ARCTIC BLUE CARBON - EXPLORING OPPORTUNITIES TO SUPPORT INUIT-LED STEWARDSHIP; NORTHERN TREATIES, INDIGENOUS RIGHTS AND ENVIRONMENTAL MANAGEMENT FRAMEWORKS

DISCUSSION PAPER PHASE 2 – LAND CLAIMS, COMMUNITY WORKSHOP OUTCOMES AND UPDATED KNOWLEDGE

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EXECUTIVE SUMMARY

This ***Phase 2 Discussion Paper*** explores opportunities to support Inuit-led stewardship of blue carbon ecosystems within the context of modern-day treaties. This paper builds on research published in 2023 (***Phase 1 Discussion Paper***) regarding federal, provincial and territorial laws and policies north of 60˚.[1] Both discussion papers should be read together for a complete picture of the treaties, legislation and policies in the north, and how they may influence or support Inuit-led stewardship of blue carbon ecosystems in the Arctic.

"Blue carbon" refers to carbon that is captured from the atmosphere and stored in marine and coastal ecosystems like seagrass meadows, mangroves and tidal marshes. These ecosystems are carbon removal powerhouses, storing up to five times more carbon per area than tropical forests[2] and absorbing it from the atmosphere about three times as quickly[3], too. Despite covering only around 0.5% of the seafloor, blue carbon ecosystems may account for more than 50%[4] of all carbon buried in marine sediments.[5] This ***Phase 2 Discussion Paper*** is specific to Arctic blue carbon within Inuit Nunangat.

Inuit Nunangat is the Inuit homeland in Canada, encompassing 51 communities in the Inuvialuit Settlement Region, Nunavut, Nunavik (Northern Quebec), and Nunatsiavut (Northern Labrador). Inuit Nunangat forms nearly one third of Canada's landmass and half of its coastline. Large portions are co-managed by Inuit and federal, provincial and territorial governments through land and resource management regimes established by five comprehensive Inuit Crown land claims agreements (Inuvialuit Final Agreement; Nunavut Agreement; James Bay and Northern Quebec Agreement; Nunavik Inuit Land Claim Agreement; and Labrador Inuit Land Claim Agreement). Inuit Nunangat includes land, inland waters, Arctic and offshore areas, and ice-covered lands and waters, as well as associated airspace.[6]

A TWO-PHASED APPROACH

A ***Phase 1 Discussion Paper***, published in 2023 contributed research on the evolving science, laws, policies and strategies that may be employed to support to blue carbon stewardship in the Arctic.[7] The paper provided a detailed summary and analysis of laws and policies in the Yukon, Northwest Territories, Nunavut, Manitoba, Quebec and Ontario that may impact blue carbon work. The ***Phase 1 Discussion Paper*** was intended to complement two highly informative papers previously published independently: Atlantic Canada Blue Carbon Legislative & Policy Review (2022)[8], prepared by East Coast Environmental Law, and Policy and Planning for Coastal Ecosystems in British Columbia through a Blue Carbon Lens (2020), prepared by West Coast Environmental Law.[9] The ***Phase 1 Discussion Paper*** was also used to contribute information to the State of Coastal Blue Carbon in Canada report.[10]

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1. Darling K. et al. 2023. A framework for blue carbon in Canada's arctic coastal ecosystems: Discussion paper phase 1 – North of 60o ecosystems; federal, territorial, provincial laws and policies (accessed online)
2. National Oceanic and Atmospheric Administration. 2024. Coastal blue carbon (accessed online: April 24, 2024).
3. Alongi DM. 2020. Global significance of mangrove blue carbon in climate change mitigation. Sci, 2(3). DOI: 10.3390/sci2030067.
4. Macreadie PI. et al. 2021. Blue carbon as a natural climate solution. Nature Reviews Earth & Environment. 2, 826-839. DOI: 10.1038/s43017-021-00224-1.
5. World Resources Institute. 2023. How blue carbon can tackle the climate, biodiversity and development crises (accessed online: April 24, 2024).
6. Inuit Tapiriit Kanatami. 2019. Arctic and northern policy framework. 2019 (accessed online).
7. Darling K. et al. 2023. A framework for blue carbon in Canada's arctic coastal ecosystems: Discussion paper phase 1 – North of 60o ecosystems; federal, territorial, provincial laws and policies (accessed online)
8. ECEL. 2022. Atlantic Canada blue carbon legislative and policy review (accessed online)
9. WCEL. 2020. Policy and planning for coastal ecosystems in British Columbia through a blue carbon lens (accessed online)
10. Kelly B. et al. 2023. Coastal blue carbon in Canada: State of knowledge (accessed online)

This paper comprises Phase 2 of the project (**Phase 2 Discussion Paper**), exploring modern treaties and land claims and opportunities to support Inuit-led stewardship while providing updated scientific information.

1. **Phase 1 Discussion Paper (2023): A framework for blue carbon in Canada's Arctic coastal ecosystems — North of 60° ecosystems; federal, territorial, provincial laws and policies.** This paper drew on available literature and data to describe the characteristics of and threats facing blue carbon ecosystems along Canada's northernmost coastlines. Current federal, provincial and territorial laws, regulations and policy measures in Yukon, Northwest Territories, Nunavut, Quebec, Manitoba and Ontario relevant to the integrity of blue carbon ecosystems were also outlined.[11]

2. **Phase 2 Discussion Paper (2025): Arctic blue carbon — Exploring opportunities to support Inuit-led stewardship; Northern treaties, Indigenous rights and environmental management frameworks.** This paper explores the role of modern-day treaties[12] and land claims, Inuit Nunangat community interest in blue carbon, opportunities for community-led conservation of blue carbon and recent science. This paper together with the Phase 1 paper provides an opportunity to learn about Inuit priorities for blue carbon research and stewardship within the legal and governance context of Inuit Nunangat.

This project (Phase 1 & 2 Discussion Papers, inclusive of a workshop and summary) is a fundamental first step for co-developing ethical and effective projects in support of Inuit coastal conservation work. The ***Phase 2 Discussion Paper*** adds to the ***Phase 1 Discussion Paper*** regarding legal frameworks through further analyses of the rights, governance and management structures under the five Inuit-Crown treaties that span the four Inuit regions of Inuit Nunangat.[13] The Phase 2 Discussion Paper also analyzes key conservation measures, and Impact and Benefit Agreements entered into pursuant to the above treaties, with a view to assessing their potential impact on blue carbon stewardship initiatives in the Arctic.

Though the ***Phase 1 & 2 Discussion Papers*** were published sequentially, they are interdependent and meant to be read together. Existing Indigenous and treaty rights – including, for the purposes of the present analysis, those rights incorporated into the five Inuit-Crown treaties are recognized, affirmed and protected under section 35 of the *Constitution Act, 1982.* While federal, territorial and provincial legislation may govern aspects of blue carbon ecosystems as described in the ***Phase 1 Discussion Paper***, the application of these laws may be limited in some cases by existing Indigenous and treaty rights. Consequently, a comprehensive framework and set of recommendations for the support of blue carbon ecosystems in Canada's Arctic will only emerge when both ***Phase 1 & 2 Discussion Papers*** are read together.

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11. Though portions of Newfoundland and Labrador territory lie in the Arctic, this jurisdiction was thoroughly assessed in the ECEL paper. As such, it is not reviewed in the Phase 1 report.

12. Modern treaties are nation-to-nation relationships between Indigenous peoples, the federal and provincial Crown and in some cases, a territory. These treaties enable Indigenous peoples to rebuild their communities and nations on their own terms. The first modern treaty came into effect in 1975, and the latest modern treaty to come into effect was in 2016. Modern treaties define the land and resource rights of Indigenous signatories, and are intended to improve the social, cultural, political, and economic well-being of the Indigenous peoples concerned. Also known as comprehensive land claim agreements, modern treaties are generally signed where Indigenous title and rights have not been settled (https://landclaimscoalition.ca/modern-treaty/ accessed April 24, 2025).

13. Inuit Nunangat encompasses the four Inuit regions recognized in their respective modern treaties. These regions are the Inuvialuit Settlement Region, Nunavut, Nunavik and Nunatsiavut. These regions overlap with parts of Yukon, Northwest Territories, Quebec, Newfoundland and Labrador and include all of Nunavut.

KEY TAKEAWAYS

Key takeaways of this ***Phase 2 Discussion Paper*** include:

- Communities are interested in Arctic blue carbon and are ready to co-develop knowledge projects to advance Arctic blue carbon inventories, understand Arctic blue carbon pathways and transport mechanisms, and investigate impacts on Arctic blue carbon from Arctic change including increased shipping, resources development, climate change.
- Communities are interested in advancing conservation of Arctic blue carbon through conservation and regulatory measures.
- Understanding Arctic (high latitude) blue carbon inventories remains a critical knowledge gap.
- Valuing the ecological value of Arctic blue carbon as a resource, and as an ecosystem service at local, regional and global scales remains a knowledge gap.
- While the laws of Canada, Yukon Territory, Northwest Territories, Nunavut, Manitoba, Ontario, Quebec, Newfoundland and Labrador continue to apply in the jurisdictions that share territory with Inuit Nunangat, the Constitutional status of the modern treaties limits the way these laws may apply there. The opportunity modern treaties present to a regulatory approach to Arctic blue carbon conservation is important.
- In short, any legislative, policy or administrative action needs to cohere with the five Inuit modern treaties. As such it is essential that those working in Inuit Nunangat understand the treaties and what they require in relation to blue carbon ecosystem protection and stewardship.

INTRODUCTION

The knowledge of blue carbon is evolving, albeit slowly in the Arctic and more needs to be addressed. This section discusses knowledge advances made and remaining questions since the ***Phase 1 Discussion Paper*** (2023) and reflects on the outcomes of a workshop held in December 2024.

ARCTIC BLUE CARBON ECOSYSTEMS

(updated from Discussion Paper Phase 1 (2023)[14])

In the ***Phase 1 Discussion Paper***, we presented the challenges of a holistic understanding of blue carbon in the Arctic and while images of land fast ice and blowing snow do not readily bring to mind flourishing kelp forests, eelgrass and marshland, we reaffirm there is increasing evidence that Canada's extensive Arctic coast is host to significant blue carbon ecosystems. Blue carbon ecosystems such as kelp, eelgrass, and salt marshes line the Canadian Arctic coastline, sequestering vast quantities of carbon. These efforts are aided by other coastal Arctic ecosystems and organisms, not traditionally considered blue carbon ecosystems — such as phytoplankton and certain types of algae — as well as the unique geography of the Arctic. However, more research is required to quantify the carbon stocks present within these ecosystems and the potential of these ecosystems to sequester carbon, in addition to the threats to these sequestered stores and how they can contribute to climate change mitigation. The need for additional research to map and quantify blue carbon ecosystems in the north was stated by multiple participants during a workshop supporting Inuit-led stewardship of blue carbon ecosystems held on December 11, 2024.

14. Darling K. et al. 2023. A framework for blue carbon in Canada's arctic coastal ecosystems: Discussion paper phase 1 – North of 60o ecosystems; federal, territorial, provincial laws and policies (accessed online)

Marine organisms — such as phytoplankton, algae, (including ice algae and macroalgae), kelp and eelgrass, as well as plants in salt marsh ecosystems — significantly contribute to carbon sequestration and storage within the Arctic, and provide a host of ecosystem services, including defence from coastal erosion and protection of coastal community infrastructure, support for food security for Indigenous communities, habitat for biodiversity, and facilitation of climate mitigation. Threats to these services, including their ability to sequester and store carbon, include climate change and its impact on ocean dynamics, such as warming waters, ocean freshening and acidification, sea ice and glacial melt, sea level rise and coastal erosion, and permafrost melt. These threats are intensified by human exploration and resource exploitation in the Arctic.

Despite the importance and magnitude of blue carbon within the Arctic, large data gaps exist regarding the biomass, extent, distribution, carbon uptake and carbon storage of these organisms within the Canadian Arctic. Research in the Arctic is limited by accessibility due to harsh environmental conditions, geographic isolation, limited infrastructure and equipment, and, in some cases, limited perceived importance. This is especially true in the High Arctic Canadian Archipelago.

The valuation of blue carbon and blue carbon ecosystems within the Canadian Arctic is vital to their proper management and survival. Understanding the full extent and present biomass of the discussed ecosystems along the entire Canadian Arctic coastline is a necessary first step in determining their current and future capacity to contribute to climate mitigation and carbon sequestration. To appropriately manage and create effective "Nature-based Climate Solutions" (NbCS), more comprehensive investment in research regarding the full extent and biomass, carbon sequestration, and vulnerabilities of these coastal Arctic ecosystems is necessary.

Indigenous Peoples leadership, priorities, knowledge, and rights must be at the forefront of any and all steps in the research, decision and policy making, and management of these areas. This will facilitate the co-production of the most comprehensive and useful knowledge, while supporting reconciliation, equity in knowledge acquisition and decision making, in addition to promoting sustainable and effective conservation.

FEDERAL, PROVINCIAL AND TERRITORIAL LAWS, REGULATIONS AND POLICY MEASURES

Similar to the findings by ECEL 2022[15] and WCEL 2020[16] for the east and west coasts respectively, tools exist within federal, provincial and territorial laws and policies that could be used to support blue carbon sequestration initiatives along the northern coastline. However, protections rely heavily on blue carbon ecosystem performing alternative functions including habitat for protected fish, wildlife, or migratory birds, without acknowledging their climate mitigation abilities nor other ecosystem services, such as coastal and community protection, increased food security for local communities, and improved water and air quality. In other words, blue carbon ecosystems are not explicitly assigned a value and are consequently not specifically protected for their sequestration potential or ecosystem services. Also similar to the dynamic observed on the Pacific and Atlantic coasts, the bifurcation of jurisdiction between the federal government and provinces and territories at the onshore-offshore divide complicates governance and strategy in this area.

Nevertheless, the Inuit Nunangat (4 land claim agreements) jurisdictional landscape does offer some unique opportunities for blue carbon ecosystem protection. Unlike the provinces, each territory's law-making powers are delegated to them through federal statute. Devolution of such powers has occurred periodically since the establishment of the territories and continues to be negotiated today. While there are no recent instances of the federal government recalling or modifying a delegated power, it is legally possible. There is likely a more

15. ECEL. 2022. Atlantic Canada blue carbon legislative and policy review (accessed online)

16. WCEL. 2020. Policy and planning for coastal ecosystems in British Columbia through a blue carbon lens (accessed online)

fruitful route, however. The transfer of powers has led to legislative renewal initiatives in the areas of land and resources, which may allow for targeted approaches to protecting blue carbon sequestering ecosystems. A growing openness to the concept of carbon sequestration can be seen at the policy and administrative levels — likely where scientists are able to contribute directly. This information now needs to flow upward to lawmakers.

Also distinct in terms of opportunities, thanks to the foresight of Inuit communities and to early conservation efforts, large-scale parks, marine protected areas and migratory bird sanctuaries line the coastlines and offer spaces where plant life is generally protected. Migratory bird sanctuaries in particular span the terrestrial-marine divide, reflecting the habitat on which the birds that frequent those places rely. These spaces, which are already set aside, present an opportunity to define in law that blue carbon is a valued component and a valid objective of the conservation measure.

As noted above, ***Phase 1 Discussion Paper*** is not the complete picture, by any means. Any blue carbon strategy will require partnership with Indigenous representatives and co-management organizations and coherence with the Inuit-Crown and Modern and Historic Treaties that span this region. Success will also depend on a thorough understanding of the conservation measures that have already been established within the constitutionally protected rights and regulatory frameworks within treaties. This ***Phase 2 Discussion Paper*** addresses these elements, and therefore, these papers should be read and applied together.

HOW MODERN TREATIES AND LAND CLAIMS SUPPORT INUIT SELF-DETERMINATION WITH RELATION TO STEWARDSHIP WORK

The ***Phase 1 Discussion Paper*** explored supporting blue carbon in Canada's Arctic coastal ecosystems assessed — among other things — federal, territorial and provincial laws and policies that apply north of 60° latitude. The ***Phase 2 Discussion Paper*** focuses on the modern treaty foundations that define Inuit-Crown relationships across Inuit Nunangat and that may offer mechanisms to support Inuit self-determination in the stewardship of blue carbon ecosystems. Example conservation approaches including designations, Impact and Benefit Agreements and governance are explored.

RATIONALE FOR EXPLORING BLUE CARBON STEWARDSHIP THROUGH AN INUIT TREATY LENS

Inuit Nunangat[17] is composed of four Inuit regions (Figure 1), namely, the Inuvialuit Settlement Region, Nunavut, Nunavik, and Nunatsiavut. The region boasts more than 40% of Canada's landmass and 72% of Canada's coastline.[18] The majority of Canada's 60,000 Inuit, living among 53 Inuit communities call this incredible place home.[19]

17. Inuit Nunangat means "Inuit Homeland" and includes the four Inuit regions: Inuvialuit Settlement Region (ISR) in northwestern Northwest Territories and Yukon, Nunavut, Nunavik in Northern Quebec and Nunatsiavut in Northern Newfoundland and Labrador.
18. These percentages were calculated by Inuit Tapiriit Kanatami in 2022 using Can Vec Land Features dataset.
19. Inuit Tapiriit Kanatami, 2017. Inuit Tapiriit Kanatami position paper: Implementing the UN Declaration on the Rights of Indigenous Peoples in Canada. (accessed online)

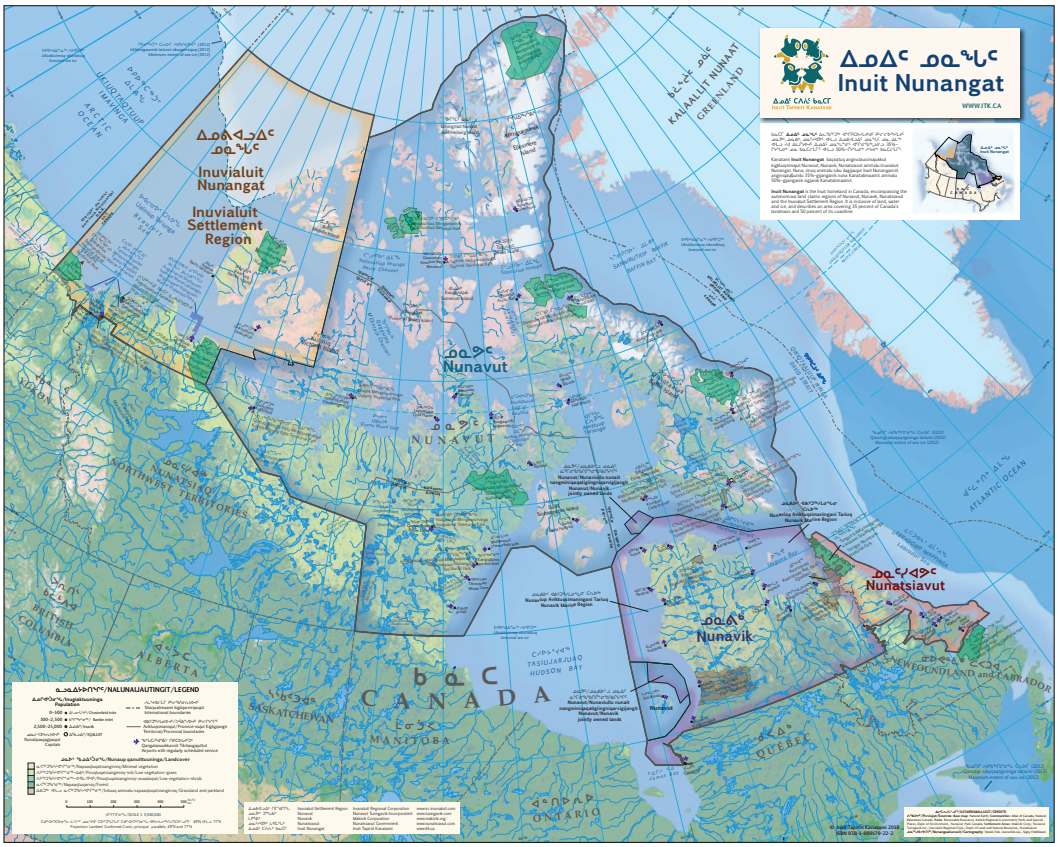

Figure 1. Map of Four Regions of Inuit Nunangat. From: Inuit Tapiriit Kanatami. [20] [21]

Five Inuit-Crown treaties were negotiated between 1975 and 2005: *the James Bay and Northern Quebec Agreement*, the *Inuvialuit Final Agreement*, the *Nunavut Agreement*, the *Nunavik Inuit Land Claims Agreement*, and the *Labrador Inuit Land Claims Agreement.* These agreements were born out of, and continue to evolve in, the context of changing demands on Canada's Arctic and its Peoples. They have the status of protected treaties under section 35 of the *Constitution Act*, 1982 and embody common objectives and solemn undertakings among Inuit and the Crown.

While the laws of Canada, Yukon Territory, Northwest Territories, Nunavut, Manitoba, Ontario, Quebec, Newfoundland and Labrador continue to apply in the jurisdictions that share territory with Inuit Nunangat, the Constitutional status of the modern treaties limits the way these laws may apply there. As stated in *Tsilhqot'in Nation v. British Columbia,*

> *"the guarantee of Aboriginal rights in s. 35 of the Constitution Act, 1982, [...] operates as a limit on federal and provincial legislative powers. [...] the guarantee of Aboriginal rights [operates] to limit governmental powers, whether federal or provincial. Part II Aboriginal rights, like Part I Charter rights, are held against government — they operate to prohibit certain types of regulation which governments could otherwise impose".*[22]

20. Inuit Tapiriit Kanatami. 2022. *Map of Inuit Nunangat.* (accessed online)

21. Inuit Tapiriit Kanatami is governed by the Inuit regions and acts as the national voice organization for Canada's Inuit.

22. *Tsilhqot'in Nation,* 2014 SCC 44.

This legal principle was reinforced in an amendment to the federal *Interpretation Act,* which received royal assent on November 27, 2024. Section 8.3(1) of this statute now reads:

> *"Every enactment is to be construed as upholding the Aboriginal and treaty rights of Indigenous peoples recognized and affirmed by section 35 of the Constitution Act, 1982, and not as abrogating or derogating from them".* [23]

In short, any legislative, policy or administrative action needs to cohere with the five Inuit modern treaties. As such it is essential that those working in Inuit Nunangat understand the treaties and what they require in relation to blue carbon ecosystem protection, restoration and stewardship.

Beyond placing a limit on government action, Inuit treaties outline pathways for Inuit and others to pursue common conservation objectives in a way that is consistent with Inuit self-determination. Familiar conservation approaches, including protected areas, Indigenous Protected and Conserved Areas, and Other Effective Conservation could be used to support blue carbon ecosystem stewardship and enhance associated carbon sequestration, while being supported under Inuit treaties, with the support of Inuit. To understand how these concepts track through the agreements, it is helpful to first provide a brief definition of some main types of protection measures.

PROTECTED AREAS

Under Article 2 of the *Convention on Biological Diversity*, a protected area is defined as

> *"a geographically defined area, which is designated or regulated and managed to achieve specific conservation objectives".* [24]

Protected Areas have conservation as their primary objective. Their core function is to promote the in-situ conservation of biodiversity. The International Union for the Conservation of Nature (IUCN) defines protected areas 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".* [25]

As these terms are similar, as Canada has adopted the IUCN definition for its conservation target policy statements, and as the Inuit-Crown relationship is necessarily the one through which this work will be accomplished, the IUCN definition is the one that will be used here.

OTHER EFFECTIVE AREA-BASED CONSERVATION MEASURES

Other Effective Area-Based Conservation Measures (OECMs) have become an important component of global conservation efforts. The Conference of the Parties to the Convention on Biological Diversity (CBD) adopted the following definition of OECMs in 2018:

> *"a geographically defined area other than a Protected Area, which is governed and managed in ways that achieve positive and sustained long-term outcomes for the in-situ conservation of biodiversity, with associated ecosystem functions and services and where applicable, cultural, spiritual, socio–economic, and other locally relevant values"* [26]

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23. R.S.C., 1985, c. I-21

24. Convention on Biological Diversity. 2022. Kunming-Montreal Global Biodiversity Framework. (accessed online)

25. Dudley, N. 2008. Guidelines for applying protected area management categories, IUCN. (accessed online)

26. Convention on Biological Diversity. 2018. Decision adopted by the Conference of the Parties to the Convention on Biological Diversity at its fourteenth meeting: 14/8. Protected areas and other effective area-based conservation measures, (UNEP/CBD/COP/DEC/14/8, s.2). (accessed online)

While OECMs may not have conservation as their primary objective, they may nevertheless deliver the effective in-situ conservation of biodiversity.[27] This focus on effects is particularly relevant in the treaty context where a measure that effectively helps sequester carbon in an Inuit region may be in support of an objective Inuit have determined to be a priority, which is prima facie unrelated to conservation.

INDIGENOUS PROTECTED AND CONSERVED AREAS

Indigenous Protected and Conserved Areas (IPCAs) or Indigenous Peoples' and Community Conserved Territories and Areas (among other terms) also find support in Inuit treaties and inherent Inuit rights. In 2017, the Indigenous Circle of Experts (ICE) was tasked with providing recommendations on the recognition and implementation of Indigenous protected and conserved areas (IPCAs) in Canada. The ICE determined that IPCAs comprise:

> *"lands and waters where Indigenous governments have the primary role in protecting and conserving ecosystems through Indigenous laws, governance and knowledge systems. Culture and language are the heart and soul of an IPCA. In Indigenous worldviews, conservation is achieved when the relationships and uses that have conserved the lands and waters for thousands of years remain intact or are re-established."*[28]

Further, IPCAs typically contain three essential elements:

- IPCAs are Indigenous-led, with Indigenous Peoples having the primary role in determining objectives, boundaries, management plans and governance structures for IPCAs as part of their exercise of self-determination;
- IPCAs involve a long-term commitment to the conservation of lands and waters for future generations; and,
- IPCAs highlight Indigenous rights and responsibilities, such as the responsibility to care for and respect lands and waters consistent with natural and Indigenous laws. [29]

The marine and freshwater ecosystems across Inuit Nunangat are truly remarkable. The expansive geography, Indigenous knowledge, comparatively low levels of industrial development, and functioning regulatory and rights frameworks present a unique opportunity to advance blue carbon stewardship. The following sections provide a brief overview of treaty-based mechanisms that could be used to support self-determination and conservation objectives.

INUIT REGIONS, TREATIES AND TREATY PROVISIONS RELEVANT TO BLUE CARBON STEWARDSHIP

INUVIALUIT SETTLEMENT REGION

Similar to immediately preceding efforts of Inuit of Nunavik in northern Quebec and the Inupiat in Alaska, the Committee for Original Peoples' Entitlement (COPE) pursued the negotiation of a land claims agreement with Canada in the face of increasing development pressures. After a decade of negotiations, the *Inuvialuit Final Agreement* (IFA) was signed on June 5, 1984. It was both the first modern treaty north of 60°N and the first to include significant marine areas within a settlement region. Inuvialuit (as represented by COPE) and Canada are parties to the IFA, and the Government of the Northwest Territories and the Government of Yukon are signatories to it. The IFA was approved, given effect to and declared valid for the purposes of federal law through the *Western Arctic Claims Settlement Act*, which received royal assent on June 28, 1984.

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27. Ibid.

28. Indigenous Circle of Experts. 2018. We rise together: Achieving pathway to Canada Target 1 through the creation of Indigenous Protected and Conserved Areas in the spirit and practice of reconciliation (accessed online)

29. Ibid.

The IFA demonstrated early stages of Canada acknowledging the prior existence of Inuit as a marine People with the inclusion of marine areas.[30] The marine area of the Inuvialuit Settlement Region is bound on the west by the Canada-United States border, on the North by the 80th parallel and on the east by the Northwest Territories – Nunavut border. The definitions in the IFA themselves speak to the awareness among parties that activity or development in the offshore could have significant impacts on Inuvialuit rights. Development comprises:

> *(a) any commercial or industrial undertaking or venture, including support and transportation facilities related to the extraction of non-renewable resources from the Beaufort Sea [...].*[31] [32]

IFA paragraph 6(4)(a) establishes the Inuvialuit Land Administration (ILA) as a division of the Inuvialuit Regional Corporation (IRC), the role of which is to administer Inuvialuit lands and to take responsibility for matters related to the supervision, management and administration of such lands. ILA has planning and management of Inuvialuit Private Lands,[33] which are bound by the mean or ordinary high-water mark of the shoreline. One area where marine areas and the jurisdiction of the ILA intersect is within the Husky Lakes Management Areas and the Husky Lakes Special Cultural Area Boundary. These are areas around Husky Lakes where traditional activities are practiced. IFA Section 8(4) prohibits dredging or development in the marine areas of Husky Lakes Management Area Numbers 1 and 2.

The IFA provisions dedicated to the Yukon North Slope (YNS) also present an opportunity for Indigenous-led conservation of blue carbon. The YNS is defined as

> *"all those lands between the jurisdictional boundaries of Alaska and the Yukon Territory and the Northwest Territories, north of the height of land dividing the watersheds of the Porcupine River and the Beaufort Sea, and including adjacent nearshore and offshore waters and islands."*[34]

Development proposed for this area goes through a targeted screening and review process. The IFA states that this area

> *"shall fall under a special conservation regime whose dominant purpose is the conservation of wildlife, habitat and traditional native use".*[35]

The IFA addresses land use planning for the offshore in general terms:

> *"it is agreed that, for the purpose of coordinating land use planning for the Beaufort Sea Region, there shall be area-specific groups dealing only with the Inuvialuit Settlement Region and that native participation, including Inuvialuit participation, in each such group shall be equal to government participation."*[36]

There is clear acknowledgement that Inuvialuit must play a role in planning the future of the offshore.

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30. Indian and Northern Affairs Canada. 2005. *The Inuvialut Final Agreement as amended.*

31. Environmental Impact Screening Guidelines (Screening Guidelines) are for the screening of proposed developments by the Environmental Impact Screening Committee (Screening Committee or EISC) in the Inuvialuit Settlement Region of the Northwest Territories and the North Slope Region of the Yukon 2014.

32. Environmental Impact Screening Committee. 2014. *Environmental Impact Screening Guidelines.* (accessed online)

33. The ISR is divided into Crown Lands and Inuvialuit Private Lands. The Inuvialuit Private Lands are further divided into lands in which the Inuvialuit have ownership of surface and subsurface minerals referred to as class 7(1)(a) lands, and lands with only surface rights referred to as 7(1)(b) lands.

34. IFA s. 12(1)

35. IFA s. 12(2)

36. IFA s. 7(82)

Built on the foundations of the Inuit-Crown relationship established in the IFA, the Beaufort Sea Partnership reflects the cooperative dialogue anticipated in that treaty. Led by Fisheries and Oceans Canada (DFO), this body convenes to discuss and make planning recommendations such as the Integrated Ocean Management Plan for the Beaufort Sea Large Ocean Management Area. It includes a Regional Coordination Committee (RCC), which is co-chaired by the Inuvialuit Regional Corporation (IRC), Inuvialuit Game council (IGC), and DFO and has representatives from federal regulators, territorial governments and Inuvialuit organizations. The RCC provides leadership, coordinated planning, oversight and direction for the implementation of the Plan."[37]

The IFA establishes a framework for Inuvialuit to negotiate directly with proponents to retain benefits from activities that occur on Inuvialuit private lands. The IFA provides for the negotiation of land rents and Participation Agreements through the ILA. These Participation Agreements could include land inspection costs, wildlife compensation, employment and service contracts, education and training or equity participation.[38] However, the Economic Measure provisions require that

> *"general guidelines developed by governments relating to social and economic interests, including employment, education, training and business opportunities to favour natives, shall be considered and applied, as reasonably as possible, to each application for exploration, development or production rights" on Crown Lands, which includes the offshore.* [39]

Further, this part of the IFA foresees the independent negotiation of cooperation agreements between Inuvialuit and proponents.

The Anguniaqvia niqiqyuam Marine Protected Area (ANMPA) was established in 2016 and the Tarium Niryutait Marine Protected Area (TNMPA) was established in 2010 under the *Oceans Act* through a collaboration between Inuvialuit and DFO together with the government of the Northwest Territories and other stakeholders.[40] The ANMPA is located off Cape Parry and the Inuvialuit community of Paulatuk. TNMPA is spread across three locations, namely, Mackenzie Bay, Kugmallit Bay and Kendall Island. Both have express conservation objectives that align with Inuvialuit priorities, including sustainable harvesting. The Inuvialuit Fisheries Joint Management Committee and DFO jointly implement these MPAs. The ANMPA and the TNMPA provide examples of the establishment and implementation of protected areas supported by IFA entities.

The 2024 Aullaviat/Anguniarvik (A/A) Traditional Conservation Area Agreement covers an area east of Ivvavik National Park along the Yukon North Slope. Its objective is to protect and conserve wildlife, habitat and biological productivity and contribute to the implementation of the goals of the IFA, the Porcupine Caribou Management Agreement and the Wildlife Conservation and Management Plan. [41] It is an Indigenous-led conservation area where Inuvialuit are the primary stewards and managers of the lands and waters. The intent of the Inuvialuit-led conservation area is to ensure healthy ecosystems and communities for future generations. Indigenous Peoples' right to self-determination is centered, as is the role of Indigenous Peoples as stewards of their traditional territories.[42]

The effectiveness of the TNMPA, ANMPA, and A/A Traditional Conservation Area will require ongoing data collection, monitoring and governance to ensure that the areas and activities continue to support their intended objectives.

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37. Beaufort Sea Partnership. n.d. *Regional Coordination Committee* (accessed online: September 22, 2022)
38. IFA s. 10(1) and (3)
39. *Ibid.* s. 16(2).
40. Fisheries & Oceans Canada. 2025. Anguniaqvia Niqiqyuam Marine Protected Area (MPA). (accessed online)
41. Wildlife Management Advisory Council – North Slope. n.d. *Aullaviat/Anguniarvik Traditional Conservation Area* (accessed online: September 24, 2024)
42. *Ibid.*

NUNAVUT SETTLEMENT AREA

After 15 years of negotiations between the Tunngavik Federation of Nunavut and Canada, and with the Government of Northwest Territories (GNWT) participating, the Nunavut Agreement was signed on May 25, 1993. The *Act respecting an Agreement between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in right of Canada,*[43] which gave the Nunavut Agreement the force of federal law came into force on December 31, 1993. It was the first modern treaty to establish a new jurisdiction in Canada.

The Nunavut Settlement Area includes all lands, water and marine areas enclosed within the mainland east of the NWT, the Arctic Islands, Baffin Island and the Hudson Straight, and the lands and waters in southeastern Hudson Bay. Under the Nunavut Agreement, marine areas are included as

> *"part of Canada's internal waters or territorial sea, whether open or ice-covered, lying within the Nunavut Settlement Area, … For greater certainty, the reference to internal waters or territorial sea includes the seabed and subsoil below those internal waters or territorial sea."*[44]

Relative to its predecessor Inuit treaties, the Nunavut Agreement includes a clearer land use planning regime as it relates to marine areas. Article 15 of the Agreement recognizes that Inuit are traditional and current users of marine areas and that there is a need for Inuit involvement in aspects of Arctic marine management and research, especially in the land-fast ice zones.[45] The onshore-offshore divide that can affect ecosystem-based conservation efforts under federal and provincial/territorial legislation is not an issue under the Nunavut Agreement. For example, if a park or conservation area partially extends into the marine areas, Article 8 (national and territorial park establishment and management) or Article 9 (entire park or conservation area) may apply.

> ***Article 8.1.1***[46]
>
> *"National Park Natural Regions" means the terrestrial natural regions as described in National Parks System Plan 1990 published by Environment Canada;*
>
> *"Zone I - Special Preservation" means specific areas or features which deserve special preservation because they contain or support unique, rare or endangered features or the best examples of natural features;*
>
> *"Zone II - Wilderness" means extensive areas which are good representations of each natural history themes of the Park and which will be maintained in a wilderness state.*

43. S.C. 1993, c. 29.
44. Nunavut Agreement Article 1.
45. *Ibid*., para 15.1.1(a) and (g).
46. Nunavut Agreement Article 8.1.1

> ***Article 9.1.1***[47]
>
> *"Conservation Area means any Conservation Area in existence at the date of ratification of the Agreement listed in Schedule 9-1, and any of the following areas when established under legislation;*
>
> *(a) National Wildlife Areas;*
> *(b) Migratory Bird Sanctuaries;*
> *(c) International Biological Program Ecological Sites/Ecological Areas;*
> *(d) Man and the Biosphere Reserves;*
> *(e) World Heritage Convention/Natural and Cultural Sites;*
> *(f) Wildlife Sanctuaries;*
> *(g) Critical Wildlife Areas;*
> *(h) National Historic Sites;*
> *(i) National Historic Parks;*
> *(j) Wetlands of International Importance for Waterfowl (Ramsar);*
> *(k) Canadian Landmarks;*
> *(l) Canadian Heritage Rivers;*
> *(m) Historic Places; and*
> *(n) other areas of particular significance for ecological, cultural, archaeological, research and similar reasons."*

Article 9 is particularly relevant to Inuit participation in the protection of Arctic blue carbon. It is flexible enough to provide for the protection of areas of particular significance for ecological reasons alone and for different forms of management and administration that are respectful of Inuit leadership. The Marine Areas provisions in Article 15 also refers to Conservation Areas and Parks (Article 8). The Nunavut Agreement was negotiated prior to the establishment of the legal framework for Marine Protected Areas under the *Oceans Act* and the *National Marine Areas Conservation Act*. Article 9(n) provides an opening for these legislative tools under the Nunavut Agreement.

The benefits sharing elements of the Nunavut Agreement have proven to be effective drivers for protecting ecosystems. These provisions provide a pathway for parties to identify common priorities and determine the value of an area, both in terms of ecosystem services and opportunity costs of limiting uses. The negotiation framework positions Inuit and government as rational decision makers for today and for future generations. Benefit agreements are required with respect to different undertakings, from conservation to industrial development. Government and a Designated Inuit Organization must negotiate, in good faith, for the purpose of concluding an Inuit Impact and Benefit Agreement (IIBA). The IIBA must include any matter connected with a proposed park or conservation area that would have a detrimental impact on Inuit, or that could reasonably confer a benefit on Inuit on a Nunavut-wide, regional or local basis.[48]

Article 11 of the Nunavut Agreement provides architecture for land use planning in the territory. Land use plans created under the Nunavut Agreement apply

> *"to both land and marine areas within the Nunavut Settlement Area and the Outer Land Fast Ice Zone."*

47. Nunavut Agreement Article 9.1.1
48. *Nunavut Agreement* para 8.4.4.

Ultimately, paragraph 11.3.2 indicates that

> *"the purpose of a land use plan shall be to protect and promote the existing and future well-being of the residents and communities of the Nunavut Settlement Area, taking into account the interests of all Canadians, and to protect, and where necessary, to restore the environmental integrity of the Nunavut Settlement Area".*

An important designation under the Nunavut Land Use Plan is the Limited Use Area (LUA). LUAs

> *"are characterized by the year-round prohibition of one or more types of land use. They may also include conformity requirements, such as seasonal restrictions on certain land uses or setback requirements around important features.".*[49]

To qualify as a Conservation Area under 9.1.1(n) and trigger the requirement to negotiate an IIBA under s. 9.4.1 of the Nunavut Agreement, a LUA would have to meet the following criteria:

- Be established under legislation;
- Be an area of particular significance for ecological, cultural, archaeological research and or similar reasons; and,
- Either raise a matter that would have a detrimental impact on Inuit or raise a matter that could reasonably confer a benefit on Inuit.

The Tallurutiup Imanga National Marine Conservation Area (TINMCA) provides an example of how the establishment of a conservation area in Nunavut may proceed. The TINMCA is 108,000 square kilometres in area and is located in Lancaster Sound, Nunavut. The negotiation of an IIBA between Canada and Qikiqtani Inuit for the TINMCA was concluded in August 2019. This set the stage for a submission to the Nunavut Planning Commission for a conformity determination, followed by a screening by the Nunavut Impact Review Board and ultimately, its establishment under the *Canada National Marine Conservation Areas Act*.[50] As stated in the strategic environment assessment of the TINMCA,

> *"the region supports the traditional use of five Inuit communities in the area including Grise Fiord, Resolute Bay, Arctic Bay, Pond Inlet and Clyde River. Communities use the area extensively and travel by boat or snowmobile to harvest fish, birds, seals and other marine mammals".*[51]

Parties were able to find alignment between Canada's conservation targets and the fundamental need of Inuit to ensure the flourishing of their communities. Due to its location in the high Arctic, the impact of the TINMCA for blue carbon ecosystem protection may be minimal. However, the process completed does provide a helpful guide for blue carbon stewardship and protection initiatives elsewhere in Nunavut.

49. Nunavut Planning Commission. 2023. *Recommended Nunavut Land Use Plan*. (accessed online)

50. S.C. 2002, c. 18.

51. Parks Canada. 2020. *Establishment of Tallurutiup Imanga National Marine Conservation Area* (accessed online)

NUNAVIK

In 1971, the James Bay Cree and the Inuit of northern Quebec organized to oppose the impending James Bay Hydroelectric Development Project. In 1973, the parties embarked on the negotiation of an out-of-court settlement with the Northern Quebec Inuit Association and the Grand Council of the Crees (of Quebec). A two-year time limit was assigned to these negotiations and with an hour left before the deadline, the *James Bay and Northern Quebec Agreement* (JBNQA), was signed on November 11, 1975.[52] Signatories to the JBNQA include the Government of Quebec, the James Bay Energy Corporation, the James Bay Development Corporation, Hydro-Québec, the Grand Council of the Crees (of Quebec), the Northern Quebec Inuit Association, and the Government of Canada. The *James Bay and Northern Quebec Native Claims Settlement Act* was given royal assent and the force of federal law on July 14, 1977.

The lands subject to JBNQA cover an area of 1,082,000 square kilometers in the northern regions of Québec. These lands are divided generally into three categories. Category I lands are located in and around the communities and belong to Inuit and Cree for their exclusive use. As indicated in section 5.1.10(a), under this category, Quebec remains the owner of the mineral and subsurface rights (in other words, subsurface interests were not granted to Inuit or Cree in these lands). However, consent and compensation are required before minerals or other sub-surface rights can be accessed.[53] Category II lands are lands in the public domain on which Indigenous signatories maintain exclusive hunting, fishing, and trapping rights and associated activities. Category III lands comprise the remainder and are subject to the general laws of application relating to lands on which Inuit and the Cree have specific rights of access by virtue of the JBNQA (and the Naskapi by virtue of the 1978 Northeastern Quebec Agreement).

The land claim negotiation story in Nunavik has an important second chapter, particularly for blue carbon. Inuit of northern Quebec, represented by the Makivik Corporation (as it was then known), and the federal crown, represented by the Minister of Indian and Northern Affairs and the Premier of Nunavut, signed the Nunavik Inuit Land Claims Agreement (NILCA) on December 1, 2006.[54] Whereas the JBNQA excluded all areas of the Nunavik Inuit Settlement Area beyond the ordinary low water mark along the coast, the NILCA expressly incorporates this marine area within modern treaty protections as a

> *"fundamental and integral component of Nunavik."*[55]

A stated purpose of the parties to the negotiation was to

> *"provide certainty respecting rights to ownership and use of lands and resources, including marine resources."*[56]

The NILCA came into force on July 10, 2008 following the adoption by Parliament of Canada of the *Nunavik Inuit Land Claims Agreement Act (S.C. 2008, c.2)* on February 14 of the same year.

52. Note: On January 31, 1978, the Naskapi Band of Schefferville signed the Northeastern Quebec Agreement (NEQA) with the Governments of Quebec and Canada, the "Société de développement de la Baie James", the "Société d'énergie de la Baie James", "Hydro-Québec", the Grand Council of the Crees (of Quebec) and the Northern Quebec Inuit Association, thus establishing similar rights to those acquired by the Cree and the Inuit under the JBNQA.
53. JBNQA, s. 5.1.10(a).
54. Unlike the JBNQA, the Government of Quebec is not a party to the NILCA.
55. NILCA, Preambular para 2.
56. *Ibid.* preambular para 5.

NILCA applies to the Nunavik Inuit Settlement Area, which is comprised of the Nunavik Marine Region (NMR)[57] and the Labrador Inuit Settlement Area portion of the Nunavik Inuit/Labrador Inuit overlap area. Although the jurisdiction is somewhat complex the NMR is described by the Nunavik Marine Region Planning Commission as the shoreline and offshore area in Hudson Bay, Hudson Strait, and Ungava Bay. This agreement transfers fee simple interests in subsurface rights to Nunavik Inuit. This includes 80% of the islands in the Nunavik Marine Region and includes the entire marine area, islands, lands and waters.[58]

Key principles guide the development of planning policies, priorities and objectives in the NMR, including the acknowledgement that people are a functional part of a dynamic biophysical environment and that sustainable plans cannot be established without accounting for their present and future well-being. [59] Certain factors must be taken into account in planning for the NMR, including:

> *"(a) economic opportunities and needs; (b) community infrastructural requirements, including housing, health, education and other social services, and transportation and communication services and corridors; (c) cultural factors and priorities; (d) environmental protection and management needs, including wildlife conservation, protection and management; and (e) energy requirements, sources and availability. Land use plans must reflect the priorities and values of the residents and users of the planning regions."*[60]

The Nunavik Marine Region Planning Commission is currently undertaking a survey for all Nunavik Inuit, Nunavummiut, and others interested in the Nunavik Marine Region to support the creation of the Nunavik Marine Region Land-Use Plan (NMRLUP).[61]

NILCA paragraph 11.2.1 requires that the establishment of protected areas and the amendment of boundaries of protected areas be in conformity with an applicable land use plan. Areas that may be considered protected areas include, as in Nunavut, areas where blue carbon ecosystems are present. As noted above, the NMRLUP is to be guided by principles and factors that integrate the priorities of Inuit of Nunavik. Further,

> *"the establishment, disestablishment or changing of the boundaries of protected areas on Nunavik Inuit Lands is subject to the approval of a Makivik Designated Organization (MDO)."*[62]

As under the Nunavut Agreement,

> *"prior to the establishment of a protected area, Government and a MDO shall negotiate, in good faith, for the purpose of concluding an IBA. An IBA must address elements that would have a detrimental impact on Nunavik Inuit, or could reasonably confer a benefit on Nunavik Inuit."*[63]

NILCA Schedule 11-2 and 3 explain that along with identifying access and uses by Nunavik Inuit, employment and procurement opportunities with relating to activities and services, particularly enforcement, research and monitoring under a Marine Protected Area are key elements.

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57. The NMR includes the areas of equal use and occupancy and the overlap area of the Agreement Relating to the Cree/Inuit Offshore Overlapping Interests Area, is that offshore area adjacent to, but not in, Québec (s. 3.2 NILCA)
58. *Supra* note 5, p. 9.
59. NILCA, 6.1.3.
60. NILCA, para 6.2.3.
61. Nunavut Marine Region Planning Commission. 2025. (accessed online)
62. NILCA, para 11.2.5.
63. NILCA, para 11.4.2.

In November 2024, Makivvik, Nunatsiavut Government, and Canada announced the signing of a Memorandum of Understanding to begin negotiations to create a new Inuit Protected Area/national marine conservation area in northern Labrador. The target area spans 17,000 square kilometers in the Labrador Sea adjacent to Torngat Mountains National Park. According to the Government of Canada announcement, the

> *"area is a transition between Arctic and Atlantic habitats and is home to polar bears, whales, dolphins, seals, breeding and migrating seabirds, waterfowl, and a variety of fish species. Ranging from highly scenic fjords to long beaches and mudflats, the area is a cultural and ecological treasure. For the Inuit of Labrador and Nunavik, it offers sustenance and cultural richness and serves as a vital connection to the land and sea".*[64]

While blue carbon may not be the primary target of these conservation efforts, given the landscape involved, blue carbon ecosystems will likely benefit from these actions.

NUNATSIAVUT

On January 22, 2005, the Labrador Inuit Association, representing the Inuit of Labrador, the federal government and the Government of Newfoundland and Labrador signed the *Labrador Inuit Land Claims Agreement* (LILCA). In addition to delineating land rights and ownership, harvesting rights and the treatment of resources, the LILCA also established the Nunatsiavut Government. The *Labrador Inuit Land Claims Agreement Act* received royal assent on June 23, 2025. The LILCA came into effect on December 1, 2005.

The Labrador Inuit Settlement Area spans 72,520 square kilometers and consists of all lands, including lands covered by water, and tidal waters and islands within the boundaries which encompass the north-eastern section of Labrador and the adjacent marine area called the "Zone".[65] Pursuant to Part 1.1, "Water" refers to surface and subterranean water in liquid or frozen state located in or derived from a natural channel, a lake or other body of inland water but does not include Tidal Waters. "Tidal Waters" refers to any part of the sea and any part of a river within the ebb and flow of the sea at average spring tides. Like the IFA and the Nunavut Agreement, the LILCA deals expressly with marine areas and the resources within them.

The Land Use Planning provisions in Chapter 10 apply to all lands, waters and resources in the Labrador Inuit Settlement Area other than lands under the control and administration of Canada and Tidal Waters within the jurisdiction of Canada.[66] Despite this limitation for land use planning in marine areas, Nunatsiavummiut maintain consultation rights in these areas:

> *"Canada and the Province shall Consult the Nunatsiavut Government prior to permitting, approving or authorizing a Development of Minerals in the Zone, including any marine transportation in the Zone directly associated with the Development. The Consultation shall take into consideration Inuit rights in the Zone under the Agreement and that Inuit resident in the Labrador Inuit Settlement Area are adjacent to the Zone."*[67]

The Nunatsiavut Government may also make recommendations to the Minister regarding the potential impact on the integrity of land-fast sea ice of a Development or Petroleum Exploration in the Labrador Inuit Settlement Area, including any marine transportation in the Zone directly associated with the Development or Petroleum Exploration.[68] Where the self-determined priorities of Nunavummiut and blue carbon advocates align, this consultation right provides an avenue for ensuring the value of blue carbon sequestration is considered in government decision-making.

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64. Parks Canada. 2024. *Government of Canada, Nunatsiavut Government, Makivvik, and Government of Canada advance to next step toward establishing an Inuit Protected Area in the waters of northern Labrador.* (accessed online)
65. LILCA, para 4.2.1.
66. LILICA, LILCA 10.2.1
67. LILCA, para 6.2.1.
68. LILCA s. 6.6 and 6.7

Similar to the Nunavut Agreement and NILCA, prior to the establishment of marine protected areas,

> *"in the Labrador Inuit Settlement Area outside Labrador Inuit Lands, Canada and the Province shall Consult the Nunatsiavut Government about the proposed agreement".*[69]

Further, prior to the establishment or substantial enlargement of such an area in the Labrador Inuit Settlement Area, Canada and the Nunatsiavut Government must negotiate a Parks Impacts and Benefits Agreement (Parks IBA). A Parks IBA must address any matter connected with the proposed designation that might have a detrimental impact on Inuit or that could reasonably confer a benefit on Inuit. A Parks IBA may also address governance, information sharing and data management, mitigation of negative impacts, access and the exercise of harvesting rights, employment and procurement, approaches to the protection of Nunavummiut heritage resources, etc.[70]

The Torngat Mountains National Park Reserve was created with the consent of Labrador Inuit provided through the *Labrador Inuit Land Claims Agreement* and is supported by the Labrador Inuit Park Impacts and Benefits Agreement. This was transitioned to the Tongait KakKasuangita SilakKijapvinga–Torngat Mountains National Park of Canada with the consent of Nunavik Inuit provided through the *Nunavik Inuit Land Claims Agreement*. Parks Canada and the Cooperative Management Board established under the Labrador Inuit Parks IBA identified eight management areas in the park based on their sensitive natural and cultural resources and their importance to Inuit. The three management areas in the northern portion of the park, namely, Upingivik, Kangalaksiorvik Lake, and Nachvak Lake include marine areas where blue carbon sequestration objectives may align.

CARBON CREDITS AND CURRENT UNDERSTANDINGS WITHIN MODERN TREATIES

A note from the authors: First a caveat to explain the limits of our understanding. We (the authors) do not know enough about current carbon credit verification standards to know whether the level of jurisdiction and/or control Inuit Organizations have within the marsh, tidal, and marine areas of their respective regions would be recognized by a third-party validator. For example, we do not know whether the establishment of a Marine Conservation Area under the Oceans Act, within an Inuit Region where trawling would not otherwise occur would satisfy the additionality criterion. We also do not know whether a carbon standard organization would accept, for example, an Inuit Protected and Conserved Area, which may be permitted under a land claim agreement but does not have the force of federal or territorial law.

This section focuses on stopping or prohibiting activities (such as regulating bottom contact fishing) that satisfy the concept of additionality. Key questions include:

1. What authorities do Inuit have under their modern treaties to stop or prohibit activities that are or will be deleterious to Arctic blue carbon sequestration?

2. Within the areas where harmful activities have been prohibited, what would entitle Inuit to acquire any carbon credits that may be accepted through the Verified Carbon Standard Program, for example?

As we know, the clearest basis for controlling development and associated environmental impacts is ownership. Inuit owned lands under the Nunavut Agreement, the Nunavik Inuit Land Claim Agreement, and the Inuvialuit Final Agreement are located onshore and are bound by the ordinary high-water mark. The Inuit estate in Labrador Inuit Lands extends to the seabed within the boundaries of certain Water Lots, however, these do not include Tidal Waters above the seabed within the Water Lots. In short, the level of jurisdiction that provides the typical

69. LILCA, para 9.2.1.
70. LILCA, para. 9.2.2.

foundation for the validation and issuance of carbon credits may not currently exist in the tidal and marine areas under the Inuit land claims agreements.

Beyond the ordinary high-water mark, harvesting activities pursuant to commercial fishing licenses are subject to the laws of general application. A review of the public registries associated with the environmental impact screening and review mechanisms under the Inuit land claims agreements suggest that commercial fishery activities — including trawling — are not currently screened for potential negative impacts. Under LILCA, it appears that the Nunatsiavut Government may determine who harvests under those commercial fishing licenses that are issued to the Nunatsiavut Government and to manage aquaculture that overlays Labrador Inuit Lands that extend to the boundaries of Water Lots. There does not appear to be reliable control mechanisms that are currently being exercised over federally issued commercial fishing licenses.

There may be other tools that Inuit can use to advocate for the prohibition of activities that may be harmful to Arctic carbon ecosystems.

Land use plans provide a co-operative opportunity to designate marine areas as limited use zones. Land use planning bodies are established under the Nunavut Agreement (Nunavut Planning Commission), NILCA (Nunavik Marine Region Planning Commission) and LILCA, (Nunatsiavut Regional Planning Authority). The land use planning structure in the Inuvialuit Settlement Region is not as developed as other land claims agreements. Section 7(82) states that for the purpose of coordinating land use planning for the Beaufort Sea Region, there shall be area-specific groups dealing only with the Inuvialuit Settlement Region and that native participation, including Inuvialuit participation, in each such group shall be equal to government participation. The established bodies are mandated to develop plans that include land and marine area use designations. Under limited use designations, commercial activities could be limited. However, the entitlement to any associated carbon credits that may be claimed in these areas is unclear.

CONCLUSION

Any initiative to conserve blue carbon ecosystems – including data collection, designation, regulation, procurement, implementation and monitoring – will require the direct participation of Inuit in accordance with their respective modern treaties. Finding alignment with Inuit priorities, knowledge and self-determination, in combination with the stated objectives of the IFA, Nunavut Agreement, JBNQA, NILCA and LILCA, will be critical to the success of these efforts. Understanding the status of designation and implementation efforts like in the ANMPA, TNMPA, the Tallurutiup Imanga National Marine Conservation Area, the proposed protected area in the Labrador Sea and the Torngat Mountains National Park may present current opportunities for blue carbon advocacy.

Beyond the four corners of the five Inuit treaties, there are opportunities for private actors to support blue carbon stewardship initiatives in Inuit regions. IPCAs and OECMs, similar to the arrangement captured in the Aullaviat/Anguniarvik Traditional Conservation Area, offer pathways to support Inuit self-determination in conservation in cooperation with and support of Inuit objectives.

INUIT PERSPECTIVES ON BLUE CARBON STEWARDSHIP: WHAT WE HEARD FROM INUIT DURING THE 2024 WORKSHOP

On December 11, 2024 WWF-Canada sponsored a workshop aligned with the Arctic Change Conference in Ottawa. Over 60 participants from across Inuit Nunangat and around Hudson Bay, NGOs, academics and government scientists attended.

The workshop agenda was designed to engage Inuit through a discussion with Inuit rights holders and knowledge holders across the four regions in Inuit Nunangat. Indigenous community members from Northern Ontario and Manitoba, academics, legal scholars and policy experts also participated in the exploration of the current state of knowledge and interest in Arctic blue carbon.

The needs and priorities of Inuit communities and all Indigenous Peoples are rooted in the social, cultural, economic, political, governance and ecological context of the places where they live. To collaboratively develop projects that support their needs and priorities, a clear understanding of their perspectives is required regarding any subject matter. The objectives for this workshop were to gain a deeper understanding of the perspectives, needs and priorities of Inuit communities and other Indigenous community members in relation to:

- Coastal and marine ecosystem stewardship;
- The role and/or importance of carbon and climate change in stewardship work;
- The role and importance of coastal ecosystems in conservation economies; and
- How modern treaties and land claims may support Inuit self-determination in stewardship work.

The workshop posed the following questions to participants:

- Is Arctic blue carbon of interest to your community/region?
- What do you know about Arctic blue carbon in your community/region?
- Would you be interested in learning more about the legislative framework and policy in your region that could support Arctic blue carbon conservation?
- How could blue carbon ecosystem stewardship support your community's economy?
- What other information would help you make informed decisions in your community/region?

The workshop began with talks from invited speakers and then provided participants from Inuit Nunangat as well as others with a forum to share their perspectives on blue carbon in coastal and marine ecosystems and explore opportunities to support Inuit stewardship along the coastline. The workshop concluded with discussions on the potential benefits of blue carbon for food security, climate adaptation, and the importance of community-based management and stewardship.

The workshop emphasized the need for sustainable conservation financing, integrating Indigenous knowledge with scientific research, and the role of blue carbon in Arctic conservation. In general, there seemed to be a great deal of interest as well as unknowns for Arctic blue carbon.

Participants raised questions about co-management, the accounting of blue carbon balances, locations and forms of blue carbon in the Arctic, the impacts of a changing climate on carbon cycling, the impact of mining on the environment, and the potential for monetizing blue carbon through carbon credits.

All were welcomed to join this workshop to listen to representatives from Inuit Regions on approaches to blue carbon stewardship, offer their perspectives and to learn about the state of knowledge on Arctic Blue Carbon from knowledge holders, academics and legal specialists. There was significant participation from the over 60 participants in attendance.

Four speakers presented on various blue carbon topics in Arctic regions and communities including community and scientific perspectives, legal frameworks, and NGO initiatives. Discussions covered the environmental and cultural importance of blue carbon, historical and ongoing Inuit conservation efforts, scientific aspects of blue carbon, rights through land claims and legislation, and WWF-Canada's regional focus.

The workshop featured speakers:

- Richard Paton (Qikiqtani Inuit Association) opened the session and highlighted the importance of blue carbon for Inuit led conservation, the unique environmental aspects of the Qikiqtani region, and the need for sustainable conservation finance.
- Jim Goudie (Nunatsiavut Government) discussed Inuit conservation efforts, challenges in co-management with federal authorities, and the significance of integrating Indigenous knowledge with scientific research.
- Zou Zou Kuzyk (University of Manitoba) emphasized the need for a holistic understanding of carbon cycles and the importance of integrating Indigenous knowledge with scientific research.
- Erin Keenan (World Wildlife Fund Canada) discussed the organization's support for conservation economies, protected areas, and the importance of integrating blue carbon protection into land use planning.

Additional questions, observations and discussion points were contributed by participants and participants could also add their thoughts in writing. Questions and selected responses are summarized below.

DISCUSSION

Is your community / region interested in blue carbon why or why not?

- We are very interested in blue carbon in addition to the microorganisms that live in the food chain.
- We are very interested in identifying areas of significance based on a variety of factors biodiversity, culturally important sites, and stores are an important piece. We want to ensure that traditional ways of life continue and large stores or blue carbon tie into that.
- Community members working on MPA/IPCAs are interested to understand how mapping/monitoring blue carbon in their areas of interest could be leveraged for carbon credits/investments in protected areas in the name of nature-based climate solutions.

What would you like to know about blue carbon?

- What is the best way to integrate blue carbon, coastal carbon, inland carbon and waterborne carbon? They're all connected and it is difficult to separate these for accounting/measurement.
- How much blue carbon is there and where is it? This would inform the mapping of protected area development / management.
- How long does it remain in the sediments?
- How is it relevant to people's lives?
- We are just starting out with blue carbon and it's a good time for scientists to come and work in our area.

Arctic blue carbon random thoughts?

- What is success with regard to blue carbon conservation? How would we measure it? Some categories for quantifying success could be:
  - Conservation
  - Blue carbon quantification
  - What community wants
  - Relating to reconciliation
  - Sustainability
  - Restoration
  - Building capacity
  - Monitoring
  - Effective communication
  - Dialogue
- One of the communities expressed a wish to understand as much as they can about the blue carbon in their region and asked for a commitment of support in doing so.
- Blue carbon is relevant to Inuit and Cree communities through country foods. This can be communicated insofar as blue carbon may be an indicator of ecosystem health for fish habitat, bird habitat and caribou forage.
- It would be useful to have a list of what is considered blue carbon
- Carbon is the western science way to illustrate and study ecosystem connectivity and meet the indigenous point of view of organisms links. We are all connected.
- Could blue carbon be used as leverage tool to obtain fisheries lobbies?

As a knowledge holder, academic, policy person how could you support communities?

- It is important to help create policy that supports community interest by building research questions around community questions rather than using them as a resource to further the western scientific agenda.
- Maintaining blue carbon is relevant to Inuit/Cree priorities since blue carbon is important for bird, fish and mammal habitat.
- A synthesis of existing scientific studies that document HOW and WHY blue carbon is an indicator for ecosystem health would be useful.
- It may be useful to have more outreach activities to help communities to understand carbon quantification and work with them on this endeavor.
- A carbon credit model may be a useful tool to support financial stability of Inuit protected and conserved areas.
- Identification / mapping of carbon rich habitats in the Arctic still needs to be done. This can support the identification of areas for protection in perpetuity.

How could blue carbon stewardship support your community/region?

- Stewarding protection of blue carbon supports healthy habitats, healthy fish, and healthy people. This will require training and resources.

ARCTIC BLUE CARBON: A REVIEW OF RECENT SCIENCE

In the December 2024 workshop, communities displayed interested in the amount and location of blue carbon. Importantly, they made the point that they see the carbon cycle holistically and not separated between terrestrial, marine and freshwater environments but rather flowing between these systems with climate forces and ecosystem services acting within each in unique but interconnected ways. Academics were also interested in carbon cycling and the climate forces acting on these cycles. Therefore, the amount, location and transport of carbon in the Arctic are continuing data gaps. However, this is fast-moving area of research and below we detail recent updates to Arctic blue carbon knowledge on the type and quantity of blue carbon in the Arctic, as well as some management and protection strategies.

BOTTOM TRAWLING

Recent studies suggest that bottom trawling may be substantially contributing to global warming through carbon emissions generated from disturbed sediments. In 2024, a study by Atwood et al. found that 55-60% of CO2 produced from bottom trawling is released into the atmosphere within nine years.[71] In addition, the study estimated that trawling could have emitted a cumulative 8.5-9.2 Pg CO_2 into the atmosphere between 1996 and 2020, contributing 0.97-1.14 ppm to atmospheric CO_2 concentrations.[72] It should be noted that there remains debate within the literature regarding the level of precision in certain models and experiments used to estimate CO_2 emissions from bottom trawling. These debates are largely focused on assumptions of the

71. Atwood TB. *et al.* 2024. *Atmospheric CO2 emissions and ocean acidification from bottom-trawling.* Front. Mar. Sci, 10. DOI: 10.3389/fmars.2023.1125137

72. *Ibid.*

reactivity of organic carbon.[73] The continuing debate underlines the need for continued funding and research to investigate the effects of bottom trawling on CO_2 emissions. Nonetheless, there have been other studies that have underlined the impact bottom trawling may have on organic carbon stocks in marine ecosystems. Zhang et al. (2024)[74] found that organic carbon in the sediment of highly bottom trawled areas in the North Sea (greater than 1 sweep per year) was consistently being reduced, while both gain and loss of sedimentary organic carbon occurred in weakly trawled areas.

Mobile, bottom contact, trawl or dredge gear are defined as follows:

- Mobile refers to gear that is towed or hauled by a vessel through the water, either on or off the seabed, to overrun the target species or herd them into a collecting device of some kind (e.g., a bag net). The towing or hauling mechanism must not be human-powered for this gear to qualify.
- Bottom contact refers to gear that is designed or modified to make contact with the seabed (including partial and/or occasional contact). For example, a bottom-contact gear may have discs, bobbins or rollers on its footrope, or other attachments designed or modified to make contact with the bottom. Trap-based fisheries are excluded.
- Trawl refers to any fishing gear that uses a large bag net dragged in the sea by a vessel or vessels for the purpose of taking fish.
- Dredge refers to fishing gear consisting of a metal frame attached to a collecting device (such as a holding bag constructed of metal rings or mesh, or a rigid cage structure). As the metal frame is dragged upon or above the seabed, fish (shellfish or finfish) are pushed up and over the frame, then into the collecting device. Fish collection may be facilitated in various ways, including suction, hydraulics, or teeth or blades that push into the seabed.

Both reduced bottom trawling and restricted bottom trawling equipment have been identified as priorities in the Canadian Marine Protected Areas (MPS) Protection Standards (2023)[75] with the following restrictions for bottom trawling and gear.

NEW MPAS

The following bottom-trawl gear will be prohibited in new MPAs (those established after April 25, 2019):

- single bottom otter trawl (side or stern)
- twin (double) bottom otter trawl
- beam trawl
- shrimp trawl (also known as modified otter trawl)
- twin (double) shrimp trawl
- triple shrimp trawl
- hydraulic clam dredge
- scallop dredge
- scallop drag

73. Hiddink JG. *et al.* 2023. *Quantifying the carbon benefits of ending bottom trawling.* Nature, 617, E1–E2. DOI: 10.1038/s41586-023-06014-7.
74. Zhang et al. 2023. GWL_FCS30: *A global 30 m wetland map with a fine classification system using multi-sourced and time-series remote sensing imagery in 2020*. Earth System Science Data, 15(1), 265–293. DOI: 10.5194/essd-15-265-2023.
75. Fisheries & Oceans Canada. 2023. *Canada Marine Protected Areas (MPA) Protection Standard.* (accessed online)

Bottom-trawl gear types also include the bottom and midwater gear types listed below, in cases where they are designed or modified to make contact with the seabed (including partial and/or occasional contact):

- pair bottom trawl
- demersal or boat seines (Danish seine or Scottish seine)
- pair seine
- midwater (pelagic) trawl (side or stern)
- midwater (pelagic) pair trawl
- semi-pelagic trawl
- any mobile drag, rake or dredge
- any future technological innovations and new or experimental gear types that are functionally or materially similar to other prohibited gear on this list.

The gear listed above would be prohibited where modified to make seabed contact.

Specific exceptions for new MPAs

Bottom-trawl gear used in Aboriginal and treaty rights-based fisheries and for scientific research pertaining to MPA management, advancing marine ecological science or fisheries management, in alignment with the MPA's (conservation) objectives, are determined on a case-by-case basis.

EXISTING MPAS

Existing MPAs (those established before April 25, 2019) will be reviewed as part of their ongoing management cycles to determine the compatibility of bottom-trawl gear:

- with the MPA's (conservation) objectives and
- in consultation with partners and stakeholders

Where this gear is determined to be incompatible, its use would be prohibited.

MARINE BLUE CARBON

In contrast to coastal blue carbon ecosystems in the tidal zone (e.g. mangroves, seagrass meadows salt marshes) which are comparatively better studied, oceanic or marine carbon cycling (e.g. seaweed farming, kelp forests and seabed sediments) remains a gap.[76] [77] [78] Understanding carbon cycling in marine ecosystems is crucial to understanding the functioning of the marine system and is especially important as climate change exerts pressures on the system. A full understanding of the marine carbon cycle is also essential for developing carbon credit programs to fund the conservation of blue carbon ecosystems.

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76. Zhang *et al.* 2023. *GWL_FCS30: A global 30 m wetland map with a fine classification system using multi-sourced and time-series remote sensing imagery in 2020.* Earth System Science Data, 15(1), 265–293. DOI: 10.5194/essd-15-265-2023.

77. Verra. 2025. Area of focus - blue carbon. (accessed online)

78. Claes J. *et al.* 2022. *Blue carbon: the potential of coastal and oceanic climate action.* (accessed online)

SEAWEED HARVESTING

There has been growing interest, including in the Arctic[79], in seaweed harvesting and farming for food production and carbon sequestration. A recent study[80] found that seaweed farms bury carbon in the underlying sediments at rates towards the low end of the range measured for blue carbon habitats. However, gaps remain in assessing the carbon benefits over the course of the life cycle of products of seaweed farming.[81]

KELP

Along the Eastern Canadian Arctic coast, the estimated habitat suitability of kelp covers an estimated 312,000 square kilometres. [82] Emerging research indicates the presence of at least three kelp species along the coasts of the Kitikmeot Region,[83] previously documented by Indigenous communities,[84] although limited biomass and carbon stock estimates have been made. Large data gaps exist elsewhere along the Arctic coasts, especially in the high Canadian Arctic, historically labeled as a scarce environment, with minimal rocky substrate and therefore kelp. More research is needed in this under-studied, icy region to determine the pan-Arctic kelp distribution and its contribution to national blue carbon stocks.

Regarding kelp and seaweed, a recent synthesis paper by Pessarrodona *et al*. (2023)[85] found that research efforts on marine macroalgae (seaweed and kelp) carbon sequestration are more focused on particulate organic carbon (POC) pathways and carbon fixation. Active processes leading to carbon sequestration such as carbon export or burial in marine sediments remain poorly understood in these macroalgae ecosystems. This limits regional and country-level assessments of carbon sequestration potential and is therefore a major research gap that needs addressing.[86] There is great potential for kelp forest conservation in the Arctic given their widespread distribution in the Arctic (see Figure 2).[87] Kelp ecosystem coverage has been severely underestimated in the Arctic and models predict there is over 312,000 square kilometers of suitable habitat for kelp in the Eastern Arctic.[88] Nonetheless, climate change still poses a threat to kelp ecosystems. A 25-year study of kelp ecosystems in fjords off of Svalbard found significant shifts in the structure of the kelp community. They observed a less balanced age structure developing at most depths and the relative abundance and lower depth limit of brown algae declined, though red algae was unaffected.[89] Düsedau *et al.* (2024)[90] suggests the driving factor in these changes is alterations in underwater light since their data showed increased turbidity and decreasing irradiance from sediment in the increasing glacial meltwater input to coastal waters since 2012.

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79. WWF. 2025. *Greenland's seaweed entrepreneur.* (accessed online)
80. Duarte CM. *et al.* 2025. *Carbon burial in sediments below seaweed farms matches that of Blue Carbon habitats.* Nat. Clim. Chang, 15, 180–187. DOI: 10.1038/s41558-024-02238-1.
81. *Ibid.*
82. Goldsmit J. *et al.* 2021. *Kelp in the Eastern Canadian Arctic: current and future predictions of habitat suitability and cover.* Frontiers in Marine Science, 8. DOI: 10.3389/fmars.2021.742209.
83. Bluhm BA. *et al.* 2022. *New distribution records of kelp in the Kitikmeot Region, Northwest Passage, Canada, fill a pan-Arctic gap.* Polar Biology, 45(4), 719-736. DOI: 10.1007/s00300-022-03007-6.
84. Government of Nunavut. 2015. *Nunavut Coastal Resource Inventory*. (accessed online)
85. Pessarrodona A. *et al.* 2023. Carbon sequestration and climate change mitigation using macroalgae: A state of knowledge review. *Biological Reviews,* 98(6), 1945–71. DOI: 10.1111/brv.12990.
86. *Ibid.*
87. Goldsmit J. *et al.* 2021. *Kelp in the Eastern Canadian Arctic: current and future predictions of habitat suitability and cover.* Frontiers in Marine Science, 8. DOI: 10.3389/fmars.2021.742209.
88. *Ibid.*
89. Düsedau L. *et al.* 2024. *Kelp forest community structure and demography in Kongsfjorden (Svalbard) across 25 Years of Arctic warming.* Ecology and Evolution, 14(6). DOI: 10.1002/ece3.11606.
90. *Ibid.*

Despite threats, kelp ecosystems still represent enormous potential for blue carbon sequestration and thus, collaboration on kelp research and conservation is critical. Arctic kelp forests are thought to have the highest carbon stocks and production capacity compared to Pacific or Atlantic counterparts along the Canadian coastline. It's estimated that Arctic kelp forests span 5.5 million hectares in the Canadian Arctic.[91] Frameworks for the inclusion of kelp forests in Canada's natural climate solutions inventory have recently begun to be constructed.[92]

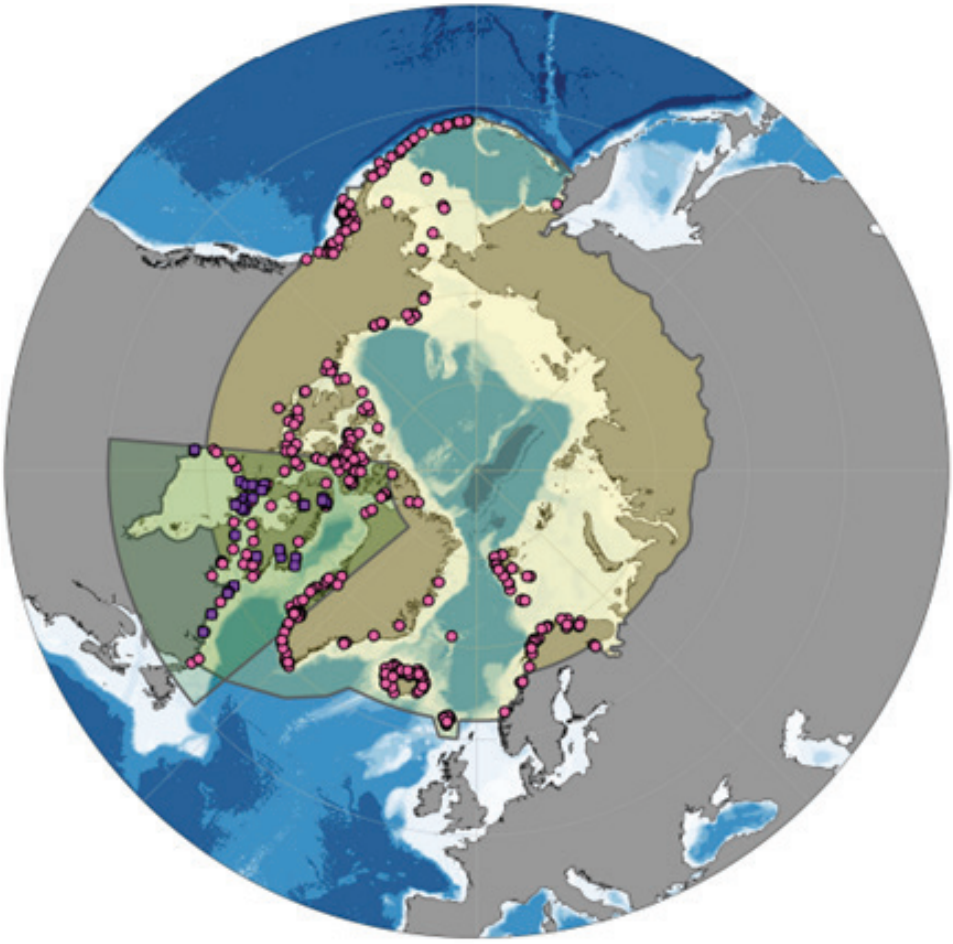

Figure 2. Known locations of kelp forest in the Arctic. From Goldsmit et al. 2021.[93]

91. McHenry J. *et al.* 2024. A blueprint for national assessments of the blue carbon capacity of kelp forests applied to Canada's coastline. *npj Ocean Sustainability,* 4(30). DOI: 10.1038/s44183-025-00125-6.

92.*Ibid.*

93. Goldsmit J. *et al.* 2021. *Kelp in the Eastern Canadian Arctic: current and future predictions of habitat suitability and cover.* Frontiers in Marine Science, 8. DOI: 10.3389/fmars.2021.742209.

SEABED CARBON

The first modeled national assessment of organic carbon in the surficial seabed sediments across the Canadian continental margin was published in 2024.[94] This assessment estimated the standing stock of organic carbon in the top 30 cm of sediment to be 10.9 Gt (7.0– 16.0 Gt).[95] Improved knowledge of the presence of bedrock across less-studied regions of the Canadian Arctic, Hudson Bay, Gulf of St. Lawrence, Newfoundland and Labrador would improve carbon estimates.[96]

Building on this work, areas within Canadian waters where new Marine Conservation Area's (MCAs) would be most efficient at protecting surficial carbon were identified. [97, 98] The research found that, outside of areas already protected by MCAs, the Arctic does not contain comparatively high carbon densities that would warrant prioritization for protection at a national scale. However, Epstein *et al.* (2025) did note that as the Arctic warms, carbon accumulation is likely to increase due to higher rates of primary productivity (photosynthetic activity) andreduced ice scour of sediment. Recommended areas for protection in the Arctic were the Foxe Basin, the Beaufort Shelf and Canadian Arctic fjords.[99]

SEAGRASS MEADOWS

Very little is reported in the scientific literature about the locations of seagrass meadows in the Arctic with most known locations in the Arctic close to or immediately adjacent to human settlements (Figure 3).[100] Therefore, surveys to locate and map the extent of seagrass meadows in the Arctic are an important step towards understanding blue carbon ecosystems. Collaboration with Inuit in this endeavor is critical given that locations may already be known to Inuit.

Within the Canadian Arctic and Subarctic, eelgrass meadows are abundant, but some have been seen to be declining and are threatened within the Hudson Bay and James Bay. These are suspected to be largest marine meadows along the North American coasts.[101, 102] Along the high and western Canadian Arctic coasts gaps within seagrass distribution and biomass exist, however, Indigenous communities have observed eelgrass near settlements in the Northwest Territories and Nunavut, with the most northern observation at Grise Fiord in Nunavut in the Eastern Arctic.[15 103] While there are studies regarding the estimated carbon sequestration rates of eelgrass meadows along Canada's Pacific and Atlantic coasts, as well as along other Arctic coasts such as in Greenland and Norway, no estimates for rates of carbon sequestration or carbon stocks within eelgrass along the Canadian Arctic coast currently exist. To effectively manage these ecosystems more research is needed to determine the approximate biomass and subsequent carbon sequestration and storage by these ecosystems.

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94. Epstein G. *et al.* 2024. *Predictive mapping of organic carbon stocks in surficial sediments of the Canadian continental margin.* Earth System Science Data, 16(5): 2165–2195. DOI: 10.5194/essd-16-2165-2024.

95. *Ibid.*

96. *Ibid.*

97. Epstein G. *et al.* 2025. *Protection of seabed sediments in Canada's marine conservation network for potential climate change mitigation co-benefit.* FACETS, 10: 1-14. DOI: 10.1139/facets-2024-0080.

98. Epstein G. *et al.* 2024. *Predictive mapping of organic carbon stocks in surficial sediments of the Canadian continental margin.* Earth System Science Data, 16(5): 2165–2195. DOI: 10.5194/essd-16-2165-2024.

99. Epstein G. *et al.* 2024. *Predictive mapping of organic carbon stocks in surficial sediments of the Canadian continental margin.* Earth System Science Data, 16(5): 2165–2195. DOI: 10.5194/essd-16-2165-2024.

100. Murphy G. et al. 2021. *From coast to coast to coast: ecology and management of seagrass ecosystems across Canada*. FACETS. 6: 139-179. DOI: 10.1139/facets-2020-0020.

101. *Ibid.*

102. Lalumière R. *et al.* 1994. *Eelgrass meadows in a low Arctic environment, the northeast coast of James Bay, Québec*. Aquatic botany, 47(3-4), 303-315. DOI: 10.1016/0304-3770(94)90060-4.

103. Government of Nunavut. 2010. *Nunavut Coastal Resource Inventory.* (accessed online)

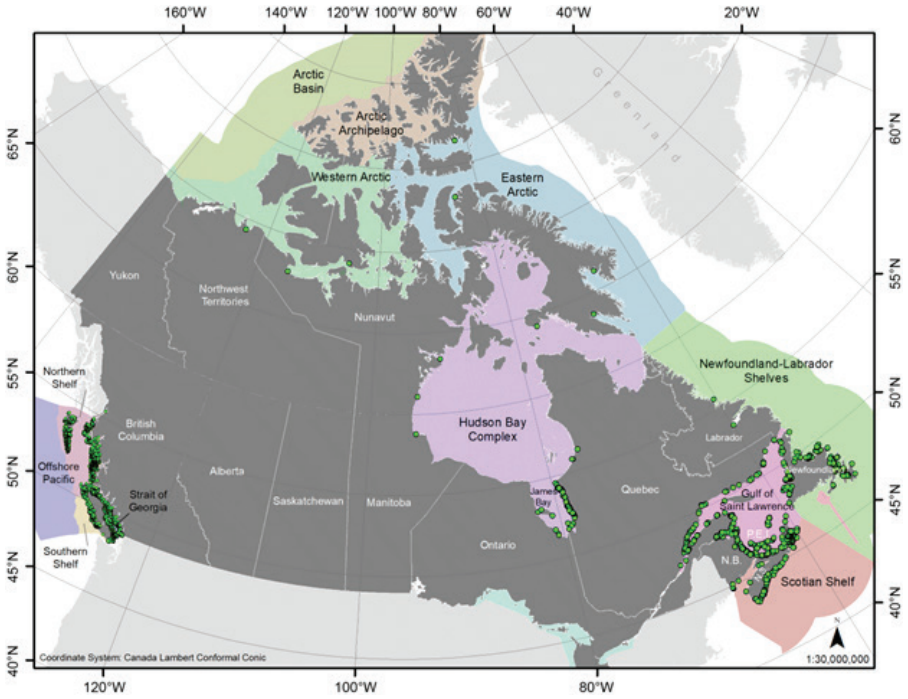

Figure 3. Distribution of eelgrass (Zostera marina) in Canada across 12 marine bioregions. Points represent locations of published studies or inventories where eelgrass meadows have been observed. From Murphy et al. (2021).[104]

SALT MARSHES

Statistics Canada indicates there is currently 3,602 square kilometers of mapped salt marsh in Canada, with 63% of Canada's mapped salt marsh residing on the Arctic coast.[105] Salt marshes have been documented as far north as Ellesmere Island. However, salt marshes thrive in more temperate waters. As seen from satellite data there is a large distribution of salt marshes within the Mackenzie delta and along the southern coast of the Hudson Bay.[106] Again, large data gaps exist regarding the extent and biomass of salt marsh along the Canadian Arctic coast, as well as associated carbon stocks and sequestration rates.

Salt marshes represent another key opportunity for blue carbon conservation in coastal regions of the Arctic. A study using 10-metre resolution sentinel-1 satellite data[107] found that significant parts of the Sanikiluaq coastline and the Nunatsiavut coastline had moderate densities of salt marshes (Figure 4), though the study did not cover areas north of 60oN. Zhang *et al.* (2023)[108] using 30-metre resolution satellite data also mapped coastal wetlands showing large areas of tidal flats and some salt marshes in the Canadian Arctic (Figure 5). The Arctic is an area of priority for the mapping of tidal marshes and salt marshes given how little is known about their distribution there.[109]

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104. Murphy G. *et al.* 2021. *From coast to coast to coast: ecology and management of seagrass ecosystems across Canada.* FACETS. **6**: 139-179. DOI: 10.1139/facets-2020-0020.

105. Statistics Canada. 2022. *Census of environment: A framework for salt marsh ecosystem accounting*. (accessed online)

106. NatureServe Explorer. 2016. *Arctic and subarctic coastal salt marsh.* (accessed online)

107. Worthington TA. *et al.* 2024. *The distribution of global tidal marshes from Earth observation data.* Global Ecology and Biogeography, 33, e13852. DOI: 10.1111/geb.13852.

108. Zhang X. *et al.* 2023. *GWL_FCS30: A global 30 m wetland map with a fine classification system using multi-sourced and time-series remote sensing imagery in 2020.* Earth System Science Data, 15(1), 265–293. DOI: 10.5194/essd-15-265-2023.

109. Maxwell TL. *et al.* 2024. *Soil carbon in the world's tidal marshes.* Nat. Commun. 15, 10265. DOI: 10.1038/s41467-024-54572-9.

Figure 4. 2020 distribution of tidal marshes, with darker colours representing greater tidal marshes extent (km²) within a 0.5° grid cell. From Worthington et al. (2024).[110]

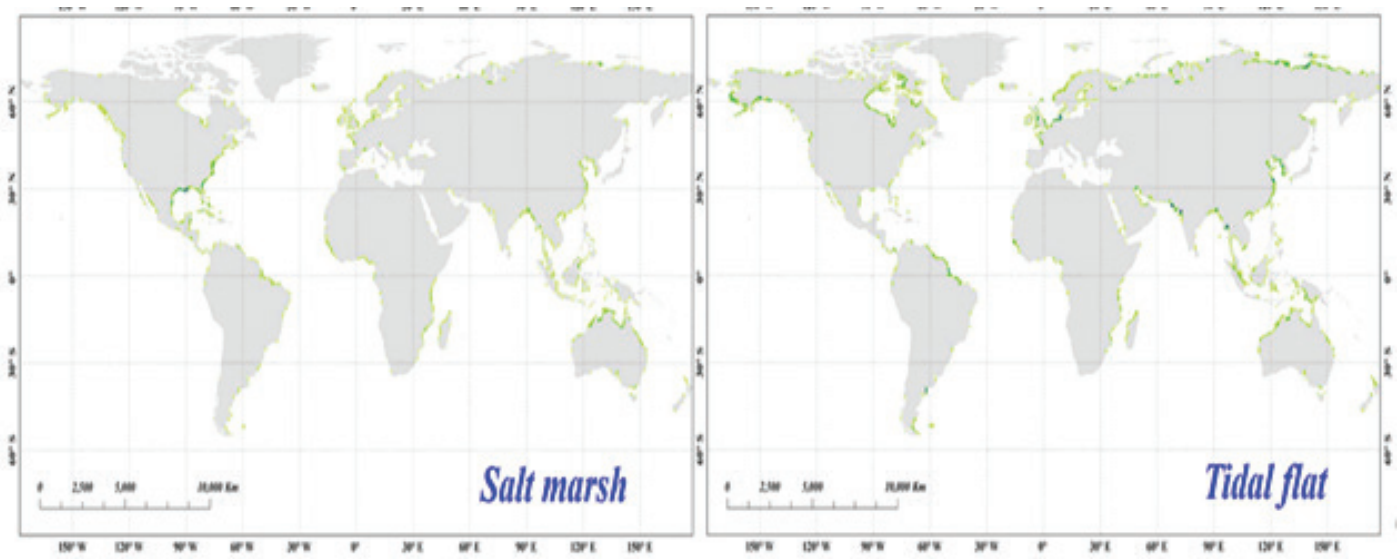

Figure 5. The spatial distributions of salt marshes and tidal flats at w 0.5o grid cell resolution. From Zhang et al. (2023).[111]

110. Worthington TA. *et al.* 2024. *The distribution of global tidal marshes from Earth observation data.* Global Ecology and Biogeography, 33, e13852. DOI: 10.1111/geb.13852.

111. Zhang X. *et al.* 2023. *GWL_FCS30: A global 30 m wetland map with a fine classification system using multi-sourced and time-series remote sensing imagery in 2020.* Earth System Science Data, 15(1), 265–293. DOI: 10.5194/essd-15-265-2023.

PHYTOPLANKTON

Pickart *et al.* (2024) found that phytoplankton biomass from an early summer bloom in the Chukchi Sea sank to the bottom faster than expected by gravity alone because of subduction from baroclinic instability.[112] Biomass that was not subjected to this process often got carried away to other areas by the horizontal current. Pickart *et al.* (2024) further predicted that with a changing climate and less ice cover, barometric instability is likely to increase changing the dynamics of carbon export to the benthic zone in the Arctic ocean from phytoplankton blooms.[113] Understanding the distribution and movement of phytoplankton derived blue carbon is important since it will inform which areas should be protected to preserve blue carbon. This underscores the need for a better understanding of the carbon dynamics of phytoplankton blooms now, and under a changing climate.

Phytoplankton dominate Arctic waters, representing a foundational pillar in the Arctic food web, contributing high rates of primary production. Massive carbon uptake occurs in phytoplankton blooms —sometimes large enough they can be seen from space. In the past, these blooms occurred exclusively in the spring, but now also occur in autumn. The loss of sea ice has presented new opportunities for phytoplankton blooms by increasing sun exposure, habitat availability and length of growing season, (beginning earlier and ending later). This subsequently increases annual net primary production and therefore carbon uptake. Emerging data indicates — with increased irradiance of the seafloor caused by sea ice loss — areas along the Canadian Arctic coast may experience new occurrences of sea floor blooms in the future, such as the Canadian Arctic Archipelago and Foxe Basin.[114] Climate change could have profound effects on the base of the food web, which could reverberate through trophic levels, affecting productivity and movement (migration) at higher trophic levels, and therefore this is an area of science with an urgent need for more research. Millions of birds and marine animals migrate

north to feed on those phytoplankton blooms, so what happens when the bloom dynamics change? Would this affect the wildlife that Inuit hunt? Making confident hypotheses regarding the consequences of intensifying climate change remains difficult. Large data gaps exist regarding the extent of, and biomass produced by, phytoplankton blooms, as well as the carbon fixation rates and potential alterations climate change may induce.

ICE ALGAE

Ice algae blooms support the Arctic food web as well as contribute to primary production and carbon uptake, although to a lesser extent than phytoplankton. These blooms commence within and underneath sea ice in the early spring and result in either the burial or recycling of its organic carbon.[115][116] Although data gaps exist regarding the produced biomass of ice algae blooms within the Canadian Arctic, as ice algae is often underrepresented when discussing Arctic primary production, some of the highest levels of ice algae biomass have been recorded within Canadian land-fast ice in Resolute Bay.[117][118] Climate change is likely to have significant effects on ice algae distribution and production. As sea ice continues to thin and melt ponds increase, significant increases in ice algae north of 77˚N are expected due to the thinning of thick, multiyear ice and increase in melt ponds, and increasing

112. Pickart RS. *et al.* 2024. *Vertical carbon export during a phytoplankton bloom in the Chukchi Sea: Physical setting and frontal subduction.* Journal of Geophysical Research: Oceans, 129(11). DOI: 10.1029/2024JC021465.
113. *Ibid.*
114. Shiozaki T. *et al.* 2022. *Bottom-associated phytoplankton bloom and its expansion in the Arctic Ocean. Global* Change Biology, 28(24), 7286-7295. DOI: 10.1111/gcb.16421.
115. Leu E. *et al.* 2011. *Consequences of changing sea-ice cover for primary and secondary producers in the European Arctic shelf seas: timing, quantity, and quality.* Progress in Oceanography, 90(1-4), 18-32. DOI: 10.1016/j.pocean.2011.02.004.
116. Arrigo KR. *et al.* 2012. *Massive phytoplankton blooms under Arctic sea ice.* Science, 336(6087), 1408-1408. DOI: 10.1126/science.1215065.
117. Fernandez-Mendez, M., Olsen, L. M., Kauko, H. M., Meyer, A., Rösel, A., Merkouriadi, I., ... & Assmy, P. (2018). Algal hot spots in a changing Arctic Ocean: Sea-ice ridges and the snow-ice interface. Frontiers in Marine Science, 5, 75.
118. Leu, E., Mundy, C. J., Assmy, P., Campbell, K., Gabrielsen, T. M., Gosselin, M., ... & Gradinger, R. (2015). Arctic spring awakening–Steering principles behind the phenology of vernal ice algal blooms. Progress in Oceanography, 139, 151-170.

light availability to the algae. Whereas south of 77˚N — as seasonally formed sea ice melts earlier — the algae may experience habitat loss and a shortened window of production.[119] [120] [121] Large data gaps exist regarding the rates in which sea ice algae take up carbon and the fate of said carbon, whether it be recycled within the water column or buried in seafloor sediments. Further research clarifying the extent ice algae, as well as its role and contribution to blue carbon storage and sequestration within the Canadian Arctic is needed to better manage and address potential climate impacts.

Kholbach *et al.* (2024) found that the Barents Sea zooplankton community generally does not depend on ice algae and ice algae only supplements their diets of pelagic phytoplankton.[122] They further suggested that this relatively low dependency on sea-ice algae may indicate that the food web may be resilient to sea ice decline. Nonetheless, there are indications that sea ice algae are important for the entire Arctic food web, with one study finding that ice algae carbon signatures were present in 96% of organisms in a dataset of 2300 samples from 155 different species including invertebrates, fish, seabirds and marine mammals from across the Arctic.[123] [124] Ice algae represents a generally low quantity source of nutrition in Arctic food webs often making up only 1-26% of total primary production in the Arctic, though it can represent a much larger proportion of primary production in the spring and early summer during blooms.[125] Though generally low in quantity, ice algae tends to have high nutritional value because of the prevalence of diatoms rich in cellular levels of long chain polyunsaturated fatty acids and antioxidant carotenoids meaning that gross primary productivity alone may not accurately depict it's energetic contributions to the food web.[126] It is projected that ice algal primary production will decrease under future climate conditions because of truncated blooms and fresher, warmer surface waters could increase algal degradation, reducing the nutritional quality of the ice algae biomass that enters pelagic and benthic zones.[127] Generally, ice algae contribution to primary productivity remains poorly understood because of the limited ability to assess it using remote sensing at spatially or seasonally-relevant scales.[128]

SUMMARY

The valuation of blue carbon ecosystems within the Canadian Arctic is vital to their proper management and survival. Understanding the full extent and present biomass of the discussed ecosystems along the entire Canadian Arctic coastline is a necessary first step in determining their current and future capacity to contribute to climate mitigation and carbon sequestration. To appropriately manage and create effective "Nature-based Climate Solutions" (NbCS), more comprehensive investment in research regarding the full extent and biomass, carbon sequestration, and vulnerabilities of these coastal Arctic ecosystems is necessary.

Indigenous Peoples leadership, priorities, knowledge, and rights must be at the forefront of any and all steps in the research, decision and policy making, and management of these areas. This will facilitate the co-production of the most comprehensive and useful knowledge, support reconciliation, equity in knowledge acquisition and decision making, as well as promote sustainable and effective conservation.

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119. Hill V. *et al.* 2022. *Contrasting sea-ice algae blooms in a changing Arctic documented by autonomous drifting buoys.* Journal of Geophysical Research-Oceans, 127(7). DOI: 10.1029/2021JC017848.

120. Lannuzel D. *et al.* 2020. *The future of Arctic sea-ice biogeochemistry and ice-associated ecosystems.* Nature Climate Change, 10(11), 983-992. DOI: 10.1038/s41558-020-00940-4.

121. Tedesco L. *et al.* 2019. *Sea-ice algal phenology in a warmer Arctic*. Science Advances, 5(5), eaav4830. DOI: 10.1126/sciadv.aav4830.

122. Kohlbach D. *et al.* 2024. *Ice algae as supplementary food rather than major energy source for the Barents Sea zooplankton community.* Progress in Oceanography, 229, 103368. DOI: 10.1016/j.pocean.2024.103368.

123. *Ibid.*

124. Koch CW. *et al.* 2023. *Year-round utilization of sea ice-associated carbon in Arctic ecosystems.* Nature Communications, 14, 1954. DOI: 10.1038/s41467-023-37612-8.

125. *Ibid.*

126. *Ibid.*

127. *Ibid.*

128. *Ibid.*

HOW CAN BLUE CARBON-RELATED WORK BENEFIT INDIGENOUS COMMUNITIES?

Based on discussions at the December 11th workshop, blue carbon is important to Inuit because its conservation generally aligns with their priorities in marine and terrestrial environments. We have found three mechanisms by which blue carbon-related work can benefit people in the north and improve their quality of life: stewardship programs, management options and payment for ecosystem services.

STEWARDSHIP

GUARDIAN PROGRAMS

Guardian programs provide an option for stewarding blue carbon since many programs already monitor the ecosystems where blue carbon is most concentrated.[129] There are already Guardian programs in five communities in Inuit Nunangat with five to seven Guardians in each community. The Guardian programs are set to expand in all communities.[130] These programs foster and support Indigenous governance, encourage Indigenous harvesting rights and help stimulate the building of infrastructure within communities for equipment and food storage, among other things.[131] Guardian programs can also have a significant return on investment. For instance, the Guardian programs in Taloyoak and in communities around Tallurutiup Imanga are estimated to have generated a return on investment of $27 million.[132]

NAUTTIQSUQTIIT PROGRAM

The Nauttiqsuqtiit program is a unique stewardship program that was established as part of the Inuit Impact and Benefit Agreement (IIBA) for Tallurutiup Imanga and Tuvaijuittuq. Given that Nauttiqsuqtiit is already funded through Parks Canada, a federal agency, and jurisdiction of the marine areas in Canada are a federal responsibility, the expansion of this program could be a reasonable option to steward blue carbon ecosystems in the Arctic. Tallurutiup Imanga, which is already stewarded by Nauttiqsuqtiit, is one of the areas with the highest concentrations of blue carbon in the Arctic (Figure 6).[133] Given that Nauttiqsuqtiit are already out on the land conducting stewardship activities, funding activities with proceeds from blue carbon credits (Figure 6), while expanding their mandate to monitor blue carbon could be a very efficient and effective use of funds. This program has also had strong socioeconomic benefits for local communities in the high Arctic, giving Inuit the resources, opportunity and autonomy to steward their land in the form of meaningful job opportunities.[134]

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129. Government of Canada 2025. *Indigenous Guardians map.* (accessed online)

130. Richard Paton, QIA Pers Com. December 11, 2024

131. *Ibid.*

132. Smart Prosperity Institute. 2023. Inuit-led economic development: An overview of Nunavut's blue conservation economy. (accessed online)

133. Epstein G. *et al.* 2025. *Protection of seabed sediments in Canada's marine conservation network for potential climate change mitigation co-benefit.* FACETS, 10: 1-14. DOI: 10.1139/facets-2024-0080.

134. Qikiqtani Inuit Association. 2020. *Nauttiqsuqtiit.* (accessed online)

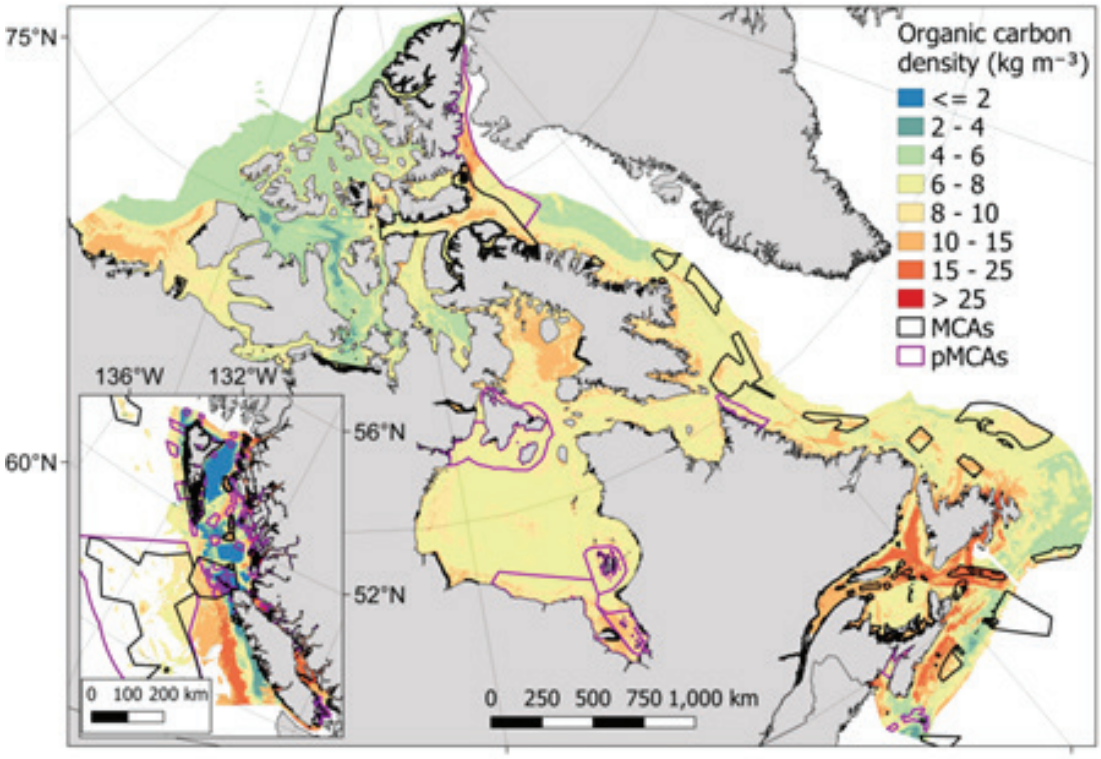

Figure 6. Marine conserved area coverage of seabed sediment organic carbon. From Epstein et al. (2025).[135]

MANAGEMENT: BOTTOM TRAWLING

Inuit are concerned that bottom trawling in the Arctic Ocean in and around areas with marine mammals will wipe out those marine mammals that are important to them.[136] This interest aligns with blue carbon conservation since bottom trawling is having a significant impact on global carbon emissions as trawling the seafloor disturbs the carbon contained in sediment.[137] Therefore, bans or restrictions on bottom trawling are likely to be of mutual interest between those who seek to protect blue carbon and Inuit.

As discussed above, there are a few tools available under land claims agreements to prohibit trawling, though they are co-operative in nature due to the lack of ownership below to the high water mark. Examples include:

- the establishment of conservation areas within which commercial fishing activities are limited,
- designation of limited use areas in important Arctic carbon sequestration zones under land use plans, and
- application of terms and conditions on commercial fishing through regional, strategic or project-specific environmental impact screening and review processes (Note: Individual commercial fishing initiatives do not appear to be screened under land claims frameworks currently, though other management tools could applied such as the protection of habitat for fish and shellfish).

135. Epstein G. *et al.* 2025. *Protection of seabed sediments in Canada's marine conservation network for potential climate change mitigation co-benefit.* FACETS, 10: 1-14. DOI: 10.1139/facets-2024-0080.
136. Inuit Circumpolar Council. 2014. *The sea ice never stops: Circumpolar Inuit reflections on sea ice use and shipping in Inuit Nunaat*. (accessed online)
137. *Ibid.*

PAYMENT FOR ECOSYSTEM SERVICES: BLUE CARBON CREDITS

One of the clearest opportunities for conservation funding is payment for ecosystem services in the form of carbon credits. In this endeavor there are also excellent opportunities to align blue carbon credit incentives with other benefits, such as sustainable eco-tourism ventures, or enhancing fisheries habitat, water quality, and coastal protection. The carbon credit market is one avenue whereby Inuit can benefit from stewarding blue carbon. A 2023 report estimated the global blue carbon credit market to be worth more than $10 billion USD and it may therefore be a potential funding mechanism for Inuit conservation and communities.[138] Carbon credits must first be accredited by a verification system before they can be sold. Multiple verification systems exist and include those listed below, with the percentage in brackets representing their 2023 market share:[139]

- Verra | Verified Carbon Standard (71.5%)
- The Gold Standard (16.6%)
- The American Carbon Registry (6.2%)
- Climate Action Reserve (5.2%)
- Plan Vivo (0.5%)

The Verified Carbon Standard (VCS) program run by Verra distinguishes between oceanic blue carbon and coastal blue carbon because of the differences in carbon cycling between these two ecosystems.[140] At this stage, only the latter contains a methodology for carbon measurement, monitoring, verification and reporting (MMRV). The evaluation of oceanic blue carbon ecosystems is under assessment.[141]

Reported prices for blue carbon credits in 2023 ranged from $5–35 per tonne of CO_2 equivalent (tCO2e) with high contributions for projects with additional sustainability certification and using standards with a strong community and socioeconomic focus.[142] As discussed earlier in this ***Phase 2 Discussion Paper,*** Modern Inuit Treaties and land and marine management will require considerable programmatic investment and development regarding the valuation of coastal Arctic blue carbon for Inuit to advance blue carbon credits. The International Monetary Fund predicts that prices for carbon credits will increase, especially for high quality projects.[143] Revenue from blue carbon could feasibly be incorporated into the socioeconomic development of Inuit economies. This would not be dissimilar from other blue carbon projects such as the Virginia coast reserve seagrass restoration project. The revenue from this project goes directly to the commonwealth of Virginia since it has jurisdiction over the bottom of the estuary where the restoration is taking place. In this case the revenue from blue carbon credits are used to conduct the restoration and monitor outcomes of the project. While all marine ecosystems are under the jurisdiction of the federal government in Canada, it is conceivable that agreements could be signed that transfer the proceeds from oceanic blue carbon sequestration to Inuit communities to be used to fund Guardian programs or programs like Nauttiqsuqtiit at Tallurutiup Imanga.[144] Funding programs like Nauttiqsuqtiit would create critical and meaningful jobs that could also support monitoring of blue carbon. That this could be a conceivable political reality is supported by articles pertaining to ocean or marine areas within the 4 relevant Inuit land claim agreements, for example in article 15 of the Nunavut Agreement it states:

138. Ocean Panel. 2023. The blue carbon handbook: Blue carbon as a nature-based solution for climate action and sustainable development. (accessed online)
139. *Ibid.*
140. Verra. 2025. Area of focus - blue carbon. (accessed online)
141. Ocean Panel. 2023. The blue carbon handbook: Blue carbon as a nature-based solution for climate action and sustainable development. (accessed online)
142. *Ibid.*
143. *Ibid.*
144. Oceans Act, S.C. 1996, c. 31

> *"15(e) an Inuit economy based in part on marine resources is both viable and desirable;*
> *…15 (g) there is a need for Inuit involvement in aspects of Arctic marine management, including research."*

Given these are agreements signed with the federal government, there is likely sufficient legal basis to assume that such an arrangement is feasible. Barriers to moving forward with blue carbon credits include setting up the administrative process to apply for recognition in coastal ecosystems. In coastal areas where monitoring programs already exist the conditions are likely present to begin pursuing verification.

CONCLUSIONS, RECOMMENDATIONS AND NEXT STEPS

Inuit communities are uniquely placed to understand the locations, status' and holistic value of blue carbon ecosystems. Below are next steps to advance Inuit rights regarding blue carbon conservation.

1. **Understanding the Arctic blue carbon cycle and co-developing knowledge acquisition projects with communities.**

2. **Continue to create space to work with communities to answer key questions.**

- Organise a second knowledge co-production workshop on the high-latitude carbon cycle, including Arctic blue carbon discussions to share existing knowledge, identify gaps in knowledge from both the scientific and community knowledge bases.
- Assess how communities can be better prepared to understand the connections and the changes being observed in their regions regarding Arctic blue carbon.
- Co-develop projects to address Arctic blue carbon questions.
- Create a "State of Knowledge for Arctic Blue Carbon" report.

3. **Invest in research and knowledge sharing to explore Arctic blue carbon ecosystems in a changing climate.**

- The question of how much carbon is in the Arctic, where it is, and its transport are ongoing data gaps.
- Quantify the carbon sequestration value of Arctic blue carbon across Inuit Nunangat.
- Gather information and conduct surveys to identify seagrass habitat in the Arctic.
- Work with communities to design and advance carbon assessments in their communities. This would include terrestrial, freshwater, coastal and marine ecosystems and would include working with community knowledge holders, academics, and researchers. This ensures the holistic approach and interdependence of the terrestrial and marine system.
- Gather data on the presence of bedrock across less-studied regions of the Canadian Arctic, Hudson Bay, Gulf of St. Lawrence, Newfoundland and Labrador to improve carbon estimates.
- Emerging research indicates that a majority of Canada's mapped salt marsh is located along the Arctic coast. In addition, kelp forests and eelgrass meadows have been observed and documented by local communities in areas that knowledge gaps exist within western science. It is recommended that future advocacy work to re-characterize the Arctic as a region that hosts productive marine plant life.

- Blue carbon ecosystems are traditionally defined as including saltmarshes, seagrass meadows, mangrove forests, and macroalgae communities, such as kelp forests. However, there are numerous coastal organisms that sequester significant amounts of carbon, such as microalgae, including ice algae and phytoplankton. The expansion of the classification of "blue carbon ecosystem" may present new opportunities and motivations for the conservation of marine ecosystems, ensuring their ability to sequester and store blue carbon.

4. Assess how changes in the Arctic are impacting blue carbon stores and transport.

- Work with communities to investigate the contribution of other ecosystem carbon sources to the marine environment through, for instance runoff and melting, both now and under a changing climate.
- Investigate threats affecting blue caron ecosystems and the co-benefits they provide including sustenance.
- Efforts to understand the dynamic between the potential increase in blue carbon habitat and the potential decline in health and carbon sequestration of oceans should be prioritized, and accompanied by an understanding of climate change impacts on local communities.
    - Climate change presents a potential increase in suitable habitat and a northward expansion of coastal ecosystems, however, coastal erosion, permafrost melt, sea ice and glacial melt, ocean acidification and stratification, as well as increased run off all present rapidly evolving threats to the blue carbon of the Canadian Arctic Ocean. Human disturbances also present threats, including, increased shipping and sea traffic, resource exploration and extraction, and increased coastal development.
- Encourage partnerships with academic institutions and researchers to advance the scientific basis for blue carbon credits in Arctic ecosystems.
- Advance protection of important blue carbon stores in the Arctic.
    - The majority of exported carbon, if not recycled into the food web and/or water column, is trapped and stored within the sediment, either basin or shelf sediment. If this sediment is then disturbed, for example through sub-sediment resource extraction/exploration, or practices such as bottom trawl fishing, the stored carbon is then released back into the water column with the increased possibility of it being released back into the atmosphere. However, the majority of marine sediment, globally and within the Arctic Ocean, are not within marine protected areas. As sea ice continually retreats, accessibility to the Arctic Ocean and its marine sediments is continually increasing. The massive size of the Canadian Arctic continental shelf presents large opportunities for the protection of the seabed and stored carbon along this shelf.

5. Support community action to conserve blue carbon.

- Support recommended priority areas for protection, including Foxe Basin, the Beaufort Shelf and the Canadian Arctic fjords.
- Conduct additional interviews with members from all Arctic regions to assess blue carbon conservation and management approaches, including references to bottom trawling and carbon credits.
- Support the potential of exercising community marine conservation goals related to kelp forest conservation.
- Center Indigenous Peoples, priorities, governance structures, knowledge, and values in all research, policy and management measures that take place within or affect the Arctic, to the degree welcomed by Indigenous rights holders.

    - Indigenous-led conservation and the co-production of knowledge facilitates effective ecological stewardship and the creation of the most comprehensive knowledge.
- Prioritize Inuit-led and co-managed areas and initiatives to improve the understanding of Arctic blue carbon and outline Indigenous-led opportunities for the long-term management of these important and remote ecosystems.
- Identify what conservation measures are available for communities to preserve and protect blue carbon in their communities (e.g., conservation areas, bottom trawling restrictions, ice breaking impacts, shipping restrictions, coastal restoration).
- Investigate how blue carbon conservation can contribute to socioeconomic development of Inuit communities as well as support Inuit traditional land management.
- Identify how blue carbon initiatives can support and fund Inuit priorities.

6. Assess regulatory approaches to conserve, restore and manage blue carbon.

- Reflect the co-benefits of protecting Arctic blue carbon in protected areas negotiations. When Arctic blue carbon ecosystems are protected and conserved, everyone benefits.
- Analyze protected area arrangements, management plans and benefits agreements for ways to valuate blue carbon ecosystems for the climate change mitigation service they provide and compensate Inuit for ensuring they are preserved.
- Assess what regulatory measures can be used to conserve blue carbon. Advance the integration of blue carbon ecosystems and their role as carbon sinks into statutes or regulations applicable to the Arctic.
- Analyze Inuit treaties for tools Inuit could use to protect blue carbon ecosystems, if desired.
- Evaluate land use plans for opportunities to include blue carbon ecosystems as valued components under land use designations.
- Ensure that proceeds from carbon credits flowing from Inuit management and protection of blue carbon ecosystems fund Inuit conservation and stewardship programs (such as Nauttiqsuqtiit). This will allow for the necessary monitoring to be done by Inuit and create meaningful jobs for Inuit while also fueling Arctic local economies by means of continued traditional hunting and fishing, and the knock-on economic and social effects the products of those hunts bring to Arctic communities.
- Continue to investigate the effects of bottom trawling on carbon sequestration and release.
- Support a ban of bottom trawling in areas with large blue carbon stocks, where appropriate.
- Continue research to assess the extent, range, biomass, stocks and sequestration rates of Arctic blue carbon ecosystems, including extensive carbon mapping and quantification to facilitate improved GHG accounting for international reporting and target setting.
    - There are extensive knowledge gaps in western science regarding coastal ecosystems along the Canadian Arctic coast, especially in the Arctic basin and Canadian Arctic Archipelago. These gaps not only relate to the extent and biomass of coastal ecosystems, but also the standing carbon stocks, rates of carbon sequestration, and rates of carbon export and burial of these coastal ecosystems.
- Consider Arctic blue carbon in the context of new and existing management and protection measures to reduce impacts on stored carbon both on land (i.e., to reduce lateral transfer) and in marine habitats.

7. Advance recommendation from the legal analysis of jurisdictions.

- Increased the perceived importance and protection of Arctic blue carbon to facilitate the creation of new instruments and motivations to ensure the long-term protection and management of plant ecosystems.
    - The jurisdictions studied have not yet expressly integrated blue carbon sequestration concepts into their statutes and regulations. Plants are rarely identified as elements of "wildlife" and protections are primarily available by extension of their role as habitat for fish and other protected species.
- Emerging conservation efforts should prioritize wholistic approaches to ensure the health and longevity of nature.
    - Jurisdictional boundaries complicate efforts to describe current legal frameworks and develop new approaches for the protection of blue carbon ecosystems. The segregation of land, waters, and airs in conservation efforts and jurisdictions does not reflect Indigenous conservation priorities that understand the interconnectedness and interdependence that exists within entire ecosystem, placing humans within the ecosystem. Some protected spaces however, in particular Migratory Bird Sanctuaries, acknowledge the importance of protecting habitat across the onshore-offshore divide. These spaces can be pointed to as precedent for future advocacy.