and commercial or industrial buildings with some exceptions. Regulations will establish two types of building setbacks. Vertical setbacks will be set for all areas of the coast and establish minimum building elevations as a vertical height above mean sea level in meters to the nearest 20 centimetres: Horizontal building setbacks will be determined by designated professionals to ensure new construction is far enough from the high-water mark to be safe from coastal erosion throughout an 80-year planning horizon (Province of Nova Scotia 2021). The new regulations are expected to be issued in 2023 (Nova Scotia Department of Environment and Climate Change, 2022b).

3.2.3 New Brunswick

In September 2022, New Brunswick released a renewed climate action plan; *Our Pathway Towards Decarbonization and Climate Resilience*, setting out 30 actions with most focused on climate mitigation but eight actions included under a climate adaptation pillar (Province of New Brunswick, 2022). Key actions include: developing and beginning implementation of a flood education and awareness program by 2025; releasing a comprehensive provincial climate change risk assessment by 2025; developing a provincial climate change adaptation plan by 2026, followed by climate adaptation plans for priority government departments by 2027; ensuring adaptation plans are updated and completed for 50 percent of all local governments and rural districts by 2025 and 100 percent by 2030; developing a long-term Flood Mitigation Plan by 2024 to establish priority locations for infrastructure upgrades; maintaining biodiversity and increasing resilience through nature-based solutions by developing a renewed Biodiversity Strategy by 2025; setting a new target for protected areas by 2024; and implementing a living shorelines program by 2026 (Province of New Brunswick, 2022).

New Brunswick's *Climate Change Act*, passed in 2018, further supports climate adaptation. The Act requires climate action plans to be reviewed at least every five years and to have annual progress reports. The Act establishes a Climate Change Fund which may be used for both mitigation and adaptation purposes including for public education related to climate change and for adaptation measures to address current or future climate conditions.

3.2.4 Newfoundland and Labrador

Newfoundland and Labrador released its five-year climate change action plan in 2019 recognizing the need for both mitigation and adaptation actions (Government of Newfoundland and Labrador, 2019). The plan describes various adaptation actions to date, such as: creation of a Climate Data portal to provide provincial climate change data and information; development of flood risk maps incorporating climate change projections for eight locations; and establishment of a coastal erosion and monitoring and mapping program covering over 120 locations. Proposed adaptation-related actions stand out as being very general. For example, the Province promises to: work with the agriculture, forestry, fisheries and aquaculture industries to increase knowledge and build resilience to changing climatic conditions (Action 4.4.4); enhance the coastal erosion and monitoring program (Action 4.6.2); support the development and dissemination of climate research and information (Action 4.6.3); continue to integrate climate change into flood risk maps (Action 4.6.4); integrate climate change considerations and projections into government infrastructure development decisions (Action 4.6.9); and work with the Federal Government and Indigenous governments and organizations to develop and implement a Northern Adaptation Strategy that includes Labrador (Action 4.6.10). To ensure accountability, the plan promises progress reports half-way through the five-year plan and again at the end of the plan's duration.

A mid-term review of the climate change action plan, issued in December 2021, provides examples of key adaptation progressions (Government of Newfoundland and Labrador, 2021a). Key adaptation actions included completion of flood risk maps incorporating climate change projections for three areas and planned flood risk maps for three more locations for 2021-2022. A risk assessment report on projected climate change impacts on municipalities and major natural resources industries, including fisheries and aquaculture, was published in March 2021, with various future adaptation recommendations (Government of Newfoundland and Labrador, 2021b).

3.3 Preliminary conclusions

This overview of provincial climate adaptation action in the Atlantic region confirms that climate adaptation is indeed on the agenda of each province, although efforts are not equally well developed, nor do all equally integrate ocean climate concerns. Nova Scotia's legislative initiative in the area of coastal protection is notable despite delays in finalizing the regulations.

4 Indigenous-led climate adaptation

Section 35 of the *Constitution Act, 1982* recognizes and affirms the rights of First Nations, Inuit and Métis peoples (Constitution Act 1982) and Canada has committed to the implementation of the UN Declaration on the Rights of Indigenous Peoples (UNDRIP) (UN General Assembly, 2007). The unique vulnerability of Indigenous peoples to climate change and the disproportionate impacts that they experience are well recognized globally, as is the importance of their leadership in climate action (JIIPFCC n.d.). In 2005, the Inuit played a leadership role in drawing global attention to the human rights consequences of greenhouse gas emissions on Indigenous cultural rights in a petition to the Inter-American Commission on Human Rights (Watt-Cloutier, 2015). Despite this, Canada has been slow to recognize the necessity of ensuring Indigenous peoples can effectively participate in climate action planning including in relation to adaptation, putting Indigenous rights at risk (Gunn, 2021). The state obligation to mitigate climate change and address adaptation needs of coastal Indigenous peoples was confirmed in the 2022 Human Rights Committee decision against Australia brought by Indigenous Torres Straight Islanders (Billy v Australia, 2022). Yet, as the previous sections illustrate, some but not all Canadian federal and provincial government adaptation law and policy initiatives have sought to effectively include Indigenous peoples and for those that have, it is an evolving process. This Part will explore Indigenous led climate action at national, regional and local scales with a focus on the North-West Atlantic region.

4.1 National

The Assembly of First Nations (AFN) works to advance the aspirations of First Nations across Canada (AFN n.d.). AFN has passed numerous resolutions supporting First Nations involvement in discussions over climate change, at the same time noting the need for financial resources to ensure assessment of climate impacts and capacity to effectively participate (AFN resolution 22/2017). The AFN has been part of the First Nations – Canada Joint Committee on Climate Action (JCCA) since 2017, a forum that brings together federal officials and First Nations representatives from all regions of Canada to collaborate on climate policy and advance self-determination (ECCC, 2022). Notably, the JCCA has dedicated time to develop 'Ethical Space', an approach which "provides an open, safe space to design, develop and work together in harmony" with equal respect for Indigenous and Western knowledge and oral and written communication systems (JCCA, 2021, 7, 27). To ensure Ethical Space is operationalized within all JCCA activities, a set of Guiding Principles were developed (JCCA, 2021, 7, 27-28). The Guiding Principles draw attention to the need to engage as early as

possible and often with First Nations in policy or program development, with funding to support capacity to participate so as to ensure meaningful outcomes for First Nations (JCCA, 2021, 27). Joint decision-making and policy development that institutionalize First Nations legal orders and knowledge systems should be prioritized (JCCA, 2021, 28). Among priorities identified in the 2021 JCCA report is the need to accelerate the full and effective participation of First Nations in the National Adaptation Strategy and to "Embed an intergenerational and intersectional dialogue on climate change in all JCCA activities" (JCCA, 2021 5, 24). The 2021 JCCA report also highlights the development of a vision – or "paradigm shift" – of First Nations Climate Leadership in which the leadership and priorities of First Nations are "at the core of climate action" through "Indigenous-led and delivered solutions" that are supported through appropriate access to funding (JCCA, 2021, 14).

The AFN and its Advisory Committee on Climate Change and the Environment plays a key role in climate adaptation policy. In 2019, the AFN passed a resolution declaring a First Nations Climate Emergency (Assembly of First Nations Resolution no. 05/2019). In 2020, a National Climate Gathering was held bringing together First Nations participants from across the country to act on the resolution (AFN, 2020). The Proceedings describe a plenary on the framing of a climate lens from a First Nations perspective and a plenary on climate leadership. Other sessions explored climate action and self-determination, First Nations perspectives on the implications for marine environments of climate change, and the potential of marine Indigenous Protected and Conserved Areas to enhance climate resiliency (AFN, 2020, 14).

In 2022, a range of climate adaptation-related resolutions were put forward by members for discussion at the AFN's Annual General Meeting (AGM) in July (AFN, 2022) some of which touch directly on marine environment and fisheries. For example, draft resolution 10 reaffirms "that First Nations' traditional knowledge, teachings, innovations, practices of sustainable management, and conservation of fish and fish habitats play an essential role in addressing climate change adaptation and mitigation strategies" and consequently the AFN is "to advocate for the full and meaningful inclusion of First Nations in the analysis of impacts of climate change on First Nations' fisheries" (AFN, 2022, AFN Draft Resolution 10/2022). Furthermore, the resolution calls on the federal Minister of Fisheries and Oceans to increase the participation of Indigenous peoples in its Blue Economy Strategy and provide a greater role for Indigenous guardians in environmental monitoring (AFN, 2022, AFN Draft Resolution 10/2022). Draft resolution 39 resolves that the AFN is to call upon the federal government to immediately respond to climate emergencies that impact the lands of First Nations, including through the replacement of damaged lands and the relocation of reserves that are particularly vulnerable to climate disaster, in full partnership with the First Nations that have been affected (AFN, 2022, AFN Draft Resolution 39/2022). Other draft resolutions call for the development of processes to compensate First Nations communities facing floods and drought, the establishment of a Nature Table to interface with Environment and Climate Change Canada on biodiversity, and other matters relating to water and emissions reductions. This overview illustrates the wide range of ongoing concerns that explicitly or implicitly address climate adaptation and oceans.

An additional area of AFN concern is the continued need for advocacy seeking "a commitment to First Nations leadership in marine conservation, such as through the establishment of marine Indigenous Protected and Conserved Areas" (AFN, 2022, AFN Draft Resolution 28/2022). In advance of the 2023 Fifth International Marine Protected Areas Congress (IMPAC5), the AFN released a report on marine IPCAs with recommendations for the Government of Canada including the adoption of a right-based approach and implementation of UNDRIP (AFN 2023; Heidt and Jones, 2023). In the short term, the report advocates co-designation as the best way forward, while legal reform will be required in the long term (Heidt and Jones, 2023). The importance of adoption and training for an Ethical Space approach is also identified in the marine conservation area (Heidt and Jones, 2023, 30-31). Notably, the AFN directly links marine protected areas to climate adaptation as a way to increase resiliency of marine species and ecosystems (Heidt and Jones, 2023, 13).

Importantly, the JCCA Guiding Principles recognize that processes led by First Nations "are not generalizable to Métis and Inuit" (JCCA, 2021, 27). It is therefore necessary to also consider other climate adaptation initiatives led by or involving Canadian Indigenous peoples who are not First Nations. For example, in 2019, Inuit Tapiriit Kanatami, the national Inuit organization, released a *National Inuit Climate Change Strategy* (ITK, 2019). The dire consequences of climate change for Inuit lands and melting sea ice and therefore for Inuit ways of life are central to the strategy. It identifies common Inuit climate priorities and centres implementation on Inuit rights and governance defined in land claims agreements, providing guidance "to existing and future partners, including governments and organizations" on "how Inuit are represented and engaged on climate issues through a rights-based approach" (ITK, 2019, 2, 14). The Strategy also aims to support the development of regional strategies and participation in international climate policy (ITK, 2019, 3).

The Strategy is informed by a vision of: "Sustainable Inuit communities bound by the inextricable links between our culture, way of life and the environment, working collaboratively in the face of a changing climate to overcome inequities, ensure our long-term prosperity, and strengthen our health and well-being" (ITK, 2019, 8). Its purpose is both to shape climate policy at international, regional, national and local scales, and to advance climate policy making, action and research that is driven by Inuit through ethical partnerships (ITK, 2019, 8). The Strategy identifies three Guiding Principles: "rights and self-determination; leadership and resilience; long-term and holistic" (ITK, 2019, 8). Five interconnected priority areas are outlined in the Strategy, three of which are particularly relevant to climate adaptation, oceans and coastal governance. First, to "Advance Inuit capacity and knowledge use in climate decision-making"; second, to "Improve Inuit and environmental health and wellness outcomes through integrated Inuit health, education and climate policies and initiatives"; and third, to "Reduce the climate vulnerability of Inuit and market food systems" (ITK, 2019, 7, 21-23). The fourth is the need to adapt to changes in natural infrastructure and to ensure climate resilience of newly built infrastructure, while

the fifth is to reach energy independence (ITK, 2019, 7). The Strategy explores the impact of sea ice changes on fish and wildlife and the Inuit (ITK, 2019, 14). Notably, the Strategy takes as a starting point that Inuit have so far "largely been excluded from participation in federal, provincial, and territorial climate decision-making" (ITK, 2019, 21). In 2019 the federal government announced funding support of $1 million for four years of implementation of the Inuit Strategy (ECCC, 2019).

4.2 Regional

The Atlantic Policy Congress (APC) of First Nations Chiefs Secretariat is a regional First Nation-led institution which supports and advocates for Indigenous interests on behalf of members representing Mi'kmaq, Maliseet (Wolastoqiyik), Passamaquoddy and Labrador Innu communities in eastern Canada and Maine (APC n.d.). The APC identifies and shares relevant climate policy research with Atlantic First Nations, coordinates meetings and supports dialogues, while also supporting climate mitigation and adaptation community measures through the federal government's Aboriginal Aquatic Resource and Oceans Management (AAROM) program (APC n.d.a; AAROM n.d.). The APC commissioned a 2021 report with the aim of providing a reference guide to key climate adaptation resources for Atlantic Canadian First Nation communities (Wilke, 2021, 1). The report concludes by suggesting regional priorities including recognition of: the centrality of the rights and self-determination of First Nations to federal and provincial climate action; the non-negotiable nature of access to traditional food fisheries by First Nations; and the susceptibility of First Nations community infrastructure to climate change including wharfs and water and the need for strengthening and replacements (Wilke, 2021, iii-iv, 32-33). The report also recommends that First Nations communities should document their climate vulnerabilities with third-party expertise as appropriate and identify adaptive measures that are cost-effective (Wilke, 2021, iv, 33-34). Overall, the APC report acknowledges that the common goals of climate adaptation work include reducing human health and safety risks, maintaining coastal ecosystem health, reducing built environment vulnerability, securing access to resources of the sea, and ensuring the diversity of livelihood opportunities (Wilke, 2021, 4).

The APC's Fisheries Department is also actively engaged in climate research and policy initiatives including on adaptation, cumulative effects, fish habitat and species at risk (APC n.d.b.). The APC commissioned a literature review of fisheries and climate adaptation research in 2021 with the ultimate objective of providing recommendations to the APC on climate mitigation and adaptation approaches for Atlantic Canadian First Nations communities (APC 2021, 7). The primary species of concern for the study of climate impacts in the region were lobster, snow crab and haddock, as well as their predators and food species (APC 2021, 16). The study observed that the literature rarely considers the interconnected ecological, social and economic dimensions of climate impacts on fisheries, and so, for example, often fail to explore how fisheries can use sustainable fishing practices to reduce their own ecological footprint (APC 2021, 25). Topics considered in the literature review include ocean acidification, changing currents, water temperature changes, sea-level rise, food-web implications and disease, as well as implications for community infrastructure, risks to fish harvesters including from extreme weather events, socio-economic impacts and ecological grief, and finally economic impacts (APC 2021, 25-36). The study noted the lack of studies on emotional, cultural and ceremonial impacts of climate change, as well as a lack of literature co-produced with Indigenous peoples and even less that was Indigenous led (APC 2021, 37). In addition to the literature review, the report documents engagement sessions, vulnerability assessment, and a two-eyed seeing evaluation, concluding with recommendations and infographics designed to support climate action in fisheries policy and programs (APC 2021, 61-66). Beyond recommendations for additional studies, a key recommendation is that the APC "continue to promote discursive shifts" so as to move DFO and others away from extractive and commercial language (such as 'biomass' and 'marine goods and services') and towards language that values the inherent dignity of relationships with land, ecosystems and marine fish and mammals (APC 2021, 63). A related recommendation is that oceans policy be guided by "long-term sustainability goals that balance environmental, social, cultural and spiritual sustainability over short-term economic growth" (APC 2021, 63). Ultimately, both mitigation and adaptation approaches should be advocated for at all scales and climate change should be addressed holistically with attention to ecological grief concerns and the development and implementation of restorative action plans (APC, 2021, 66).

4.3 Local

Many First Nations and Inuit communities in the Atlantic region have or are undertaking climate adaptation actions with an oceans and coastal governance dimension, sometimes but not always with government funding support. Funding is available through various federal programs and as of May 2021, forty-three percent of First Nation communities in Canada had been the direct recipient of federal climate funding for at least one climate initiative, with another sixteen percent indirectly accessing benefits (JCCA, 2021, 17). The lack of access to climate funding support by forty-one percent of First Nations has been attributed to the complexity of application processes which create hurdles for communities with the least capacity especially as they are often grappling with urgent challenges (JCCA, 2021, 17-18). An example of a program dedicated to supporting Indigenous peoples in climate adaptation is the Indigenous Community-Based Climate Adaptation Program, established in 2018 for a period of 10 years to support long-term climate monitoring efforts and public engagement (Government of Canada n.d.a.). It has supported the monitoring of climate patterns and ocean circulation in the Nunatsiavut Territory of northern Labrador, as well as monitoring efforts by many Indigenous communities in Atlantic Canada.

Some First Nations communities in Atlantic Canada have proactively developed climate adaptation plans. An April 2013 presentation of the climate assessment and adaptation plans of the Miawpukek First Nation on the island of Newfoundland reveals

an awareness of the need for preparedness for climate impacts ranging from sea level rise and coastal erosion to flood risks, and more frequent and severe storms (Miawpukek First Nation, 2013). Attention is paid in the plan to a wide range of issues including coastal management and the aquatic and marine environment. A key lesson shared is the need for climate adaptation to be an integral and ongoing part of all community plans.

The Mi'Kmaq Confederacy of Prince Edward Island (PEI) has been working with the Lennox Island and Abegweit First Nations (the Epekwitk Mi'kmaq) to develop climate adaptation plans, undertaking community engagement, climate vulnerability assessments and emergency planning (Angus et al., 2019). The Lennox Island First Nation is especially vulnerable to rising sea levels, coastal flooding and erosion due to its low elevation. In 2022, the Epekwitk Mi'kmaq signed a memorandum of understanding with the federal Minister of Environment and Climate Change to work together to establish a National Park Reserve in the Pituamkek area (Hog Island Sandhills) (Parks Canada, 2022b). From a climate change perspective, Hog Island Sandhills as a chain of barrier islands serves as a breakwater, protecting many vulnerable low-lying communities from storm and wave impacts. Initial feasibility studies suggest a need to install protective adaptations to help the island and its culturally-significant features and the local ecosystem survive a changing climate (Government of Canada n.d.).

The Unama'ki Institute of Natural Resources has worked to develop the climate adaptation capacity of Mi'Kmaq communities on Cape Breton Island of the Bras D'Or Lakes Region, an area designated as a UNESCO Biosphere Reserve (Daigle et al., 2015). A 2015 study provides an overview of technical science and Traditional Ecological Knowledge data on community elevations, storm-surge flooding, and coastal mapping and erosion, so as to visualize the risks associated with sea level rise and increasing prevalence of extreme weather events, The Institute has also provided support with community consultation and the collection of traditional knowledge.

The Unama'ki Institute of Natural Resources is also leading an Indigenous Protected and Conserved Area (IPCA) project on behalf of the Assembly of Nova Scotia Mi'kmaw Chiefs, with federal funding support (JCCA, 2021, 21). In 2020, Unama'ki Elders, other Knowledge Holders, and youth were consulted to identify priority sites (JCCA, 2021, 21). The outcome Tan Telot'ik Report presented a vision of Kluscap Cave and identified an area of interest that includes a "federal marine Ecologically Sensitive Area", and "habitat for culturally significant and at-risk species", among other aspects (JCCA, 2021, 21). This case study is described in the 2021 report of the First Nations-Canada Joint Committee on Climate Action.

The Nunatsiavut Government of Northern Labrador's Imappivut (Our Oceans) initiative is described in the *National Inuit Climate Change Strategy* as an example of Inuit-led climate action (ITK, 2019, 6). The Imappivut initiative was launched in September 2017 with the signing of an agreement between the Nunatsiavut and federal governments committing to develop a marine management plan for northern Labrador that would centre Labrador Inuit rights. Imappivut envisages the possible creation and co-management of marine Indigenous Protected Areas that would protect Inuit use of the ocean, marine life and the marine environment in light of the impacts of climate change (ITK, 2019, 6; Nunatsiavut Government n.d.). In February 2022 a memorandum of understanding was signed between Nunatsiavut and the federal government committing to explore the feasibility of establishing a marine Indigenous protected area adjacent to Torngat Mountains National Park under the *Canada National Marine Conservation Areas Act* (Parks Canada, 2022c).

4.4 Preliminary conclusions

This overview of Indigenous-led climate adaptation initiatives at the national, regional and local levels with a focus on the Atlantic region confirms the importance of oceans-related climate adaptation for Indigenous communities. It also highlights the need for governments to treat Indigenous peoples as climate leaders whose engagement and knowledge should guide decision-making. An embrace of nation-to-nation relationships could then restore the inherent dignity of marine fish, mammals and ecosystems rather than treating them as exploitable resources.

5 Discussion and future directions

As our review of federal, provincial and Indigenous approaches and responses to changing oceans have shown, Canada has incrementally progressed in climate adaptation. Following the launch of a Climate Adaptation Platform in 2012 and the adoption of the *Pan-Canadian Framework on Clean Growth and Climate Change* in 2016, the federal government has moved forward on many fronts. They include the establishment of the Canadian Centre for Climate Services and launch of the Disaster Mitigation and Adaptation Fund in 2018. In November 2022 a *National Adaptation Strategy* and an accompanying *Government of Canada Adaptation Action Plan* were released. Various adaptation programs have been developed including programs to build regional adaptation capacity and expertise and to enhance ocean and coastal monitoring.

Canada has also made some adaptation advances in sectoral areas of ocean management. Fisheries and Oceans Canada has been working towards incorporating climate change considerations into fisheries stock assessments and has adopted a precautionary and adaptive approach to potential future fisheries in the Beaufort Sea region in particular by requiring further ecosystem research and understandings before considering commercial fishing applications. Adaptive fisheries and shipping management measures have been imposed to protect the endangered North Atlantic right whale from gear entanglements and ship strikes.

Canada has also been progressive in establishing MPAs and OECMs. Canada has established 14 MPAs under the *Oceans Act* with the Tuvaijuittuq MPA off the coast of Ellesmere Island in the Arctic being specifically established to support the adaptation of ice-dependent species in the face of decreasing multi-year pack ice. Canada has committed to conserving 25% of marine and coastal

areas by 2025 and to work towards protecting 30% of these areas by 2030.

The Provinces have also been responding to climate change impacts and risks to coastal areas. The four Atlantic provinces have established a regional hub, CLIMAtlantic, to provide climate information and advance climate-related research and training. Each Atlantic province has developed a climate action plan which includes climate adaptation priorities.

At the same time, Indigenous peoples in Canada have been active in both their own climate adaptation planning at the ocean climate nexus, and in seeking to ensure that they are fully engaged in planning initiatives carried out by governments. Examples of Indigenous climate oceans leadership at different scales identified in this study include the *National Inuit Climate Change Strategy*, the regional fisheries studies carried out by the Atlantic Policy Congress, and initiatives led by the Mi'kmaq Confederacy of PEI, Unama'ki Institute of Natural Resources, and the Nunatsiavut Government. Notably, the creation of marine Indigenous protected and conserved areas appears to be high on the agenda of many Indigenous communities, as well as that of the federal and some provincial governments.

Future climate adaptation efforts are likely to occur mainly through implementation of the fragmented array of climate adaptation processes, programs, and plans described above and through the use of existing legal tools. For example, *Canada's National Adaptation Strategy* calls for the development of federal-provincial and federal-territorial climate action plans and has set goals and objectives for five adaptation dimensions. The Strategy is required to undergo regular progress reports and to be updated on a five-year cycle. Through climate action plans, provinces are also committed to advancing ocean and coastal adaptations on many fronts. For example, Prince Edward Island has pledged to establish a municipal climate adaptation program, develop a coastal flood warning system and create a provincial land-use plan. Nova Scotia has committed to developing and implementing climate adaptation strategies for all government departments as well as sector-specific adaptation plans for fisheries and aquaculture. New Brunswick has promised to develop a provincial climate adaptation plan by 2026 followed by adaptation plans for priority departments by 2027 and for local governments and rural districts by 2030.

A variety of legal tools are already available to address ocean climate adaptation. For example, the *Oceans Act* allows MPAs to be established in an expedited and interim manner through ministerial orders. Variations orders and licensing conditions under the *Fisheries Act* have already been used to protect the North Atlantic right whale from fishing gear entanglements and interim orders under the *Canada Shipping Act, 2001* have been used to impose vessel speed and routeing measures to protect right whales in their new feeding grounds in the Gulf of St. Lawrence.

Various law and policy enhancements to better address ocean climate adaptation in Canada should also be considered. On the policy side, the adoption of climate adaptation strategies for key federal government departments and agencies with ocean and coastal responsibilities should be a priority along with sectoral adaptation strategies for fisheries, aquaculture, shipping and species at risk protection. A strategy on how climate adaptation will be addressed in integrated ocean planning and MPA management should also be a policy priority.

On the legal side, incorporating climate change responsibilities through legislative and regulatory changes need to be considered. For example, the Minister of Fisheries and Oceans already has a mandate to amend the *Oceans Act* to address climate change and that mandate might be implemented in various ways including a recognition of the opportunities to address climate mitigation and adaptation in the ocean context, authorization to designate MPAs as climate refuges and a requirement for MPA management plans to be adaptive and dynamic through close climate change monitoring and timely reviews. To support legal coherence, other Canadian laws pertaining to protected area establishment and monitoring should also include climate change provisions. Canada's *Fisheries Act* might also be revisited in light of climate change, for example, requiring precautionary and ecosystems approaches in fisheries management rather than leaving application of those principles to ministerial discretion. Section 92 of the *Fisheries Act* requires a five-year review of its provisions and operations which offers a window in 2024 to consider how to factor climate change and precautionary and ecosystem approaches into decision-making. Canada's implementation of a precautionary approach has been difficult due to both limits in scientific information and at times a lack of transparent fisheries management decisions (Winter and Hutchings, 2020).

Fisheries and Oceans Canada is leading a Blue Economy Regulatory Review which is seeking to advance regulatory modernizations in support of the blue economy with public comments invited until 17 March 2023 (Government of Canada, 2023). However, it remains to be seen how climate adaptation will be addressed.

The need to better ensure effective implementation of the rights of Indigenous peoples at all levels of Canadian adaptation planning and legislative reform is a cross-cutting theme. Indigenous peoples must be effectively included in all climate adaptation discussions and planning. This is understood to be a legal requirement due to UNDRIP, whether or not legislatively implemented by the respective government. Neither federal nor provincial governments have fully taken on this responsibility, although the federal government has been slowly moving in this direction in its development of the climate adaptation strategy. This may in part explain why it has taken so long. The AFN's involvement with the JCCA and the development of Guiding Principles to ensure the operationalization of ethical space in adaptation planning reveals future pathways that ensure equal respect for Indigenous knowledge, the institutionalization of Indigenous legal orders, and funding support to realize the goal of solutions that are both led and delivered by Indigenous peoples. Effective inclusion in climate adaptation policy is understood to require equitable access to funding for Indigenous led studies and plans as well as funds for

implementation. Application processes for these funds must be accessible so as not to discourage applicants by their complexity. Effective inclusion is also understood as necessitating a paradigm shift that assumes Indigenous leadership in climate action. This is being realized to some degree through federal support for marine Indigenous Protected and Conserved Areas, with funding for Indigenous guardians, although long-term funding including for capacity building will be required. With regard to fisheries, there is keen interest in the Atlantic region in understanding the implications of climate change, and more generally a sense that DFO is not doing a good job of effectively including Indigenous peoples. This is not surprising given that integration of Indigenous rights into the *Fisheries Act* only occurred in 2019 as well as the history of conflict in the Atlantic region over the Indigenous rights to livelihood fisheries (Standing Senate Committee on Fisheries and Oceans, 2022).

One thing is certain regarding climate adaptation and the future of ocean and coastal governance in Canada. Canada has left port on many law and policy fronts but a long, arduous adaptation voyage lies ahead. Navigating the swells of federalism with varying interests and needs of provinces, territories, local communities and Indigenous governments will not be easy. An overarching question for Canada is whether ocean climate actions will continue to be advanced incrementally through a fragmented array of law and policy initiatives or whether a more strategic approach might be adopted. Following the lead of the United States, Canada might consider developing a whole-of-government Ocean Climate Action Plan. The U.S. Plan sets out detailed ocean climate actions needed to meet three goals: creating a carbon-neutral future; accelerating nature-based solutions; and enhancing community resilience to ocean changes (Ocean Policy Committee, 2023). As a cross-cutting principle, the Plan pledges early, frequent and meaningful engagement with Tribal Nations and Indigenous Peoples in implementing ocean climate actions and the Plan promises to explore innovative funding mechanisms for supporting research, monitoring and workforce development by Tribal Nations and Indigenous Peoples (Ocean Policy Committee, 2023, 69).

6 Materials and methods

This research article provides a law and policy summary of climate change adaptation initiatives in Canada at the ocean-climate nexus at national, provincial, and Indigenous governance scales with a focus on the Atlantic region. The methodology was the review of relevant new and amended laws, regulations, and policy statements, and related commentaries on these developments.

Authors' note

The law and policy developments in this paper aim to be accurate to April 2023. Further versions of *Canada's National Adaptation Strategy* and Action Plan were published in June 2023.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material. Further inquiries can be directed to the corresponding author.

Author contributions

DV and SS contributed to the conception and design of this paper. First drafts of sections were written by LG (federal), JF (Indigenous) and KS (provincial). DV undertook final drafting of the federal and provincial parts while SS finalized the Indigenous section. DV and SS wrote the discussion and future directions part. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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