People, Place, and the Ocean

The Gros Morne Community-led Marine Atlas

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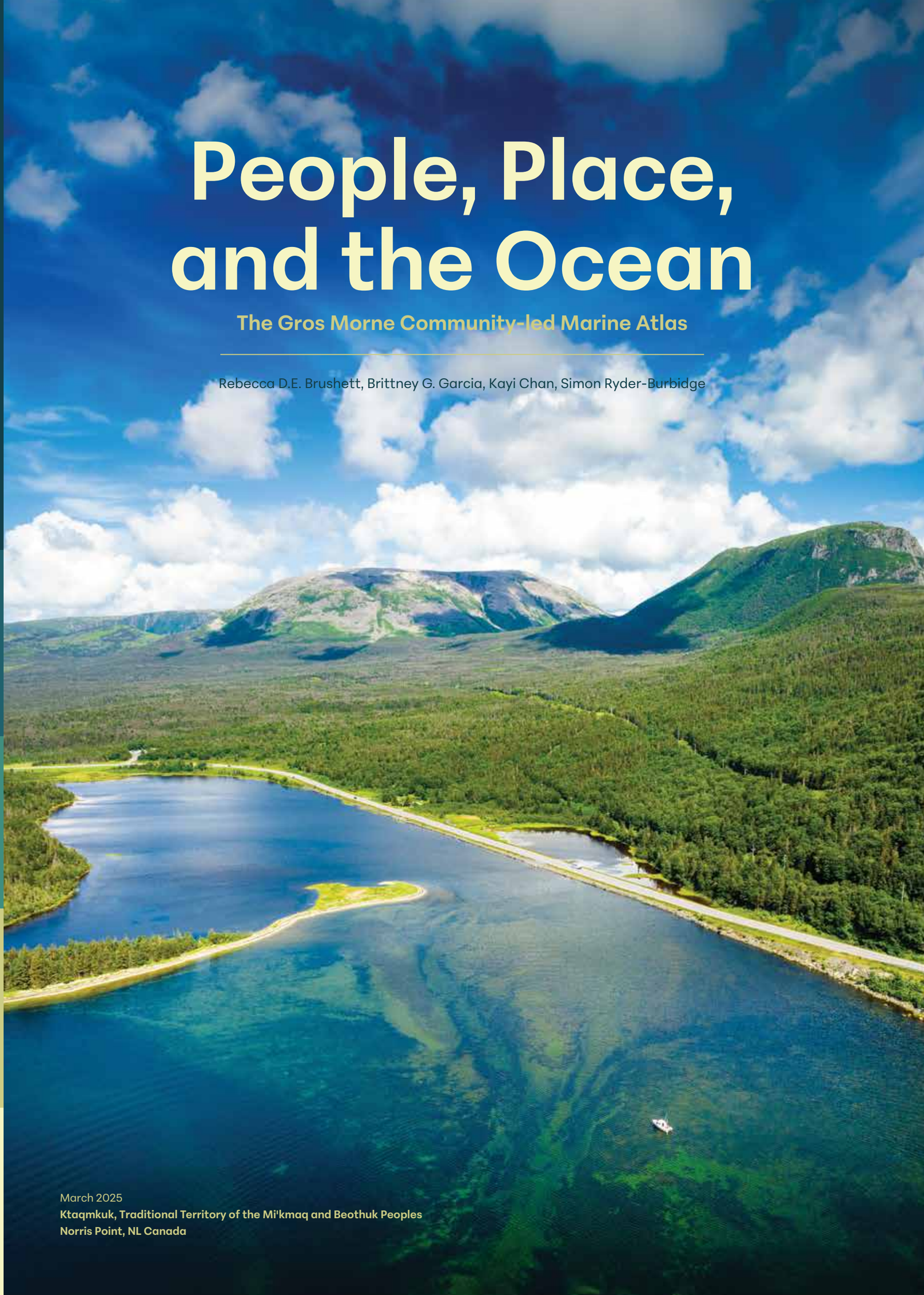
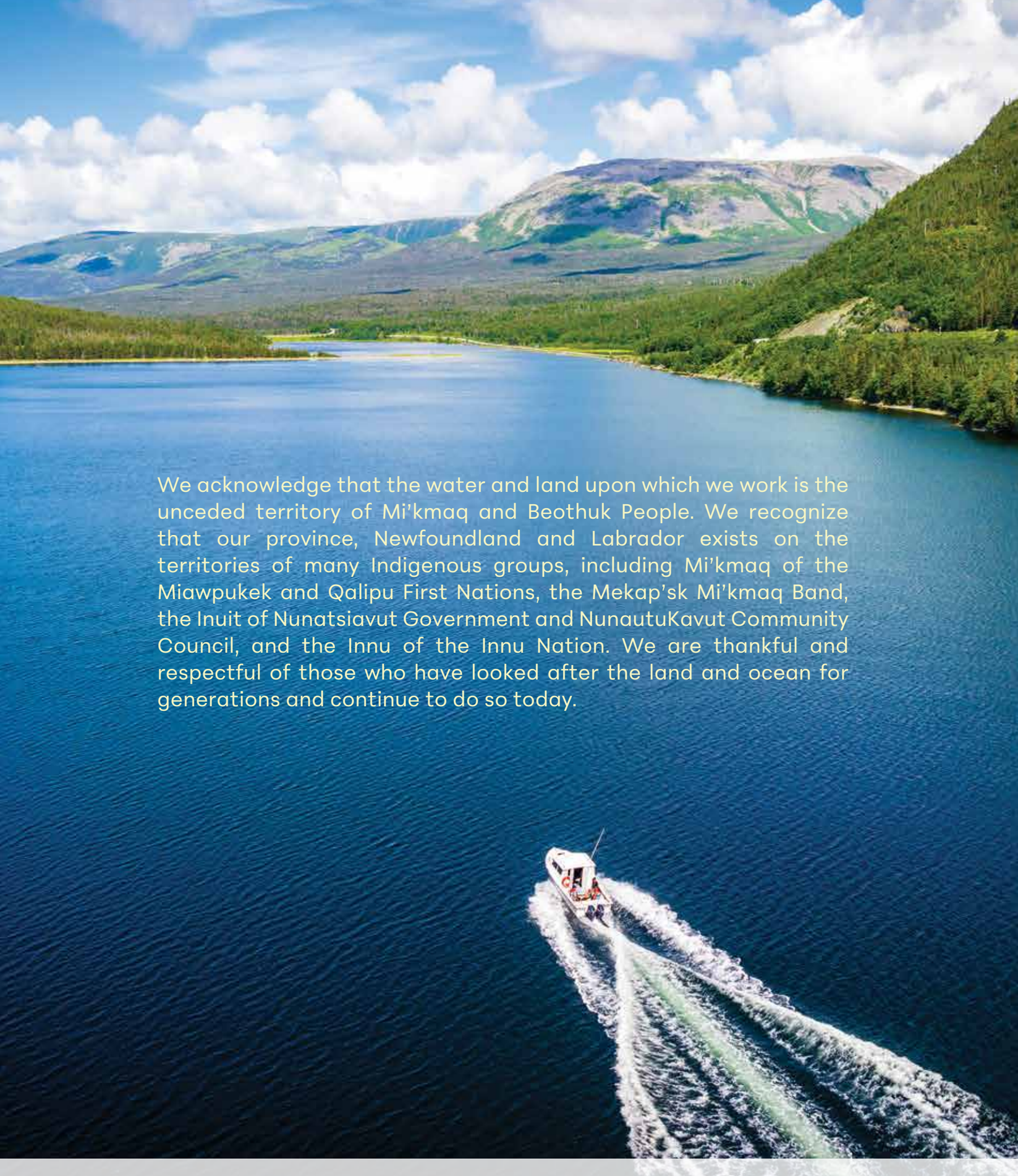


March 2025
Ktaqmkuk, Traditional Territory of the Mi'kmaq and Beothuk Peoples
Norris Point, NL Canada



We acknowledge that the water and land upon which we work is the unceded territory of Mi'kmaq and Beothuk People. We recognize that our province, Newfoundland and Labrador exists on the territories of many Indigenous groups, including Mi'kmaq of the Miawpukek and Qalipu First Nations, the Mekap'sk Mi'kmaq Band, the Inuit of Nunatsiavut Government and NunautuKavut Community Council, and the Innu of the Innu Nation. We are thankful and respectful of those who have looked after the land and ocean for generations and continue to do so today.

Ecology Action Centre

Ecology Action Centre (EAC) is a member-based environmental charity in Nova Scotia. Since 1971, we've taken leadership on critical environmental issues from biodiversity protection to climate change to environmental justice. The EAC envisions a just and vibrant world of respect, belonging and ecological resilience. The EAC Marine Team works to ensure the ocean is resilient, healthy, and provides for thriving coastal communities. The team works internationally, nationally, and locally for better fisheries management, strong ocean protections, traceable and transparent seafood supply chains and sustainable livelihoods. We support communities in decision-making and advocacy efforts that honor Indigenous and traditional local knowledge, recognizing the importance of the waters around them.

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Photo credit: *Drew Kennedy*

Forward

In response to several challenges facing the marine ecosystems we rely on today, the purpose of the Gros Morne Community-led Marine Atlas (the Atlas) is to place the voices of the people who live, work, and play in this area at the centre of ocean management for the region. The Atlas can serve as a tool and guidance document for all levels of government to ensure community-oriented and spatially informed decisions toward sustainable economic growth and marine conservation.

This work would not be possible without the help of so many people in the communities that make up the Gros Morne region. A special thanks to the many fish harvesters who spent hours sharing invaluable knowledge about important fish stocks and their habitat and to Dr. Robert Hooper, who dedicated his life to marine biological research at the Bonne Bay Aquarium and Research Station (BBARS). Thanks to key stakeholders in the hospitality and tourism sectors, all municipal town councillors who took part, councillors who took part, Miawpukek, Mekap'sk Mi'kmaq Band and Qalipu First Nations, and residents that call Gros Morne their home. Thanks to Kayi Chan, who was essential in creating the maps you'll see throughout the Atlas, and to Samira Hatami who spent countless hours documenting the decades of research conducted to create our inventory of Gros Morne marine and social science. Thanks to Jordy Thomson, who helped oversee this project from inception, and to Shannon Arnold and Jackie Bauman, who helped us fine tune the atlas into what it is today. Our final thanks goes to our funder, the Wyss Foundation, who's contributions made all of this work possible. We couldn't have done it without your support!

Project Lead

The creation of this Atlas was led by Rebecca Brushett, who has called Gros Morne home for almost 15 years. It began with her graduate work (2015–2019) mapping the social and ecological values of coastal communities in Gros Morne and her commitment to envisioning a sustainable path forward for the region—one that protects marine biodiversity and ensures a thriving future for the people who live in and rely on the waters of western Newfoundland. Following the completion of her graduate work, Rebecca held onto this ambition to share the Gros Morne community's unique love story with the ocean, and to explore how decades of ocean and social science conducted in the area could be used to steward the marine environment. As the EAC's Marine Protection and Planning Coordinator, Rebecca built on her thesis work, leading a further four years (2020-2024) of community engagement, participatory mapping, research, and survey data compilation to bring this community-led Atlas to life.

Figure 1 *Rebecca Brushett at the Bonne Bay Aquarium and Research Station (BBARS) in 2021 reviewing, scanning and organizing research done since the late 60's.*

Photo credit: *Rebecca Brushett*

Acronyms Used

AHOI- Atlantic Healthy Oceans Initiative
AIS- Aquatic Invasive Species
BBARS- Bonne Bay Aquarium and Research Station
CCCOI- Coastal Communities Conservation Opportunities Initiative
C-NLOPB- Canada-Newfoundland-Labrador Offshore and Petroleum Board
COSEWIC- Committee on the Status of Endangered Wildlife in Canada
CPAWS- Canada Parks and Wilderness Society
CURRA- Community University Research for Recovery Alliance
DFO- Department of Fisheries and Oceans Canada
eNGO- Environmental Non-Governmental Organization
EAC- Ecology Action Centre
ECCC- Environment and Climate Change Canada
FFAW- Fish, Food, and Allied Workers
FRCC- Fisheries Research Conservation Council
GBS- Glenburnie-Birchy Head-Shoal Brook
GM- Gros Morne
GMCA- Gros Morne Cooperating Association
GMNP- Gros Morne National Park
GMTRIP- Gros Morne Tourism Regional Implementation Program
MaPP- Marine Plan Partnership
MFN- Miawpukek First Nation
MPA- Marine Protected Area
MUN- Memorial University of Newfoundland
NRRD- Non-renewable Resource Development
NL- Newfoundland and Labrador
ROV- Remote Operated Vehicle
SDM- Structured Decision Making
SPI- St. Paul's Inlet
TEK- Traditional Ecological Knowledge

Photo credit: *AHOI*

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Photo credit: *Visit Gros Morne*

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Photo credit: *AHOI*

Photo credit: *Jelly fish-Visit Gros Morne*

Photo credit: *Rebecca Brushett*

Executive Summary

In many parts of Newfoundland and Labrador, communities are defined by a relationship with the land and water. Nowhere is this truer than the Gros Morne region of western Newfoundland, where a rich mosaic of landscapes, seascapes, terrestrial and marine ecosystems offer sustenance, livelihood, independence and so much more.

This deep relationship between people and their environment makes community leadership in the conservation of biodiversity and the management of natural resources critically important to achieve positive social and ecological outcomes. In a place like Gros Morne, sustainable economic opportunities and the preservation of cultural practice go together with the protection of ecosystems, and vice versa. Indeed, enabling local leadership in environmental decision-making can be the difference between divisive projects that fail to get off the ground, and collaborative projects that integrate into the fabric of community life (Walker, Mitchell and Wismer, 2001).

More than just a book of maps, the Atlas tells the story of the people of Gros Morne and their connection to the sea and highlights more than 50 years of local ocean science, offering a tool towards the future development of a community-led marine plan for the region.

Over the past eight years, more than 400 stakeholders and rightsholders have contributed to this Atlas through Rebecca Brushett's graduate research at Memorial University of Newfoundland (MUN) and her subsequent role leading community engagement for the EAC. Between 2015 and 2018 followed by EAC-led engagement starting in 2020 (see Table 1), effective and repeat community engagement workshops and meetings were conducted to gathered input on key marine areas of importance, resources essential for ocean health and coastal livelihoods, economic opportunities, and marine protection. Fish harvesters, tourism operators, town council members, scientists, Indigenous communities, and other stakeholders all took part in the creation of the Atlas, providing invaluable knowledge and perspectives the Gros Morne region values. Various methods to provide an open space for discussion and engage with the region were used to elicit community participation including presentations, videos, lunch and learn sessions, mapping exercises, and surveys.

Surveys and presentations were the same for each engagement session and working group, to ensure transparency and reduce mixed messaging. Survey questions were derived from Brushett (2018) with minimal alteration to ensure consistency. At the introduction of each workshop, a group facilitator or EAC staff person read through and explained the survey questions and provided guidance on mapping exercises to ensure participant understanding.

Engagement sessions were planned based on the availability of prospective participants. Given the proportionally high number of fish harvesters and tourism operators working in the Gros Morne area, most of the meetings were scheduled during the low seasons from October to March. Key stakeholders were identified and invited three weeks prior to the engagement sessions by email, using social media platforms, radio and posters. All fish harvesters were called directly, and others were added throughout the life of the engagement meetings in a “snowball style,” which included cold-calling and word of mouth through meeting attendees.

Ultimately, this document is meant to provide the foundation of a community-based marine plan. The hope is for the Atlas to support decision-making processes that safeguard the sustainable livelihoods and unique culture that is Gros Morne while also advancing ecological protections the region will support for generations to come.

Key Themes from the Community

Here, we summarize key input received through community surveys and consultations, touching on a wide variety of marine planning considerations. Expansion on these key themes can be found in the body of the text and in Appendix B.

Commercial and recreational fisheries

- The fishing industry has been a cornerstone of identity for Newfoundlanders and includes both inshore and offshore commercial fisheries
- The recreational and food fisheries are important for both locals and visitors to access fresh seafood
- Fisheries regulators need to responsibly manage struggling fish stocks, including improved capacity to monitor and deter illegal / damaging activities.
- Inshore fish harvesters maintain a strong sense of stewardship and responsibility for the fishery, and many felt managers should connect with them directly rather than consult with the fisheries unions.

Tourism

- Tourism has played a key role in sustaining Gros Morne's economy since the early 1990s.
- Concerns exist regarding regional capacity and infrastructure as the tourism sector continues to grow.
- Suggestions to diversify economic opportunities in the tourism sector that speak to the next generation.
- Opportunities exist to connect the fishing and tourism sector to build and expand cultural experiences.
- Majority support continued tourism development with an emphasis on eco-tourism.

Managing for a sustainable ocean-based economy

- The ocean is an essential economic driver in Gros Morne and supports development in the region with tourism, fisheries, transportation, and other coastal activities.
- Infrastructural support is needed to treat sewage, dispose of waste, effectively recycle and compost as increased visitor load continues to impact communities.
- Many wish to see an enhanced accessibility of information relating to topics like climate change, dumping at sea, commercial fishing practices, tourism, and coastal development.
- Update approval process for future economic development projects to ensure effective environmental impact assessments are conducted (e.g., aquaculture, oil and gas, wind, etc.)

Other economic opportunities

- Lack of trust exists for provincial and federal aquaculture regulations to ensure ocean-based fish farming does not harm the environment or wild fish stocks.
- Other industries discussed in the region include oil and gas and mining development. Some recognize the economic and social benefits that these industries could bring, but also highlighted that the long-term environmental risk could outweigh the short-term economic boost for tourism-centered communities.
- Approval of any new projects should not be considered until effective community engagement is done.
- Many worry about greenhouse gas emissions, soil and water contamination, noise pollution, land clearance, and species depletion from potential oil and gas or mining activities.
- The ecological integrity of coastal and marine environments as well as cultural values in Gros Morne should be prioritized over financial gain by provincial government or large corporations.
- If renewable energy structures for wind turbines, solar panels, or wave energy could be installed in areas out of sight and assessments show little to no environmental impact then this industry could be welcomed.

Ocean management and community participation

- Governments must make a better effort to improve trust and transparency.
- Meaningful engagement with community members is necessary for any conversation relating to conservation or development in the Gros Morne region.
- Majority support a land to sea regional plan to identify innovative and necessary solutions to increase conservation and develop economic growth sustainably.
- Better management and more enforcement capacity is necessary to ensure the natural resources and community members stay protected for future generations.
- Many also stressed the importance of recognizing what impacts may affect their livelihoods moving forward and ways to prepare for the future.

Future research opportunities

- Improve knowledge of fisheries sector and declining fish stocks.
- Better understanding of impacts from a changing climate on important commercial fish stocks.
- Identify innovative ways to build a sustainable fishery and necessary infrastructure for the future
- Develop standardized monitoring techniques to evaluate major changes to marine habitats over time.
- Identify ways to build a sustainable blue economy
- Identify best-fit management techniques for the ocean.
- Expand research to areas beyond Bonne Bay and St. Paul's Inlet.
- Build upon historic research to better understand health of species at risk.

Marine protection

- The communities recognize Gros Morne waters as a special marine ecosystem.
- Extensive research by many experts have highlighted habitats and species that are vital to maintaining the rich biodiversity still thriving today.
- Local fish harvesters have taken part in voluntary marine conservation efforts for over 50 years to protect lobster, crab and sensitive fish stocks in the region.
- Over 70% of people surveyed in Gros Morne – including fish harvesters, business operators and community members said they would support marine protection, and another 10% were interested to learn more about the concept.
- Financial and technical support should be made available to help during transition towards enhanced marine protection.
- In depth discussions between governments, Rightsholders, and stakeholders will be required to decide what type, if any, marine protection is suitable for Gros Morne.
- Although many were conflicted on who they would wish to govern a potential protected area, most favour a federal option that would ensure protection of cultural heritage, inshore fisheries and tourism along with sensitive marine species and habitats.
- "Support for the establishment of marine protection was based in part on the understanding that it would halt oil and gas development, ocean-based finfish aquaculture, bottom dragging, and other heavy industrial activities.

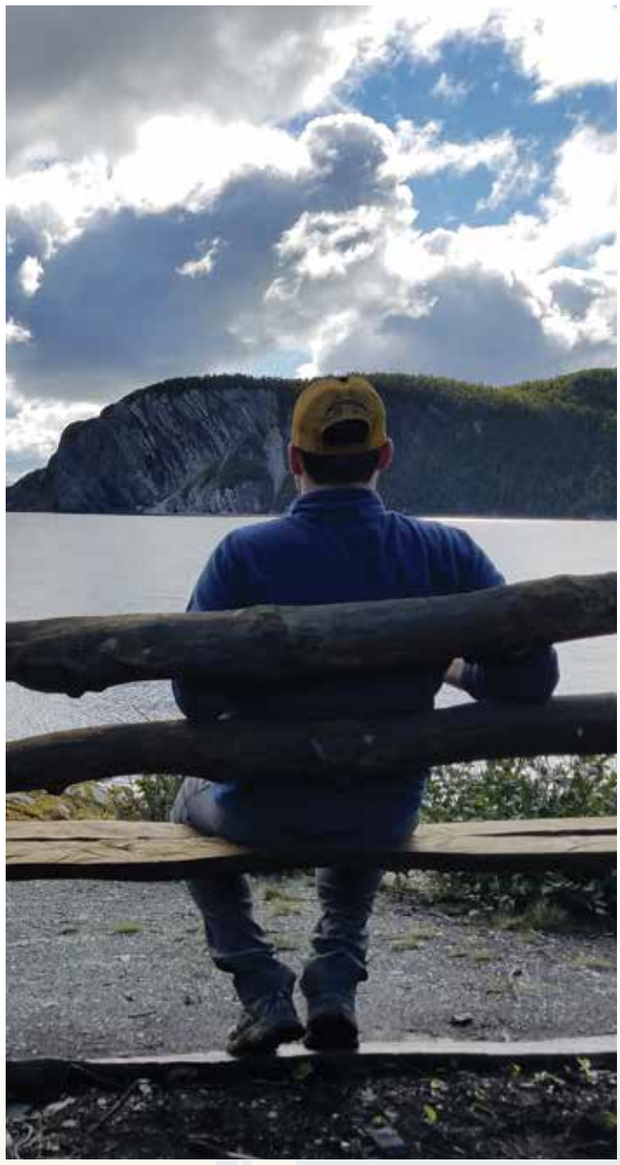


Photo credit: *Rebecca Brushett*

Community-led Marine Planning

What is community-based planning and how does it work on the water?

Community-based planning is a tool to ensure that all decisions impacting a particular people, place or environment are carefully considered through a community lens. Applying a community lens can help to determine whether new ideas align with established community visions, and big decisions – e.g., land or resource management -- can be made accountable to existing cultural, economic and ecological values.

Just as the land provides for communities of Gros Morne, so does the sea. Profound ties between people and the marine environment have existed from the earliest Indigenous communities through the modern era, where the ocean offers food, livelihood, and a way of life for folks throughout the region. This deep and often ancestral connection to the ocean means that coastal and marine management decisions should be very thoughtfully considered and understood as meaningfully impactful for communities – for better or worse.

A marine plan, when developed with the people who live and work in the region of focus, can be a very valuable tool to aid in these decisions (Diggon et al., 2020). A well-designed plan can help to identify areas best suited for economic development, marine protection, and the sustainable use of marine resources. An effective planning process can also reduce conflict over competing interests in shared marine spaces (UNESCO-IOC & European Commission, 2021) .

Figure 2 *Rebecca presenting to community members in Norris Point during EACs 2023 winter community engagement sessions.*

Components of a Marine Plan

The people

To create a strong marine plan, you must have the trust and open space for the communities, fish harvesters, and experts to speak freely about what they value for the future of their communities and the health of the ocean.

Historical analysis

Understanding how historical changes have shaped a given community and how people have responded to major economic or environmental events can provide a foundation for future management strategies.

General management direction

Creating shared objectives and strategies: a blueprint aimed at achieving positive change and supporting agreed upon community recommendations for conservation, stewardship and long-term sustainability.

Economic development direction

Creating objectives and strategies to promote a more circular region that manages our marine resources in a more sustainable way.

Spatial zoning

Combining maps, spatial analysis and community engagement to make more informed decisions about how ocean spaces should be used.

Implementation and monitoring

An effective implementation plan followed by consistent monitoring and evaluation processes ensure that strategic direction can be amended as needed.

Figure 3 *Trout River fishing boats along the wharf, Newfoundland. Photo Visit Gros Morne*

Photo credit: *AHOI*

How could a marine plan benefit the Gros Morne communities?

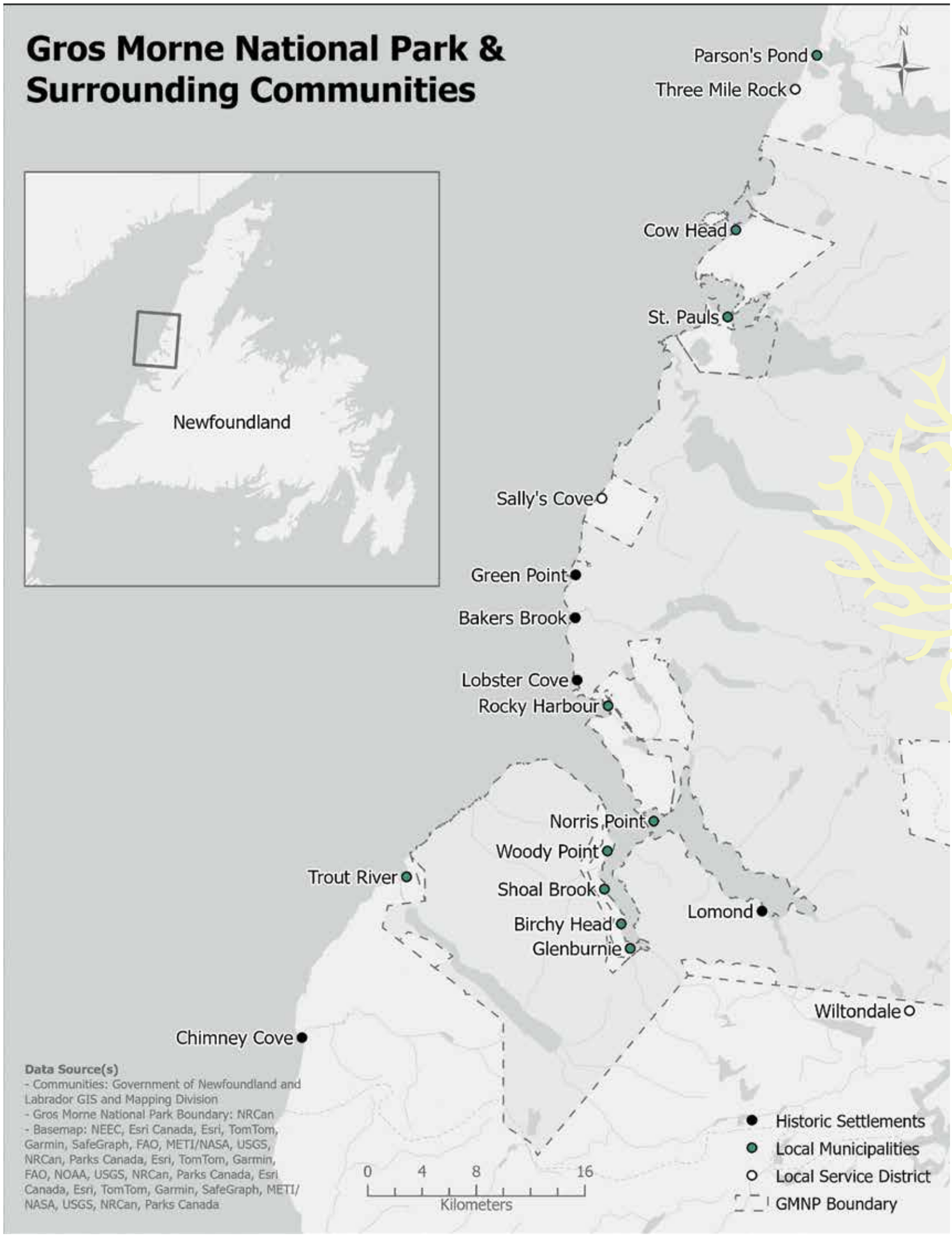
Overall, a strong marine plan for the Gros Morne region would:

- Provide a framework for community-led and ecosystem-based approaches to management and marine resource decisions.
- Incorporate regional values and present better direction for policy change.
- Identify and support sustainable economic models for coastal communities.
- Compile long-term social and ecological data gathered throughout the Gros Morne region; provide opportunities to engage with science for the advancement of marine protection and sustainable economic growth.
- Identify climate adaptation and ecosystem restoration needs.

Chapter 02

Getting to Know the Gros Morne Region

Photo credit: *AHOI*



Map 1 *The Gros Morne region and its surrounding communities including historic settlements, local municipalities and the local service districts along western Newfoundland. The Gros Morne region is now made up of seven enclave communities within and surrounding Gros Morne National Park and include, Cow Head, St. Paul's, Rocky Harbour, Norris Point, Glenburnie-Birchy Head-Shoal Brook (GBS), Woody Point and Trout River.*

The Historical Journey of Gros Morne's Ocean Connections

The historical information below was collected from community websites, heritage signs located in the Gros Morne region and from conversations with Indigenous First Nations and local knowledge holders.

- Indigenous Peoples came to Bonne Bay area beginning with the Maritime Archaic people around 2500 B.C and were followed by the Groswater Paleoeskimos (Inuit) (Heritage Newfoundland and Labrador, n.d).
- European settlers from Scandinavia first appeared in the region around A.D 1000 when Norse, Vikings and Basques sailed and fished along the coast.
- The Basques named the bay which they called Baya Ederra or 'The Beautiful Bay' which came to be known as Bonne Bay.
- Through the Treaty of Versailles in 1783 the French came to control fishing rights in Bonne Bay and along the entire western coast of Newfoundland.

1902

- After a year of unregulated seining significantly decreased the herring population in Bonne Bay, 200 fish harvesters blocked off the main arm in boats and forced the seiners to retreat .

1940

- Fish harvesters from outside St. Paul's began overfishing the St. Paul's Inlet (SPI) herring spawning stock using various fishing methods.

1960-1970

- MUN's BBARS is established to conduct marine field research in the Gros Morne region.
- Dr. Hooper begins his life's work with BBARS to study the marine environment around Gros Morne.

1971-1980

- Herring Protection Committee was formed by local residents to prevent overfishing in St. Paul's Inlet. Efforts were too late, and herring stock collapsed shortly after.
- Gros Morne National Park established for its glacial and geological history.
- Growth in tourism begins in western, NL.
- 1800s French interests were diverted by the Napoleonic Wars
  - Earliest settlement in Gros Morne and when inshore fisheries began for lobster, cod, herring, salmon, and snow crab.
  - Joesph Bird (The Bird and Company) set up one of the earliest English trading posts in Bonne Bay.
  - Halifax firm, Payzant and Frasher began a lobster factory in St. Paul's which became one of the most successful canneries in western, NL.
  - Development of lumbering in the east arm of Bonne Bay at Stanleyville and Robinson's Cove.

1991-2000

- Gros Morne Co-operative Association (GMCA) established.
- The collapse and moratorium of the commercial cod fishery for NL is announced by the Minister of Fisheries and Oceans.
- Voluntary v-notching of female lobsters came to the lobster fishery in western Newfoundland.

2001-2010

- Tourism and public education grow with opening of aquarium at the BBARS.
- MUN's Community University Research for Recovery Alliance (CURRA) Program begins.
- "Voluntary lobster area closure in Trout River Cove was initiated by local fish harvesters. It was formally protected by DFO in 2010.
- Snow Crab Steering Committee formed.

2011-2020

- Anti-fracking campaign, Save Gros Morne, was initiated by community to vocalize opposition against proposed oil and gas activities.
- Ecology Action Centre sets up remote office to begin work with region to build Community-led Marine Atlas.
- Covid Pandemic shuts world down and heavily impacts tourism and fisheries sector.
- Atlantic Healthy Oceans Initiative (AHOI) is established and begins its first project to reduce plastic use and pollution in region.

Figure 4 *Gros Morne region throughout the years, from first settlers to present day*

Chapter 03

The Process of Creating a Community-led Atlas

We drew on several existing marine planning initiatives, such as the Marine Plan Partnership for the North Pacific Coast (MaPP) for guidance and inspiration in the development of the Atlas and methodology. MaPP is a partnership between the Province of British Columbia and 17 First Nations, combining scientific research, local and traditional knowledge towards a marine management and protection framework (Diggon et al., 2020; McGee et al., 2022). We merged learnings from projects like MaPP with EAC expertise in community engagement, protection and planning policy, data analytics, and GIS. This foundation enabled us to gather, interpret and ultimately map input from community participants on topics highlighted in this document. This section provides additional detail on the methodological approaches used throughout the project's life.

Figure 5 *Indigenous First Nations, municipal town council members and academic experts attending EAC's 2022 community engagement session in Glenburnie-Birchy Head-Shoal Brook (GBS), NL.*

Photo credit: *Ecology Action Centre*

Meaningful community engagement

Effective and repeat community engagement was fundamental to the creation of the Atlas. Engagement sessions and workshops conducted throughout the project used various methods to elicit community participation, including presentations, videos, mapping exercises, surveys, and an open space for discussion.

Over the past eight years, more than 400 stakeholders and rightsholders have contributed to this Atlas through Rebecca Brushett's graduate research at Memorial University of Newfoundland (MUN) and her subsequent role leading community engagement for the EAC. Between 2015 and 2018 (Brushett, 2018; Table 1), workshops and meetings gathered input, followed by EAC-led engagement starting in 2020, which included meetings, surveys, and mapping exercises. The surveys focused on key marine areas, resources essential for ocean health and coastal livelihoods, economic opportunities, and marine protection. Community engagement mainly consisted of sector-specific workshops for fish harvesters, scientists, Indigenous communities, and other stakeholders, providing a safe space for open dialogue across different sectors.

Surveys and presentations were the same for each engagement session and working group, to ensure transparency and reduce mixed messaging. Survey questions were derived from Brushett (2018) with minimal alteration to ensure consistency. Delivery was adjusted as necessary to accommodate participants' respective level of familiarity with survey and mapping exercises. At the introduction of each workshop, a group facilitator or EAC staff person read through and explained the survey questions and provided guidance on mapping exercises to ensure participant understanding.

Engagement sessions were planned based on the availability of prospective participants. Given the proportionally high number of fish harvesters and tourism operators working in the Gros Morne area, most of the meetings were scheduled during the low seasons from October to April. Key stakeholders were identified and invited three weeks prior to the engagement sessions by email, using social media platforms, radio and posters to ensure they could be available. Others were added throughout the life of the engagement meetings in a "snowball style," which included cold-calling and word of mouth through meeting attendees.

Photo credit: *Ecology Action Centre*

Table 1

Table 1 Atlas Community Engagement

2015-2018-Brushett Graduate Research Community Engagments	
Stakeholder Category	**Stakeholder representatives**
Fish Harvesters	6
Academic Experts	12
Community Members	9
Business Operators	6
Government/ Municipalities	8
eNGOs	3
Indigenous First Nations	1
2020-2021-EAC Community Engagement Sessions	
Fish Harvesters	5
Academic Experts	2
Community Members	29
Business Operators	63
Government/ Municipalities	2
eNGOs	11
Indigenous First Nations	2
2021-2022-EAC Community Engagement Sessions	
Fish Harvesters	39
Academic Experts	7
Community Members	10
Business Operators	8
Government/ Municipalities	4
eNGOs	2
Indigenous First Nations	0
2022-2023-EAC Community Engagement Sessions	
Fish Harvesters	40
Academic Experts	15
Community Members	87
Business Operators	10
Government/ Municipalities	24
eNGOs	27
Indigenous First Nations	9
Total stakeholder participation from 2015-2023	**441+**

Community-led mapping workshops

In addition to community surveys and consultation, mapping exercises helped to identify areas most important for fisheries, tourism, recreation, current and future research, and potential marine protection. This process included multiple phases to build relationships with participants and to better understand and refine the places and activities most important to community members.

Brushett (2018) maps and spatial layers collected or generated were used as a preliminary base to collect additional information. Mapping questions were provided (see Appendix A) to assist participants, who were asked to shade paper maps or "circle and identify" key areas and features, to add missing features, or otherwise correct errors in the basemaps. The marked-up paper maps were then scanned and georeferenced. Polygons were created and added to the initial biological, economic or social layers provided.

In 2022 EAC created an online participatory mapping tool to improve processing time and focus on areas more difficult to view on paper. The participatory mapping tool was created using RStudio, designed to enable participants to zoom and identify exact areas where various features needed to be added (see Appendix A). Polygons were automatically generated after each mapping exercise and then downloaded. Both paper and online polygons were then added to existing map layers, creating the final maps featured throughout this Atlas. Available public government GIS data was cross-referenced, and appropriate spatial layers were included where possible.

Using NVivo to create an inventory of research and community values

The last element of this Atlas was to organize over 50 years of biological and social science research conducted at Gros Morne through NVivo. NVivo is a software program used for qualitative, quantitative, and mixed-methods research. Specifically, it is used for the analysis of unstructured text, audio, video, and image data by providing tools for classifying, sorting, and arranging the data to enable the identification of themes and patterns. Using NVivo, EAC created an inventory of data made available by BBARS and MUN. This inventory included more than 400 published and unpublished reports completed by students and researchers who studied at Gros Morne. This inventory has been used to assign appropriate credit and acknowledge the effort and participation of researchers in the region. NVivo was also used to generate key themes from EAC engagement sessions, and to include findings from Brushett (2018) and the Community-University Research for Recovery Alliance (CURRA) project. CURRA was a social science initiative aimed at assisting western Newfoundland communities with the recovery of fish stocks and fishing communities from 2007 to 2014. CURRA provided invaluable insight to guide the Atlas from a social and cultural perspective.

Using NVivo software to create spatial layers

Beyond processing survey and interview data, we used NVivo analytical capacity to map the locations of marine research conducted at Gros Morne over time. To do this, we first developed "cases" and "codes" according to marine locations, species and habitats studied at the BBARS. These cases covered decades of work from 1960-2020. This was then analyzed and used to generate spreadsheets that highlighted species, habitat, temperature, GIS coordinates and more. Points were generated from this and were then used to generate the research maps featured in Chapter 7 of this Atlas. We presented these maps during EAC engagement sessions to get community participants up-to-speed on the marine science taking place in their waters.

Figure 6 *EAC 2020 community engagement session with local fish harvesters in Rocky Harbour, NL.*

Chapter 04

Culturally Significant Areas

Photo credit: *Rebecca Brushett*

Through existing social science research, traditional ecological knowledge offered by participants and mapping done by fish harvesters, we highlighted areas of cultural significance to the people of Gros Morne. Map 2 was produced by asking community participants to identify locations where culturally significant activities take place. These activities included: mussel and clam digging; recreational fishing; game hunting; exploring tidal pools; beachcombing; rock-skipping; “boil-ups” or “mug-ups” at the shore; areas to enjoy coastal views; spending time with family and friends on the coast; and much more. Map 2 also includes publicly available data on important geological/fossil sites, and areas where Indigenous artefacts have been located. Our research did not examine these features specifically.

Map 2 *Culturally significant areas in the Gros Morne region showing historic artifacts and important locations identified by residents. Participatory mapping highlights the number of residents that defined respective areas as culturally important. Blue represents 5-19 people, beige 20-29 people, and pale yellow 30-32 people.*

Chapter 05 Coastal Livelihoods in Fisheries and Tourism

Figure 7 *Group picture of fish harvesters from Trout River, Woody Point and GBS who participated in EAC's community engagement and mapping event held at the Merchant Warehouse in the Fall of 2021.*

The fisheries and tourism sectors are the two most important industries in Gros Morne (DFO, 2011b). The commercial fisheries include both inshore and offshore fisheries with the majority fishing for lobster, crab and halibut. The tourism sector celebrates a rich fishing and cultural heritage, fresh seafood and wild game, world class hiking, and outdoor opportunities livened by the unique geological terrain, incredible coastal views and deep fjords that make this area so special.

Commercial fisheries

The fishing industry has been the cornerstone identity of Newfoundlanders for a long time, with coastal communities in western Newfoundland settling in what is now termed the Gros Morne region in the late 1800s. Newfoundlanders have a special connection to the sea; some say the salt is in their bones. The knowledge that fish harvesters possess and pass down through generations is sometimes called traditional ecological knowledge (TEK). This type of knowledge is often characterized by a deep understanding of the environment, and in this case includes an ethic of stewardship toward marine ecosystems and fish stocks essential to local livelihoods.

This section documents the fisheries that are most important to the local fish harvesters in

Figure 8 *Old lobster traps stacked in Gros Morne.*

the region. Through the mapping exercises the harvesters identified areas most important for spawning and their way of life. Through in-depth conversations and surveys this atlas was also able to capture and share the values of over 60 harvesters highlighting their TEK and what they want to see into the future for the fishing industry.

The commercial fishing industry in the Gros Morne region includes both inshore and offshore fisheries. In 2020, during EAC's fish harvester meetings, all attendees were asked the main species they fish annually. Overall, crab was the main species caught along with lobster, halibut and cod (see Figure 9). It should also be noted in Figure 9 that bait fish and forage fish are the same species (mackerel, herring and capelin) requiring two different licence types. A bait license is one acquired by lobster harvesters, for example, with the catch used only to bait their traps. A forage fish license is a commercial license acquired to sell bait fish to other fish harvesters like those fishing lobster or crab.

Figure 9 *Fish Harvesters from Cow Head and St. Paul's area participating in EAC's community engagement and mapping event, held at the Shallow Bay Motel during the winter of 2023.*

Main Fisheries of Workshop Participants

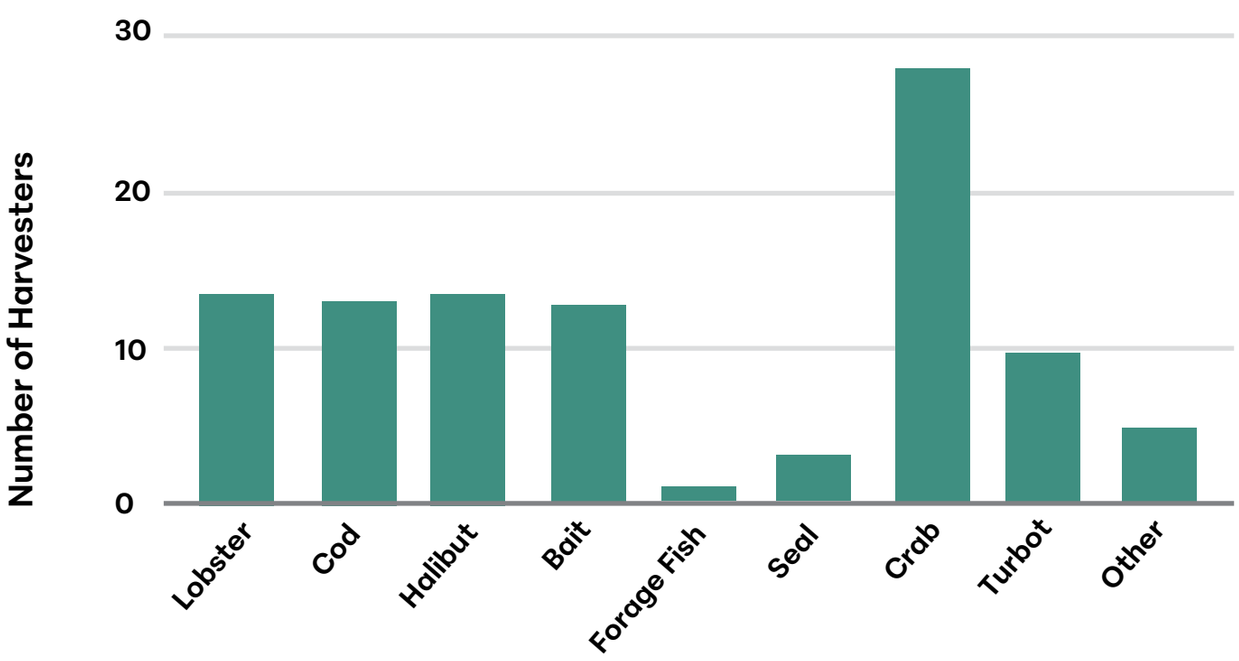


Figure 10 *Results from the 2020-2023 surveys given at EAC fish harvester engagement sessions. Thirty-nine (39) harvesters were asked to check all the commercial fisheries they are engaged in. Majority identified that they participated in at least 4 different fisheries throughout the fishing season.*

Fishing zones

Commercially important fish stocks are largely divided into categories which align with the zones of the ocean water column: pelagic, demersal and benthic.

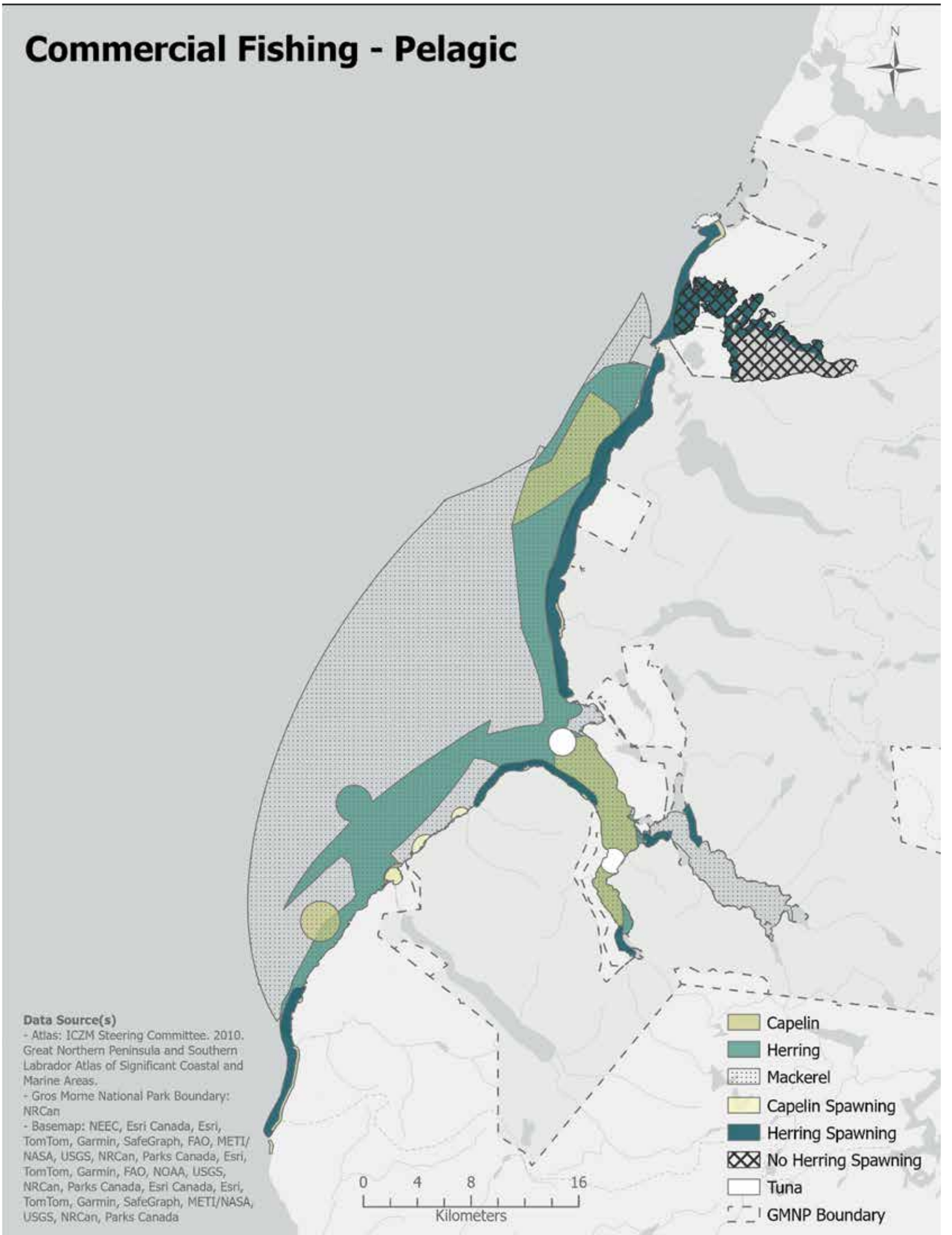
The pelagic zone is the mid-water environment up to the ocean surface. Species found in this zone include forage fish or "bait fish" like capelin, mackerel, and herring which are used in the lobster and crab fisheries. Small pelagic species have been culturally important species to humans for millennia. They are fished for food, social and ceremonial purposes by First Nations, commercially, recreationally, and for use as bait in other fisheries, and have historically been some of the most abundant fisheries in our region.

Fish harvesters have voiced concern over this commercial fishery due to over-exploitation by large and mid-size seiners. With the changing water temperatures local fish harvesters have observed some seiners dropping their nets to match where the fish have migrated in the water column. This poses big issues as the nets then scrape the ocean floor, damaging the habitat many other marine species are dependent on. During EAC's 2023 fish harvester meetings, we heard that these populations are becoming smaller and spawning later.

Other important fish found in this zone include Atlantic Bluefin Tuna *(Thunnus thynnus)* and various species of sharks; also referred to as "large pelagics". Although bluefin have frequented this area for centuries, more and more have been observed staying for long periods of the season to feed on smaller pelagic fish species Atlantic Herring *(Clupea harengus)*, Atlantic Mackerel *(Scomber scombrus)*, Sand lance *(Ammodytes spp.)*. Bluefin tuna are known to travel thousands of miles to feed and spawn. Their migration is affected by water temperature, spawning, and prey availability. Due to their high value, bluefin tuna have been overfished heavily in the past and populations have declined. With strong management and fishery cooperation, the western Atlantic population is now recovering (ICCAT, 2023).

continued on page 31

Figure 11 *Capelin rolling in Trout River Cove, NL*



Map 3 *Areas identified by local fish harvesters that are commercially important for catching species found in the pelagic zone. Harvesters also identified areas most important for spawning by these species and where a herring stock used to frequent but since the 70s, has not returned.*

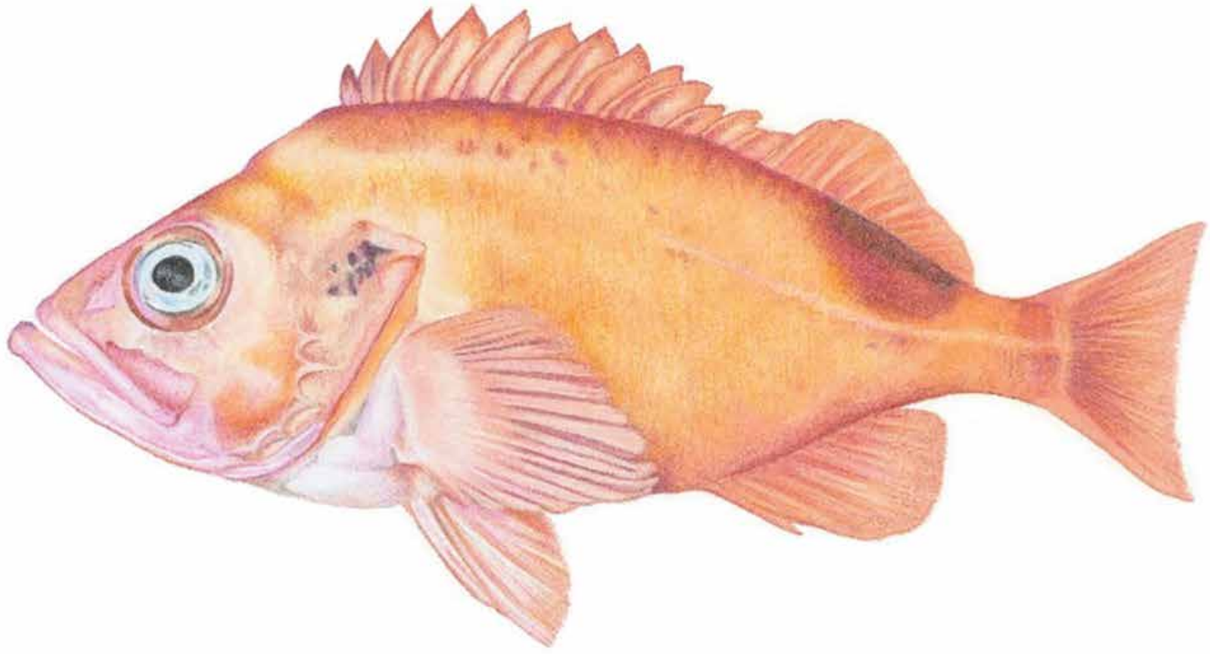


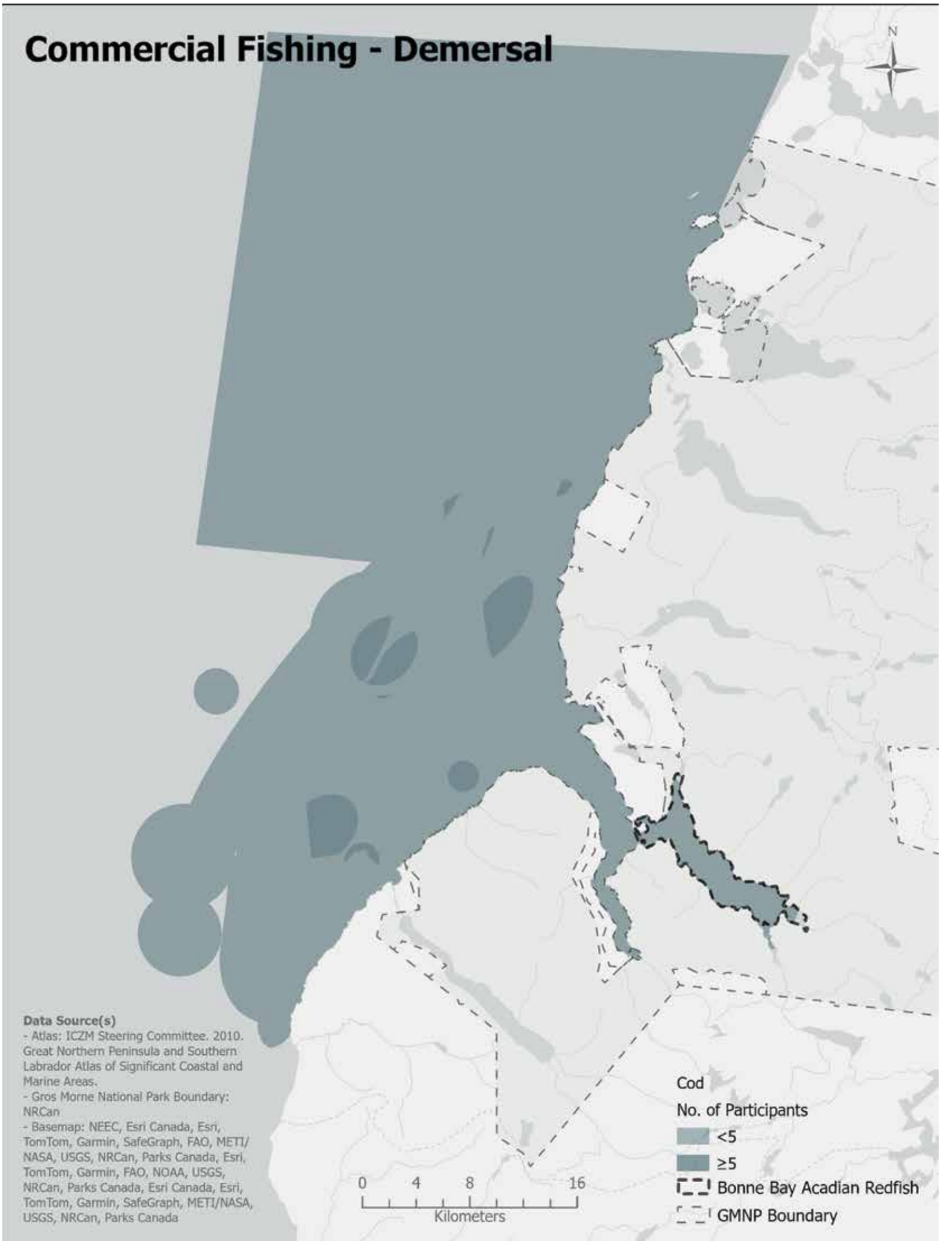
Figure 12 *Drawing of Bonne Bay Acadian Redfish by Kristin Roks. Photo AHOI*

In the **demersal zone**, or area just above the ocean floor species like Atlantic cod *(Gadus morhua)* and Acadian redfish *(Sebastes spp.)* are found. The population of cod in Gros Morne is part of the northern Gulf of St. Lawrence Atlantic cod stock. Longlines and gillnets are now the main gear types fishing Atlantic cod in the region. For decades large bottom trawlers fished Atlantic cod contributing to the overexploitation of the population and eventual collapse. A moratorium for directed fishing was placed on Atlantic cod in 1992. This led to a displacement of over 30,000 fishery workers in Newfoundland (Wall,1999). The cod population today in this region is still struggling to recover, limiting the fishery in this region.

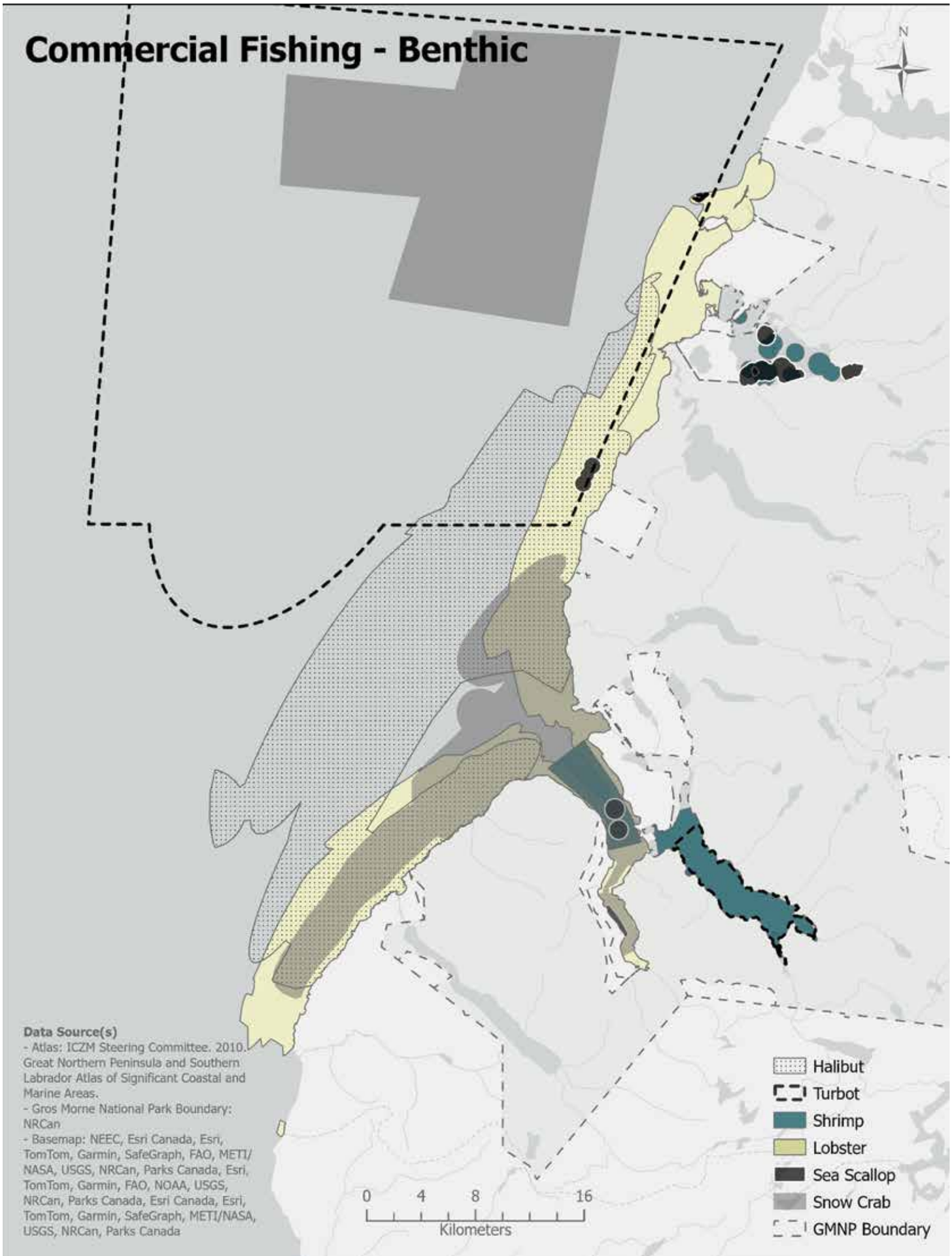
The redfish fishery in western Newfoundland closed in 1995 to help the redfish stocks rebuild to healthy levels. In 2018, an experimental fishery was put in place to assess the redfish population and collect important data such as size, species identification, and bycatch, and to test different types of fishing gear and methods. In the Gros Morne region and throughout the Gulf of St Lawrence, there are two types of redfish species: Deepwater redfish *(S. mentella)* and Acadian redfish *(S. fasciatus)* (DFO, 2024).

The Eastern Arm of Bonne Bay is home to a unique subspecies of Acadian redfish. Limited water exchange between the fjord and the Gulf of St. Lawrence combined with a shallow sill (~15m in depth) at the entrance of the Arm, this species has been isolated from the Atlantic population. This small population of slow growing fish is very sensitive to potential human threats and natural events. The Bonne Bay Acadian redfish was listed in 2010 by COSEWIC (Committee on the Status of Endangered Wildlife in Canada) as a species of special concern, and there is currently no directed fishery (COSEWIC, 2010; DFO, 2024).

Throughout the **benthic zone** many commercially important fish stocks including lobster, crab, and halibut can be found. This zone yields some of the highest valued commercial fish stocks of all the three types for the region. Historically the lobster fishery is what encouraged settlement in Gros Morne and is still one of the most important industries today for coastal communities in western NL (Temple et al., 2010). Although turbot is the first fishery to open in this zone, the crab fishery is viewed as the main start of the season for most of the local fish harvesters. Following the short crabbing season is the lucrative lobster fishery. The changing climate in the Gulf has brought optimal temperature conditions for the lobster population to boom in this region. Some also think they may be migrating north away from the warming waters in Maine and Nova Scotia. While the lobster fishery in this region comes to a close at the end of June, other harvesters are preparing for the halibut season. Harvesters fish for halibut in July and August and have a fall season in September. All three of these fisheries sustain many fishing families in the area, and they represent some of the most sustainable fisheries in the region using only pots, traps and hook and line.



Map 4 *Areas identified by local fish harvesters that are commercially important for catching species found in the demersal zone. The area where the species of special concern, the Bonne Bay Acadian redfish, is found is also identified.*



Map 5 *Areas identified through participatory mapping by local fish harvesters that are commercially important for catching many species found in the benthic zone including lobster, halibut and snow crab.*

Key themes from the community: **Fisheries**

- Relationships need to be established with fish harvesters (not unions) directly affected by DFO management decisions to **improve trust and transparency**.
- Increased capacity and funding needed to **improve monitoring and enforcement efforts** that will deer illegal and damaging activities to our important fish stocks (i.e., lack of bycatch monitoring and illegal fishing practices by large seiners, over-harvesting concerns).
- Fisheries need to be **managed for the future prosperity of our rural NL communities** and in a more sustainable and innovative way.
- **Conservation efforts needed to protect community** identity, culture and the recovery of important fish stocks.

Figure 13 *Norris Point residents cleaning and fileting Atlantic Halibut caught by a local inshore fish harvester. Many buy directly from the fish harvesters and portion and vacuum seal, so they have fresh seafood throughout the winter.*

Figure 14 *View overlooking Bonne Bay from Woody Point, NL. To the right, local residents participate in the recreational fishery, fishing for Atlantic Mackerel.*

Recreational fisheries

In September 1996 shortly after the moratorium in 1992, a recreational license or "Food Fishery" for Atlantic cod was established that had a limited quota to catch five fish per person to a maximum of 15 fish per boat per day (Lilly, 1996).

In many rural communities in Newfoundland, tourism relies on the local recreational fishing industry. Tourists are attracted to the opportunity to consume locally caught seafood, interact with industry people, get out on the water, and experience a small version of the historic NL way of life. Visitors and locals alike enjoy recreational fishing for salmon, cod, trout, char, smelt, mackerel, and scallops (DFO, 2011b). Brook trout *(Salvelinus fontinalis)*, Atlantic cod *(Gadus morhua)*, Atlantic mackerel *(Scomber scombrus)*, Smelt *(Osmeridae spp.)* are the species most caught by anglers (Neis & Ommer, 2014).

The Atlantic salmon *(Salmo salar)* holds historical importance for St. Paul's residents. As seen in the research Map 6 and Map 7, there are many rivers that are important for recreational salmon fishing. Common recreational salmon fishing rivers in this region include Lomond River, Deer Arm, and Western Brook.

Atlantic mackerel and capelin *(Mallotus villosus)* are also two favorite pastimes locals and travellers love to fish. The towns are a buzz as they wait for capelin to "roll' in Trout River cove. On the wharves throughout Gros Morne in the summer evenings you will see all ages with their lines out hoping to catch mackerel.

Photo credit: *Visit Gros Morne*

Figure 15 *Resident of Gros Morne participating in the recreational capelin fishery, collecting some capelin that "rolled in" on Trout River Cove, NL.*

Map 6 *Important areas identified by fish harvesters and locals for recreational fishing activities as well as a breakdown of specific species. Bivalves include mussels, clams and scallops. Many participate in seabird hunting so locations waterfowl and seabirds frequent was also included.*

Tourism

Since the establishment of Gros Morne National Park (GMNP) in the 1970s, followed by a UNESCO World Heritage designation in the late 1980s, many in the region have grown to understand the role tourism has played in sustaining their communities and keeping their family's home (Vannini & Vannini, 2018). Although there was significant opposition related to the way the government established the national park, most now see its direct and indirect value for continued employment opportunities. This became more apparent when the cod moratorium hit in the 90s, taking many off the water and away from the fishing industry.

Along with the national park came the Gros Morne Cooperating Association (GMCA). This non-profit continues to play an instrumental role in connecting directly with all municipalities in the region and works tirelessly with communities to better understand what sustainable economic development could look like now and into the future.

With a national park in place, some commercial, recreational and traditional activities were limited in the region, including timber harvesting, moose hunting and snowmobiling. Conversely, the park brought more federal government resources to maintain the highways, grow hiking and ski trails, build educational facilities, conduct research on important species and habitats, and above all, provide hundreds of jobs both directly and indirectly to the area. The economy began to diversify after the establishment of GMNP with people working directly for the park on visitor experience and field research. Many small businesses have since emerged in private adventure touring, culture, hospitality and elsewhere to serve the influx of visitors to the area (DFO, 2011b).

During the engagement sessions to build the Atlas many talked about their position and feelings towards the national park and tourism overall. Although many saw the benefits of tourism,

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Figure 16 *Old fishing shed in Green Point, NL.*

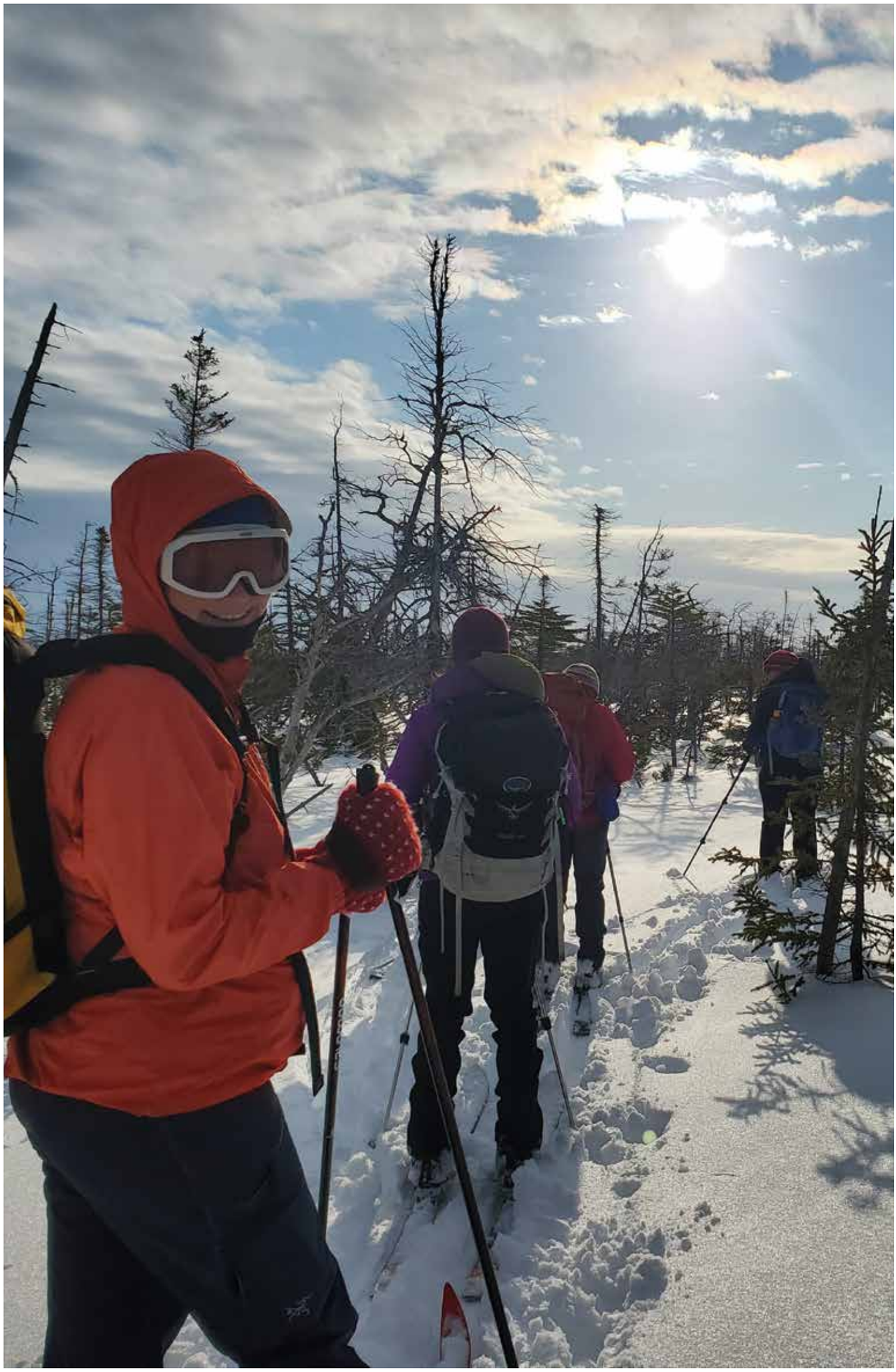


Photo credit: *Rebecca Brushett*

Figure 17 *Parks Canada conducting a public engagement session at MUN St. John's campus in the winter of 2019 for their 2019 Management Plan.*

those benefits were not always perceived to be connected to the establishment of the Park, or the UNESCO World Heritage designation. In previous research conducted on sustainable development, 93% of residents surveyed (n= 477) still agreed the benefits of tourism outweigh the drawbacks (Dodds, 2024). Combining Brushett (2018) and EAC's community engagement events from 2020-2023, we saw 85% support for continued tourism development in the future with an emphasis on no-take eco-tourism (Figure 19). The people in this region are deeply connected to place and have a strong sense of pride to protect their home and way of life. Further to this you can see what types of tourism-based activities they value most and where in Maps 7 and 8 below.

Do you support increased eco-tourism development?

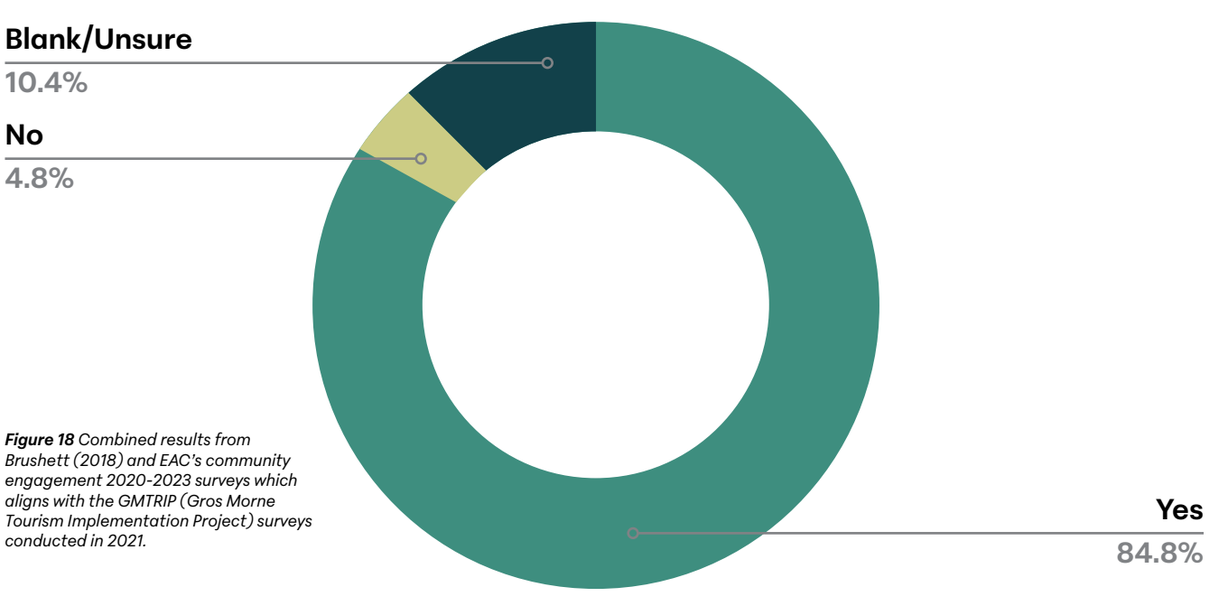
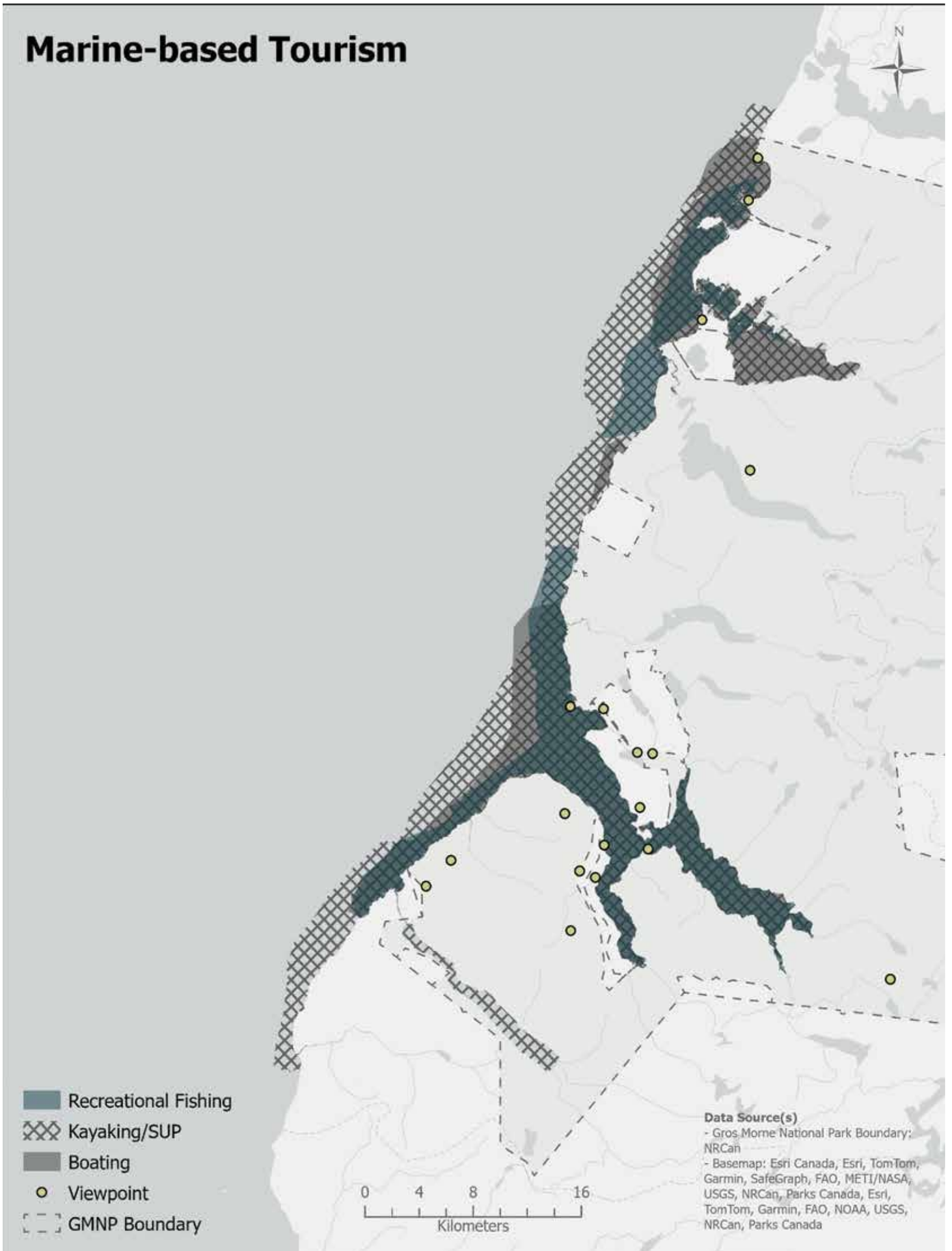
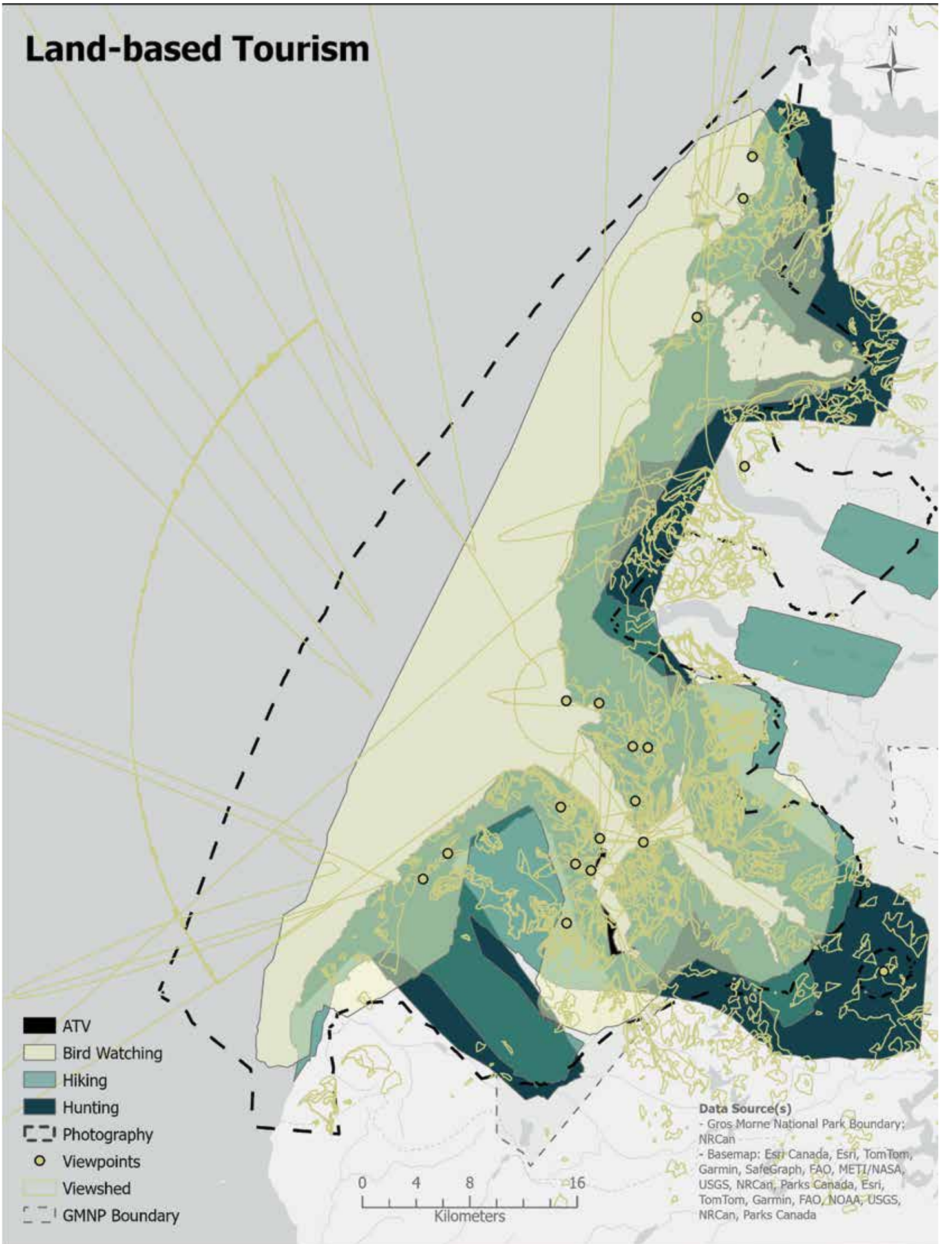


Figure 18 *Combined results from Brushett (2018) and EAC's community engagement 2020-2023 surveys which aligns with the GMTRIP (Gros Morne Tourism Implementation Project) surveys conducted in 2021.*



Map 7 *Areas identified by EAC engagement participants who are from the area or come to enjoy it for various types of marine-based activities. Viewpoints were identified as areas most important to enjoy the scenic beauty of the area including the ocean which surrounds the region.*



Map 8 *Areas identified by EAC engagement participants who are from the area or come to enjoy it for various types of land-based activities. Viewpoints were identified as areas most important to enjoy the scenic beauty. The viewshed is how far one can see from the viewpoints identified.*

Key themes from the community: **Tourism**

- **Concerns related to regional capacity** to grow sustainably in this sector.
- Support for a **community-led tourism plan** to look after the municipalities and environment, not just the businesses.
- Find ways to **diversify economic opportunities in the tourism sector that speak to the next generation** and bring families home.
- Increase **connections between the fishing industry and tourism** sector.

Figure 19 *Visitors overlooking Bonne Bay from the Jenniex House look-out in Norris Point, NL.*

Chapter 06
Supporting the Growth of a Sustainable Blue Economy

Figure 20 *Fishing boat filled with lobster traps in Bonne Bay, NL.*

Maintaining a sustainable ocean-based economy

A sustainable ocean-based economy must not only encompass sustainable development but also transform and rebuild abundant marine ecosystems while ensuring the long-term health of coastal communities. The creation of high-quality, co-managed marine protection for sensitive marine species and habitats need to be a priority to preserve and grow a sustainable in-shore fishery while also respecting Indigenous Rights and overall community culture (UNESCO-IOC & European Commission, 2021). Co-management ensures that the community is involved in the planning process and that any developments are grounded in existing community ambitions.

Photo credit: *Rebecca Brushett*

Our survey results and key findings below suggest that a sustainable ocean-based or "blue" economy for Gros Morne could consider such sectors as low-impact shellfish aquaculture or well-planned renewable energy. This along with other low-impact project developments could take place alongside the region's valuable inshore fishing and tourism sectors providing another level of resilience to the area. Any developments must however find ways to always proactively build community and safeguard healthy terrestrial and marine environments to the greatest extent possible.

Key themes from the community: **Managing for a sustainable economy**

- Concerns about the future of our declining rural communities and how we can encourage youth to stay or come back to the region.
- Extra training opportunities were suggested for community members to improve their employability or interest to stay in their communities around rural NL.
- Improved programming for region was suggested that links the rich culture, fisheries, tourism and hospitality sectors together.
- Update approval process for future economic development projects to ensure effective environmental impact assessments are conducted (e.g., aquaculture, oil and gas, wind, etc.).
- Work with interested parties to develop new ways to diversify economic growth in areas of tourism and hospitality, fisheries and processing, agriculture, and aquaculture that will have a more circular systematic approach.
- Through increased education and outreach, help regions better understand issues and changes to important marine environments from climate change, unsustainable commercial fishing practices, tourism and coastal development.
- Create a list of regional needs accompanied by skill-building and job development to protect coastal communities for generations to come.
- Create a broad community code of sustainable conduct for marine users.
- Find ways to increase municipal capacity and engagement to help community groups and the region better look after the ocean (infrastructure, sewage treatment updates, etc.).

Photo Credit: *Rebecca Brushett*

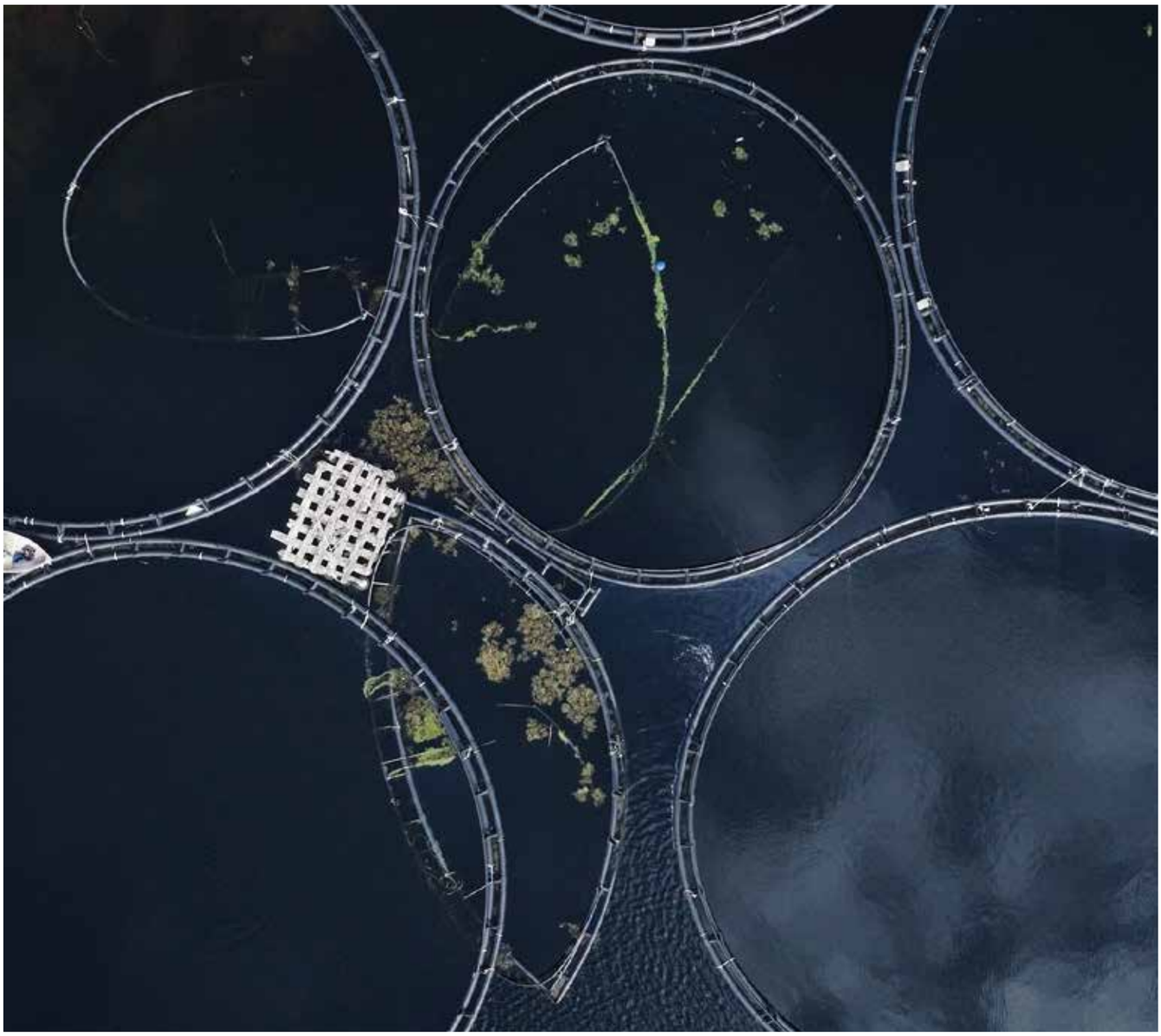


Figure 21 *Drone photo of abandoned finfish aquaculture cages at locally known location 'The Locker' in Hermitage Bay, NL. Photo: Atlantic Salmon Federation - Jake Dicks.*

Roughly 25 years ago, a Norris Point fish harvester named Melvin Reid tried farming cod in traps off his brother Walter's wharf in Neddies Harbour (Bonne Bay). Unfortunately, the cost of bait and temperature of the marine environment (too warm) were not favorable.

-Discussion by Norris Point fish harvesters during 2023 workshop in Cow Head.

Aquaculture

In general, many survey respondents were hesitant to support aquaculture outright. Those that were open to aquaculture development of any kind expressed a strong preference towards the shellfish industry, which garnered support from more than half of respondents. On finfish aquaculture, respondents did not trust the provincial government to establish appropriate policies and standards to ensure operations would be conducted in a sustainable manner. In this context respondents believed that ocean-based finfish aquaculture would cause more harm than good to the environment, wild fish stocks, commercial fisheries, tourism, and ultimately coastal communities. Out of precaution and concern for the potential impacts to inshore fisheries, many did not support finfish aquaculture or were unsure. Some respondents suggested instead that if any finfish aquaculture was to come to this region, that it would have to be a closed contained, land-based operation. Others felt that aquaculture development of any kind should require substantive community engagement prior to moving forward.

Support for Shellfish Aquaculture Development

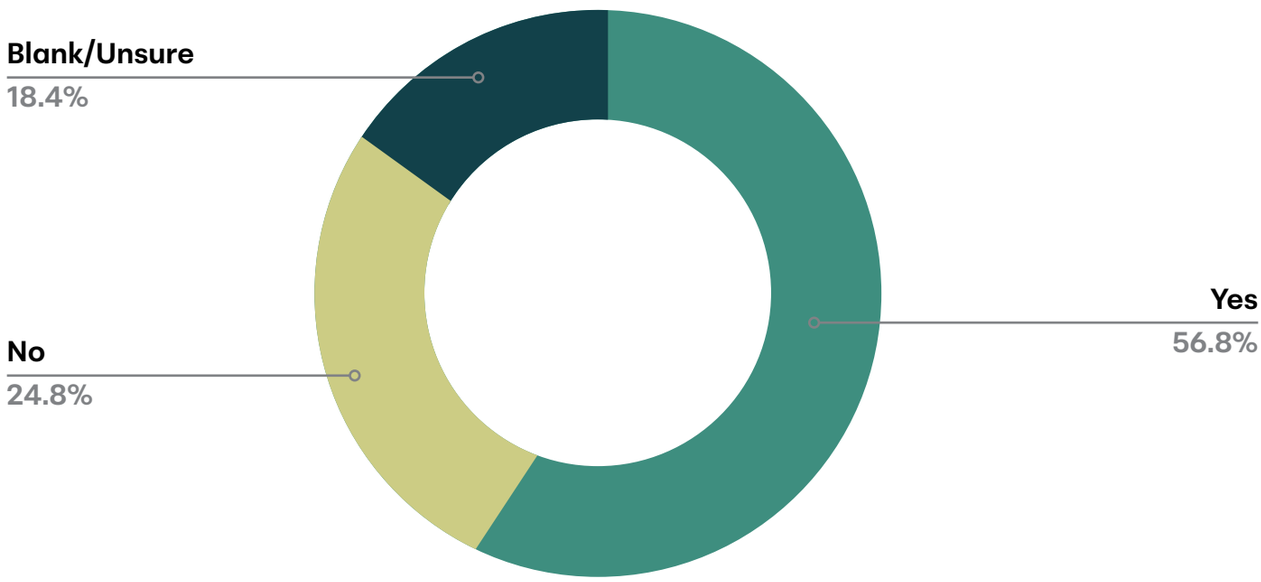
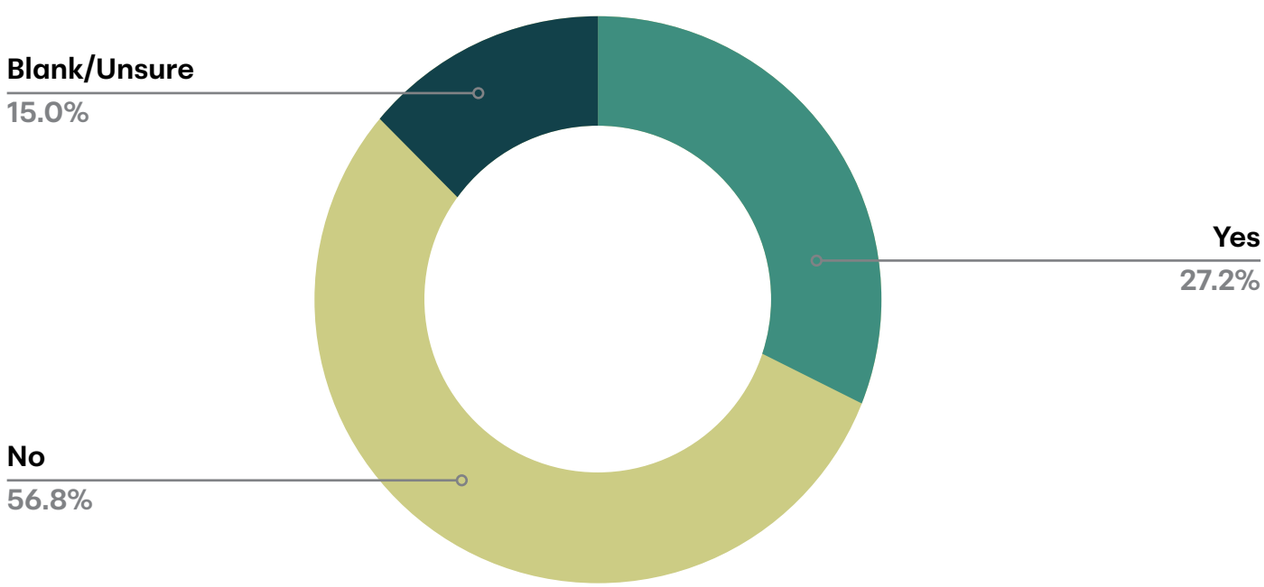


***Figure 22** Combined Brushett (2018) and EAC 2020-2023 survey results from the stakeholders and general public in Gros Morne (n=156). Results show how many support, oppose, or want to know more about shellfish (above) and finfish (below) aquaculture in this region.*

Support for Finfish Aquaculture Development



Key themes from the community: **Aquaculture**

- Many have **mixed feelings about the potential of aquaculture to revitalize the economy** in declining coastal communities.
- **Fear of ocean-based finfish aquaculture impacts** on wild fish stocks (escapees, virus transfer, sea lice, etc.).
- Approval of any aquaculture projects should not be considered until **effective community engagement with all at stake** (not just unions like FFAW, but business owners and community members, etc.) takes place.
- **marine plants and shellfish**
  - The water temperatures may not be optimal which would lead to epiphyte infestation on an algal (seaweed) farm.
  - Shellfish-like mussel farms could be beneficial to our area, but more research is needed.
  - Mapping out best fit areas should be mandatory to identify the locations shellfish (mussel, scallops) farms could be established that don't harm other fisheries in the region.

Photo credit: *Stoo Metz - www.stoo.ca*

Mining and/or Oil and Gas Development

Through surveys and consultations, we heard from a number of community members who suggested that mining, oil and gas development (including unconventional gas well development or fracking) can result in considerable ecological risk. Mixed community positions on the development of mining, and oil and gas projects require more open discussion at community meetings to better understand the region's position on non-renewable resource development. Survey results and commentary at EAC community meetings aligns with other findings in literature on the topic of energy development in the region, including submissions made by Parks Canada (Kent, 2012) and the UNESCO World Heritage Committee (UNESCO, 2019), and research addressing potential threats (Warpinski, Wolhart & Wright, 2004; Foldger, Tiemann & Bearden, 2012). There is more expansion on this topic from the region found in Appendix B.

Photo credit: *Ecology Action Centre*

In 2013, there was a project proposal to develop hydraulic fracking in the marine area of Gros Morne (CPAWS-NL, n.d.; Smith, 2016). Some stakeholders opposed this development due to the potential negative impacts to the natural environment, tourism industry, and on Gros Morne's designation as a World Heritage UNESCO Site (Burzynski, 2012.; Normore, 2015; Smith, 2016). Other stakeholders saw the development as an economic opportunity (Smith, 2016). Letters of opposition were written by many community members, including local experts and Indigenous peoples (Burzynski, 2012; Normore, 2015). In 2013, the provincial government placed a moratorium on fracking, and the C-NLOPB (Canada-Newfoundland-Labrador Offshore and Petroleum Board) decided not to renew the exploration license (CPAWS-NL, n.d.).

Do you support mining and/or oil and gas development in the GM Region?

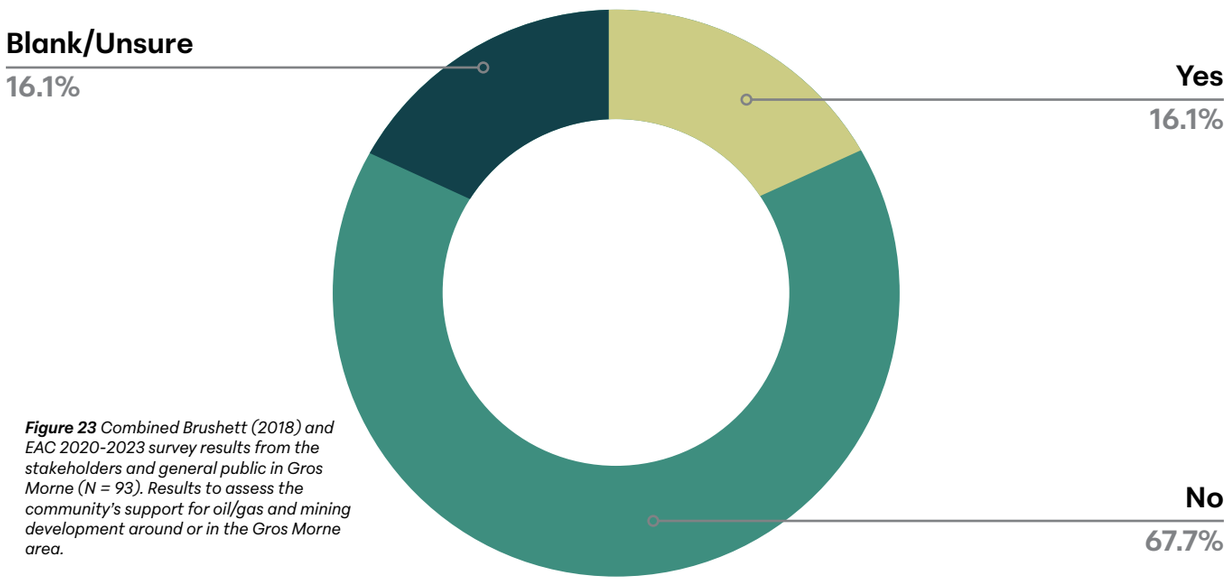


Figure 23 *Combined Brushett (2018) and EAC 2020-2023 survey results from the stakeholders and general public in Gros Morne (N = 93). Results to assess the community's support for oil/gas and mining development around or in the Gros Morne area.*

Key themes from the community: **Mining / oil and gas development**

- Non-renewable resource development (fracking, conventional oil and gas exploration and development) poses **too much risk to the environment and other sustainable economic drivers in the region**. Environmental risk outweighs the short-term economic boost with little to no social benefits.
- A thorough **plan, environmental assessment and meaningful community engagement would need to be completed** to understand how this industry could avoid impact to residents and other sustainable economic sectors.
- **Stronger policies and procedures at the federal and provincial level need to be developed and put in place.**
- **Some support for potential job opportunities this sector could provide**, although many were torn due to the high-risk factor.

Figure 24 *Oil rig off the coast of eastern Newfoundland. Photo by: istock.com/Wirestock*

Photo credit: *Deposit Photos*

Emerging issues:

Renewable developments in wind, solar, hydro and wave energy

During EAC's discussions from 2020-2023, little was mentioned about the opportunities to grow the economy in the renewable energy sector. However, wind energy in particular has emerged as an important topic in 2024, particularly with the onset of Newfoundland's Regional Assessment of Offshore Wind (Government of Canada, 2024). Previous consultations reviewed community opinions on the topic of renewable energy development, and we have derived some key themes from that work along with expert opinions highlighted below (Brushett, 2018).

> Before we start talking about how we're going to decarbonize the globe with Newfoundland and Labrador's energy warehouse, I would like to see a focus at home, where we're trying to discern how we can manage these projects fairly, and how we can make sure that the benefits rest with the people who have to live with the adverse benefits of these developments... Rather than spending billions on megaprojects. Dr. Mercer advocates for smaller wind development, and projects that will see the communities they serve reap the rewards. If a regulatory framework can go ahead, I would like it to be for the benefit of communities, not for corporations.
> *- Mercer, N. (2022) CBC interview.*

Key themes from the community: **Renewable energy**

- The **tourism and fisheries sector are vital to Gros Morne's local economy and identity** so, many in the region do not want those industries put in jeopardy.
- If renewable energy projects are to be considered in this region, then **in-depth planning, cumulative environmental assessments (including cultural/ social impact) and community engagement must take place.**
- The **ecological integrity of coastal and marine environments as well as cultural values in Gros Morne should be prioritized** over financial gain by provincial government or large corporations.
- This industry could be one welcomed to the region ***if*****, structures (wind, wave) or panels (solar) could be installed in areas out of sight and assessments show little to no environmental impact.**

Management of natural resources

Just as the health of the environment plays a critical role in the lives of Gros Morne residents, the management of natural resources has an outsized impact on livelihoods in the region. Many communities have long felt that resource management is too centralized in the government offices of Ottawa and St. John's, and that more localized management regimes would enable a greater alignment with the people and the values of western Newfoundland.

In speaking with the residents of Gros Morne, we learned that many felt their trust was broken twice by the federal government: once during the establishment of Gros Morne National Park in the 1970s, and then again in the 1990s during the closure of the cod fisheries. The mismanagement of natural resources and important ecosystems, whether old growth forests or critical Atlantic cod habitat, has led to uprooted communities and the loss of jobs, ways of life and identities. Management decisions of the past have shaped how the people of this region react when policy ideas are introduced by our government today. To create strong, prosperous communities that trust government decision makers, a more transparent approach is necessary. Below are the key points raised by Gros Morne residents in relation to natural resource policy and management.

***Photo credit**: NL Tourism*

***Photo credit:** NL Tourism*

Key themes from the community: **Management of natural resources**

- Engage in a meaningful way.
  - Develop and practice more integrated engagement approaches between government departments, sectors, and communities.
  - Reflect the local values and support grass-roots initiatives.
- Major concerns relating to the lack of monitoring and enforcement to deter illegal and damaging activities.
  - Fishing and hunting gear use.
  - Damage to river and coastal ecosystems.
  - Increase active enforcement by municipal councils to foster change in coastal communities.
- Issues with over-harvesting in fisheries.
- Update approval process for future economic development projects to ensure effective environmental impact assessments are conducted (e.g., aquaculture, oil and gas, wind, etc.).

Understanding the Health of our Ocean through Scientific Research

Our understanding of the ocean has grown over millennia from the knowledge shared by the Mi'kmaq and Beothuk People to the traditional ecological knowledge passed down over the centuries by the many fish harvesters who have lived and worked in the ocean surrounding this region (Tuck, 2022) .

In more recent years, as Western marine science began to take shape in the Gros Morne region, Dr. Robert Hooper led the way, devoting his life to understanding the rich biodiversity that makes up the marine environment. Leading with a credit to Dr. Hooper and his pioneering research in the region, this section highlights the marine science that has contributed to this Atlas, identifying areas where research has been conducted to date, and identifying important topics for future research through the community survey.

Figure 25 *Dr. Robert Hooper with a large Atlantic cod in the 70s, at the "field station" where the BBARS exists today. Photo credit Dr. Robert Hooper*

An ode to Dr. Robert Hooper and marine science in Gros Morne

Dr. Hooper began his work in Gros Morne with MUN in the late 1960s. Helping to create and direct MUN's Bonne Bay Marine Station (now called the Bonne Bay Aquarium and Research Station-BBARS), Dr. Hooper was able to develop and nurture a clearer picture of understanding about the marine environment in western Newfoundland. Through his own marine research and the field courses he taught, Dr. Hooper has helped the community, fish harvesters and decision makers appreciate just how unique and sensitive the marine habitats and species are in this area. Thanks to research inspired by Dr. Hooper and many others at the BBARS, we now have decades of invaluable data on marine ecosystems of the Gros Morne region. Building on the work of Dr. Hooper and many other researchers at BBARS, the Atlantic Healthy Oceans Initiative (AHOI), a non-profit founded in 2019, is now also contributing local research and data collection to the growing body of science in the Region.

Figure 26 *The current Bonne Bay Aquarium and Research Station (BBARS) in Norris Point, NL.*

Figure 27 *EAC staff and AHOI Research Assistants collecting baseline data using AHOI's underwater ROV in Deer Arm, NL. Photo AHOI*

Figure 28 *Trading Books for Boats (former program offer at the BBARS) conducting a plankton tow with the help of tourism operator, Bon Tours in 2008. Photo Fiona Cuthbert*

Beyond baseline research

Bringing together the efforts of Dr. Hooper, BBARS, AHOI and a wide range of other researchers and institutions conducting marine science in Gros Morne, EAC reviewed, documented and organized all available publications dating back to 1967 into a public accessible electronic database (see Chapter 3, Methods section). This electronic database is now housed at the BBARS library for anyone to use. Map 9 below was generated from this database and outlines a point count of all previous research undertaken in the region. It is important to note the amount of research done in the heart of Bonne Bay, primarily due to the location of the BBARS. It is also worth noting several gaps where additional research is still needed to better understand the health of the marine environment in this region.

This section highlights aspects of research that should be considered in the development of marine planning and protection programs moving forward.

Photo credit: *AHOI*

Map 9 *Areas where research has taken place since the late 1960s. Each point count represents the overall geographic area where the research was conducted, and the number in the point represents the number of research projects that took place in that location.*

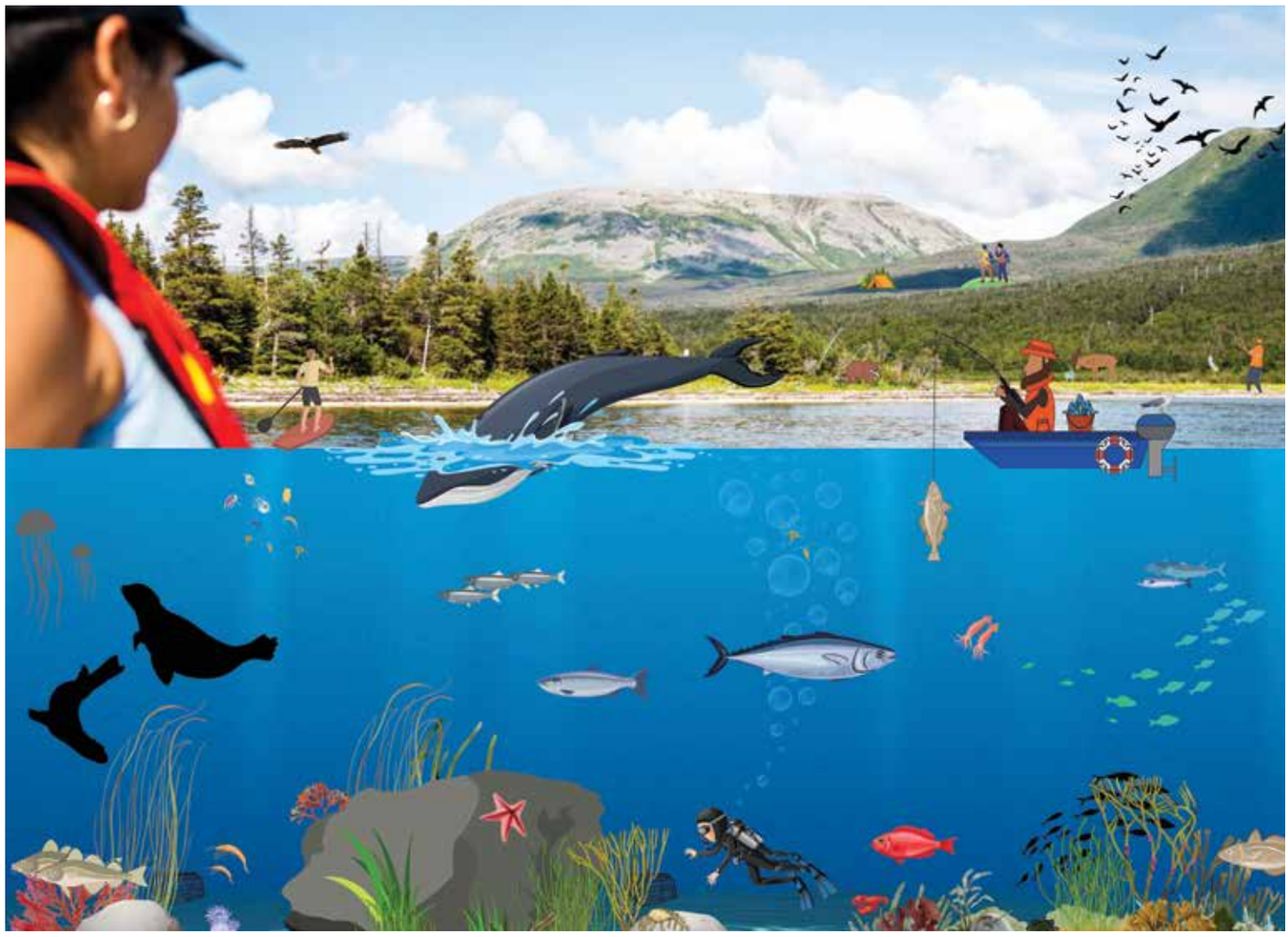


Figure 29 *A cartoon depicting the diverse environment which makes up Gros Morne's marine food web and those who enjoy it.*

Plankton, Coral and Sponges

Plankton

Phytoplankton, from the Greek phyton for "plant", are autotrophic algae that live near the water surface, using light from the sun to create energy. Phytoplankton live in the upper water levels (eutrophic zone), provide the base for marine and freshwater food webs. The energy they produce accounts for almost half of all photosynthetic activity on earth (Cermeno et al., 2010; Banfield, 2013; Shukla, 2022).

Zooplankton – zoo, for "animal" – are small protozoans or crustaceans and can be the larvae of larger animals such as fish, shellfish, and worms (Banfield, 2013). Zooplankton play an essential role across trophic levels, offering food to larger animals and lending their by-product to bacterial and phytoplankton production (Richardson, 2008). They are the sole food source for baleen whales. They also play an important role in climate change as they are carbon sinks, moving large amounts of carbon from the ocean's surface to deeper depths. Ecosystem services provided by zooplankton include nutrient cycling, fishery production, and climate regulation.

Photo credit: *Scott Leslie*

Copepods, a common crustaceous zooplankton, are one of the most abundant multicellular animals found in the waters of Gros Morne – and throughout the North Atlantic (McKeown, 1992). A study done in St. Paul's Inlet, a unique fjord-estuarine environment to the north of Gros Morne, showed that copepods (including *Cyclopoida* and *Calanoida*) were the most common species of zooplankton in the area. However, because of the lack of tidal influences and salinity in the Inlet, the zooplankton abundance was not highly productive relative to similar sites (Stevens, 2017).

Photo credit: *Scott Leslie*

Corals and sponges

Coral reefs are also important ecosystems that support biodiversity richness. Deep-water corals like the carnation coral (*Neptheid* spp.), a soft coral found throughout Bonne Bay, offer feeding areas safe from predation to groundfish – including commercial fish stocks and endangered species (Edinger et al. 2007; Auster, 2005; Costello et al., 2005).

Sponges are some of the most common organisms in deep sea marine environments. Sponges are known to create biodiversity hotspots in otherwise low productivity areas by providing habitat and refuge for a variety of marine species. They are located globally along continental shelves, slopes, seamounts, mid-ocean ridges, and canyons (Hanz et al., 2022). Sponges are found throughout Gros Morne, with 50-plus species found in local waters. Bonne Bay's largest sponge populations are found in the Eastern Arm, where currents can carry food deep into the fjord (Hooper, 1975; Hooper, 1982).

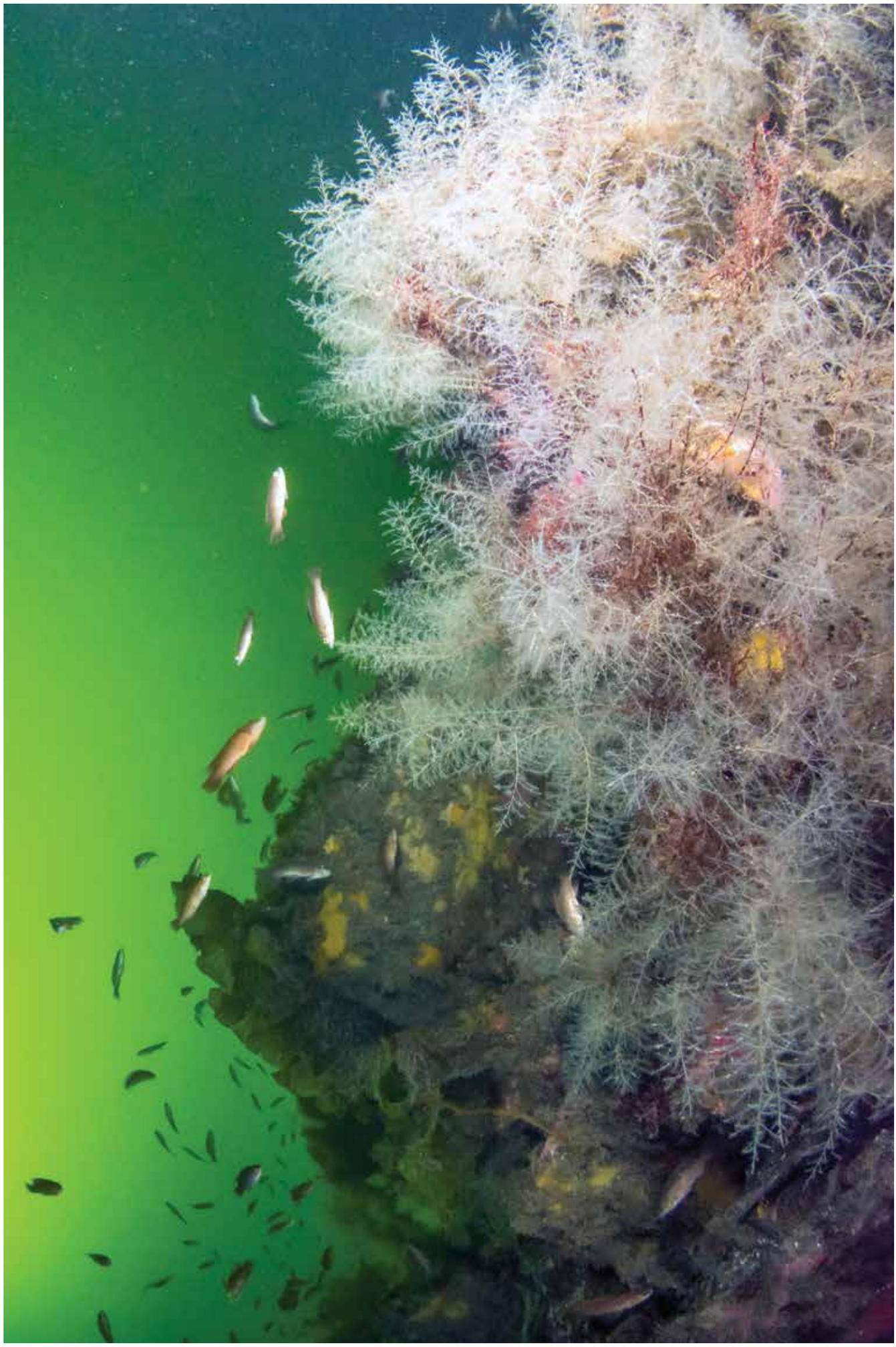


Figure 30 *The vertical rock off Gadd's Harbour with a cluster of white branching hydroids in Bonne Bay, NL. Photo Scott Leslie*

Map 10 *Plankton, coral and sponge research conducted between 1970-1990 in the Gros Morne region. Point counts are used to show the number of species identified at specific research locations. The bigger the point the more research has taken place on that species.*

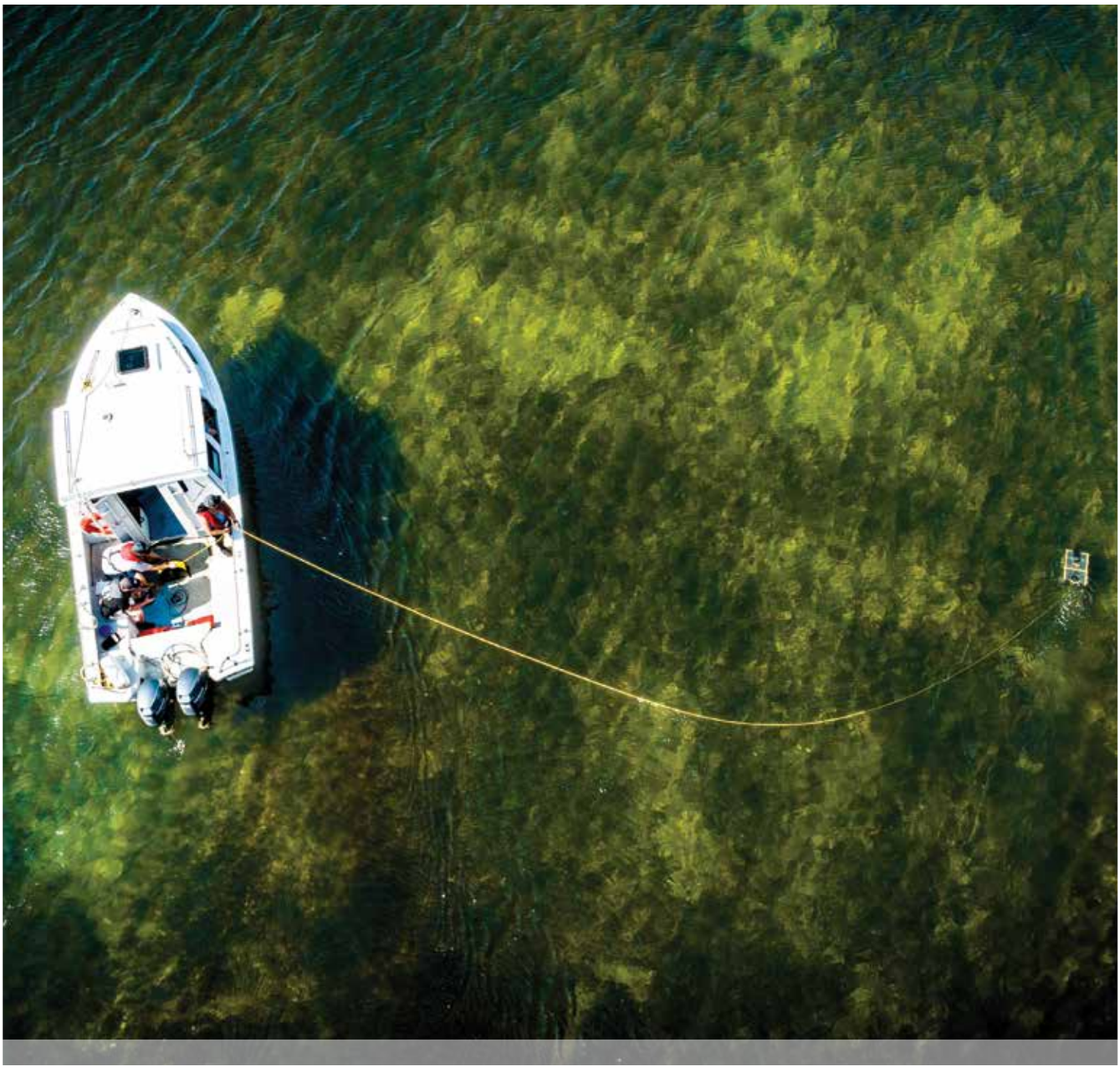


Figure 31 *AHOI in partnership with EAC conducting eelgrass research using their Remote Operated Vehicle (ROV). Photo AHOI*

Coastal Habitat

Seagrass meadows

Seagrass beds, or meadows, are important habitats valuable to many marine and coastal ecosystems (Katwijk et al., 2009). They can be found in shallow water, bays, and estuaries. Seagrasses are ecosystem engineers and can sequester carbon in their root systems (Oreska et al., 2020) Seagrass meadows provide coastal protection from storm surge and erosion and provide critical nurseries for fish and crustaceans important to our commercial fisheries (Obaza, Hoffman & Clausing, 2015). In Bonne Bay, eelgrass *(Zostera marina)* is the only true marine vascular plant and can be found throughout the bay in areas like Deer Arm, the Lomond River estuary, and St. Paul's Inlet.

Salt marshes

Found exclusively in coastal ecosystems, salt marshes are dominated by salt-tolerant grasses, and have both terrestrial and marine characteristics. These high productive areas offer nursery habitat, shelter and feeding grounds for many species ranging from invertebrates to fish and birds. Threespine stickleback *(Gasterosteus aculeatus),* Ninespine stickleback *(Pungitius pungitius),* White hake *(Urophycis tenuis)* (Stevens, Melanson & Campbell, 2010), American eel *(Anguilla rostrata),* Brook trout, Cunner *(Tautogolabrus adspersus)*, sculpin *(Myoxocephalus)* species including Longhorn *(M. octodecemspinosus)* and Shorthorn *(M. scorpius)*, and Winter flounder *(Pseudopleuronectes americanus)* (Melanson & Campbell, 2012) were also identified in the saltmarshes of SPI.

Continued on page 63

Photo credit: *AHOI*

Salt marshes provide several important ecological services, including sinking and sequestering carbon, mitigating stormwater surges, flooding and erosion, and filtering pollutants and excess nutrients (Vernberg, 1993). In the Gros Morne area, St. Paul's inlet is home to very extensive and well-developed salt marshes while smaller marshes can be found in Lomond River estuary and Deer Arm Barachois. The St. Paul's Inlet saltmarsh holds ecological significance for a number of reasons, including its use by Atlantic salmon migrating between freshwater and saltwater for breeding (Kukac, 2009).

Seaweeds

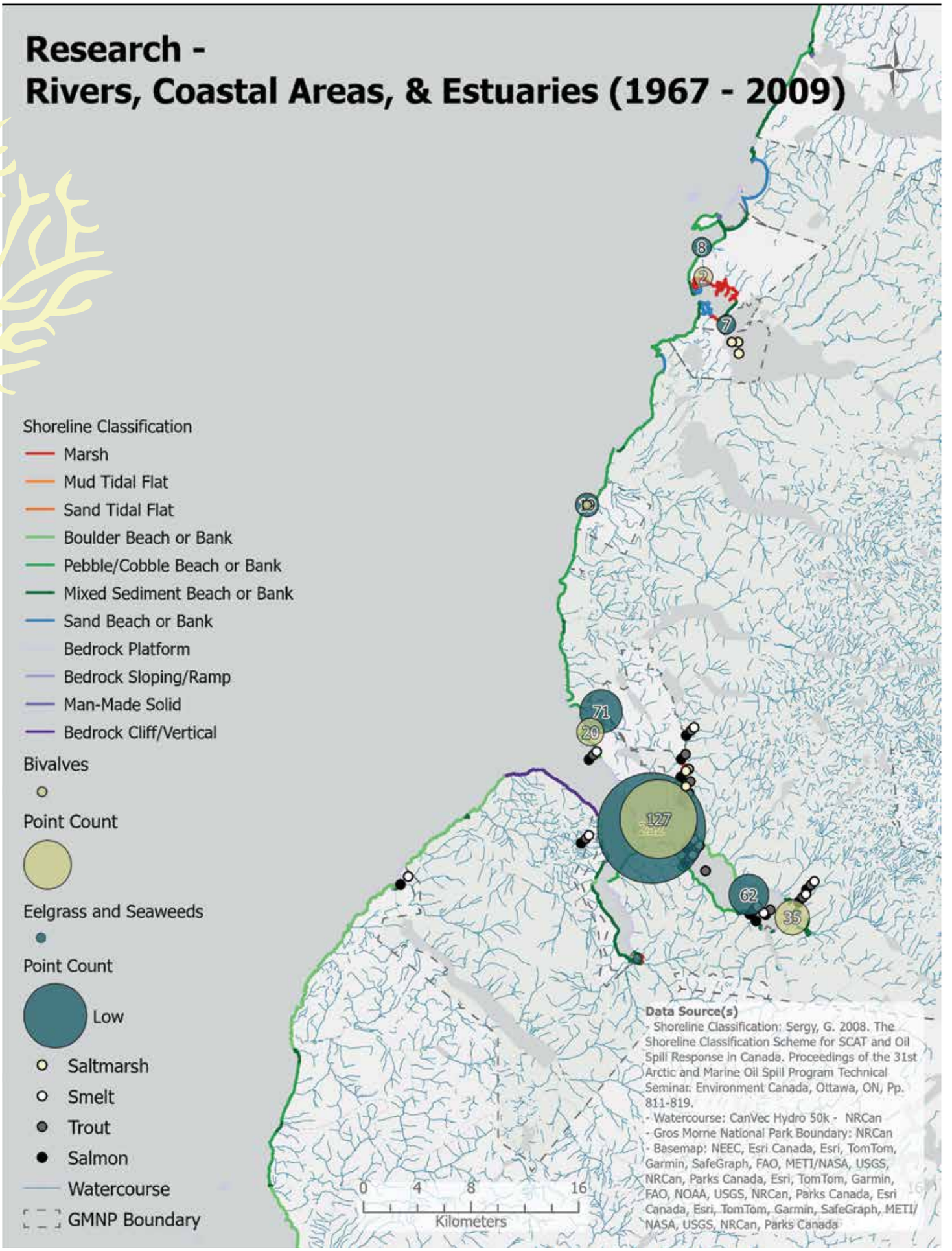
Research done by Bonne Bay Aquarium and Research Station (BBARS) has identified a wide variety of local seaweed species, ranging from rockweed *(Ascophyllum nodosum)*, Cyanobacteria or blue-green algae, green seaweed *(Cladophora rupestris)*, brown seaweed *(Ralfsia verruscosa)*, red crust *(Hilden brandia)* and other green, brown and red algae *(Opanubi, 2009)*. The waters of Bonne Bay are also home to both arctic and temperate kelp species, including *Laminaria longicruris, L. digitata, L. solidungula, Agarum* spp., *Saccorhiza* spp. and *Alaria* spp. Seaweed and kelp forests are important and productive habitats for many species as they provide shelter with dense underwater forests and aid juvenile species protection to avoid predation. These forests also act as a food source for benthic species like crab, lobster, and cod. Seaweed, kelp, and eelgrass meadows all play a crucial role in shoreline stabilization against erosion (Shea, 2009).

Figure 32 *Various species of trout are found in Newfoundland and Labrador, including brown trout, brook trout, lake trout, and rainbow trout. Brook Trout (pictured) and lake trout are native to Newfoundland. Trout migrate between freshwater and saltwater as they prepare to reproduce. Photo Sean Landsman*

Estuarine species of interest

Atlantic salmon, American/Rainbow smelt, several species of trout, and a number of mollusk species commonly occur in estuarine environments, saltmarshes and rivers in the Gros Morne region. These animals often play major roles in maintaining local food webs and balancing ecosystems. Salmon, trout and smelt all exhibit migratory behavior during spawning season and travel throughout the river systems during these times. Mollusk species found in intertidal habitats and elsewhere in Gros Morne include softshell clams, snails, and mussels (Currie et al., 2009). St. Paul's Inlet, home to several estuarine habitat types, provides the kind of favourable environment that a wide variety of species use to reproduce and grow.

Figure 33 *Wild Atlantic salmon are native to Newfoundland and Labrador, found throughout the province. They are anadromous species that live in the sea and enter rivers to spawn. In the Gros Morne area, a counting fence along Western Arm Brook monitors migrating salmon and a fishway was built on the Lomond River to enable returning salmon to bypass difficult falls and rapids (Mullins, Caines & Lowe, 2001). Photo Nick Hawkins*



Map 11 *Shoreline classification data from Environment Canada along with rivers connected to the marine environment. Research conducted in this map focused on bivalves (mussels, scallops), anadromous fish (salmon, trout and smelt) as well as important marine habitats like eelgrass meadows, saltmarshes and seaweed or algae. Point count shows the number of research projects in a specific location. The larger the point the more research has taken place in identified location.*

Figure 34 *Green Crab amongst an urchin bed. Photo Scott Leslie*

Aquatic Invasive Species: European Green Crab and Membranipora

Invasive Species are regarded as one of the top threats to biodiversity. Unlike a native species, these species are not common to the area they are found. They can rapidly introduce themselves into an ecosystem and may affect and even wipe out the surrounding species or habitat that are invading (Caines & Gagnon, 2012).

European green crab *(Carcinus maenas)* are native to Europe and North Africa and were first found in Newfoundland and Labrador in 2007 (Klassen & Locke, 2007). Their food choice, wide temperature variability, salinity tolerance, and phenotypic plasticity make them one of the most proficient invasive species (Young & Elliott, 2020). Their preferred habitats are shallow waters and are normally found in the subtidal and intertidal zones. They also prefer sheltered environments like seagrass, salt marshes, and rocky/sandy bottoms (Klassen & Locke, 2007). They destroy eelgrass beds which are important habitat for many marine species that use them as nurseries and to avoid predation. They outcompete other organisms for food and space and reduces local species' biodiversity (Klassen & Locke, 2007). The salt marshes and eelgrass beds in Bonne Bay are ideal habitats for green crab. Green crab were first discovered in the region in 2009 and their number has increased annually and only plateaued once it reached threshold (Butt, 2017).

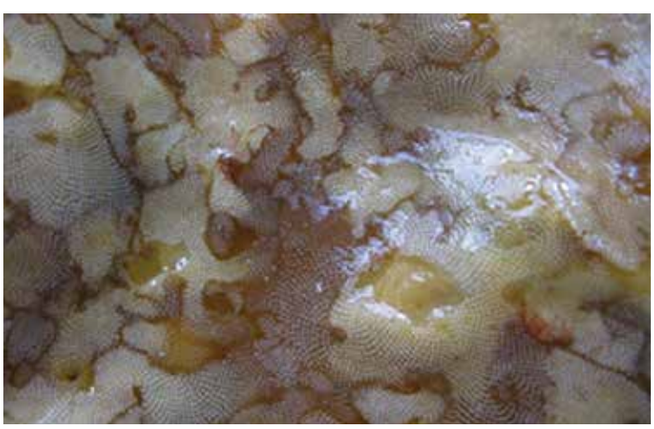
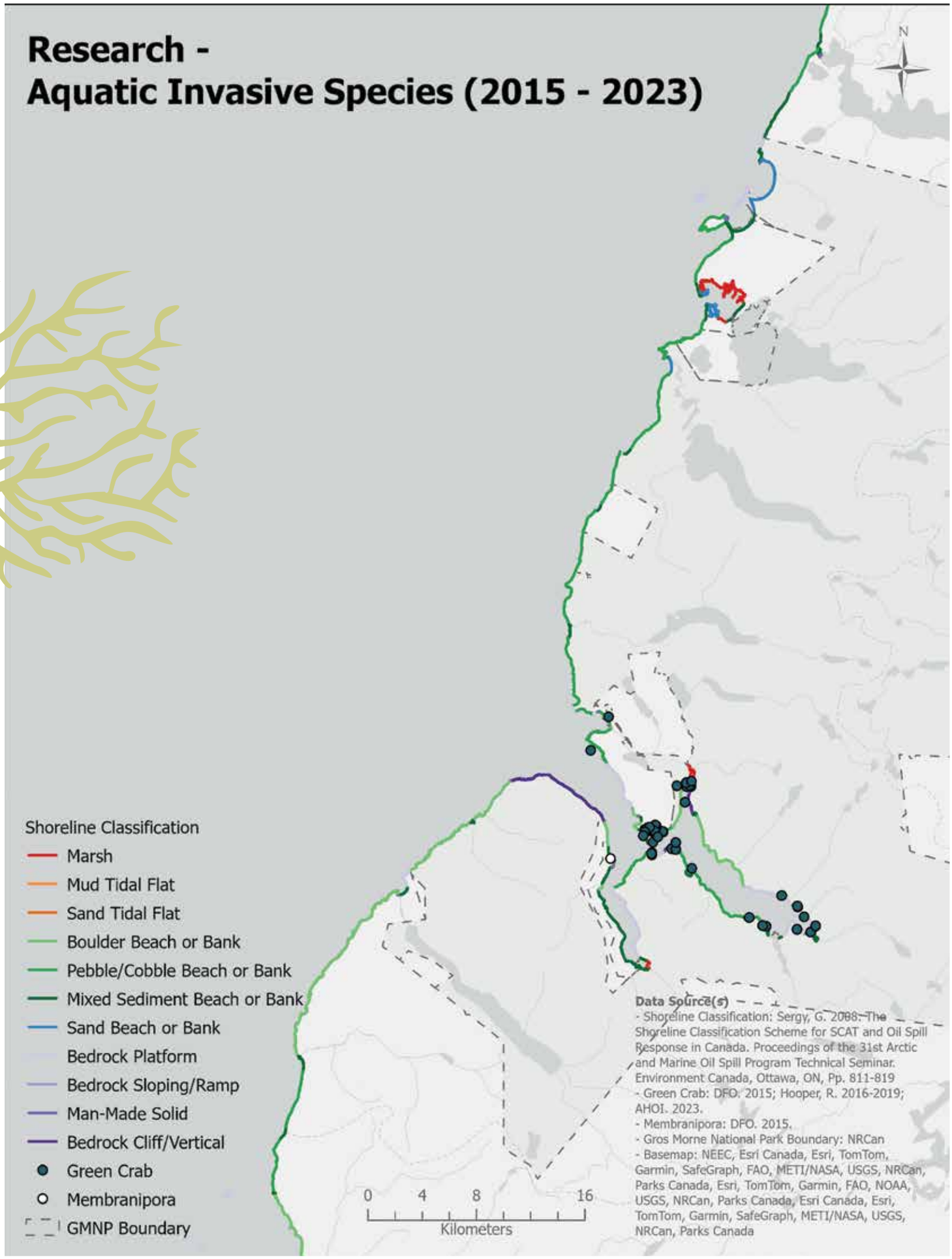


Figure 35 *Invasive Bryozoa - Membranipora on kelp in Bonne Bay. Photo Scott Caines*

Membranipora membranacea or Coffin Box is a bryozoan or tiny invertebrate animal. It is another aquatic invasive species found in Gros Morne. They form colonies on rockweed, kelp, and other seaweed or hard surfaces like boat hulls and can be distinguished by their mesh-like appearance (Figure 35). It was first found in eastern Canada in the 90's and in NL in 2002 (Caines & Gagnon, 2012 . It grows best in areas with strong currents or good tidal water exchanges. Coffin Box Bryozoan are considered AIS (Aquatic Invasive Species) because their colonies can entirely cover a blade of kelp or other seaweed species, preventing it from absorbing nutrients, making it extremely brittle and more susceptible to demise from the strong wave action (DFO, 2011a). Coffin Box can also prevent spore release by the kelp and will reduce the amount of light available for photosynthesis by the seaweed thus reducing the growth rate or entirely killing this marine species and ecosystem on which many juvenile fish and marine species depend in coastal environments (DFO, 2011a).

Photo credit: *Scott Leslie*



Map 12 *Research done showing various shoreline classification and aquatic invasive species (green crab and Membranipora) found in the Gros Morne region.*

Figure 36 *School of cunners off wharf in Norris Point. Photo Scott Leslie*

Pelagic species

Pelagic fish can be found in the open ocean between the surface and seafloor. Small pelagic fish species have been called forage or bait fish and form a vital link in the food chain by providing an abundant nutrient source for many larger species, such as tunas, sharks, seabirds, and marine mammals. Small pelagic fish found in the waters surrounding Gros Morne include capelin, herring, and mackerel (Paterson, 2014). Capelin normally spawn on beaches near Trout River, Wild Cove, St. Paul's and Cow Head, though the majority of mature capelin are found offshore in deeper and cooler waters (Hooper & Patey, 1993). These fish often follow migratory patterns that are affected by temperature, reproduction, and food availability (Paterson, 2014).

Map 13 *Small pelagic (capelin and herring) species research that has been conducted in the Gros Morne region where each point represents a research location.*

Demersal species

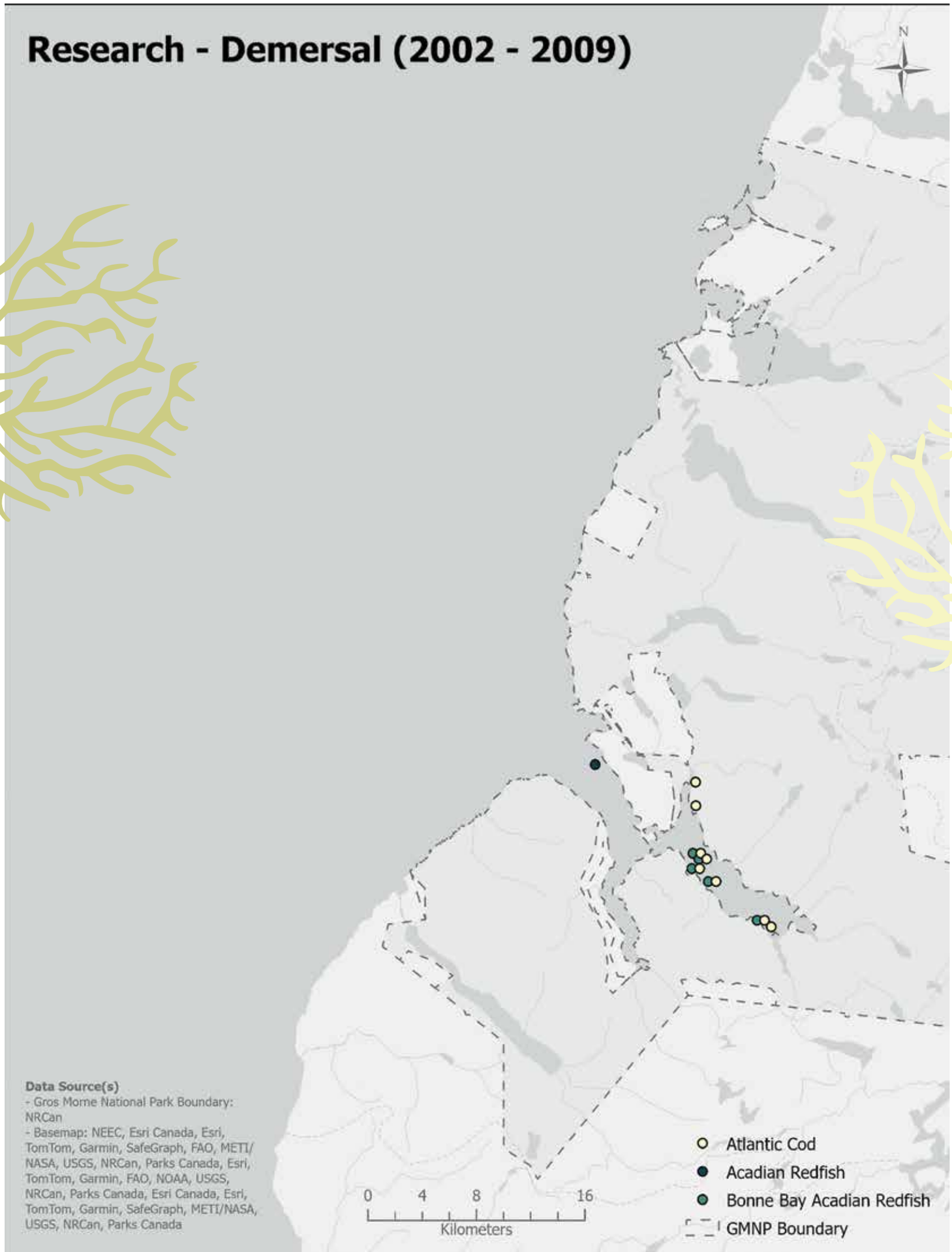
Demersal or "groundfish" live near the bottom of the ocean floor in the demersal zone -- the water column immediately above the seabed. Species found in this zone in the Gros Morne region include Atlantic cod and redfish. Atlantic cod are considered keystone species in their ecosystems and their declines have affected their respective environments (Sodeland et al. 2022).

There are two populations of Acadian redfish *(S. fasciatus)* that inhabit the Gros Morne waters, the Atlantic population and the Bonne Bay population.

The Bonne Bay Acadian Redfish is COSEWIC assessed as a species of special concern (COSEWIC, 2010). In Bonne Bay, cod and redfish are common in zones below 25m as there is a change in water temperature and depth. This layer in the water column allows for a mix of warm and cold water that allow these species to pick their preferred temperature (Hooper, 1975).

Figure 37 *A student from the 2008 BBARS Course (B3714) holding an Atlantic cod. Photo Dr. Joe Wroblewski*

Figure 38 *Redfish (Sebastes sp.) at Gadd's Point in Bonne Bay, NL. Photo Bob Hooper*



Map 14 *Atlantic Cod, Acadian, and Bonne Bay Acadian Redfish research done in the demersal water column in Gros Morne region where each point represents a research location.*

Figure 39 *Winter flounder. Photo Scott Leslie*

Benthic species

Benthic species live in the "benthic zone" on the ocean floor. Some species found in this zone in the Gros Morne region include American lobster *(Homarus americanus)*, Snow crab *(Chionoecetes opilio)*, Atlantic halibut *(Hippoglossus hippoglossus),* Sea scallop *(Placopecten magellanicus)* and shrimp. These species are also important for local and commercial fisheries in the area.

American lobster and snow crab can be found in Newfoundland and Labrador waters and normally inhabit shallow waters in coastal regions in mud, rock bottoms, eelgrass beds, salt marshes, and off-shore in mud-clay bottoms (Milewski, Smith & Lotze , 2021). Lobsters are found in shallow shelves above 30m, like Bonne Bay, since they can survive cold waters but need warm water for a portion of the year (Rogers, 2010). Snow crab populations are only found in the deep outer basins of Bonne Bay (Hooper, 1975).

Shrimp populations are economically and ecologically important for the area, found throughout the waters, their migration is influenced by depths and temperature (NOAA, 2024a). Sea scallops are important to marine ecosystems as they filter the water column and contribute to the seabed and provide habitats for other organisms (NOAA, 2024b). They are both found throughout the waters of Bonne Bay.

Atlantic halibut have a distribution range in the northwestern Atlantic from the Arctic circle to the coast of Virginia and have significant numbers off Newfoundland and Labrador's coasts. Atlantic halibut are one of the most "commercially valuable groundfish in the Atlantic Ocean" (DFO, 2018). The yellowtail flounder *(Pleuronectes ferruginea)* have all been observed in waters surrounding the Gros Morne area.

Map 15 *Benthic species (lobster, snow crab, shrimp, scallop and halibut) research done in Gros Morne region where point count shows research published for a given location and each cluster number represents the amount of research done at identified research location*

Birds

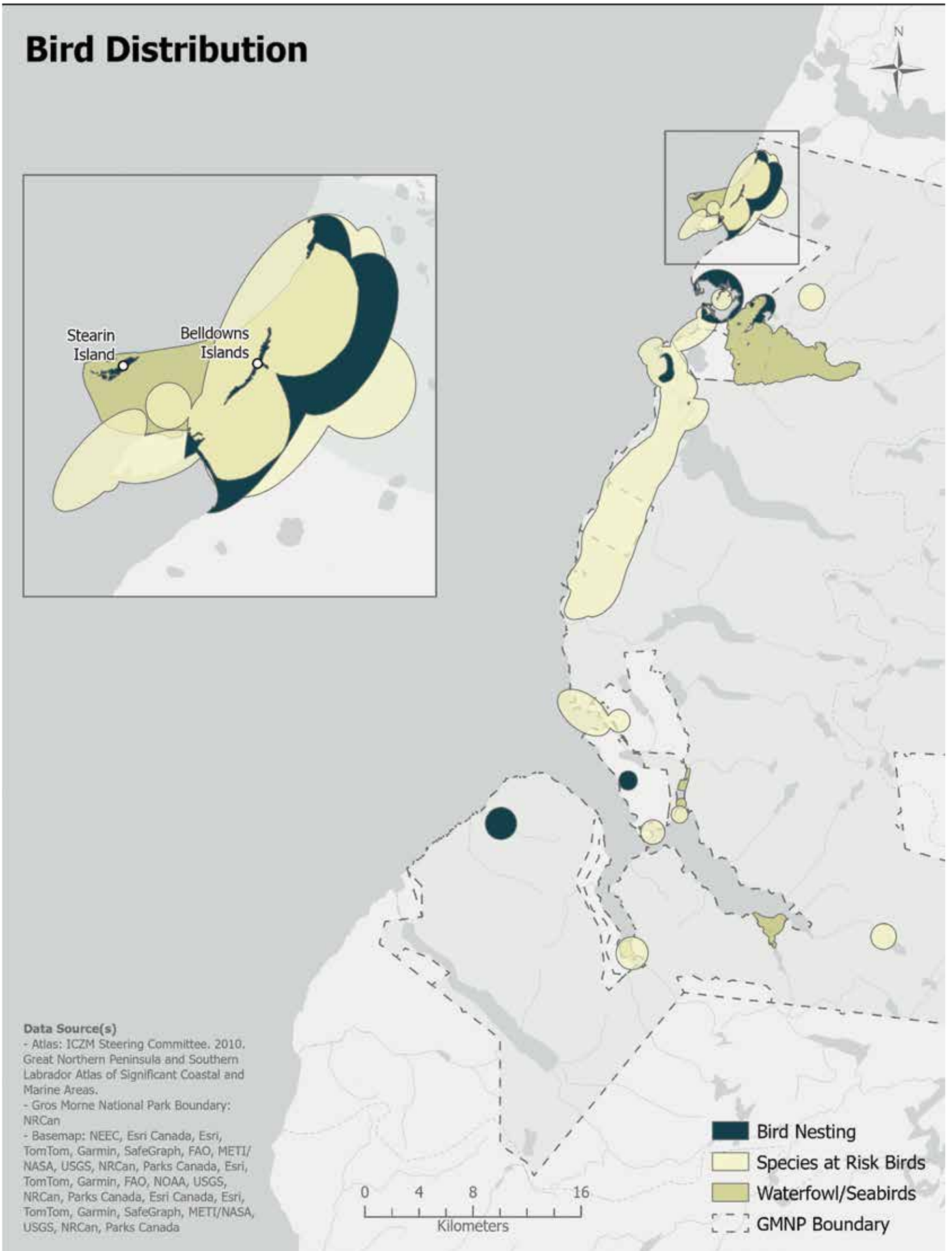
Avian or Bird species are good environmental health indicators due to their sensitivity to ecological changes. Their feeding, breeding and migration patterns are affected by food availability, habitat alteration, and other disruptions. Birds also commonly interact with a number of other species (e.g., plants, insects), and shifts in these interactions can provide information on shifting patterns of biodiversity in an area (Gregory & Strien, 2010). Seabirds and other migratory bird species are commonly found throughout the Gros Morne region.

The sandy beaches of Shallow Bay in Cow Head are an important habitat for the endangered Piping plover *(Charadrius melodus)* population. St. Paul's and the islands within the inlet serve as another important location for migratory seabird populations as it's used as a stop-over location for endangered species, like the Red Knot *(Calidris canutus)*, Buff-breasted sandpiper *(Tryngites subruficollis)*. The area also serves as important nesting grounds for common and Arctic tern *(Sterna paradisaea)*, Caspian tern *(Sterna hirundo)* (Brushett, 2015).

The saltmarsh habitats and bogs surrounding St. Paul's also serve as one of the most important moulting, staging, and wintering areas for waterfowl in the province. These include species like Canada goose *(Branta canadensis)*, American black duck *(Anas rubripe)*, Green-winged teal *(Anas carolinensis)*, and other avian species (Brushett, 2015).

Figure 40 *Spotted sandpiper (Actitis macularius) in its nesting area of Shallow Bay, NL. Photo Visit Gros Morne.*

Map 16 *Areas highlighting various bird and marine mammal research conducted in Gros Morne.*



Map 17 *Combined Brushett (2018) and EAC 2020-2023 mapping results from expert participants on the important habitats for various species of birds.*

Figure 41 *Common minke whale in Bonne Bay. Photo Visit Gros Morne*

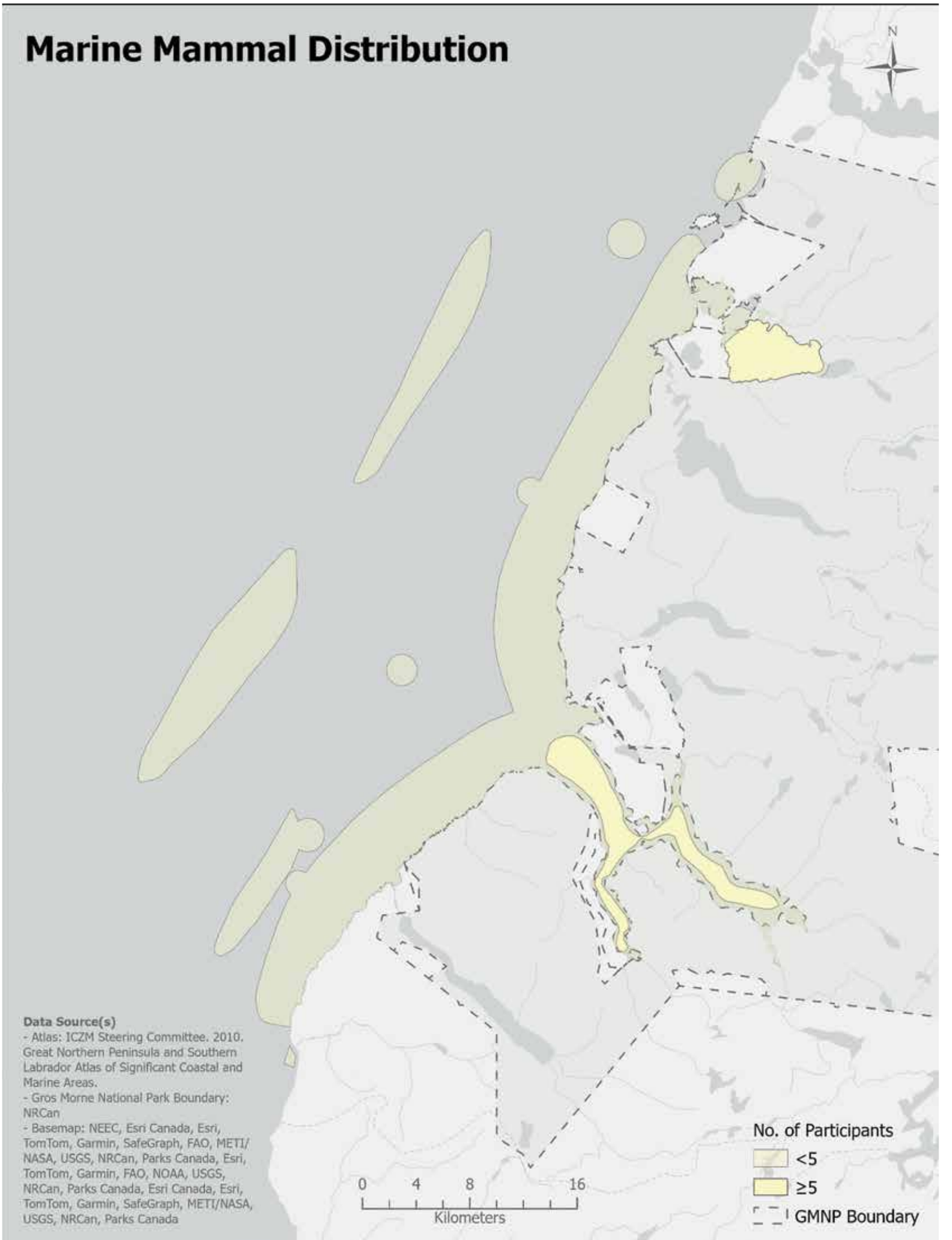
Marine mammals

Marine mammal occurrences have been confirmed by local fish harvesters, tourism operators, local residents, and researchers from BBARS. Species found in the Gros Morne region include Common minke whale *(Balaenoptera acutorostrata),* Humpback whale *(Megaptera novaeangliae),* Harbour seal *(Phoca vitulina)*, Harbour porpoise *(Phocoena phocoena)*, and occasionally White-sided dolphin *(Lagenorhynchus acutus)* (Parks Canada, 2022). The main species that have been researched in the area are Harp seal *(Phoca groenlandic)* and the Common minke whale. Bonne Bay provides harp seals and minke whales with excellent foraging grounds. A rich diversity of zooplankton along with many types of small pelagic fish species in the spring and summer months is what attracts the many types of marine mammals to the area can be found in these waters, which is why there is a high species distribution of these mammals during the summer months (Brushett, 2009).

Marine mammals are important to the marine biodiversity as they provide an essential ecosystem function. When whales surface, they stir the water columns and bring essential nutrients up, providing nutrients for phytoplankton and zooplankton.

Photo credit: *Visit Gros Morne*

Photo credit: *Ecology Action Centre*



Map 18 *Combined Brushett (2018) and EAC 2020-2023 mapping results on marine mammal distribution. The pale shades of yellow indicate less than five participants identified areas where marine mammals have been observed. The darker shades of yellow indicate where more than five have observed marine mammals like minkes, humpback whales or various species of seals.*

Figure 42 *Academic participants who joined EAC's 2020-2021 community engagement session in St. John's, NL. Areas of expertise range from fisheries ecology, fisheries management, marine mammal acoustics, corals, zooplankton, marine policy, social science, cultural perspectives of NL and more.*

Photo credit: *AHOI*

Identifying opportunities for future research

From EAC's community engagement and mapping sessions with social scientists, marine experts, fish harvesters, and First Nations, we identified several opportunities for new or expanded coastal and marine research within the region. This exercise was invaluable and aided in the creation of Map 18, which identifies where experts and knowledge holders felt continued or new research should take place into the future. Once areas were determined on the map, the participants were then asked to list what type of research they felt would be important to focus on. The major research themes are listed below in Table 2 along with the key themes highlighting specific ideas from residents, fish harvesters and experts in the area. Detailed comments on key themes found in Appendix A.

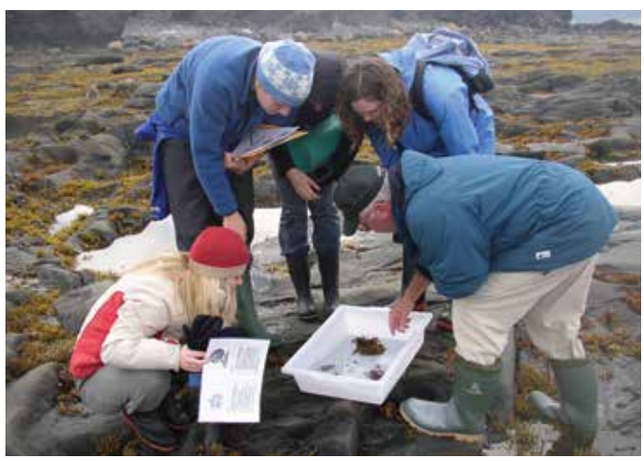


Photo credit: *BBARS*

Map 19 *Areas shaded by participants who attended EACs community engagement mapping sessions from 2020-2023. Each shade represents the number of people who agreed that research should be conducted or continued in respective areas.*

Photo credit: *Visit Gros Morne*

Table 2 Research Opportunities in Gros Morne

Research Topics	Reasons	Area of Study
Aquatic Invasive Species	Green crab presence, invasive species	Bonne Bay, Cow Head, St. Paul's
Climate Change Impacts	Flooding, erosion, storm surge damage	Trout River, Norris Point
Effects of No-Take Zone	Lobster sanctuary	Trout River
General Assessment	Baseline data collection	Lobster Cove Head, Rocky Harbour wharf, Bakers Brook, Millbrook, Back of St. Paul's Inlet
	Ecological significance	Green Point
	Historical/ cultural importance	Stanleyville
	Ultraoligotrophic lake	Western Brook Pond
Genetic Testing on Redfish	Bonne Bay Acadian Redfish	Eastern Arm, the "sill", Gadd's Wall
Habitat Assessment	Corals, species at risk habitats, salinity/ SST and dissolved oxygen (O2)	Bonne Bay and surrounding waters
	Health of eelgrass beds, blue carbon	Bonne Bay, St. Paul's
	Steep submarine cliffs	Bonne Bay
	Ecosystem exploration at deepest point of Bonne Bay ~300m	Eastern Arm of Bonne Bay
Pollution Impacts	Sewage outflows and dump sites	St. Paul's, Bonne Bay, Trout River
	Crab shell/fish dumping by fish plant	Woody Point
Recovery of Lost Fishing Gear	Lost lobster traps	Bonne Bay, Trout River
Species Presence	Fisheries population	Cow Head, Deer Arm, St. Paul's Inlet

Key themes from the community: **Future research opportunities**

- Improve knowledge on what's happening in the fisheries sector and the declining fish stocks; e.g., long-term analysis of a changing climate on important commercial fish stocks.

- Identify innovative opportunities for sustainable, long-term fishery and related work, such as:
  - shrimp shells for biomedical purposes
  - socio-ecological sustainability of the lobster and crab fishery
  - youth recruitment into the fishing sector

- Identify best-fit management techniques to appropriately manage fish stocks and community access:
  - reduce fishing efforts during peak spawning times
  - focus efforts on rebuilding extirpated fish stocks like herring in St. Paul's Inlet
  - encourage inter-generational transfer of commercial licenses

- Use geospatial techniques to map distribution of sensitive marine habitats and species (deep-sea corals, eelgrass, American eel, etc.).

- Develop standardized survey and monitoring techniques to evaluate major changes to our marine habitats over time (eelgrass abundance and distribution, seasonal migration patterns of wolffish (*Anarhichas* spp.) and other species at risk, bycatch impacts from fisheries, etc.).

- Expansion of research in the region to areas outside of Bonne Bay and St. Paul's Inlet (i.e., Trout River cove).

- Build upon historic research to better understand health of species at risk in area (i.e., genetic testing on red fish stocks in region).

Photo credit: *AHOI*

Photo credit: *Dru Kennedy*

Chapter 08

Marine Protection Opportunities for Gros Morne

The Canadian government has renewed commitments to protect 30% of the ocean by 2030, in line with international targets (ECCC, 2022) . If Canada is to achieve marine protection targets, effective community-led marine protection processes will be critical leading up to 2030. In developing MPAs (Marine Protected Areas) and other kinds of protected areas, managers need to negotiate with stakeholders and rightsholders in the area to ensure conflicting interests are balanced. Transparency and inclusion are required from the outset to reduce conflict and enable a successful decision-making process (Chuenpagdee et al., 2012).

The impacts associated with industrial development in wind energy, offshore oil and gas and, open pen finfish aquaculture – as we have seen in other parts of Newfoundland -- means that identifying areas for conservation has never been so important to protect the marine ecosystems we all rely on. Understanding what federally governed marine protected areas can prohibit or protect could be the best step forward to ensure our coastal communities, thriving small-scale fisheries and tourism economy remain prosperous for generations to come.

History of community-led marine protection initiatives throughout Gros Morne

Marine protection is not a new concept for the Gros Morne region. The fish harvesters of Gros Morne have routinely emphasized a preference for low impact fishing methods. Several historical examples illustrate how these communities have come together to safeguard the responsible use of the marine resources they depend on.

First, in the 1900s, a petition circulated after a year of unregulated seining significantly decreased the herring population in Bonne Bay (Foot, 1902, p.8). A large majority, 270 of the total 306 voters, were in support of regulatory enforcements for the herring fishery (Foot, 1902, p.8). In May of 1902, 200 fish harvesters blocked off the main arm of Bonne Bay in boats and forced the seiners to retreat from the bay (Foot, 1902, p.7).

Starting in the 1940s overfishing was ongoing for several decades using various fishing methods including seines, fish harvesters from other regions of Newfoundland and the Gulf were overfishing the

Continued on page 84

Photo credit: *Ecology Action Centre*

St. Paul's Inlet herring stock. In the late 1970s, local fish harvesters initiated the Fishermen's Herring Protection Committee to prevent the exploitation of this stock. Sadly, the St. Paul's Inlet herring stock was decimated before efforts to protect it could be put into action (Kukac et al., 2009). This herring stock never recovered and today no herring have been observed or caught in the Inlet.

In the 1990s, voluntary v-notching, a management measure introduced by the Fisheries Research Conservation Council (FRCC), came to the lobster fishery in western Newfoundland. Lobster harvesters throughout Gros Morne began this practice and some still do it today to sustain the lobster stocks (Lilly, 1996).

The establishment of a voluntary Lobster Area Closure in Trout River Bay (or Trout River Cove, as called by local residents) was initiated by local fish harvesters in 2002 following similar community-led Lobster Area Closures in Newfoundland, including Eastport. In 2010, following the community lead, DFO formally protected Trout River Lobster Area Closure as a marine refuge along with six other Lobster Areas Closures in Newfoundland and Labrador (DFO, 2019). Although the closures prohibit all lobster fishing activities to protect spawning populations and increase egg production, the communities have agreed that no fishing or other activity impacting the lobster spawning area is permitted within the boundaries of this closure (DFO, 2019).

Photo credit: *AHOI*

> V-notching is the practice of snipping a "v" into the telson or tail of a female lobster. This allows the fish harvester to quickly identify the species sex and return it back to the water to spawn rather then harvesting it.

In 2009, a snow crab steering committee formed to address snow crab sustainability. This committee was comprised of multiple harvesters. As part of committee business, an inshore regional council member sent ballots out to all snow crab harvesters in the Gros Morne area to gauge support for a two-year voluntary closure of the 12G crab management area (Neville & Hooper, 2012). Their survey found that 68% of crab harvesters in the area favoured the closure to allow stocks to recover, and the committee sent a proposal for closure to DFO (Neville & Hooper, 2012). The proposal was accepted, and a moratorium was implemented for the 2009 and 2010 fishing seasons. During EAC community engagement meetings, it was clear that the fish harvesters of Gros Morne continue to participate actively in community-led management to look after the health of their important snow crab and lobster stocks.

Formal marine protection in Canada

Frequently held misconceptions about who can establish marine protection and what activities may be banned can lead to hesitancy or even efforts to block conservation in some cases. Although some protected areas may include "no-take" zones, where no fishing is allowed, medium- and low-level protection zones typically allow for the continuation of low-impact economic activities like lobster fishing, recreational angling or marine tourism, for example. Medium and low protection zones prohibit damaging industrial activities while allowing coastal communities to maintain their way of life.

Globally, the term "marine protected area" (MPA) is used colloquially to describe many types of protected areas in the ocean based on a definition developed by the United Nations. In Canada, however, "Marine Protected Area" terminology also refers to a specific type of protected area, indicating management by DFO under the Oceans Act (1996). Marine protection can be voluntarily established by fishing communities in some cases, or formally established by government agencies or Indigenous nations. Most protected areas in Canadian waters are federally managed. These other federal protected area types and governing agencies in Canada are listed in Table 3.

To successfully develop and formalize any form of protected area, it is important to identify the kinds of marine protection best suited for the region and the objectives of protection. These considerations will often point to the governing agency best fit to implement measures required to protect vulnerable marine ecosystems or to safeguard existing cultural pursuits.

Most community participants were hesitant to decide which government agency (e.g., DFO, ECCC) would be best suited for a hypothetical marine protected area in Gros Morne. This was true also of the type of marine protection tool to use. Folks were largely unaware of the pros and cons associated with governing bodies and protection tools. Table 3 breaks down the types of marine protection in Canada and highlights prohibitions and permissions that may be relevant to ocean users in users in Gros Morne and beyond. A similar table was presented to attendees at most of the EAC community engagement sessions during 2020-2023. Having this information available at the sessions did provide some clarity and enhanced the level of support for protection within that group, as community members were able to see which activities could continue and which could not in the region. More work will need to be done by decision makers to ensure community understanding remains strong on the prohibitions, permission and regulations associated with respective protected area types if future protection proposals are to succeed.

Photo credit: *Ecology Action Centre*

Photo credit: *Rebecca Brushett*

Table 3

Table 3 Activities Permitted (or not) in Marine Environments Protected by the Federal Government

Types of Marine Protection	Government Management	Activities that are banned or permitted in each style of protected area					
		Mining/ Oil and Gas Exploration and Extraction	Dumping and Deleterious Substances (ex. antibiotics from finfish aquaculture and sewage)	Bottom Trawling	Coastal and In-water Infrastructure (ex. wind turbines)	Commercial fisheries (ex. traps, pots, mid-water trawl, long-line)	Non-extractive Activities* (ex. commercial tourism, recreational activities)
MPA Marine Protected Areas	DFO Oceans Act	👎	👎	👎	i	i	✓
NMCA National Marine Conservation Area	ECCC/PC Canada National Marine Conservation Areas Act	👎	👎	👎	i	i	✓
NWA National Wildlife Area	ECCC/ CWS Canada Wildlife Act	👎	👎	👎	👎	i	i
OECM Other Effective area-based Conservation Measure	DFO/ ECCC Dependent on location and objectives. Ex. Marine Refuge = Fisheries Act	✓	✓	i	✓	i	✓

** Individual protected area management plans may permit or prohibit activities based on conservation objectives.*

✓ Allowed 👎 Not Allowed i May be allowed, but information needed to ensure activities are sustainable

Figure 43 *Atlantic Wolffish in Bonne Bay. Photo Scott Leslie*

Areas to monitor and protect

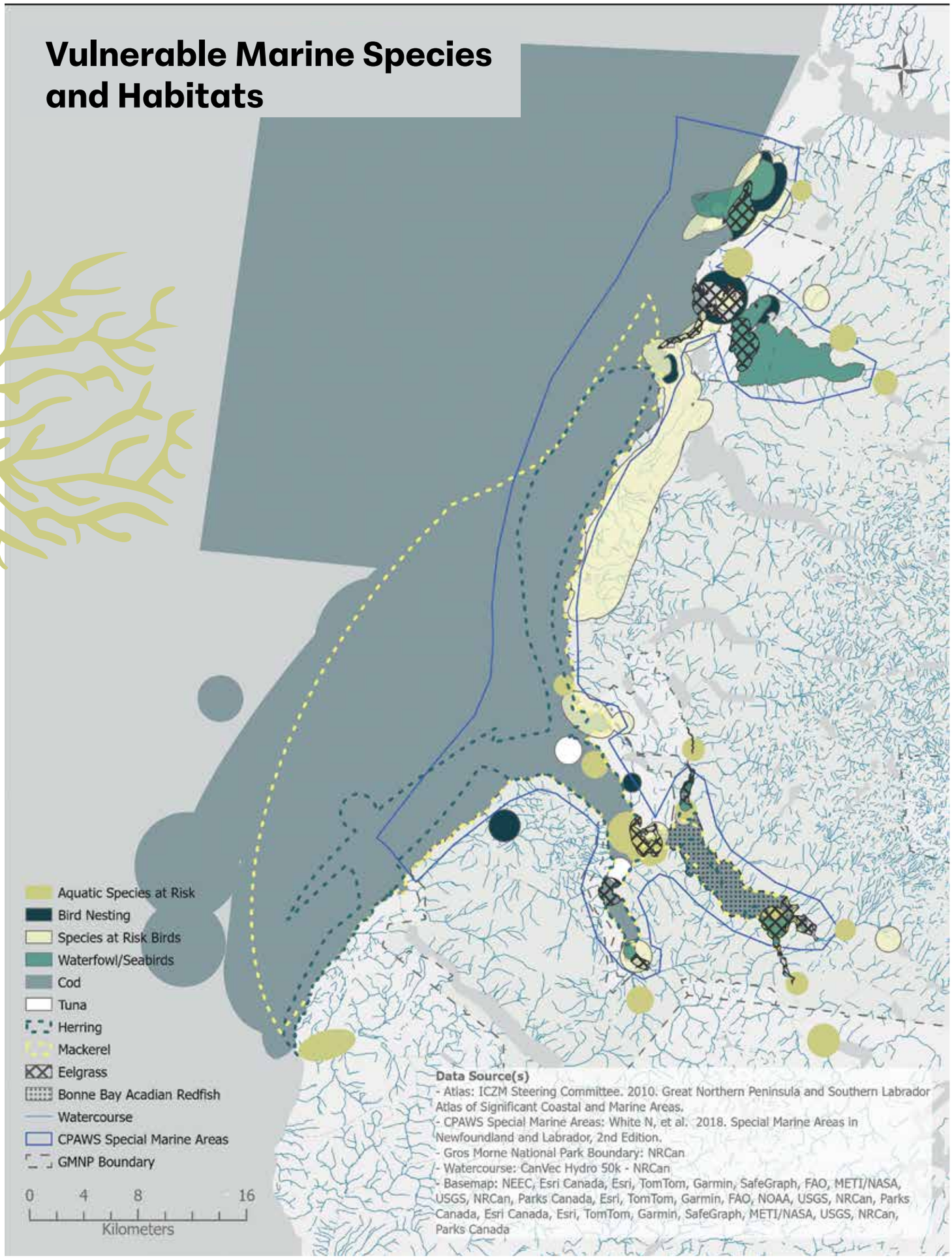
The rich variety of marine biodiversity in the Gros Morne region is widely recognized as unique in Atlantic Canada. The ocean ecosystem consists of important nursery grounds for lobster, cod and other juvenile fish stocks. Habitats range from organically rich, deep-water muddy bottom to steep rock walls teeming with life. Soft Arctic corals, sponges, vast kelp beds, saltmarshes, river estuaries and eelgrass meadows can all be found here. The sheltered fjords of Bonne Bay are home to the genetically distinct Bonne Bay Acadian redfish, various species of wolffish, American eel and other at-risk species, as well as a number of commercially important fish stocks. Migratory birds and marine mammals visit this region to nest and feed each year. Here we look at the areas most important to marine biodiversity and identify important habitats in need of increased conservation measures. Understanding where these areas are and what may be impacting their environmental health can help decision makers plan for both conservation and sustainable development.

Figure 44 *American lobster in eelgrass habitat. Photo Nick Hawkins*

Mapping vulnerable marine species and their habitats

Habitat types and species identified in Map 20 were specially selected for focus based on several criteria, including: (1) vulnerable and at-risk species; (2) key nursery habitats; (3) commercially important fish stocks; and (4) keystone species that support marine biodiversity across trophic levels in the region. This map is intended to provide a comprehensive picture of important biodiversity in the area. This map was produced by combining existing research, traditional ecological knowledge and community input. By combining this data into a single map, a picture of areas for protection consideration begins to emerge. The Canada Parks and Wilderness Society (CPAWS) special marine areas map layer was also included in Map 20 to provide additional insight into previous work conducted on important habitats in the region.

Photo credit: *Rebecca Brushett*



Map 20 *Vulnerable marine species and important habitat for biodiversity found in the Gros Morne region. This map was produced by combining existing research, traditional ecological knowledge and community input from Brushett (2018) and EAC 2020-2023 engagement and mapping sessions.*

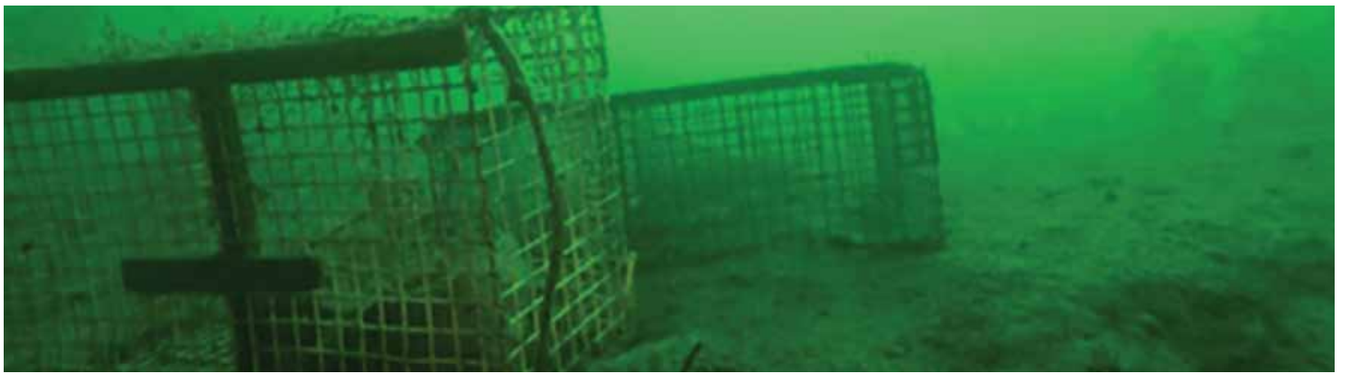


Figure 45 *Lost lobster traps in western, NL (aka Ghost Gear). Picture taken using AHOI's underwater ROV. Photo AHOI*

Areas vulnerable to human impacts

Environmental damage caused by humans, whether direct or indirect, must be managed closely. Climate change is already contributing substantively to increased ocean temperature. Warming seas exacerbate existing challenges, creating heavier storm surge, changes in prey availability, variable spawning times for commercially important fish stocks, and habitat disruption from aquatic invasive species (AIS) introductions like the European green crab. Several areas vulnerable to anthropogenic impacts (i.e., illegal dumping, ghost gear, etc.) were identified in the Gros Morne region and highlighted in Map 21 below.

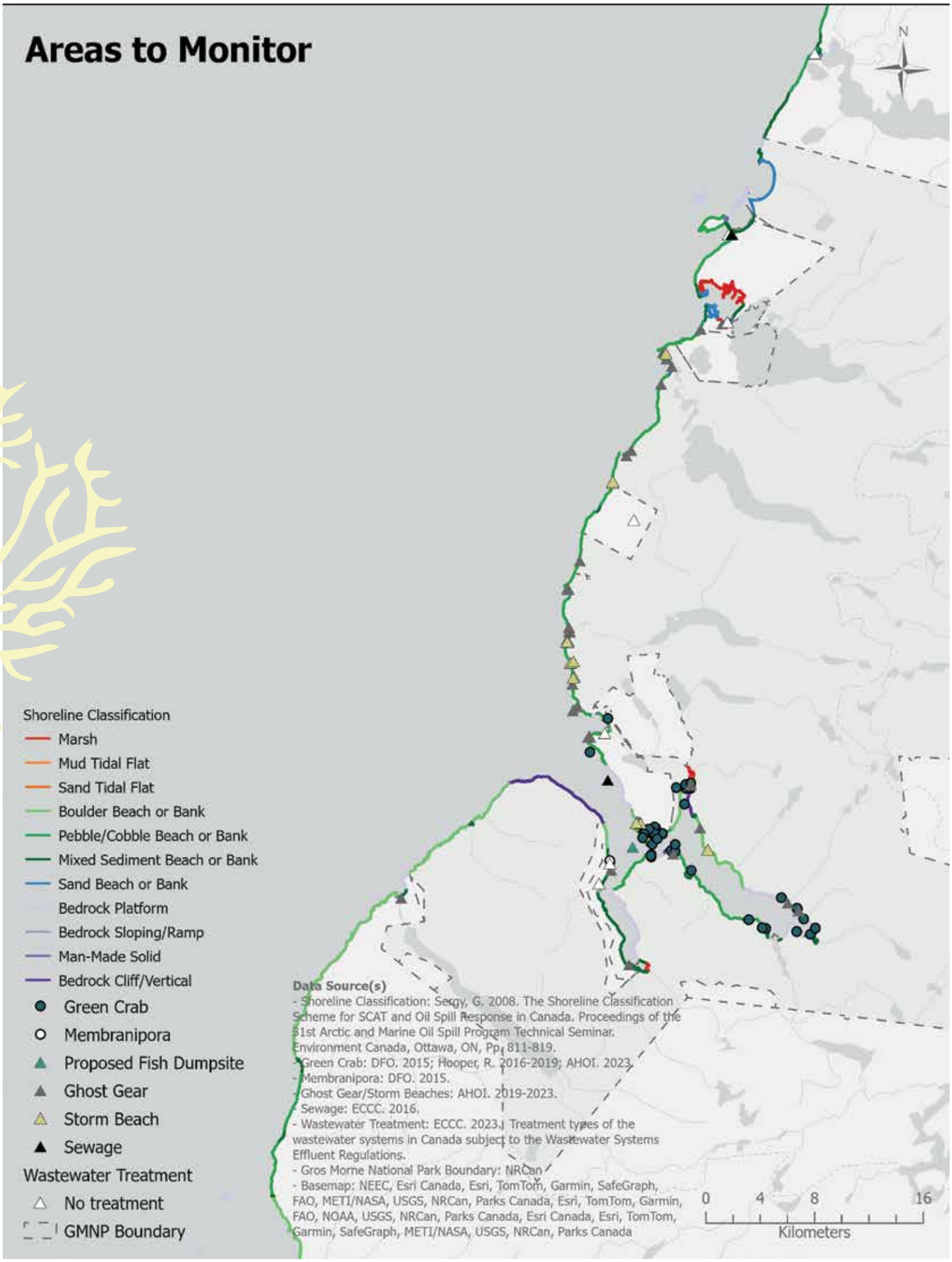
During the 2020-2023 EAC community engagement sessions with fish harvesters, it was suggested that an assessment be done to determine if there is any potential correlation between organic dumping in Bonne Bay and the declining crab population. DFO's Coastal Communities Conservation Opportunities Initiative (CCCOI) 2023 scoping report suggested that ocean floor assessments would be beneficial to understand the negative impacts of dumping at sea, with a particular focus on key benthic species

> In 2015 a proposal was sent to Environment and Climate Change Canada (ECCC) from a local fish plant to deposit 250 tons of crab waste in Bonne Bay (see Map 21). Upon consultation with experts at the Bonne Bay Aquarium and Research Station, the Town of Norris Point wrote a letter of disapproval. The business however was granted a license to dump 50 tons into Bonne Bay each year.
> *-Brushett, 2018*

Figure 46 *Illegal organic waste found dumped in Rocky Harbour, NL. Photo taken using AHOI's underwater ROV in 2022. Photo AHOI*

(DFO, 2023). This sentiment was likewise echoed by many at the EAC community engagement sessions.

Visual data collected through Atlantic Healthy Oceans Initiative surveys has provided invaluable insights into some of the human impacts affecting the waters of Gros Morne. AHOI's remote operated vehicle (ROV) program has identified areas where large amounts of waste are being dumped and where fishing gear has been lost. Through their coastal cleanup program since 2019, AHOI has also identified the locations of "storm-loading" beaches where significant amounts of marine debris accumulate annually. This information is mapped below and was discussed during EAC engagement sessions in 2023. Upon the presentation of AHOI cleanup results, many community members commented about the types and quantity of marine debris collected on the shorelines of their communities. Some residents suggested that fragile coastal landscapes and marine nurseries like eelgrass meadows can be put at risk by poorly managed tourism industries, untreated sewage drainage, large vessel dumping, careless waste disposal and inadequate government intervention. Many in the region suggested proactive mitigation and enforcement measures would be key to reducing impacts from such activities.



Map 21 *Human impacts and aquatic invasive species that have been recorded in the Gros Morne region.*

Figure 47 *Project lead, Rebecca Brushett, chatting with fish harvesters in Cow Head during EAC's 2023 winter community engagement sessions.*

Mapping community support for marine protection in the Gros Morne region

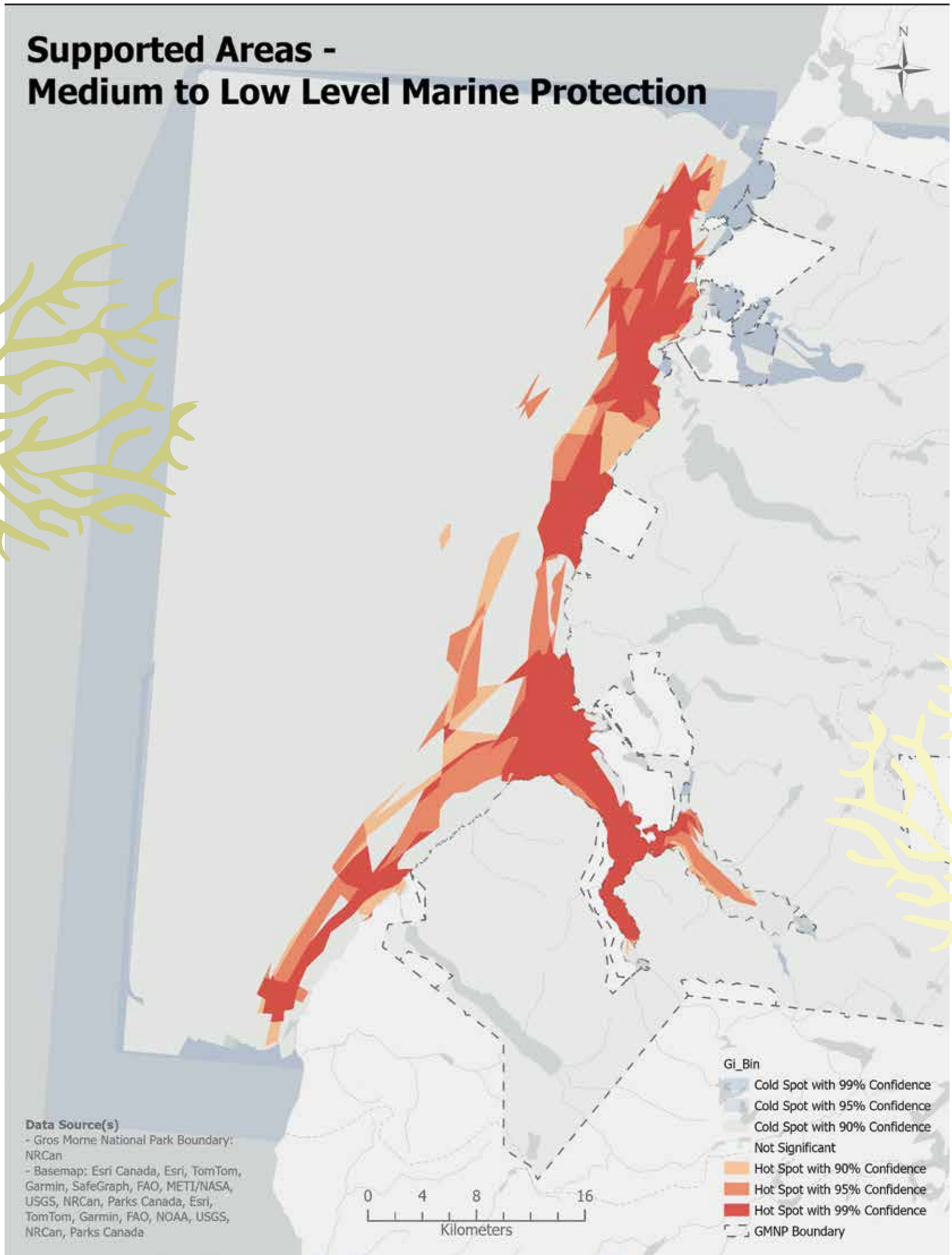
Incorporating environmental values from society in a meaningful way is essential for the success of marine protection initiatives. When marine conservation areas are tailored to meet the local needs, understanding conditions and attitudes of those most affected, positive outcomes are more likely to follow. In this context, social and economic factors can often be the pivotal set of variables for protected area success. Understanding this concept and developing engagement sessions where stakeholders can voice concerns in a safe space has allowed EAC staff to gain valuable information and build long-lasting relationships.

As the engagement process developed in the community, we observed an increasing openness to certain types of marine protection over time. EAC felt the key reason for this shift was consistent two-way knowledge sharing. Describing different types of marine protection and what they could do, outlining who would govern protected areas, and honestly envisioning how they might impact people was essential for building support. Finding and highlighting marine protection methods that would not deny local fish harvesting and tourism livelihoods was consistently identified as most important.

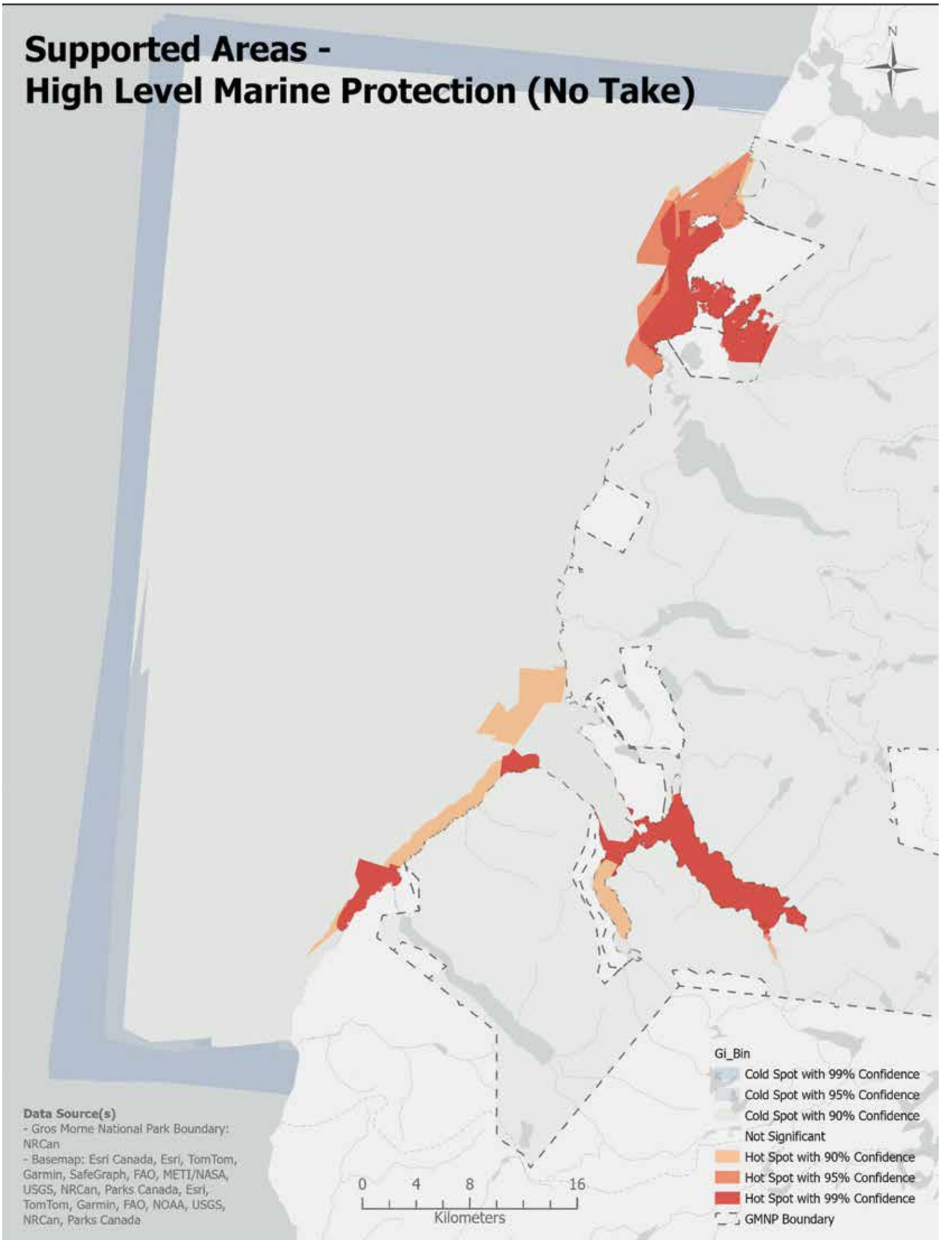
> If marine protection keeps out oil development and I can still fish, then lets protect it all!
>
> *-Norris Point Small Scale Fish Harvester at 2016 Thesis engagement session.*

When community mapping participants understood that federally protected areas could keep out the oil and gas industry while safeguarding small-scale fisheries, many coloured in the entire ocean portion of maps for low-medium protection. The results from this can be seen in Map 22 and 23 as a square grey border "footprint" that surrounds the site in the offshore portions of the ocean. Indeed, once participants understood that nuanced protection levels could keep out harmful industrial activities while maintaining their way of life (as shown in Table 3 above), opinions on protected areas often changed from oppositional to supportive in some cases.

Continued on page 95



Map 22 *Hotspot analysis maps showing areas with community support for medium and low levels of marine protection in the Gros Morne region. Data combines Brushett (2018) and EAC 2020-2023 engagement sessions. Darker red colours indicate more support.*



Map 23 *Hotspot analysis maps showing areas with community support for high levels of marine protection in the Gros Morne region. Data combines Brushett (2018) and EAC 2020-2023 engagement sessions. Darker red colours indicate more support.*

As the global market demands more from the marine resources in our ocean, the people that live and depend on the coastal regions seem ready to protect it more than ever. In Newfoundland, there is a conventional belief that Newfoundlanders -- especially those that directly depend on the ocean for their livelihood -- would resist marine protection. On the contrary, based on the survey results seen in Figure 49 and mapping exercises, EAC has confirmed that over 75% of the participants are ready to explore some form of marine protection while another 10% are unsure but open to continuing the conversation to learn more (Figure 49).

Do you think the Gros Morne Region has potential areas for various level of marine protection?

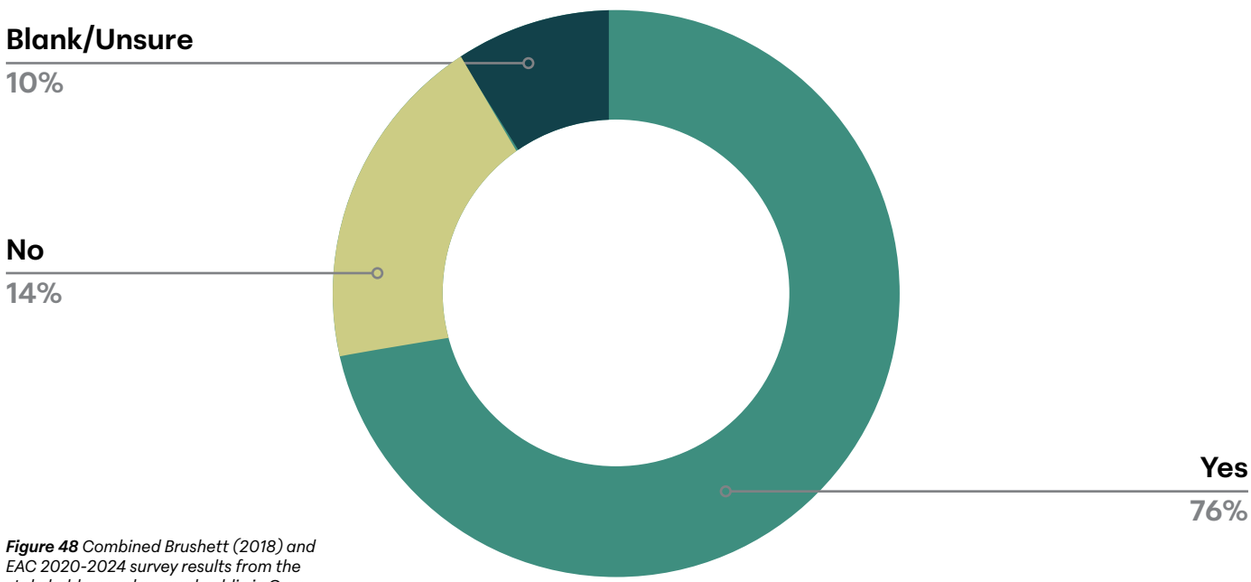


Figure 48 *Combined Brushett (2018) and EAC 2020-2024 survey results from the stakeholders and general public in Gros Morne (N = 189). Results to assess the community's support for some level of marine protection around the Gros Morne region.*

Photo credit: *Ecology Action Centre*

Key themes from the community: **Marine protection**

- Fish Harvesters **want areas protected to help rebuild declining fish stocks but** wish to be able to vote to open and close them to fishing as needed.
- In-depth discussions between **decision makers (DFO / ECCC) and stakeholders will be required** to decide what type of marine protection (if any) fits for Gros Morne.
- **Financial and technical support should be made available** to help during transition towards enhanced marine protection.
- The region is **conflicted on protected area governance.** Some feel DFO is conflicted considering the department's responsibility to manage commercial fisheries; others feel ECCC focuses too much on parks and protection and not enough on growing the economy.
- **Land and sea environments are connected;** many believe in the importance of protecting both in a holistic way.
- More research needs to be done to develop conservation and cultural protection objectives as well as potential economic impacts.

Photo credit: *AHOI*

Photo credit: *Visit Gros Morne*

Conclusion

The Gros Morne Community-led Marine Atlas is a testament to a deep-rooted sense of relationship between people and the sea in western Newfoundland. This work would not have been possible without years of contributions from hundreds of individual participants within the Gros Morne community. The Atlas brings those contributions to life, tying together traditional ecological knowledge, fishing experience, decades of marine research, mapping expertise and more. The final product highlights an incredible range of marine life, Newfoundland and Labrador culture, and ocean activity at Gros Morne. This Atlas is intended as a guide for decision-makers at DFO, Parks Canada and elsewhere, providing insight on how to support communities in the development of a marine plan for the region moving forward. The Atlas placed community voices at the forefront and is a call for the alignment of marine conservation objectives with the values and goals of the people who live, work and play on the water at Gros Morne.

Beyond the inherent value of marine conservation, healthy oceans are a source of economic prosperity, cultural identity, social relation, and individual well-being. Indeed, resilient marine ecosystems support resilient coastal communities. This resilience is particularly crucial in a region like western Newfoundland, where the impacts of climate change, recession, and supply chain shocks can present a significant risk to the small-scale inshore fishing livelihoods and eco-tourism operations that sustain communities. Carefully considered marine planning led by community could catalyze adaptation solutions and new opportunities in sectors such as ecotourism, low-impact fisheries, regenerative aquaculture, conservation management, and ocean research. As has been the case with Gros Morne National Park, the preservation of marine ecosystems and cultural heritage can lead to additional jobs in hospitality and related services and offer new avenues for economic growth through stewardship.

With Canada's ongoing commitment to the advancement of marine protection and blue economy objectives, community-led planning processes offer distinct advantages. We hope the Gros Morne Community Marine Atlas will be an important tool and starting point. Actively involving residents, fishers, stakeholders and rightsholders in decision-making can build trust, foster buy-in, and ensure that results are reflective of community priorities. Our goal in facilitating the Atlas was to empower people as stewards of their marine environment and pave the way for a durable ocean plan to balance conservation, cultural protections, and sustainable economic pursuits. The Atlas charts a course towards a future where thriving communities and healthy marine ecosystems go hand in hand. This path calls for governments to support community leadership in marine planning that contributes directly to national marine protection objectives while ensuring that our coastal communities can continue to prosper.

In conclusion, the Atlas is a symbol of the region's commitment to a sustainable future. The Atlas embodies the principles of collaboration, conservation, and community resilience that are essential for safeguarding Gros Morne's natural ocean treasures and traditional cultures for generations to come. As we move forward, we are encouraging decision makers across levels of government to follow the lead of the people: seizing opportunities for marine protection based on community input; working with local business operators and entrepreneurs to develop sustainable blue economy opportunities; supporting the preservation of traditional ways of life; and ultimately reflecting the values and aspirations of all who call this coastal paradise home.

References

Auster, P.J., Moore, J.K. Heinonen, & L. Watling. (2005). A habitat classification scheme for seamount landscapes: assessing the functional role of deepwater corals as fish habitat. Cold-water Corals and Ecosystems, 761-769.

Banfield, S. (2013). Spatial Variability of Phytoplankton Species Abundance and Species Richness Along the Deer Brook Estuary in Bonne Bay in Gros Morne National Park, Newfoundland and Labrador, Canada [Research Paper]. Bonne Bay Aquarium and Research Station. Memorial University of Newfoundland, Canada.

Brushett, R.D. (2018). Mapping Socio-ecological values: The use of geospatial tools to make informed decisions on the marine and coastal management areas surrounding Gros Morne National Park, Newfoundland [Masters thesis]. Memorial University of Newfoundland.

Brushett, R.D. (2015). Status of the Park Report St. Paul's Inlet, Gros Morne National Park of Canada: Recommendations for the future of marine environment of St. Paul's Inlet, NL [Masters research paper]. Memorial University of Newfoundland.

Brushett, R D., Odd, D., Odeyemi A.S., Mercer, N. (2014). An SDM framework to assess the possibility of sustainable unconventional gas well development in Western Newfoundland, Canada [Masters research paper]. Memorial University of Newfoundland.

Brushett, R.D. (2009). The relationship between marine mammals and their environment in Bonne Bay, Newfoundland [Research paper]. Bonne Bay Marine Research Station, Memorial University of Newfoundland.

Burzynski, M. (2012). [Letter to Steve Bonnell regarding prospect of oil exploration in Bonne Bay]. Retrieved from: https://www.cnlopb.ca/wp-content/uploads/wnlsea/dec2012/micbur.pdf

Butt, M.A. (2017). Bait Selection Study of the Invasive European Green Crab (Carcinus maenas) in Newfoundland, Canada [Masters thesis]. University of Akureyri.

Caines, S., Gagnon, P. (2012). Population dynamics of the invasive bryozoan Membranipora membranacea along a 450-km latitudinal range in the subarctic northwestern Atlantic. Marine Biology 159, 1817–1832. https://doi.org/10.1007/s00227-012-1972-z

Cermeno P., de Vargus C., Abrantes F., Falkowski P.G. (2010). Phytoplankton Biogreography and Community Stability in the Ocean. PloS ONE, 5(4):e10037. https://doi.org/10.1371/journal.pone.0010037

Chuenpagdee, R., Pascual-Fernandez, J.J., Szelianszky, E., Alegrer, J.l., Fraga, J. & Jentoft, S., (2012). Marine protected areas: Re-thinking their inception. Marine Policy, 39, 234-240.

COSEWIC. (2010). COSEWIC assessment and status report on the Deepwater Redfish/Acadian Redfish complex Sebastes mantilla and Sebastes fasciatus in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. X + 80pp.

Costello, M., McCrea, M., Freiwald, A., Lundalv, T., Jonsson, L., Bett, B., van Weering, T., de Haas, H., Roberts, J. M., & Allen, D. (2005). Role of cold-water Lophelia pertusa coral reefs as fish habitat in the NE Atlantic. Cold-water Corals and Ecosystems, 771-805.

CPAWS-NL. (n.d.). Gros Morne National Park. Retrieved 2024 from https://cpawsnl.org/gros-morne-national-park/

Photo credit: *TGM Tours*

Currie, J., Wroblewski, J., Methven, D. & Hooper, R. (2009). The Nearshore Fish Fauna of Bonne Bay, a Fjord within Gros Morne National Park, Newfoundland. Community-University Research for Recovery Alliance (CURRA). Retrieved from http://www.curra.ca/documents/Currie%20et%20al%20CURRA%20Report%20Sept09.pdf

Diggon, S., Bones, J., Short, C.J., Smith, J.L., Dickinson, M., Wozniak, K., Topelko, K., Pawluk, K.A. (2020). The Marine Plan Partnership for the North Pacific Coast- MaPP: A collaborative and co-led marine planning process for British Columbia. Marine Policy, 142. https://doi.org/10.1016/j.marpol.2020.104065

Dodds, R. (2024). Gros Morne Tourism Regional Implementation Project Case Study. Destination Canada. Retrieved from: https://dd.destinationcanada.com/sites/dd/files/inline-file-upload/Gros%20Morne%20tourism%20regional%20implementation%20project%20Case%20Study_Jan%202024_EN.pdf

Edinger, E., Baker, K.D., Devillers, R., Wareham Hayes V.E. (2007). Coldwater corals off Newfoundland and Labrador: Distribution and Fisheries Impacts. WWF Report. Retrieved from https://www.researchgate.net/publication/236952853_Coldwater_Corals_off_Newfoundland_and_Labrador_Distribution_and_Fisheries_Impacts

Environment and Climate Change Canada (ECCC). (2022, December 9). Government of Canada recognizing federal land and water to contribute to 30 by 30 nature conservation goals. News release from ECCC. Retrieved from https://www.canada.ca/en/environment-climate-change/news/2022/12/government-of-canada-recognizing-federal-land-and-water-to-contribute-to-30-by-30-nature-conservation-goals.html

Fisheries and Oceans Canada (DFO). (2011a). Aquatic Invasive Species: Coffin Box in Newfoundland and Labrador Waters. Retrieved from: https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/365565.pdf

Fisheries and Oceans Canada (DFO). (2011b). Social, Economic and Cultural Overview of Western Newfoundland and Southern Labrador. OHSAR Pub. Ser. Rep. NL Region, No.0008: xx + 173p. Retrieved from https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/343358.pdf

Fisheries and Oceans Canada (DFO). (2018). Atlantic Halibut. Retrieved from: https://www.dfo-mpo.gc.ca/species-especes/profiles-profils/atl-halibut-fletan-atl-eng.html

Fisheries and Oceans Canada (DFO). (2019). Lobster Area closures (Trout River, Shoal Point, Penguin Islands, Gooseberry Island, Glovers Harbour, Mouse Island, Gander Bay). List of Marine Refuges. Retrieved from https://www.dfo-mpo.gc.ca/oceans/oecm-amcepz/refuges/lobster-homard-eng.html

Fisheries and Oceans Canada (DFO). (2023). Marine Conservation Opportunities and Priorities for the Gros Morne Region. CCCOI Scoping Document.

Fisheries and Oceans Canada (DFO). (2024). Redfish Unit 1 Fishery. Retrieved from: https://www.canada.ca/en/fisheries-oceans/news/2024/01/redfish-unit-1-fishery.html

Foldger, P., Tiemann, M. & Bearden, D.M. (2012). The EPA Draft Report of Groundwater Contamination Near Pavillion, Wyoming: Main Findings and Stakeholder Responses. CRS Report for Congress. Retrieved from https://yosemite.epa.gov/oa/eab_web_docket.nsf/Filings%20By%20Appeal%20Number/10DEE3CA2F6DDB0D85257CD30065DD85/$File/Attachment%208%20Draft%20Report...1.08.pdf

Foot, F. (1902, April 9). Uprising against seines in Bonne Bay. The Western Star, p.8.

Foot, F. (1902, May 7). No seins to be used in Bonne Bay. The Western Star, p.7.

Government of Canada. (2024). Regional Assessment of offshore wind development in Newfoundland and Labrador. Impact Assessment Registry. Retrieved from: https://iaac-aeic.gc.ca/050/evaluations/proj/84343?culture=en-CA

Gregory, R. D., & Strien, A. van. (2010). Wild Bird Indicators: Using Composite Population Trends of Birds as Measures of Environmental Health. Ornithological Science, 9(1), 3–22. https://doi.org/10.2326/osj.9.3

Hanz, U., Riekenberg, P., de Kluijver, A., van deer Meer, M., Middelburg, J.J., de Goeij, J.M., Bart, M.C., Wurz, E., Colaço, A., Duineveld, G.C.A., Reichar, G.J., Tore Rapp, H., Mienis. F. (2022). The important role of sponges in carbon and nitrogen cycling in deep-sea biological hotspot. Functional Ecology, 36(9) 2188-2199. https://doi.org/10.1111/1365-2435.14117

Heritage Newfoundland and Labrador. (n.d.). Maritime Archaic. Heritage Newfoundland and Labrador. Retrieved March 14, 2025, from https://www.heritage.nf.ca/articles/indigenous/maritime-archaic.php

Hooper, R. (1975). Bonne Bay Marine Resources [Map]. Volume II. Memorial University of Newfoundland, Canada.

Hooper, R. (1982). Bonne Bay Marine Resources [Map]. Volume III. Memorial University of Newfoundland, Canada.

Hooper, R. & Patey, D. (1993). Environmental review of the marine intertidal zone of the northern section of Gros Morne National Park. Memorial University of Newfoundland, Canada.

International Commission for the Conservation of Atlantic Tuna (ICCAT). (2023). Executive Summary on Blue Fin Tuna. ICCAT Report. Retrieved from: https://www.iccat.int/Documents/SCRS/ExecSum/BFT_E_ENG.pdf

Katwijk, M.M., Bos, A.R., Jonge, V.N., Hanssen, L., Hermus, D.C.R., Jong, D.J. (2009). Guidelines for seagrass restoration: Importance of habitat selection and donor population, spreading of risks, and ecosystem engineering effects. Marine Pollution Bulletin. 58(2), 179-188. doi. 10.1016/j.marpolbul.2008.09.028

Kent, M. (2012). Parks Canada input into the 2012 C-NLOPB for the Western Newfoundland and Labrador Offshore Area Strategic Environmental Assessment update. Western Newfoundland and Labrador Field Unit. Parks Canada. Retrieved from https://www.cnlopb.ca/wp-content/uploads/wnlsea/sept2013/parcan.pdf

Klassen, G. & Locke, A. (2007). A biological synopsis of the European green crab, Carcinus maenas. Canadian Manuscript Report of Fisheries and Aquatic Sciences no. 2818, vii+75pp.

Kukac, J. (2009). Capturing the importance of natural resources and future activities in St. Paul's, Newfoundland [Master's thesis]. Memorial University of Newfoundland.

Kukac, J., Korneski, K., & Chuenpagdee, R. (2009). St. Paul's: Past Present Future [Community handbook]. Memorial University of Newfoundland. Community University Research for Recovery Alliance (CURRA). Retrieved from http://www.curra.ca/governance_st_pauls_inlet.html

Lilly, G.R. (1996). Growth and condition of cod in subdivision 3Ps as determined from trawl surveys (1972-1996) and sentinel surveys (1995). DFO Atlantic Fisheries Research Document 1996/069. Retrieved from: https://www.dfo-mpo.gc.ca/csas-sccs/publications/resdocs-docrech/1996/1996_069-eng.htm

McGee, G., Byington, J., Bones, J., Cargill, S., Dickinson, M., Wozniak, K., & Pawluk, K. A. (2022). Marine Plan Partnership for the North Pacific Coast: Engagement and communication with stakeholders and the public. Marine Policy, 142, 104613-. https://doi.org/10.1016/j.marpol.2021.104613

McKeown, D. (1992). Observations of Gros Morne Marine Systems during August-Sept 1992 [Research Paper]. Bonne Bay Aquarium and Research Station, Memorial University of Newfoundland, Canada.

Melanson, R.L. & Campbell, E. (2012). Near-shore fish populations within St. Paul's Inlet an estuarine system in western Newfoundland. Northeastern Naturalist, 19 (3), 487-500. https://www.jstor.org/stable/41684256

Mercer, N. (2022, April 22). Lipstick being put on a pig: Wind power researcher suspicious of government's motives or lifting ban. CBC News. Retrieved from: https://www.cbc.ca/news/canada/newfoundland-labrador/wind-power-nick-mercer-1.6411972

Milewski, I., Smith, R. E., & Lotze, H. K. (2021). Interactions between finfish aquaculture and American lobster in Atlantic Canada. Ocean & Coastal Management, 210, 105664-. https://doi.org/10.1016/j.ocecoaman.2021.105664

Mullins, C.C., Caines, D. & Lowe, S.L. (2001). Status of the Atlantic salmon stocks of Lomond River, Torrent River and Western Arm Brook, Newfoundland, 2000. Canadian Science Advisory Secretariat research document, 1480-4883. https://publications.gc.ca/site/eng/9.806736/publication.html

National Oceanic and Atmospheric Administration (NOAA). (2024a). Atlantic Northern Shrimp. Species Directory. Retrieved from: https://www.fisheries.noaa.gov/species/atlantic-northern-shrimp

National Oceanic and Atmospheric Administration (NOAA). (2024b). Atlantic Sea Scallop. Species Directory. Retrieved from: https://www.fisheries.noaa.gov/species/atlantic-sea-scallop/overview

Photo credit: *TGM Tours*

Photo credit: *Ecology Action Centre*

Neis, B. & Ommer, R. (2014). Building economically, socially and ecologically resilient fisheries and coastal communities: A policy paper. Community-University Research for Recovery Alliance (CURRA). Memorial University of Newfoundland. Retrieved from http://research.library.mun.ca/id/eprint/8432

Neville, V., & Hooper, R.G. (2012). Effect of A Voluntary Fishing Moratorium on an Inshore Stock of Snow Crab [Research Report]. Memorial University of Newfoundland.

Normore, A. (2015, Oct 13). [Letter to Mr Gosine on the Opposition of potential fracking in Bonne Bay]. Retrieved from: http://nlhfrp.ca/wp-content/uploads/2015/01/A.-Normore-Final-Submission.pdf

Obaza, A., Hoffman, R., Clausing, R. (2015). Long-term stability of eelgrass fish assemblages in two highly developed coastal estuaries. Fisheries Management and Ecology, 22, 224-238. doi. 10.1111/fme.12119

Oceans Act (1996, c.31). Retrieved from the justice laws website: https://laws-lois.justice.gc.ca/eng/acts/o-2.4/

Oreska, M.P.J., McGlathery K.J., Aoki, L.R., Berger, A.C., Berg, P., Mullins, L. (2020). The greenhouse gas offset potential from seagrass restoration. Nature-Scientific Reports, 10, 7325. doi.10.1038/s41598-020-64094-1

Opanubi, A. (2009). The morphology, physiology, and habitat of deep water seaweeds [Research report]. Memorial University of Newfoundland.

Parks Canada (2019). Gros Morne National Park of Canada Management Plan. Retrieved from https://parks.canada.ca/pn-np/nl/grosmorne/info/plan/gestion-management-2019

Parks Canada (2022). Wildlife: Gros Morne National Park. Retrieved from: https://parks.canada.ca/pn-np/nl/grosmorne/nature/vie-wildlife

Paterson, B. (2014). Study of the small pelagic fisheries for Atlantic herring and Atlantic mackerel on the west coast of Newfoundland (NAFO Division 4R). Community-University Research for Recovery Alliance (CURRA).

Richardson, A.J. (2008). In hot water: zooplankton and climate change. ICES Journal of Marine Science, 65(3), 279-295. https://doi.org/10.1093/icesjms/fsn028

Rogers, K. (2010). Examining the local lobster {Homarus americanus) stock of Bonne Bay, Newfoundland utilizing an interdisciplinary approach [Masters thesis]. Memorial University of Newfoundland.

Shea, J.C. (2009). The kelp found within Bonne Bay Newfoundland and their distribution [Research report]. Bonne Bay Marine Station, Memorial University of Newfoundland.

Shukla, K.K. (2022). Importance of Phytoplankton and their impact to the Global Ecosystem: An Overview. Int. J. of Pharm. & Life Sci., 13(3), 22-25. https://www.ijplsjournal.com/issues%20PDF%20files/2022/March-2022/3.pdf

Smallwood, J.R., Pitt, R.D.W. (1981). Encyclopedia of Newfoundland and Labrador (Vol.1). Newfoundland Book Publishers (1967) Ltd. Retrieved from https://dai.mun.ca/PDFs/cns_enl/ENLV1B.pdf

Smith, J.R. (2016). When petro-capitalism comes knocking: community interpretations and responses to the Gros Morne fracking controversy [Master's thesis]. Memorial University of Newfoundland.

Sodeland, M., Jentoft, S., Jorde, P. E., Mattingsdal, M., Albretsen, J., Kleiven, A. R., Synnes, A.-E. W., Espeland, S. H., Olsen, E. M., Andrè, C., Stenseth, N. C., & Knutsen, H. (2022). Stabilizing selection on Atlantic cod supergenes through a millennium of extensive exploitation. Proceedings of the National Academy of Sciences - PNAS, 119(8), 1–9. https://doi.org/10.1073/pnas.2114904119

Stevens, E.N. (2017). A biological assessment of zooplankton in St. Paul's inlet, an estuarine environment in Gros Morne National Park, Newfoundland [Masters thesis]. Memorial University of Newfoundland.

Stevens, E.N., Melanson, R. L. & Campbell, E. (2010). St. Pauls Inlet: a biological re-assessment of zooplankton and fish populations within an estuarine system in Western Newfoundland [Research report]. Memorial University of Newfoundland. Retrieved from https://www.academia.edu/1479504/St._Pauls_Inlet_a_biological_re-assessment_of_zooplankton_and_fish_populations_within_an_estuarine_system_in_Western_Newfoundland

Temple, K., Neis, B., Ryan, M., Brownrigg, P. & Chuenpagdee, R. (2010). Opportunities for sustainable livelihoods in the southwest coast lobster fishery. Community-University Research for Recovery Alliance (CURRA). Retrieved from http://www.curra.ca/documents/Sustainable_Lobster_Fishery_Report_December_21_2010_Final_revised.pdf

Tuck, J. (2022). Beothuk. In The Canadian Encyclopedia. Retrieved from https://www.thecanadianencyclopedia.ca/en/article/beothuk

UNESCO. (2019). Decision: 42 COM 7B.73. Gros Morne National Park (Canada) (N 419). Retrieved from https://whc.unesco.org/en/decisions/7302

UNESCO-IOC & European Commission. (2021). MSP global International Guide on Marine/Maritime Spatial Planning. Paris, UNESCO. IOC Manuals and Guides, 89(144).

Vannini, P. & Vannini, A. (2018). Re-animating Gros Morne's storyless space: from natural heritage to ecological heritage. Area. (52)213-222. https://doi.org/10.1111/area.12533

Vernberg, F.J. (1993). Salt-marsh processes: a review. Environmental Toxicology and Chemistry, 12(12), 2167-2195. https://doi.org/10.1002/etc.5620121203

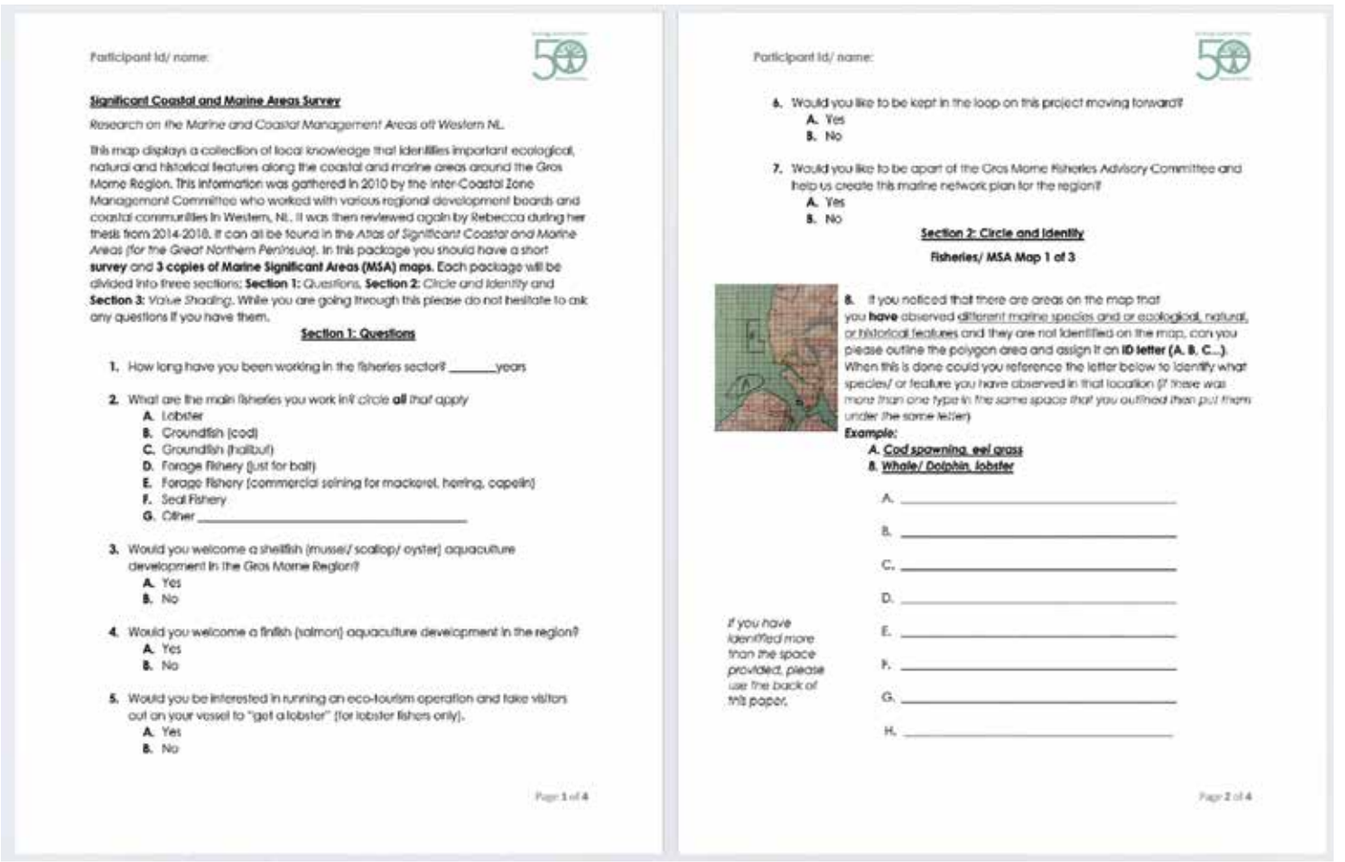
Walker, J., Mitchell, B., Wismer, S. (2001). Livelihood strategy approach to community- based planning and assessment: a case study of Molas, Indonesia. Impact Assessment and Project Appraisal, 19(4) 297-309. https://doi.org/10.3152/147154601781766925

Wall, M. (1999). The lived experience of fishers through the cod moratorium in Newfoundland [Masters thesis]. University of British Columbia. doi:10.14288/1.0053930

Warpinski, N. R., Wolhart, S. L., & Wright, C. A. (2004). Analysis and prediction of micro seismicity induced by hydraulic fracturing. Society of Petroleum Engineers Journal, 9(1), 24- 33. http://dx.doi.org/10.2118/87673-PA

Young, A.M., Elliott, J.A. (2020). Life History and Population Dynamics of Green Crabs (Carcinus maenas). Fishes, 5(1), 4. https://doi.org/10.3390/fishes5010004

Appendix A



Participant Id/ name:

Significant Coastal and Marine Areas Survey

Research on the Marine and Coastal Management Areas off Western NL.

This map displays a collection of local knowledge that identifies important ecological, natural and historical features along the coastal and marine areas around the Gros Morne Region. This information was gathered in 2010 by the Inter-Coastal Zone Management Committee who worked with various regional development boards and coastal communities in Western, NL. It was then reviewed again by Rebecca during her thesis from 2014-2018. It can all be found in the *Atlas of Significant Coastal and Marine Areas (for the Great Northern Peninsula)*. In this package you should have a short **survey** and **3 copies of Marine Significant Areas (MSA) maps.** Each package will be divided into three sections: **Section 1:** *Questions*, **Section 2:** *Circle and Identify* and **Section 3:** *Value Shading*. While you are going through this please do not hesitate to ask any questions if you have them.

Section 1: Questions

1. How long have you been working in the fisheries sector? _____years
2. What are the main fisheries you work in? *circle* **all** *that apply*
   - **A.** Lobster
   - **B.** Groundfish (cod)
   - **C.** Groundfish (halibut)
   - **D.** Forage fishery (just for bait)
   - **E.** Forage fishery (commercial seining for mackerel, herring, capelin)
   - **F.** Seal Fishery
   - **G.** Other _____
3. Would you welcome a shellfish (mussel/ scallop/ oyster) aquaculture development in the Gros Morne Region?
   - **A.** Yes
   - **B.** No
4. Would you welcome a finfish (salmon) aquaculture development in the region?
   - **A.** Yes
   - **B.** No
5. Would you be interested in running an eco-tourism operation and take visitors out on your vessel to "get a lobster" (for lobster fishers only).
   - **A.** Yes
   - **B.** No

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Participant Id/ name:

6. Would you like to be kept in the loop on this project moving forward?
   - **A.** Yes
   - **B.** No
7. Would you like to be apart of the Gros Morne Fisheries Advisory Committee and help us create this marine network plan for the region?
   - **A.** Yes
   - **B.** No

Section 2: Circle and Identify

Fisheries/ MSA Map 1 of 3

8. If you noticed that there are areas on the map that you **have** observed different marine species and or ecological, natural, or historical features and they are not identified on the map, can you please outline the polygon area and assign it an **ID letter (A, B, C...)**. When this is done could you reference the letter below to identify what species/ or feature you have observed in that location (*if there was more than one type in the same space that you outlined then put them under the same letter*)

Example:

A. Cod spawning, eel grass

B. Whale/ Dolphin, lobster

A. _____

B. _____

C. _____

D. _____

E. _____

F. _____

G. _____

H. _____

If you have identified more than the space provided, please use the back of this paper.

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Figure 49 *Screenshot of sample survey provided at EAC engagement and mapping workshops.*

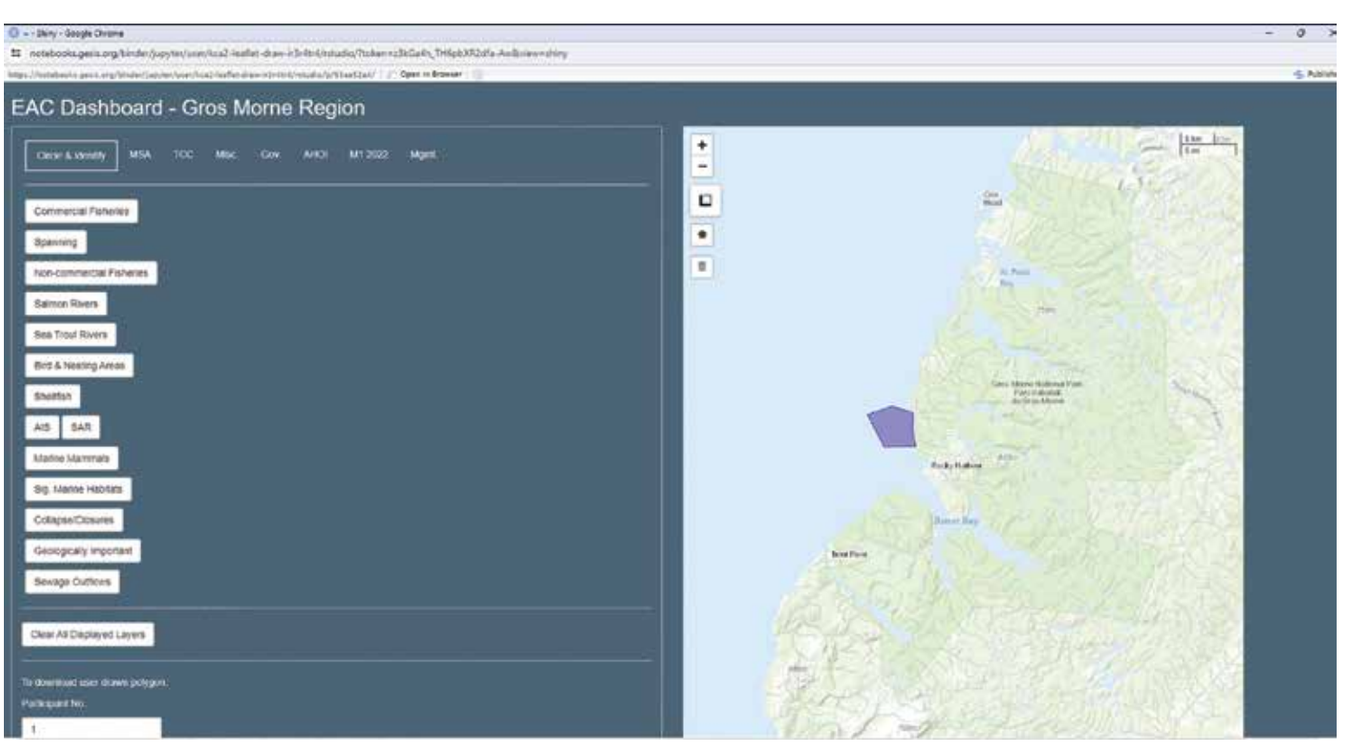

Figure 50 *Screen shot of participatory mapping tool created for EAC mapping sessions*

Appendix B

Photo credit: *Rebecca Brushett*

Expansion of Key Themes from the Region Over the Years

Commercial and Recreational Fisheries
Relationships need to be established with fish harvesters (not unions) directly effected by DFO management decisions to improve trust and transparency. ▪ DFO and other decision makers must improve transparency and communication in a timely fashion with appropriate fish harvesters and coastal community representatives. ▪ Many expressed issues with fisheries management and unfair allocations of various fishing licenses (crab, capelin, lumpfish, redfish, turbot, crab, shrimp and lobster). ▪ Government needs to engage in a meaningful way with those most at stake. Appropriate fish harvester reps (not just FFAW) should review all 50 fish stocks not just a select few to reduce fishing pressure on declining stocks.
Increased capacity and funding needing to improve monitoring and enforcement efforts that will deter illegal and damaging activities to our important fish stocks (i.e. lack of bycatch monitoring and illegal fishing practices by large seiners, over-harvesting concerns). ▪ Lack of monitoring for bycatch from the seining fishery. Comments about lack of monitoring of the forage fishery, and seines setting fixed fishing gear closer to the ocean floor. ▪ Undersized Greenland and Atlantic Halibut being caught and lack of enforcement to look after health of both stocks.

Continued on page 106

Commercial and Recreational Fisheries

Fisheries need to be managed for the future prosperity of our rural NL communities and in a more sustainable and innovative way.

- Processing of fish stocks should take place in the regions the resource is being harvested from to improve economic stability in rural coastal communities (ie. shrimp).
- Many uncertain about future of fisheries in NL and state focus needs to be on responsible fishing practices. (i.e. review gear types used in region and opportunities to use options that rebuild fish stocks and improve fish quality. Seines and trawling vs trap, longline or gillnet).
- Expansion of commercial licenses and recreational fishing needs to be reduced until stocks are healthy and adjacent communities' needs are fully met.
- Policies in the fishery need to change in order to make it a more profitable industry (2009).
- Inter-generational transfers should be encouraged not heavily taxed to deter and financially burden fishers and limit the amount of licences/ per fish harvester to spread the wealth.
- Inshore fishery is the backbone of rural NL. Vital to economic sustainability and population retention of coastal communities in rural NL.
- Create or improve ecolabelling and fairtrade labels to help the consumer better understand where their fish is coming from, if they were caught sustainably, etc.
    - DFO support for labelling in the lobster fishery.
    - Price products based on premium fair-trade standards
- Sustain the economically and culturally important small-scale fisheries in Gros Morne was a priority expressed by many attendees, including local fish harvesters.
- Find new avenues to ensure retention and growth of the fisheries sector (tourism, education, selling locally, aquaculture etc.).
    - Identify other non-traditional commercial fishing opportunities (sea urchin, kelp).
- This fishery closure (Atlantic mackerel) provides an opportunity to explore alternatives for bait for trap fisheries to reduce costs to small-scale fish harvesters and decrease carbon emissions associated with waste disposal.
- Innovative ideas need to be well tested to ensure it doesn't do more harm than good both environmentally and economically (i.e. Whale-safe gear contributing to the ghost gear issue).

Conservation efforts needed to protect community identity, culture and the recovery of important fish stocks.

- Create TACs that support stock recovery (i.e. premature reopening of cod fishery in 1995, TAC of Witch Flounder didn't support stock recovery).
    - Reduce fishing effort at the commercial and recreational level for declining fish stocks.
    - Choose appropriate minimum size measures to effectively rebuild declining fish stocks.
- Close fishing areas during peak spawning seasons. Without strong management to implement this, greed will rival conservation in the industry.
- Create seal exclusion zones and improve management plans for the seal harvest. Market this as a sustainable fishery and erase the stigma at the international level.
- Suggestions to increase efforts to assess impacts from large-scale dumping of organic fish waste in Bonne Bay and Rocky Harbour. Questions relating to impacts from dumping and untreated sewage outflows to declining crab populations in 12G.
- Support for v-notching measure of female lobsters to improve reproductive potential.

Commercial and Recreational Fisheries

- Improve consultation with industry and stakeholders when listing species at risk (i.e. wolffish)
- Improve management measures to combat increasing levels of AIS in vulnerable fish habitats and adjacent shellfish aquaculture sites.
- Find more circular solutions to fish harvesting and processing to utilize all components of the fish stocks being harvested (process locally, bait alternatives to reduce fishing pressures on small pelagic, etc.)
    - The use of waste as bait from other fisheries/industries (i.e., aquaculture waste, material left from processing, etc.) may provide an economic- and environmentally conscious solution.
- Majority agreed the no take protected area in Trout River will stay into the unforeseeable future to protect Trout River Cove and the species that depend on it.
- Majority supported the increased conservation efforts by AHOI, a local non-profit, who has been collecting plastic waste and lost fishing gear that has been littering the beaches or lost at sea around Gros Morne.
- The fish harvesters understand the ocean is changing and want to support whatever efforts are needed to help protect our struggling fish stocks.
    - One unique message that also came from the majority was the fish harvesters understanding and belief that our ocean is changing. Having a Marine Research Station in Norris Point since the late 60's exposed many to research done on the health of our ocean. Dr. Robert Hooper, the initial Director of the Bonne Bay Marine Station (now called the Bonne Bay Aquarium and Research Station), would spend countless hours working with the fish harvesters, talking to them about what he was working on and the changes he had observed and knew would be coming. The fish harvesters and those who originally settled here in the late 60's will be the first to tell you climate change is real; it's happening in our region. Many voiced their support to find solutions to mitigate impacts from climate change to our marine resources.

Photo credit: *Visit Gros Morne-GMCA*

Growing the Tourism Industry

Concerns related to regional capacity to grow sustainably in this sector.

- Concerns around impacts to environmental and communities from increased visitation to area. The population of residents' hovers around 3500 while the influx of visitors has gone as high as 200,000 people in peak season from May to Sept (Parks Canada, 2019).
    - Ability to effectively protecting the ecological integrity of the marine and terrestrial environments.
    - Financial capacity by municipalities to effectively dispose of waste, recycle, maintain road damage from increased traffic, treat excess sewage before entering our marine environments, etc.
    - Policies along with increased monitoring need to be updated and enforced to ensure businesses run in a more responsible manner that protect the health of our environments and coastal communities (ie. Cruise ship disposal of waste, dumping of organic waste by land-based companies, coastal development, etc.).

Support for a community-led tourism plan to look after the municipalities and environment, not just the businesses.

- Cumulative impacts by projects from all sectors should be reviewed together which look at other economic drivers outside of tourism, climate change impacts to our communities and environments as well as mandatory actions that need to be put in place to handle increased economic development and visitation to this area so business and everyday life can happen without disruption.
- Considerations need to be given to protecting our cultural activities over tourism related development (timber harvest, snowmobiling, moose hunting and recreational fishing).

Find ways to diversify economic opportunities in the tourism sector that speak to the next generation and bring families home.

- Build an experience that connects visitors to the region's rich inshore fishing culture.
    - Dining experiences that highlight the sustainable seafood and fishing practices in our region.
    - Historic tours where fishing has and continues to take place (i.e.. Visit fishing sheds along the coast, connect with fish harvesters, recreational fishing charters, etc.)
- Identify best-fit areas for marine related tourism experiences that connect with coastal birdwatching, adventure (kayaking, stand-up paddling, scuba diving), educational excursions (glass bottom boat tours, recreational fishing, citizen science, climate changes like coastal erosion and sea-level rise, etc.) and sustainable infrastructure (floating marina, scuba dive shop, showers, etc.).
- Identify best-fit areas for land-based related tourism experiences that connect with birdwatching, adventure (mountain biking, cycling and marathon-style events, etc.).
- Grow economic opportunities in low traffic areas to spread visitors throughout region.
- Build dependable childcare options for young working families.
- Diversify cruise ship potential so it is done sustainably and supports many businesses not just a few.
- Find ways to extend the working season to all 4 seasons.

Growing the Tourism Industry

Increase connections between the fishing industry and tourism sector.

- Find synergies to blend them as an experiential chartered tour or a ocean to plate food and cultural experience.
- Find ways to tell our story and promote the recovery of fisheries and the fishing communities.

Mining and/or Oil and Gas Development

Non-renewable resource development (fracking, conventional oil and gas exploration and development) poses too much risk to the environment and other sustainable economic drivers in the region. Environmental risk outweighs the short-term economic boost with little to no social benefits.

- Our goal is to look at sustainable economic development for the future, this is not one of them.
- Potential concerns on migrating fish stocks (salmon) and marine mammal species
- Many worries about the marine environment and the impacts it would have to the species and thousands of seabirds that migrate to this area on an annual basis.
- Gros Morne is too ecologically important to explore these options.
- All marine, terrestrial, and coastal areas with a buffer between 10-40km should protect Gros Morne and its communities from being explored for potential mining and/or oil and gas development.
- Fears of oil spill risk even during exploration. Ocean-based rigs have high flow rates, too difficult to confine spills and spills would reach coastal areas within hours. Some things may be debatable, but oil spill mortality risk is absolute!
- Added tunneling and shipping, boom/bust economy, blow-out impacts, changes current tourism and fishing sectors, negatively impacts too high.
- Gros Morne is not the place for Non-renewable Resource Development (NRRD). The area has other values that must be protected as a world class environment. Not to mention the aesthetic impact which is very important within a tourism-driven economy.
- Exploration, seismic activity, and potential spills will negatively affect the community culture, fishing industry and overall ecological integrity of coastal and marine environment. We need to reduce acoustic disturbance, protect the fish and its spawning habitat, marine mammal migration routes and migratory bird nesting areas to name a few.
    - Exploratory seismic activity has potential to harm aquatic flora and fauna. During exploratory activities, not necessarily the magnitude, but the frequency and temporal intensity of seismic exploratory activities is presumably on par or greater than during extraction. This could cause greater risk for affected flora and fauna.
    - The environment would be impacted most because negative effects from oil/gas a marine mining have long lasting effects on the affected area, even altering the submarine landscape. This has a trickle-down effect on various aspects of the other two categories.

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Mining and/or Oil and Gas Development

A thorough plan, environmental assessment and meaningful community engagement would need to be completed to understand how this industry could avoid impact to residents and other sustainable economic sectors.

- Similar to aquaculture communities require a plan outlining how this will take place in balance with the other industries already here.
- How will this impact our tourism industry.
- With a national park in this area, which is also a UNESCO World Heritage Site, more consideration needs to be given to this type of industry. Consultation needs to go beyond just the residents and business owners in the area. Gros Morne is protected for *all* of society and future generations, not just the people currently living in the region.
- Many attendees do not support the development of oil, gas, and mining in the Gros Morne region because of the potential conflict with the fishing industries, tourism and economic development, environmental concerns, and overall aesthetic.
- In-depth research needs to continue before support can be shown.

Stronger policies and procedures at the federal and provincial level need to be developed and put in place.

- This sector has not been done responsibly, no credible regulatory oversight.
- From a political point of view, job creation tends to outweigh all benefits. I'd like to think our government wouldn't permit NRRD in a national park/UNESCO site.
- Oil and gas may be of value if cost of environmental protection is included.

Some support for potential job opportunities this sector could provide, although many were torn due to the high-risk factor.

- Too many unknowns = high risk.
- Possible/potential effects on ground water quality.
- History of negative impacts, future cost for clean up could be very high for province of NL.
- Potential for oil spills, currents bring oil onshore.
- Because geology here differs from the normal for this type of activity.
- Unreliable research.
- This will change and seriously affect tourism.
- Will affect fishing/food source, view scape, traffic/road use, social changes, spills, water pollution, waste management.
- Riskier than conventional- chemicals used, impacting the environment and human health. There are even social impacts.
- Most activity is below surface; therefore, surface impacts are indirect: traffic, noise, sightlines, and scenic views.

Photo credit: *Rebecca Brushett*

Mining and/or Oil and Gas Development

- Passes through the vast layers of geo-strata, uses high pressure for extraction; highest risk of blow outs, wastewater often reinjected at high pressure into tapped well, which increases risk of seismic activity.

- Most of the work done to date hasn't tested that there is an unconventional resource offshore or inshore western, NL. If a well did test for oil, then environmental studies and hydro/geological studies should be conducted. Geological modelling of the fractures that exist subsurface should be studied in conjunction with groundwater mapping. Once track has been conducted, subsurface mapping should be reevaluated to compare pre vs post fracking to determine the extent of fracturing resulting from the fracking process. Most of the reservoir in Port aux Port, Gros Morne and along the west coast is too brittle to conduct fracking. There are engineering challenges for well planning. Geological modelling of the prospect and surrounding area must be conducted to truly assess the risk that fracking may have on a particular area. The target prospects vary greatly in the geological/structural integrity and in their potential to encounter oil/gas. In terms of mineral exploration in coastal environments, fracking is on a regular basis and is called difficult it is conducted regularly offshore, whereas mechanical and chemical hasn't been conducted in NL in or offshore.

- Massive infrastructure and activity levels relative to other extraction methods, spatially extensive activity would open access to any remote areas with many associated environmental concerns.

- Produces effluent and sewage, earthquake risk.

- Master's project results on SDM approaches to fracking results (Brushett, et al., 2014).

    - The only way to explore is to put a moratorium on high volume fracturing with controlled activity. Under this alternative, controlled exploration and testing would be permitted and no further activity would take place until a policy was developed, accepted, and put into legislation. The main guideline that is essential to the success of this alternative for all stakeholders is the stipulation that all exploration must strictly follow UNESCO guidelines which states buffer zones must be set out prior to exploration that does not allow testing and exploration to take place; ensuring the protection of sensitive ecological and cultural areas.

    - The lack of policy before exploration still raises fears for the environment from all at stake; particularly if the government will hold to this agreement. The push in discussion to not have a timeline for policy set by government also raised some questions by the above stakeholders. This decision permits government to take the time they need to explore potentially costing the province millions without the benefit of permanent job creation; additionally, the social and environmental impacts could be infinite.

    - The wealth of polarized views has made the decision to use structured decision making (SDM) for this topic very obvious. The only way to assess this highly debated topic is to form a structure that would help make a decision that took all alternatives into consideration and allowed all stakeholders to participate; something SDM allows you to do. For sustainable fracturing to exist three fundamental objectives must be met; (i) to maximize social sustainability, (ii) to maximize environmental sustainability and (iii) to maximize economic benefits.

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Mining and/or Oil and Gas Development

- The potential economic driver, one supportive attendee stated, "could keep [their] kids home".
- Non-renewable resource extraction has been shown to generate large economic returns, including jobs, taxes, royalties, and population growth.
    - Land will be destroyed, but we need jobs to make money. It's not much good to have a beautiful place and have no one to enjoy it. We need jobs and money to keep people around, and with technology today, these natural resources can be extracted with minimal damage.
    - Responsibly designed and carried out NRRD can provide jobs, benefit communities, and retain and increase populations in rural areas. There is potential for some loss of tourism traffic, but some of this can be mitigated by protecting viewscapes and particularly dense tourist zones.
- There could be a boom of jobs, but this is short term and does not lend itself to sustainability for the future economy in our area.
- There would be clear economic benefits, though these may be moderated by job loss and impacts on tourism, fisheries, etc.
- The issue is distribution isn't even, and unless it is very carefully planned, including the exit strategy, it will cause socioeconomic problems.
- If nothing went wrong (spills, damage to coastal environment, sea birds, fishing areas, price of oil goes up or down), it could be good for economy, but I feel it wouldn't benefit many residents.
- The main risk is associated with spills. Responsibly designed extraction would hopefully have minimal environmental risk. This includes mining as well as oil/gas extraction.
- If any activities were to be considered they should be focused on land-based only, no ocean-based exploration.
- Major efforts would be required to identify the best location (if any) for non-renewable resource development (NRRD).
- Fracking
    - Land-based, low flow rates, aquifer water not used locally so human impact on fluids minimal.
- Conventional
    - Well head on land or sea- minimal or mitigatable impacts.
    - Would support it if, the size of the operation, number of drills, and area were confined to an area with low negative impact to communities and environment.
    - Very little impact at depth because reservoir is below water table by km. Most impact is at site of drilling activity.
    - Much more localized activity than fracking, reduced environmental stressors relative to fracking, still a low risk of catastrophic spills.
- Exploration
    - There may be biological consequences and it can be minimal if timed to avoid transient/seasonal migration patterns of marine mammals and fish stocks. They are short term events, no proven long-term effects to environment.

Renewable Energy

The tourism and fisheries sector are vital to Gros Morne's local economy and identity so, the majority do not want to put those industries in jeopardy.

- Majority would consider it if, it could guarantee there would be no impacts to the tourism sector, national park and Gros Morne's UNESCO World heritage status.
- If it can complement and not impact other industries in a negative way, then support may be possible.
- Inconvenience for recreational boating as well as inshore fishing industry.

If renewable energy projects are to be considered in this region, then in-depth planning, cumulative environmental assessments (including cultural/ social impact) and community engagement must take place.

- For most to benefit in the Gros Morne region and given the ecologically sensitive nature of the tourism product, the cornerstone of the region, decision-makers must assess how all project proposals may enhance or negatively impact other industries, to make an informed decision.
- Incremental development can be more damaging than single developments. We have to understand the total impact of proposed developments before proceeding.
- It is important to consider the cumulative effects of multiple projects. Some of the effects may not be identified when considering projects in isolation.
- Regardless of development type, all should go through assessment for the sake of due diligence for the benefit of the marine/coastal ecosystem and confidence of the public.
- A strategic environmental assessment is the most accurate way to measure stressors and thresholds for development in an area.
- You need to focus on sustainable development for the long term. But, if you do it on a project-by-project basis, there can be negative outcomes that get missed.

The ecological integrity of our coastal and marine environments as well as our cultural values in Gros Morne should be prioritized over financial gain by provincial government or large corporations.

- Major threats to migratory birds, marine mammals (wind, wave).
- Aesthetic value and viewsheds cannot be compromised (tourism sector) so location is a critical issue that must be discussed with the residents of Gros Morne and those that value this region.
- It is not a question of benefits from the energy being generated, it's a question of how much destruction will take place in our coastal and marine environments to build and disassemble the structures required pre and post energy generation. How much destruction will also take place in our communities and on our highways during development and who will pay the price for this?
    - Installation should avoid sensitive fish spawning/rearing areas, eelgrass beds, migration routes, etc. (wind, wave).
- Major impacts on rivers (hydro)- transmission towers affect coastal and forest environment. Negative affects to salmon rivers, creates anaerobic environment above dam and therefore mercury, which contributes to the bioamplification of toxins up the food chain.

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Renewable Energy

- Hydroelectric dams affect fish migration, runoff, water levels, and the scenic value of rivers. The increased potential of flooding and changes to the landscape should also be considered before any project approval.
- The potential change to substrate in the area developed (wave).
- More research and education was requested as it relates to the potential benefits of creating new marine habitats for intertidal species (corals).
- Some didn't know enough to comment but suggested government would need to consider: viewscapes affected by wind, wave and solar, noise affected by wind, changes in natural environment from wave and hydro. Some impact could be acceptable, given it being a greener energy source.

This industry could be one welcomed to the region if, structures (wind, wave) or panels (solar) could be installed in areas out of sight and assessments show little to no environmental impact.

- Solar seems to have low impact on the marine and coastal environment. The more, the better, use small arrays in locations already populated and developed.
- Could be done on land, near shore. Not impossible in park or other parts of western, NL.

Future Research Opportunities

Improve our knowledge on what's happening in our fisheries sector and the declining fish stocks.

- Cod population size and health.
    - Short and long-term effects to the recovery of cod stocks if seal herds reduced.
- Continuation of halibut (Atlantic and Greenland) stock health, maturity and density through tagging programs and other scientific approaches.
- Study the correlation between seabird and capelin fish stock population decline.
- Assess effectiveness of fishing methods and gear types (i.e. Nordmore grate for shrimp fishery to reduce bycatch, seining impacts to marine habitat and forage fish stocks, etc.).
- Identify conservation methods that will improve the health of important commercial fish stocks.
- Impacts of illegal dumping of fish waste on the ocean floor and the declining 12G crab stock.
- Assess lobster population density in deeper marine habitats.

Marine Protection

Fish Harvesters want areas protected to help rebuild declining fish stocks but, local harvesters want to be able to vote to open and close as needed.

- I'd like to see protection to look after our fishing grounds, bait fish like capelin and our inshore fish harvesters.
- Want Trout River Cove 13B ("rock to rock") lobster closure area and 12G crab fishing area to be closed when fish harvesters request it and open otherwise.
    - 14A has been a lobster sanctuary for approximately 20 years. No fishing is permitted within this region including rod and reel for cod fishing (based on TEK). Residents can go on beach and get capelin when they are "rolling".
    - When crab fish area 12G is closed it becomes a no-take area for fisheries with only light activities permitted.
- Feel there are too many regulations now when it comes to the fisheries management and don't want something else to keep fish harvesters from fishing.
- I need more information before I can choose yes or no to protection in Gros Morne (chose unsure). Zone 3 (med to low protection) makes some sense (i.e. Not allowing oil and gas), but I don't want fishing to be banned as it will affect jobs and the local way of life.
- Crab harvesters have banded together to agree to only harvest every second season, despite quota being available each year. lobster harvesters have a high proportion of V-notch program participants, a voluntary initiative. The harvesters in Bonne Bay support the BBARS and frequently donate rare or unusual catch.
- Fisheries in Bonne Bay are critical to community economics. Besides everyone employed at 3Ts fish processing, Bonne Bay is one of the only locations seiners can access Atlantic Herring. Herring caught by seiners is used by lobster and crab harvesters and other options would greatly increase already high bait costs.
- Many fish harvesters voiced their fear of the fish stocks decline and support voluntary closures which they've been doing in this region since the 70's (herring, crab and lobster).
- Fish harvesters spoke about the fishing pressure from seiners in the 1970s leading to the collapse of herring spawning stock in St. Paul's Inlet. Concerns about seining for forage fish in Bonne Bay and other important fishing grounds since forage fish, such as capelin, mackerel, and herring, are essential to healthy marine environments and other lucrative fisheries like lobster. Majority of the small-scale fish harvesters called for better management of these fisheries.
- The commercial fishery is needed for so many businesses and it's been a part of our way of life for years. The communities of Gros Morne depend on the marine and land-based natural resources- they have shaped the culture in this area so more information and meaningful consultation will need to be provided by DFO, ECCC before we trust the government. We would need more than a couple minutes or a couple 1-hour discussions as this is a big decision for all of us with potentially far-reaching impacts.
- The majority requested the need for a better understanding of what is protected in each zone (high, med or low-level protection) and type of marine protection and more importantly, what is kept out.
- The problem with protecting the bay is that there is a very small amount of small-scale fish harvesters in the area. There are 10 small boat fishermen (with 20ft boats). They fish lobster and crab in the bay. The big boats are 26ft. There are long liners, small seiners (mid fleet) and regular seiners (big fleets).

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Marine Protection

- Oil and gas should be independent of fishing when explaining what should stay out. Most fishing in this bay is seining, not dragging and trawls. Should be further broken down and understood that seining doesn't touch the bottom. I don't support the ban on seining but would look separately at dragging. I do want some protection, but I can't give a proper "yes or no" response if I don't know what I'm supporting.
- If a federally protected area is established in the Gros Morne region, government support should be offered to anyone in an industry that may need to transition towards an industry that is permitted or more sustainable (i.e., investment in alternative gear, training to conduct fishing in a more sustainable way, etc.).
- Depends on community priorities-whatever conservation tool best fits those identified priorities.
- Various levels of protection would be required because of the various functions of the marine area (e.g. fishery, residential, tourism, etc.). There are many things to consider.
- Reallocation of resources and the reduction of sustainable harvest and conservation starts with identifying areas and protecting them.
- A higher value should be given to stakeholders directly impacted by the implementation of a potential MPA.
- Some fear as a small geographic area there may be conflicts with closing some areas and not others, especially conflicts in the fishing industry.

> I don't think my opinion should matter as much as a local fishermen...it might inflate things a little bit.
>
> *- 2022 Academic Expert at Community Meeting.*

Marine Protection

The region is conflicted on protected area governance. Some feel DFO is conflicted considering the department's responsibility to manage commercial fisheries; others feel ECCC focuses too much on parks and protection and not enough on growing the economy.

- Yes, The Gros Morne region, especially the areas immediately surrounding Bonne Bay, would make an excellent zoned NMCA governed by Parks Canada (ECCC).
- This is where the pushback occurs in MPA. Parks Canada doesn't own water. There have been issues with them in the past where they are known to tell vs ask. Federal fisheries department does not ask locals and fish harvesters what they want.

> Perhaps the "oceans" side of DFO is easier to work with then the "fisheries" side. They seem to have more of a focus on community impact.
>
> *- Local comment from Norris Point resident and business operator.*

Land and sea environments are connected; many believe in the importance of protecting both in a holistic way.

- The bay (Bonne Bay) is crucial to fisheries; however, it is also an incredibly unique ecological region, particularly the East Arm which is geographically secluded from the ocean and has genetically unique redfish.
- More protection in sensitive areas. i.e. redfish and species at risk. That special redfish area should be closed out altogether. No fish zone and more research need to be done. Species at risk are important for Indigenous people. -Miawpukek First Nations Natural Resource Dept.
- Support to assess Bonne Bay Acadian Redfish health and threats since bottom trawling and gillnetting happened in the 70's and 80's. Concern for potential extinction and need for protection.
- More restrictions need to be placed on approved and illegal dumping in our marine ecosystems.
- Majority support efforts to protect and restore declining fish stocks (lumpfish, herring, capelin, snow crab, sea urchins, Bonne Bay Acadian Redfish, 0-aged cod, wolffish, American eel, soft arctic corals, migratory birds) and their important nursery and spawning grounds (saltmarshes, kelp forests and eelgrass beds).
- Public concerns about increased human activities around the region including poaching and what impacts they may be having on our river, coastal and ocean environments and species.
- Most of Trout River and others in Gros Morne mentioned the importance of the lobster fishery and protecting their spawning grounds.
- Many recognized the benefits of the National Park designation on the development and sustainability of rural communities.
- The majority support the highest level of protection that can also maintain the inshore commercial and recreational fishery.
    - The majority fear if marine protection is implemented that the fishing industry will be impacted or taken away.
    - I support what the fishermen have identified and the deepest areas of eastern arm to protect the unique red fish species.

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Marine Protection

More research needs to be done to develop conservation and cultural protection objectives as well as potential economic impacts.

- A better understanding of what Aquatic Invasive Species are in the area and the impacts they may be having on the marine environment and important commercial fishery species.
- Many wanted to understand how important eelgrass beds and other protected habitats like those in Bonne Bay (Deer Arm) might be to rebuilding fish stocks and allowing juvenile species to grow without major environmental pressures.
- More work needs to be done to understand how our changing climate is impacting the health of our fish stocks and habitats they depend on.
- Believe there needs to be a balance between sustainable economic development and protection of our natural marine resources.
- Formalizing the zoning not only for land protection but the ocean would improve and protect socio-ecological values but may also reduce conflict.
- Support for strong policies and regulations that support biodiversity protection and community well-being.
- Majority want to protect the culturally important areas that house fishing sheds and other historic structures.
- Increased efforts need to be taken to use traditional ecological knowledge from elders and fish harvesters to better understand what changes they're seeing in the marine environment.
- Indigenous history, traditional culture and pride of place is strong in the Gros Morne region communities. While most communities rely on tourism as the main economic driver, traditional activities remain a central cultural focus of these areas.
- Attendees discussed the importance of coastal areas, such as beaches for the arts and music.
- Areas in Bear Cove and surrounding areas near Lobster Cove Head in Rocky Harbour should be looked at for increased marine protection. Some coastal areas are unique. Connect with community guardians and elders to learn more about cultural importance.

Photo credit: *AHOI*

Appendix C

Photo credit: *Rebecca Brushett*

Table 4 Marine species identified by less than 5 participants and excluded from final maps.

1. Blue Shark
2. Crowded Wormseed Mustard
3. Golden Star Tunicate
4. Griscombs Arnica
5. Mountain Fern
6. Rainbow Trout
7. Acadian Redfish (outside of eastern arm)
8. Shark (general)
9. Squid
10. Sunfish
11. Swordfish
12. Woodland Caribou
13. Wolly Arnica

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