

# NATIONAL FRAMEWORK FOR ASSESSING THE CUMULATIVE EFFECTS *of* MARINE SHIPPING



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# 1 DEFINITIONS

These definitions have been adopted from various sources to increase the accessibility to, and understanding of, the *National Framework for Assessing the Cumulative Effects of Marine Shipping* (the CEMS Framework). Definitions may vary across regions to reflect regional contexts but, to some degree, they still encompass the concepts and factors defined in this report.

## Activity

An action that may impose one or more stressors on the valued components being assessed (adapted from O, et al., 2015).

## Adaptive management

A planned and systematic process for continuously improving environmental management practices by learning about their outcomes. Adaptive management provides flexibility to identify and implement new mitigation measures or to modify existing ones during the life of a project. (IAAC, 2016)

## Collaboration

To work jointly on an activity; especially, to produce or create something.

## Cumulative Effect (CE)

Changes caused by multiple interactions among human activities and natural processes, which accumulate across time and space, and pertain to systems such as the environment, health, social, culture and economics. (Adapted from the CCME, 2009).

## Cumulative Effects Assessment (CEA)

A systematic process of identifying, analyzing, and evaluating changes in the environment (e.g. changes in environmental, cultural, health, social and economic conditions) caused by multiple interactions among human activities and natural processes, which accumulate across time and space.

## Effects

Changes, either positive or negative, direct or indirect, short or long term, localized or large scale, to the environment or to health, cultural, social or economic conditions which are caused by or a result of consequences of an action or multiple actions. (Adapted from the Impact Assessment Agency [IAA], 2019).

## Environment

Components of the Earth, including:

- a) land, water and air, including all layers of the atmosphere
- b) all organic and inorganic matter and living organisms
- c) the interacting natural systems that include components referred to in (a) and (b) (IAA, 2019)

## Indicator

Metrics used to measure and report on the condition and trend of a valued component (VC) and which should be clearly identified to further focus and facilitate the analysis of interactions between the activity and the selected VC (BC EAO, 2013).

## Indigenous Knowledge

(There is no universally accepted definition of Indigenous knowledge. For the purpose of the CEMS initiative and this Framework, the following definition is appropriate). A form of empirical information that is derived from a multitude of experiences and traditions that are passed down orally or by shared practical experiences of people who have lived within and as part of the natural environment for hundreds or thousands of years. Indigenous Knowledge includes the inextricably interconnected culture, spirituality, traditions, and ecology of a group of people and their landscape, as it is embedded within a larger socio-cultural context and traditional worldview (Pickard, et al., 2019).

## Marine environment

All waterways including saltwater and freshwater ecosystems within Canadian jurisdiction.

## Marine shipping

Includes commercial vessels, ferries, cruise, fishing and recreational vessels operating in waters within Canadian jurisdiction.

## Management levers

Legislation, regulations, policies or voluntary tools that can be used to mitigate or manage the effects of marine shipping activities on environmental, health, social or cultural valued components.



## Management measures

Legislation, regulations, policies, or voluntary tools currently in place to manage the effects of marine shipping activities under various levels of jurisdiction.

## Management objective

A qualitative or quantitative statement that defines the desired future condition of a value and typically includes a measurable result in order to help identify appropriate indicators, thresholds, potential mitigation measures and monitoring strategies (Wilson, 2020).

## Mitigation measures

Management levers implemented to eliminate, reduce, control or offset the adverse effects of an impact or stressor.

## Pathways of Effects (PoE)

Models that describe the linkages between human activities (such as marine shipping), associated stressors, and their effects on endpoints, or valued components (adapted from the Canadian Science Advisory Secretariat [Hannah, et al., 2020]).

## Partnership

A relationship where two or more parties with compatible goals form an agreement to do something together.

## Regions

There are six pilot areas where regional cumulative effects assessments (CEAs) are being conducted under the CEMS initiative: Northern Shelf Bioregion, BC; South Coast, BC; Cambridge Bay, NU; St. Lawrence, QC; Bay of Fundy, NB/NS; and Placentia Bay, NL. The specific spatial boundaries for these regional CEAs were not pre-defined.

## Stressors

Any physical, chemical, or biological means that, at some given level of intensity, have the potential to change an ecosystem or one or more of its components (O, et al., 2015).

## Threshold

Levels at which a particular stressor or valued component exceed a level of concern resulting in an alternative management regime. Thresholds are informed by a combination of technical understanding and a socially defined level of acceptable change (Pickard, et al., 2019).

## Valued Components (VCs)

Environmental, social, cultural, economic, historical, archaeological, or aesthetic features that may be affected by an activity and that have been identified to be of particular importance by government agencies, Indigenous peoples, or the public. The value of a component not only relates to its role in the ecosystem, but also to the value people place on it (adapted from Pickard, et al., 2019).

The term *Valued Component* is traditionally used and understood in the context of impact assessment and, as such, is used throughout this document. However, assigning “value” to some aspects of the environment over others may not be simple due to the Indigenous worldview that everything is interconnected (Faculty of Native Studies, University of Alberta, 2020). In some cases, alternative terms may be used and defined.

## 2 INTRODUCTION

In November 2016, the Government of Canada announced the \$1.5 billion Oceans Protection Plan (OPP) with the mandate of protecting coasts and waterways under Canadian jurisdiction. The main priorities of the OPP are to build a world-leading marine safety system, preserve and restore marine ecosystems, create stronger Indigenous partnerships, engage coastal communities, and build a stronger evidence base for decision-making. As Canada's lead department on policies and regulations related to the safety and security of marine transportation, Transport Canada (TC) has responsibilities to develop and administer various initiatives under the OPP. This includes the Cumulative Effects of Marine Shipping (CEMS) initiative.

### 2.1 WHAT IS THE CUMULATIVE EFFECTS OF MARINE SHIPPING INITIATIVE

The CEMS initiative falls under the Preserving and Restoring Marine Ecosystems pillar of the OPP. The initiative grew out of concerns about the effects of past, present and future shipping activity on coastal and marine environments and Indigenous ways of life. These concerns are frequently raised during project-level impact assessments (e.g. port development or resource extraction projects).

There have not been many regional cumulative effects assessments (CEAs) conducted in Canada. However, they can help provide a more proactive approach to addressing the interactions between marine shipping activities and their effects.

The purpose of the CEMS initiative is to establish shared approaches to better understand the potential cumulative effects of regional marine shipping activities on the environment and the people surrounding it (i.e. CEMS pilot assessments), and to develop a National CEMS Framework to share our continued learning from our CEMS pilot assessments.

Key deliverables and tangible outcomes from the CEMS initiative include:

1. The development of a National CEMS Framework that is informed by national and regional work.
2. The amalgamation of data and/or gathering of knowledge in each of the pilot areas to support regional CEMS assessments.
3. Regional CEMS assessments in the six pilot areas.
4. The generation of knowledge through the assessments on the regional cumulative effects of marine shipping to inform future research.
5. The development of regionally specific tools (e.g. mitigation and management measures) that can be applied to existing vessel movements or future project developments as well as system-wide initiatives that can be applied nationally.

Regionally, Transport Canada is working alongside Indigenous partners, coastal communities and stakeholders in six pilot areas on all three coasts to inform the development of the National CEMS Framework by identifying priority stressors from marine shipping and regionally specific environmental, social and cultural values, referred to throughout this document as "Valued Components."

The pilot areas provide broad representation in terms of current and projected marine development and the diversity of Canada's coastal environments.

They include:

- Northern Shelf Bioregion, British Columbia
- South Coast, British Columbia
- Cambridge Bay, Nunavut
- St. Lawrence and Saguenay Rivers, Quebec
- Bay of Fundy, New Brunswick and Nova Scotia
- Placentia Bay, Newfoundland and Labrador



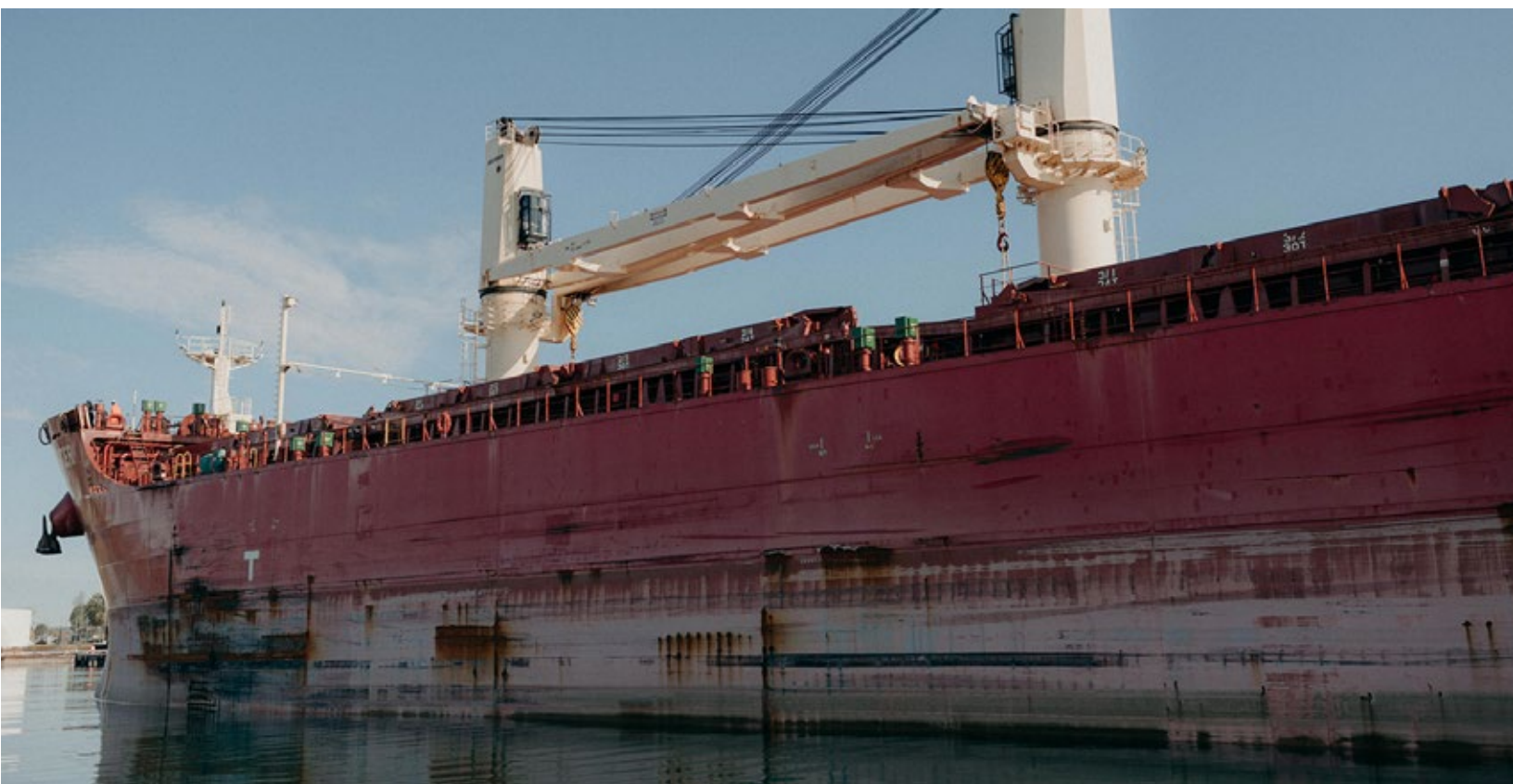
The vision of the CEMS Initiative is to support evidence-informed decision-making that can conserve the marine ecosystem and Indigenous ways of life while facilitating economic activity in the marine transportation sector. The initiative also envisions nation-to-nation partnerships between the federal government and Indigenous peoples, and collaboration among the federal government, Indigenous peoples, the marine industry, subject matter experts (e.g. academia and Non-Governmental Organizations), other levels of governments, and other stakeholders.

Through the CEMS initiative, TC aims to enhance relationships within the cumulative effects community across the country by contributing to increased learning and coordination of research. Designing an iterative and flexible process that is responsive to collaborators and changing environmental conditions within the National CEMS Framework will help TC continue to establish meaningful relationships. The CEMS Framework is also intended to keep evolving through time, practice, and application.

## IMPORTANCE OF REGIONAL CUMULATIVE EFFECTS ASSESSMENTS

A cumulative effects assessment (CEA) is a systematic process of identifying, analyzing, and evaluating changes in the environment (e.g. changes in environmental, cultural, health, social and economic conditions) caused by multiple interactions among human activities and natural processes, which accumulate across time and space. Cumulative effects in Canada have historically been assessed on a project-by-project basis. However, the process of assessing cumulative effects in a project assessment, such as those related to marine shipping activities, does not always provide a complete understanding of cumulative effects at a regional level. This can lead to gaps in understanding

the full extent of effects in an area. A lack of research and gaps in data have historically limited our understanding of regional shipping impacts on marine environments. Regional CEAs are a better tool because they allow for analysis and decisions based on the effects in a region that a project lens cannot capture due to its limited scope of analysis. CEAs at the regional scale are also increasingly viewed by governments, Indigenous peoples, industry, and researchers as a viable way to proactively address large-scale impacts, such as to ocean health and safety.





The CEMS initiative provides an opportunity to start addressing the regional cumulative effects of marine shipping at the strategic level. In the context of impact assessments, impacts may be addressed by conditions on proponents, however many marine shipping activities may not be within the care and control of the proponent. The CEMS initiative can inform project-level impact assessments by:

- Understanding the values of Indigenous peoples and coastal communities within the pilot areas.
- Highlighting marine shipping issues relevant to the pilot areas.
- Identifying VCs and/or prioritizing areas of study.
- Amalgamating available data and knowledge relevant to marine shipping and environments in pilot areas, including the identification of data/knowledge gaps.
- Providing evidence to inform the identification and recommendation of regional mitigation measures and management strategies that could be applied to future projects in the pilot areas, or more broadly.

Canada's *Impact Assessment Act* (IAA, 2019) has introduced new ways of addressing cumulative effects through Regional Assessments (RAs). As the CEMS initiative is an activity-based CE assessment that focuses

only on marine shipping activities, the CEMS pilot assessments can feed into larger RAs by providing regionally and/or sub-regionally specific recommendations for managing marine shipping, as well as a data summary of the evidence that supports that decision making.

In general, the National CEMS Framework will be helpful to other groups that are conducting regional processes or assessments. More specifically, the regional pilot area summaries in Appendix I will help inform project-level impact assessments with marine shipping components in these areas. A lot has been learned both at a national and regional level through the development of the Framework and this learning can be applied to similar processes and/or related assessments outside of the marine shipping context.

The CEMS initiative primarily relies on existing and/or publicly available data as input for assessment work, so there is currently no intention to republish these datasets. It is expected that any input datasets used in the regional pilot site area work will be tracked and listed in the relevant assessment reports, and/or provided in a compilation document relevant to the region. Output datasets from assessment work will be published, where possible and appropriate, through publicly available channels such as [Open Data](#), and listed on related directories like [Open Maps](#) and the [Open Science and Data Platform](#).



The Government of Canada is committed to working toward reconciliation with First Nations, Inuit and Métis (Indigenous peoples) through renewed, nation-to-nation, government-to-government and Inuit-Crown relationships based on the recognition of rights, respect, co-operation and partnerships. Indigenous peoples are key partners in the OPP, as coastal environments are intrinsic to the identities and ways of life for these communities. Indigenous peoples have valuable traditional and local knowledge, which can inform the marine safety system and ecosystems through OPP initiatives such as the CEMS initiative.

Indigenous participation is especially important in Canada, where Indigenous peoples have constitutionally recognized Aboriginal and treaty rights, including Aboriginal title.

The CEMS initiative relies on regional partnerships, collaboration, and engagement in each of the six identified pilot areas, as well as with national organizations where possible and appropriate. TC has developed various types of models for strengthened collaboration with Indigenous peoples aimed at improving the quality and legitimacy of CEMS assessments (See Appendix I for more information on these collaboration models).

### 2.5.1 Indigenous Knowledge and Inuit Qaujimajatuqangit

Indigenous peoples are the sole owners of their knowledge and therefore the only ones who can define it. Indigenous knowledge (IK) and Inuit Qaujimajatuqangit (IQ) are gathered over generations of experience and interactions within an environment and are inseparable from regionally specific Indigenous values and culture. IK, IQ and science represent different ways of understanding the environment and our place within it. All should be understood as complementary worldviews that, when appropriately weaved together, create a more informed and holistic understanding of an ecosystem.

There are no universally accepted definitions of IK or IQ. These terms are used to communicate a body of knowledge borne out of Indigenous ways of life and informed by Indigenous peoples' intimate relationship with their natural world. Among the definitions of IK and IQ that are available, certain common traits exist. For example, IK and IQ are:

- rooted in Indigenous traditions, languages, cultures, and history
- holistic in nature and closely linked to the environment
- cumulative and dynamic, growing and expanding with the experiences of individuals and communities
- integral to and inseparable from the livelihoods of Indigenous peoples

In addition to the term Indigenous knowledge, other common terms include traditional knowledge, traditional ecological or environmental knowledge, Aboriginal traditional knowledge, Métis knowledge, IQ, IK systems and community knowledge, among others.



***Inuit Qaujimajatuqangit embraces all aspects of traditional Inuit culture, including values, world-view, language, social organization, knowledge, life skills, perceptions and expectations.***

*(Nunavut Social Development Council, 1999)*

## 2.5.2 Working with Indigenous Knowledge and Inuit Qaujimajatuqangit

Article 31 of the [United Nations Declaration on the Rights of Indigenous Peoples](#) states that “Indigenous peoples have the right to maintain, control, protect and develop their cultural heritage, traditional knowledge and traditional cultural expressions, as well as the manifestations of their sciences, technologies and cultures, including human and genetic resources, seeds, medicines, knowledge of the properties of fauna and flora, oral traditions, literatures, designs, sports and traditional games and visual and performing arts. They also have the right to maintain, control, protect and develop their intellectual property over such cultural heritage, traditional knowledge, and traditional cultural expressions.”

***Etuaptmunk, or Two-Eyed Seeing, adamantly, respectfully, and passionately asks that we bring together our different ways of knowing to motivate people, Aboriginal and non-Aboriginal alike, to use all our understandings so we can leave the world a better place and not compromise the opportunities for our youth (in the sense of [Seven Generations](#)) through our own inactions.***

*Institute for Integrative Science and Health,  
Cape Breton University*

On June 21, 2021, the *United Nations Declaration on the Rights of Indigenous Peoples Act* received Royal Assent and immediately came into force. This legislation advances the implementation of the Declaration as a key step in renewing the Government of Canada’s relationship with Indigenous peoples.

While the weaving of IK and IQ is a foundational piece to the CEMS initiative, this knowledge can be culturally sensitive and include information the community may want to protect from public disclosure. Knowledge holders and/or their communities have control over their knowledge and may have requirements or conditions for working with it. It is important to TC to remain adaptable and respectful when approaching sensitive Indigenous knowledge, as well as to abide by the OCAP® (ownership, control, access and possession) principles outlined by the First Nations Indigenous Governance Centre. TC employees working with IK and IQ must respect community protocols, including any protocols concerning the handling, storage, access or integration of knowledge. One way TC is demonstrating this respect is by helping establish data-sharing agreements between third-party contractors and Indigenous peoples. Through this process, a third-party contractor may work directly with Indigenous peoples to access and incorporate IK and IQ in their work, while only providing TC with a high-level summary of that information to bypass the need for TC to access the specific sensitive data/knowledge itself. It is important to note that this is just one approach to incorporating IK and IQ into a CEA, and that each approach should be regionally specific and directly informed by local Indigenous peoples.

## 2.5.3 Funding Agreements

Funding to support the capacity for coastal communities and Indigenous peoples to participate in the CEMS initiative has been a key and ongoing priority that has contributed to the success of the initiative. Various types of funding agreements for coastal communities and Indigenous peoples to participate in OPP initiatives are available through the Indigenous and Local Communities Engagement and Partnership Program (ILCEPP) and Community Participation Funding Program (CPFP). The ILCEPP encourages participation in long-term, ongoing engagement activities, and builds capacity and relationships for ongoing participation in OPP initiatives, including CEMS.

Similarly, the CPFP is used to provide short-term capacity funding to help Indigenous peoples and local communities participate in activities related to the national work and regional pilot assessments. Ensuring the availability of appropriate funding to support capacity has been extremely important to the success of the CEMS initiative.

Funding opportunities beyond TC’s ILCEPP and CPFP programs may be available and could be an option to support participation of Indigenous peoples in the CEMS initiative; not all ongoing funding programs have been listed in this document as they are subject to change.

## WHY IS MARINE SHIPPING IMPORTANT?

Marine shipping is a vital part of Canada's economy, culture, environment, and security (Council of Canadian Academies, 2017). Canada's marine transportation sector is essential for trade growth and prosperity as it often remains the only viable mode of transporting certain goods, such as natural resources, agricultural products and manufactured goods, to domestic and international markets. In Canada's Arctic, marine transportation remains the most viable way to provide communities and their residents with an annual re-supply of goods and materials. As concluded in a 2017 study by the Council of Canadian Academies, when assessed in relation to economic, environmental, security, and cultural impacts at the national, regional and local levels, marine shipping has a positive and sizable social and economic value to Canada.

It is important to identify the environmental, social, and cultural effects of marine shipping to protect all Canadians

and their environment, while sustaining the world's dependency on marine transportation. With an improved and heightened emphasis on efficiency, safety, security, and the development of environmental regulations that support international standards, Canada's marine transportation sector will continue to play a crucial role in supporting economic prosperity.

The marine shipping industry and various regulators have an important role to play in the CEMS initiative in terms of developing national and/or regionally specific management tools that can be applied to existing vessel movements or future project developments. Collaboration between the Government of Canada, Indigenous and

coastal communities, and stakeholders such as the marine industry, is also key in developing these tools.

## DEVELOPING THE FRAMEWORK

The CEMS toolkit is composed of the following documents, resources and events and each has contributed to shaping the National CEMS Framework. Input received through engagement events, workshops, webinars, pilot areas and stakeholder engagement has also been thoughtfully considered and adopted in the Framework, where appropriate. All documents and resources mentioned below can be found on the [CEMS webpage](#).

- Literature review of "Cumulative Effects
- Management Concepts and International Frameworks"
- Evaluation of Cumulative Effects Assessment
- Methodologies for Marine Shipping
- Cumulative Effects Assessment: Technical Workshop
- Engagement with Indigenous and academic cumulative effects practitioners
- Key stakeholder engagement
- CSAS Science Advice for Pathways of Effects for Marine Shipping in Canada
- Regional pilot areas



## 2.7.1 Literature review of “Cumulative Effects Management Concepts and International Frameworks” (Lerner, 2018)

In the early stages of the CEMS initiative, a researcher from the University of British Columbia conducted a literature review of international cumulative effects management frameworks with a focus on marine shipping and coastal contexts. The purpose of this work was to inform the development of the National CEMS Framework by identifying existing policies, procedures, and tools that enable management of cumulative effects at a regional scale. Sources for the review included the author’s professional experience, academic and grey literature, and recommendations from TC and Fisheries and Oceans Canada (DFO).



## 2.7.2 Evaluation of Cumulative Effects Assessment Methodologies for Marine Shipping (Pickard, et al., 2019)

In 2018, ESSA Technologies Ltd. prepared a report for Transport Canada, which reviewed existing national and international methodologies for the assessment of cumulative effects. The report informed various phases of the CEMS assessments by recommending which methodologies (i.e. spatial, analytical and modelling) are most applicable under different regional scenarios. Before finalizing the report, input from a national Indigenous and multi-stakeholder perspective was received during a two-day workshop attended by technical knowledge holders in the field of cumulative effects.



## 2.7.3 Cumulative Effects Assessment: Technical Workshop (Stratos Inc., 2019)

In February 2019, TC hosted a two-day workshop to bring together more than 60 practitioners with technical knowledge in the field of cumulative effects. Key objectives of the workshop were to:

- present findings of the methodology assessment
- gather input on evaluation research to inform a path forward for regional work
- provide an opportunity to build and strengthen relationships and learning between federal governments and Indigenous peoples, territorial and provincial government departments, environmental non-governmental
- organizations, academia, and marine industry stakeholders



## 2.7.4 Engagement with Indigenous and academic cumulative effects practitioners

One of the recommendations of the February 2019 workshop was to draft a rough proposal of the National CEMS Framework with input from CE practitioners. Two groups were then formed: an Indigenous CE practitioner group and a group of academics with expertise in CEA frameworks and/or methodologies. Input gathered from these practitioners provided insightful guidance and concepts which were incorporated into the first draft of the Framework. Some key themes of the input received included:

- Indigenous collaboration
- Weaving of Indigenous Knowledge
- VC-based approach vs. an ecosystem-based approach
- Adaptability (no one-size-fits-all approach)

Indigenous and CE practitioners also provided key input on the first draft of the Framework to inform the current publication.

## 2.7.5 Key stakeholder engagement

Industry has and will continue to have opportunities to provide input into the CEMS initiative at certain stages, both regionally (i.e. through input and discussion on potential regional management levers) and nationally (i.e. through input and discussion on system wide initiatives as well as input into the Framework). TC continues to bring interested industry representatives to the table to share information on mitigation and to explore what other measures could be implemented. Any mitigation options being proposed would be evaluated in the context of the potential impacts on the shipping industry and the economic and social benefits it provides.

Academic researchers and non-government environmental organizations have also helped to inform both the National Framework as well as regional pilot areas; especially, by sharing their latest research on the Framework design, and providing data used to inform the regional cumulative effects assessments. In addition, other federal/provincial/territorial government departments have been instrumental in informing the development of the National Framework as well as carrying out the regional pilot area assessments.

## 2.7.6 CSAS Science Advice for Pathways of Effects for Marine Shipping in Canada (*Fisheries and Oceans Canada [DFO], 2020*)

To support the CEMS initiative, TC requested science advice from DFO on the environmental effects of marine shipping in Canada. In response to this request, DFO developed, through the Canadian Science Advisory Secretariat (CSAS) process, two reports: *Science Advisory Report and Pathways of Effects Conceptual Models for Marine Commercial Shipping in Canada: Biological and Ecological Effects*. These reports present a suite of activity-Vexplore ways in which commercial shipping activities can impact the marine environment, as well as related science advice.

## 2.7.7 Regional pilot areas

Due to varying regional realities, the CEMS pilot areas have progressed quite differently (i.e. through the development of regionally specific collaboration models and engagement strategies, weaving of IK/IQ, data amalgamation, assessment methodologies, etc.). The guidance provided in the National CEMS Framework is supported by TC's experience conducting CEMS assessments in these regional pilot areas. The Framework will continue to be updated as the regional pilot work unfolds and new experiences are gained.



# 3 A NATIONAL FRAMEWORK FOR ASSESSING THE CUMULATIVE EFFECTS OF MARINE SHIPPING



## PURPOSE AND GOAL

The purpose of the Framework is to provide flexible guidance on how regional cumulative effects of marine shipping can be assessed, instead of by project. It outlines the steps involved in conducting an assessment on the regional cumulative effects of marine shipping as learned from the regional pilot assessments.

The goal of the Framework is to share our continued learning and approaches to conducting regional activity-based CE assessments. It does so by providing a set of tools to aid in the assessment of cumulative effects in a collaborative way. Going forward, the Framework could also be useful for regional CEAs in other areas of Canada being conducted by TC or other jurisdictions undergoing regional processes/assessments.



## FRAMEWORK COMPONENTS

The Framework, illustrated in Figure 1, includes key activities and outcomes through six phases:

- Early Engagement and Planning
- Scoping
- Assessment
- Decision-making
- Action
- Evaluation and Reaction

The CEMS initiative is committed to completing work in the first four phases. The following sections describe each phase in detail. This Framework is iterative, adaptable (within and between phases), and continues to be informed by the CEMS pilot assessments undertaken to date. There is no one-size-fits-all approach when it comes to assessing regional cumulative effects across Canada.

This Framework should guide future CEMS assessments in Canada, but ultimately, assessments should be informed by collaboration and regional realities. Designing an iterative and flexible process – responsive to collaborators and changing environmental conditions – will support TC in establishing meaningful relationships with partners and collaborators. Timelines for the completion of specific activities and results will be influenced by the collaborative process. For details on the approach taken in each CEMS pilot area, please refer to Appendix I.

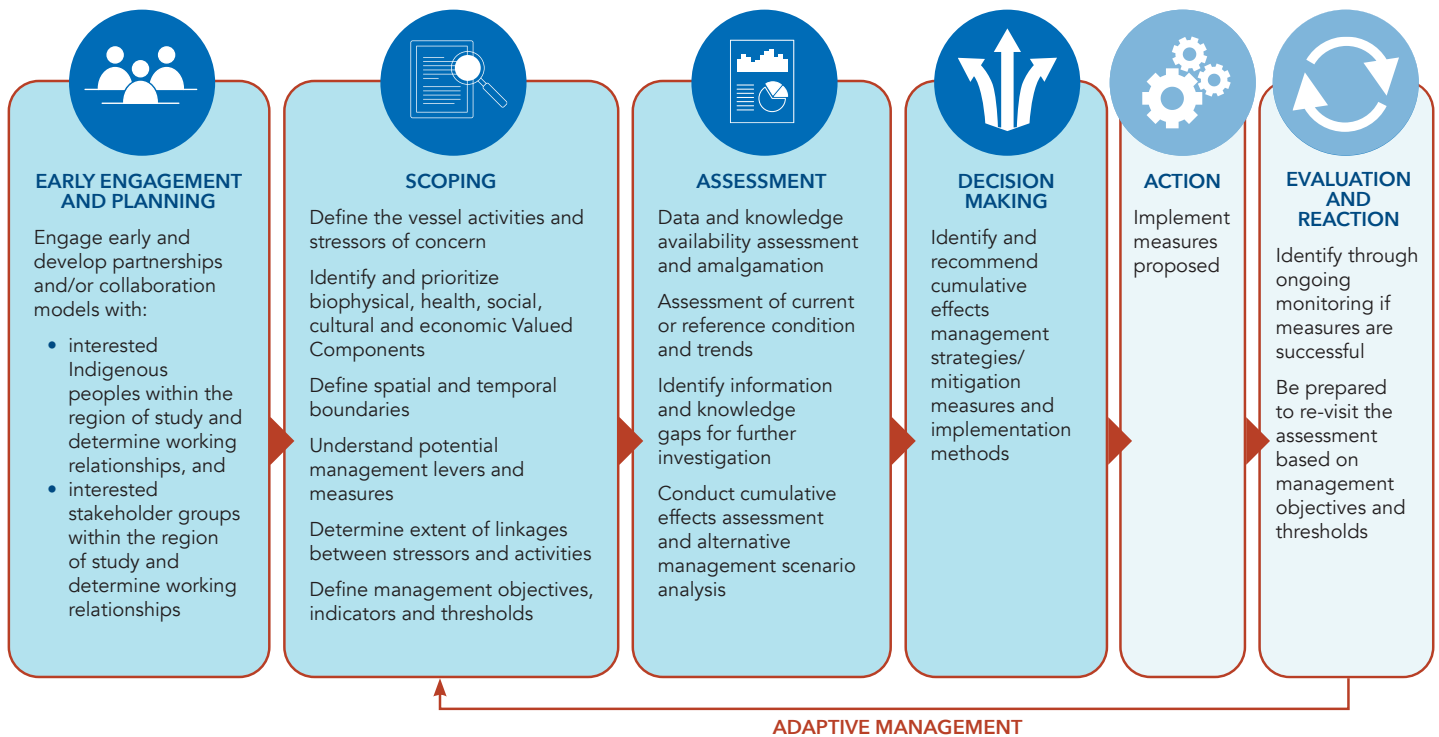
While the purpose of this Framework is to provide guidance in assessing the cumulative effects of marine shipping, TC acknowledges that these Framework phases can be applied across various sectors and within other regional assessment processes.





# CUMULATIVE EFFECTS OF MARINE SHIPPING ASSESSMENT FRAMEWORK

## ENGAGEMENT/COLLABORATION



**Figure 1:** Transport Canada's Cumulative Effects of Marine Shipping Assessment Framework under the Oceans Protection Plan. The CEMS initiative is committed to completing work in the first four (blue) phases.

### 3.1 EARLY ENGAGEMENT AND PLANNING

#### STEPS

- Engage early and develop partnerships and/or collaboration models with interested Indigenous peoples within the region of study and determine working relationships
- Engage early and develop partnerships and/or collaboration models with interested stakeholder groups within the region of study and determine working relationships

The objective of this phase is to build relationships between TC and regional partners that are centered on trust, respect, and recognition of Indigenous rights and title. Where existing relationships with Indigenous peoples have been established, they may be leveraged to support engagement on CEMS; however, all interested Indigenous peoples and stakeholders within the region should also be engaged to seek out opportunities to work collaboratively.

Collaboration models and working relationships will be developed with the partners to ground the work and set the stage for the work at hand (e.g. bringing in experts to present on topics, such as emergency response).

## 3.1.1 Engagement plan

The first step to engaging on any regional cumulative effects assessment is to develop an engagement plan in order to identify target partners and collaborators within the study area. Distinct groups may have varying degrees of involvement and influence on the development and implementation of the regional pilot (e.g. partners or collaborators).

With respect to the CEMS initiative, partners represent groups that have an agreement, or collaboration model, in place to work together with TC. Partners require a high level of engagement and are heavily involved in the regional CEA process. Collaborators on the other hand represent groups, such as subject matter experts, that are engaged when and where appropriate, but do not hold any formal collaboration agreement.

Target partners and collaborators identified in an engagement plan may include:

- Indigenous peoples
- Coastal communities
- Port Authorities
- ENGO's
- Marine science organizations/Academics
- Industry
- Other Government Departments
- Transboundary groups

Early in the CEMS initiative, TC developed a national engagement plan to identify interested parties in each regional pilot area. Through early discussions, TC found that the core principles to ground the engagement plan included collaboration, culture, co-operation, inclusivity, respect and vision (i.e. setting clear goals and objectives). Engagement activities also helped build support and create awareness of the CEMS initiative both nationally and regionally. For example, the CEMS initiative used whole-of-government OPP anchor events (Dialogue Forums and Indigenous Workshops) and other supplemental meetings to meet key engagement objectives in each region.

For both national and regional engagement, TC has found that both online and in-person meetings help build strong relationships with partners and collaborators. Collaboration events may also serve as opportunities to educate, when necessary or requested, such as on existing regulations or programs (i.e. bringing in experts to present on topics like emergency response).



## 3.1.2 Collaboration models

Throughout a regional CEA process, Indigenous peoples, collaborators, and stakeholders should determine how and to what extent they would like to be engaged. A collaboration model is a tool for documenting expectations, goals and objectives early in the relationship-building stage to set the tone for the work ahead. Some questions that may guide the development of a collaboration model include:

1. What principles should ground the work?
2. What are the responsibilities of each group for the relationship to work?
3. What are the responsibilities of each group to complete the work?
4. How should the groups work together?
5. How should decisions be made?

Collaboration models with Indigenous peoples (or other groups, if needed) should always be co-developed and may include information such as cultural context, key definitions, goals and objectives, governance structure, intended deliverables, linkages and dependencies, and resourcing. Some of this work may organically feed into the next phase of the Framework. For more information on collaboration models developed for the CEMS pilot areas, see Appendix I.

In recognizing the shared stewardship of potential VCs and shared responsibilities for management of the cumulative effects of marine shipping at large, it is important to provide opportunities for collaboration with and input from the marine industry, environmental non-governmental organizations and other stakeholders throughout a regional CEA process.

### POTENTIAL OUTCOMES

- Formation of technical teams
- Development of collaboration model(s)
- Development of engagement strategies
- Drafting of short- and/or long-term workplans and identification of related capacity
- Creation of a tool for tracking engagement and collaboration

## 3.2 SCOPING

### STEPS

- Define the vessel activities and stressors of concern
- Identify and prioritize biophysical, health, social, cultural, and economic Valued Components
- Define spatial and temporal boundaries
- Understand potential management levers and measures
- Determine the extent of linkages between stressors and activities
- Define management objectives, indicators, and thresholds

The purpose of scoping is to define and justify all parameters of the regional CEA prior to the assessment phase. There are many possible methods for how to focus a regional CEA.

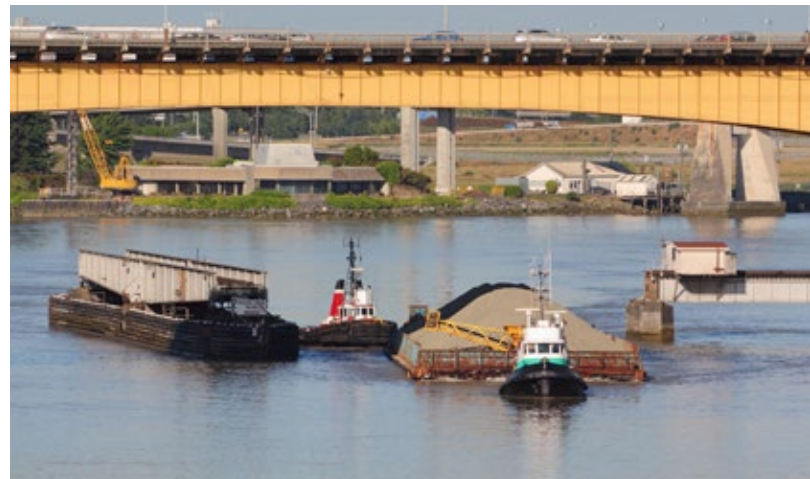
### 3.2.1 Defining Valued Components

In many cases, the CEMS initiative has adopted a VC-based approach, which is closely aligned with concepts common to ecosystem-based management. While it is important to understand the ecosystem context when conducting a regional CEA, assessing cumulative impacts on VCs can be a means to build an understanding of an ecosystem. Conversations with some Indigenous peoples have also led to important discussions about compartmentalizing and assigning heightened “value” to certain aspects of the environment over others. An understanding of the interconnectedness of all aspects of the environment, including human well-being and belonging, is central to many Indigenous worldviews (Faculty of Native Studies, University of Alberta, 2020). Given this understanding, the parameters of an assessment should initially be broadly defined to ensure all possible activities, stressors, and VCs are considered.

In the context of the CEMS initiative, this means identifying all shipping activities and stressors that may cause cumulative effects in the pilot areas, as well as all environmental, cultural, and social components that may be impacted.

From this point, a smaller, more manageable set of parameters may be chosen to focus the assessment. Identifying priority VCs for any assessment is a complex task with no prescribed approach. The goal in this phase is to be responsive to the values of regional partners and collaborators. See Appendix I for more information on how VCs were defined in each CEMS pilot area.

Scoping should always be done in collaboration with regional partners and/or collaborators and consider input from subject matter experts and other stakeholders. A collaboratively developed set of selection criteria will help to scope down regional issues and identify which stressors and VCs to focus efforts on. The process of refining a broader set of issues will help to document and justify the rationale behind the prioritized VCs.

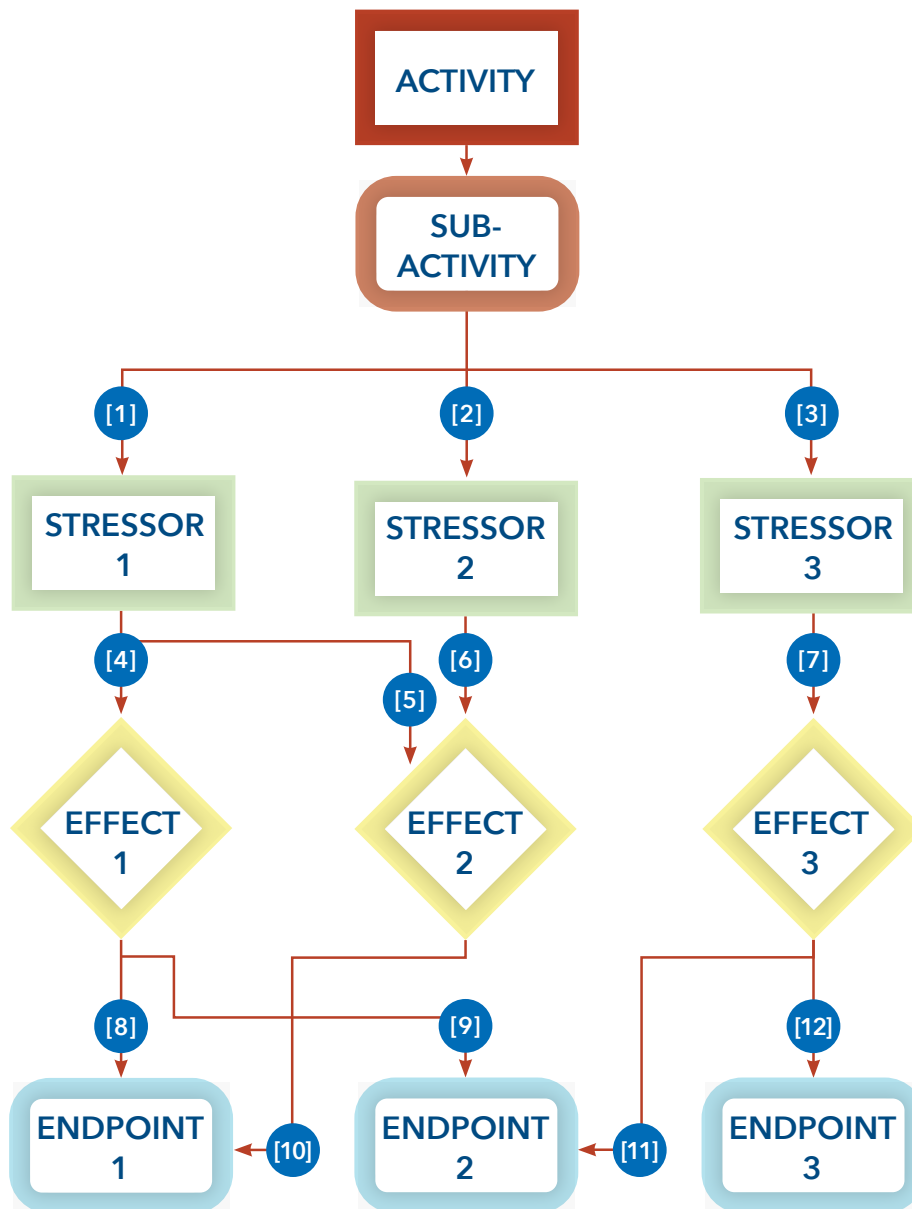


### 3.2.2 Pathways of Effects diagrams

A Pathways of Effects (PoE) diagram is a useful tool that may be developed for priority VCs. PoE conceptual models describe the linkages between activities, associated stressors, and their effects on VCs. They serve as visual representations of effects and are supported by text describing each pathway linkage. Figure 2 shows a template of a PoE diagram from the CSAS report Pathways of Effects Conceptual Models for Marine Commercial Shipping in Canada: Biological and Ecological Effects (Hannah et al. 2020). In the case of the CEMS initiative, the activity for any PoE is always marine shipping and the sub-activity is always associated to an action of marine shipping (e.g. movement underway or discharges). The numbers corresponding to each arrow in the diagram are accompanied by text that describes and provides evidence for that linkage.

Conversations through CEMS pilot areas have led to important discussions about how to visualize PoE's through an Indigenous lens. Similar to the notion that assigning “value” to certain aspects of the environment over others does not align with Indigenous worldviews, traditional PoE conceptual models sometimes do not represent the Indigenous understanding of interconnectedness. Namely, interconnectedness is inherently a circular approach to viewing the world, rather than the linear nature of PoE diagrams.

From these conversations, a two-eyed seeing approach to visualizing marine shipping activities, stressors, effects, and “connections” has been adopted in the South Coast, BC CEMS pilot area (refer to Appendix I for more information).



**Figure 2:** Template structure for a Pathway of Effects model diagram from the PoE CSAS report (Hannah et al. 2020). Arrows indicate the linkages between components, numbers link to supporting text/evidence.

### 3.2.3 Spatial and temporal boundaries

Defining spatial and temporal boundaries is an important step in scoping out a regional CEA. Through early engagement, TC found that there are many factors that may contribute to spatial and temporal boundaries. For the CEMS pilot areas, the geographic scales may be informed by the extent of the marine shipping activities on chosen VCs or already established boundaries such as Indigenous territories or bioregional boundaries. TC has also considered the scale to which management levers could be implemented to refine the scope for the purpose of making management recommendations.

The spatial boundaries for the assessments of pathways in a study area should be informed by the best available data for an indicator. Regional CEAs may also be divided into sub-regional CEAs. This layered approach allows for sub-regionally specific issues, values, and mitigation measures to be identified, ultimately leading to a more fulsome regional CEA. Considerations for temporal boundaries will be discussed further in section 4.3.

### 3.2.4 Management objectives, indicators and thresholds

A management objective is a quantitative or qualitative measurement or description of the future condition of a VC that should be used to inform appropriate indicators, thresholds, potential mitigation measures, and monitoring strategies (Wilson, 2020). Collaboratively drafting clear management objectives for each prioritized VC helps set the stage for the next steps and phases of a regional CEA. In some cases, a management objective may already exist for a VC if it is federally managed (e.g. through the *Species at Risk Act*).

Indicators are metrics used to measure the potential effect of an activity on a VC. They serve as a proxy for VCs and stressors, and help to measure the condition of a VC based on its management objective. Indicator selection should consider criteria such as relevance, responsiveness, and feasibility (Pickard, et al., 2019). Through the CEMS initiative, TC has found that, in certain cases, indicators for VCs may be chosen prior to defining management objectives. This step, much like many other steps in a regional CEA, is iterative and may vary on a case-by-case basis.

Thresholds are qualitative or quantitative levels of an indicator, which, if surpassed, may initiate changes in management. Those who have a strong relationship or understanding of a resource, or VC, will have a deeper understanding of its acceptable thresholds. Thresholds may vary from region to region and from community to community and may not be appropriate for some stressor-VC relationships. They should always consider the regional context of where the CEA is taking place and be directly informed by science as well as local community and Indigenous knowledge. Indicators and thresholds should also have sufficient data available to understand the regional context and support the assessment. An analysis and amalgamation of data is crucial to identifying indicators, but this may only reach completion in the next phases identified in this Framework. In some cases, there may not be data available to assess the impacts on an indicator. Identifying where gaps in data and knowledge exist is still an important outcome for focusing future efforts. These examples clearly demonstrate the importance of maintaining an iterative framework process.

### 3.2.5 Management levers and management measures

As defined above, management levers include legislation, regulations, policies, or voluntary tools that can be implemented to mitigate or manage the effects of marine shipping activities on environmental, social, or cultural VCs. Management measures are existing legislation, regulations, policies, or voluntary tools currently in place which manage the effects of marine shipping activities under various levels of jurisdiction.

It is important to understand the management context and the possible outcomes, in order to help focus efforts during the scoping phase. However, depending on factors such as capacity, this exercise may be carried out at the same time as the assessment phase. Key pieces to identify during this step include the type of management lever, who has jurisdiction over the lever, and the process for implementing it. A list of possible management levers and management measures with respect to waters within Canadian jurisdiction can be found in Appendix IV.

#### POTENTIAL OUTCOMES

- Development of selection criteria, including rationale, for identifying and prioritizing interests and values
- Development of conceptual diagrams
- Identification of spatial and temporal boundaries for prioritized values
- Identification of management levers, measures and objectives for all prioritized values

- Data and knowledge availability, assessment and amalgamation
- Assessment of current or reference condition and trends
- Identify information and knowledge gaps for further investigation
- Conduct regional cumulative effects assessment and alternative management scenario analysis

### 3.3.1 Data and knowledge amalgamation

Assessing and amalgamating available data and knowledge are important first steps of a regional CEA, which typically involves considering a variety of potential input datasets and data gaps. This exercise begins with compiling and evaluating the quality and spatial/temporal extent of the best available data for stressors, VCs, and their indicators. Indigenous knowledge should be weaved into this amalgamation with protocols in place to assure the collection, storage, and application of data respects possible sensitivities. As discussed in section 2.4, there may be sensitivities with respect to how certain Indigenous knowledge is gathered, utilized, and accessed.

Depending on the nature and scope of the regional CEA, data-related considerations for both science and Indigenous knowledge could involve building awareness and understanding of themes such as:

- Qualitative and quantitative data and analysis
- Current and historic conditions
- Spatial and temporal factors
- Scale and context
- Availability and cost (open data, shared/donated, purchased, collected, derived, etc.)

If a knowledge gap exists and there is an insufficient amount of data to support an assessment, it is important to adhere to precautionary principles when determining appropriate management and mitigation measures. An outcome of the CEMS initiative could also be to recommend an increase in research efforts for certain stressors, VCs, or indicators that have existing data/knowledge gaps, in order to avoid any limitations in future CE or project-related assessment work. As such, all potential effects of marine shipping should be documented even if data/knowledge gaps currently exist.



### 3.3.2 Geographic Information Systems

Collaborative decision-making among partners and collaborators could involve discussion of some or all of the above-noted topics. There are many tools that can facilitate these discussions, such as shared exploration and visualization of data. To promote the utilization of geographic information system (GIS) platforms, appropriate training and capacity should be available to interested users. Considering the goals and requirements of these discussions will help in selecting appropriate collaboration tools.

For the CEMS pilot assessments, an online platform with a broad range of GIS capabilities was selected on a trial basis to help users view, explore, share, and discuss data. The platform allows for the creation of as many private collaborative spaces as needed.

For the CEMS initiative, it has also been important to consider potential linkages with other initiatives and GIS tools, that cover related interests or subject matter. Finding overlaps and opportunities to collaborate helps to maximize efficiency and minimize duplication of effort.

### 3.3.3 Assessment methodologies

As categorized by Pickard, et al. (2019), regional CEA methodologies can be grouped into core themes including spatial, analytical, and modeling methods. The selection of an assessment methodology must be regionally specific as it depends on the relevance (e.g. priority valued components, shipping issues of concern), rigor (e.g. data availability), and feasibility (e.g. capacity) within each study area (Pickard, et al., 2019). Selecting a methodology depends on the outputs from other components within the Framework and may change as the scope is refined, more data becomes available, or the regional context shifts.

Throughout CEMS initiative engagement, adaptability was identified as an essential element of a regional CEA framework, since it is widely acknowledged that processes and methodologies should be informed by the regional context of each pilot area. The regional context considers both the ecological environment, the local and Indigenous context, and input from stakeholders.

A primary objective of assessing pathways of effects, for example, is to understand the cause-effect relationship between stressors and priority VCs. Pickard, et al (2019) also identifies the various approaches to assessing pathways of effects. The outcomes of these assessments should help identify which pathways have the most significant influence on the overall health of an ecosystem (i.e. the relative drivers of the system) which, in principle, supports decision making.

### 3.3.4 Assessment: understanding baseline conditions

The purpose of this step is to use the best available data to understand the significance of historical stressors on priority VCs when determining baseline conditions. At the basic level of a regional CEA, the baseline conditions of indicators are assessed in relation to their thresholds to determine whether a change in management (i.e. implementation of management lever) is required.

Good regional CEAs begin with understanding how priority VC conditions have changed over time and whether those changes are significant considering the threshold identified (Noble, 2015). If the current condition of an ecosystem is taken as the baseline on which future effects are compared (i.e. for shifting baseline syndrome: the baseline does not consider past effects), the assessment would greatly underestimate the cumulative effects that have already occurred in the study area and would lead to the ineffective management of priority VCs; particularly, those that are already nearing a critical sustainable tipping point (Noble, 2015).

Looking at historical data/knowledge to understand the effects that have already occurred in a study area is essential to assessing how an ecosystem may react to future changes and can help to inform the development of thresholds. However, there are several considerations to be made when defining the temporal scope of the baseline conditions. Historical data/knowledge can be culturally sensitive, difficult to find, and may require a considerable amount of time and resources to collect.

This step can be done at the same time as the data and knowledge amalgamation step described above. Information gaps are also often identified at this stage.





### 3.3.5 Assessment: predicting future effects

Once the retrospective analysis is conducted on the priority VCs, a good regional CEA predicts what future cumulative effects may look like based on various proposed or projected development scenarios (Noble, 2015). It is challenging to forecast future levels of marine vessel activity because there are many underlying factors that influence the levels and patterns of vessel traffic in a region. For instance, vessel traffic in areas near ports may be more influenced by economic drivers (e.g. container ship traffic being proportional to changes in Gross Domestic Product) than in areas with lower amounts of commercial traffic. The approach to forecasting vessel traffic also depends on the types of vessels being considered, the spatial scale (e.g. regional vs. local), temporal scale (e.g. predicting 2 months vs. 20+ years into the future), and the availability of data/knowledge to support any modelling efforts. It is important to recognize that there are various sources of uncertainty inherent with any approach taken to predict future conditions (e.g. the approval of new project developments or the occurrence

of unpredictable severe weather events caused by climate change). One goal of predicting vessel traffic is to recognize and capture uncertainties to build confidence in understanding the levels of vessel traffic in the future and the associated effects on VCs.

Due to the complexities of forecasting vessel traffic, there is no standardized methodology applicable to all situations. As such, the CEMS initiative commissioned a review of methodologies for predicting future vessel traffic in the Northern Shelf Bioregion, British Columbia; however, the information is applicable to all Canadian coasts. The report provides overviews of the fundamental concepts for forecasting marine shipping and various methodologies or strategies that have been applied in existing studies. The report serves as a useful tool for understanding the advantages and limitations of each type of vessel-forecasting methodology and highlights key considerations that should be made when exploring future scenarios.

#### POTENTIAL OUTCOMES

- Agreement on assessment methodologies
- Amalgamation of data and/or knowledge
- Increased understanding of indicators, trends and thresholds
- Understanding of assessment conclusions
- Refining the list of relevant potential mitigation measures and management levers



- Identify and recommend cumulative effects management strategies/mitigation measures and implementation methods

The key outcome of the decision-making phase of a regional CEA is to identify a recommended suite of prioritized measures to be recommended through a regional mitigation strategy. These mitigation measures should be derived from the list of potential management levers and measures identified in the scoping phase of the assessment (see Appendix IV) and refined as necessary with the outcomes of the regional CEA. Other measures may be identified throughout and after the assessment phase as more information becomes available and more collaboration occurs. For each CEMS pilot area, all recommended mitigation measures will be co-developed with collaborators and aligned to the extent possible with the outcomes of other relevant initiatives.

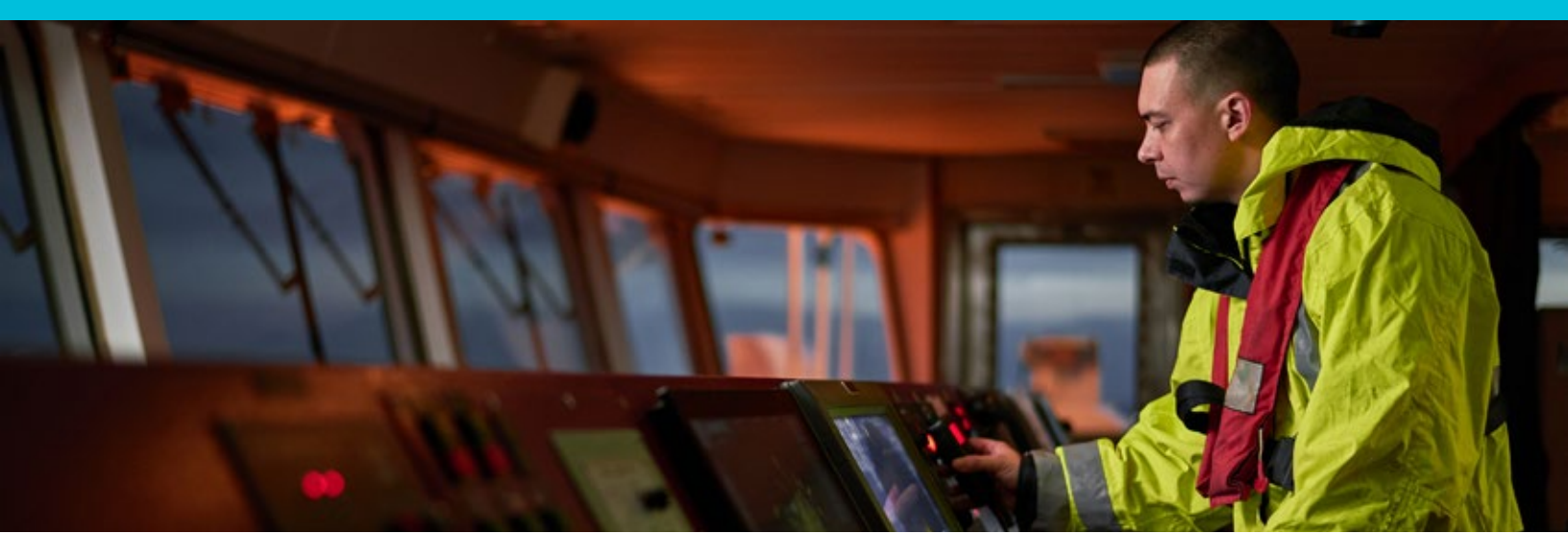
The objective of mitigation measures is to reduce or eliminate the adverse cumulative effects of an activity on the ecosystem through priority VCs. According to Noble (2015), in cases where a priority VC has been identified through the regional CEA to have reached or surpassed its sustainable threshold, the only acceptable management action may be to restore, and hopefully enhance, the VC condition. Consideration will need to be given to the implications (e.g. economic, social, cultural, etc.) of any potential management action prior to implementation.

In addition to implementing concrete mitigation measures, a regional CEA may also inform strategic level outcomes (e.g. marine use planning), as well as federal project impact assessments under the *Impact Assessment Act*, or any other project reviews subject to a provincial or territorial impact assessment process (e.g. Inuvialuit Final Agreement, *Nunavut Planning and Project Assessment Act*, *Yukon Environmental Socio-Economic Act* and *Mackenzie Valley Resource Management Act*). A regional mitigation strategy may also include recommendations for knowledge building and coordination such as further data collection where data gaps have been identified. It is important that the results of a regional CEA be available to, and widely shared, with all relevant stakeholders and authorities to ensure all possible mitigation measures are considered.

Due to the nature of regional CEAs, management decisions typically fall under the jurisdiction of multiple relevant authorities. These authorities may include others in the decision-making process, such as various federal government departments, other levels of government, the marine shipping industry, and Indigenous peoples. The roles and responsibilities of relevant authorities must be understood to efficiently participate in the decision-making process. The results of a regional CEA support decision-makers by providing information and evidence on the current and projected future states of priority VCs in relation to their stressors. A strong evidence base for adverse cumulative effects should increase the confidence of decision-makers to implement recommended mitigation measures.

## POTENTIAL OUTCOMES

- Development of a prioritized list of regional mitigation measures to implement in a regional management strategy



3.5

## ACTION

### STEPS

- Implement proposed measures

The objective of this phase is to implement recommended mitigation measures agreed upon in the decision-making process and, where appropriate, begin drafting a follow-up program to design how the measures will be monitored. As discussed above, implementation may fall under the jurisdiction of many relevant authorities, depending on the nature of the recommended mitigation measures. There are also many factors that may contribute to the successful implementation of marine management measures. Elliott (2013) describes these factors as the 10-tenets for integrated, successful, and sustainable marine management; namely, measures to manage the marine environment must be:

- Ecologically sustainable
- Technologically feasible
- Economically viable
- Socially desirable/tolerable
- Legally permissible
- Administratively achievable
- Politically expedient
- Ethically defensible (morally correct)
- Culturally inclusive
- Effectively communicable

Not all these tenets may always be relevant for every regional CEA. For example, a recommended mitigation measure may not be politically expedient, but it may be necessary in the context of reconciliation and building stronger relationships with Indigenous peoples.

The process and plan for implementing mitigation measures is also dependent on the type of lever selected. For example, creating new or revising existing legislation is a lengthier process than enacting new regulations. Similarly, the process of creating new legislation or enacting new regulation looks much different than trialing a voluntary measure. In all cases, it is important that an action plan allows for engagement and input from interested and implicated parties.

### POTENTIAL OUTCOMES

- Development of an action plan describing the process for how to implement measures
- Implementation of mitigation measures/regional management strategy

- Identify through ongoing monitoring if measures are successful
- Be prepared to re-visit the assessment based on management objectives and thresholds

### 3.6.1 Follow-up and monitoring

Regional CEAs are often designed with a considerable amount of uncertainty and are often sensitive to unpredictable socio-economic changes. Monitoring is integral to a follow-up program as it allows practitioners to re-evaluate regional study areas after the implementation of mitigation measures and determine if scoping or management changes need to be made. This is the foundation of adaptive management. A follow-up program should be developed collaboratively with any authorities who may have responsibilities under the program. Roles and responsibilities for each relevant authority should also be defined early in the process.

The overall objective of a follow-up program is to understand the outcomes of decision-making, which can inform ongoing refinement of the regional CEA and associated mitigation measures. A follow-up program may:

- verify predictions of environmental effects identified in the regional CEA
- determine the effectiveness of mitigation measures in order to modify or implement new measures where required
- support the implementation of adaptive management measures to address previously unanticipated adverse effects
- provide information on effects and mitigation that can be used to improve and/or support future impact assessments including CEAs
- support environmental management systems used to manage the environmental effects of projects (adapted from IAAC, 2011)

Indicator monitoring involves periodic collection of data to confirm the condition and trend estimates of the indicators, which helps to inform effectiveness monitoring (Wilson, 2020). If the measure of an indicator surpasses the management threshold established in the scoping phase (section 4.2), then a change in management should be triggered. This often involves implementing a more rigorous mitigation measure or a change in management strategy. The stressor should also be monitored so that the relationship between stressor and effect can continue to inform changes to mitigation, if needed.

Effectiveness monitoring is broader in scope and aims to evaluate the success of the overall regional CEA. Determination of success is achieved by periodically evaluating the current state of the study area with the stated management objectives of each VC and the overall stated goal of the regional CEA.

Depending on the outcomes of the assessment, follow-up, and monitoring, there may be instances where the management objectives and thresholds should be reviewed and updated. When the regional reality, as determined through monitoring outcomes, does not align with stated management objects and goals, then the cumulative effects projected in the regional CEA are not being adequately addressed, and adaptive management is required.

A follow-up program should be designed in collaboration with local knowledge holders and must allow the opportunity for input by relevant authorities. Opportunities should be available for Indigenous peoples and local communities to also be involved in monitoring studies.

#### POTENTIAL OUTCOMES

- Development of an adaptive monitoring strategy
- Understanding of performative indicator thresholds
- Creation of a follow-up program

## 4 CONCLUSION

The goal and purpose of this Framework is to share our learning and approaches to regional activity-based CE assessments by providing flexible, consistent guidance on how Transport Canada has assessed the cumulative effects of marine shipping on a regional basis. The guidance provided in this Framework is supported by our experience conducting CEMS assessments in our regional pilot areas. It currently represents our experience to date. However, the Framework is evergreen and will be updated as the regional pilot work unfolds, and as new federal guidance is published.



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## 6 APPENDICES

There are three appendices attached to this Framework.

Appendix I provides an in-depth summary of the CEMS regional pilots in the Northern Shelf Bioregion, British Columbia; South Coast, British Columbia; Cambridge Bay, Nunavut; St. Lawrence and Saguenay Rivers, Quebec; Bay of Fundy, New Brunswick and Nova Scotia; and Placentia Bay, Newfoundland and Labrador. This Appendix is current as of Spring 2022 and will be updated as work progresses and as new CEMS pilots are initiated.

Appendix II documents lessons learned throughout the regional pilot areas as well as national-level engagement. It also includes key success factors of the initiative.

Appendix III includes a list of resources within the CEMS toolkit, which have helped to inform the initiative nationally and regionally.

Appendix IV is a table of possible management levers and management measures with respect to waters within Canadian jurisdiction. It covers the jurisdiction of multiple federal departments, the International Maritime Organization, and voluntary management measures. The table is intended to share information, but it is non-exhaustive. Other management levers/measures may exist and can always be suggested for addition.





# APPENDIX I: PILOT AREAS

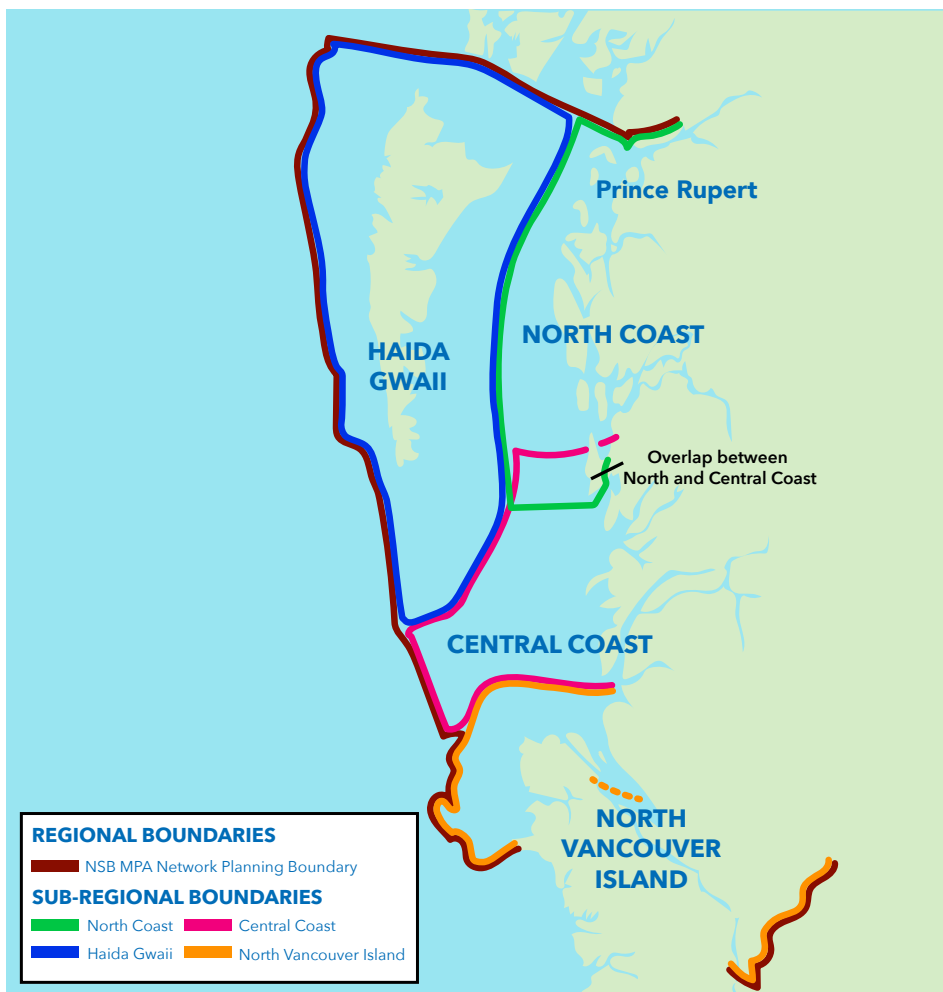


## NORTHERN SHELF BIOREGION, BRITISH COLUMBIA

### Introduction

In western Canada, the Northern Shelf Bioregion (NSB) occupies approximately two-thirds of British Columbia's coast by encompassing the marine and coastal areas from the northern end of Vancouver Island to the Alaska border and extending westward to the continental slope (see Figure 1). This area is home to numerous First Nations that have occupied, accessed, used, and stewarded the waters of their territories for millennia and that continue to rely on the marine environment for harvesting valued resources and obtaining physical, mental, and spiritual wellbeing, among many other connections to their culture and history. The kelp forests, deep fjords, open waters, estuaries, and networks of archipelagos in the NSB are also home to

salmon, shellfish, whales, and many other ecologically, culturally, and economically important species. Due to the abundance of marine resources as well as the current existence of ports and industrial developments that support and facilitate growth of Canada's economy, the waters of the NSB accommodate various marine shipping activities from small recreational boats to very large commercial vessels. In consideration of existing and future industrial developments and trends in increasing vessel traffic within the NSB, understanding the cumulative effects of marine shipping activities will help identify actions to protect the many valued components intrinsic to the NSB.



**Figure 1:** Graphic rendition of the Northern Shelf Bioregion boundaries that comprise four sub-regions, Central Coast, North Coast, North Vancouver Island, and Haida Gwaii.

# 1 Early Planning and Engagement (2018–2019)

On June 21, 2018 the Government of Canada and Pacific North Coast (PNC) First Nations (listed in Table 1) signed the Reconciliation Framework Agreement for Bioregional Oceans Management and Protection (the “RFA”). The RFA serves as an important commitment to regional partnership in the task of ocean management and an opportunity to develop a Nation-to-Nation approach to oceans protection between Canada and PNC First Nations. The RFA commits the Parties to advance Collaborative Governance and Management<sup>1</sup> on matters related to Marine Planning and Oceans Management and Shipping, Marine Safety, and Ocean Protection. Schedule B of the RFA specifies the commitment of all Parties to work on cumulative effects initiatives in the NSB, which includes the CEMS NSB Pilot Area.

Transport Canada and the PNC First Nations established a Technical Working Group (hereby referred to as the “CEMS NSB TWG”) that meets monthly to work collaboratively on implementing the CEMS NSB Pilot Area. In addition to regular CEMS NSB TWG meetings, a preference of the PNC First Nations was to also have meetings without the presence of the federal government. Doing so provided space for the PNC First Nations to highlight and discuss sensitive Indigenous Knowledge, and their preferences for weaving such information into CEMS assessments. These discussions also helped ensure the values and priorities of all the Nations were being adequately addressed at the CEMS NSB TWG table.

The first step taken by the CEMS NSB TWG was co-developing a Project Charter to align the expectations of all Parties and to serve as an early-planning resource for implementing the CEMS NSB Pilot Area. The Project Charter outlined the project background, goals and objectives, linkages to other OPP initiatives, geographic and policy scopes, among other items that specify the preferred and agreed to governance structure and methods for conducting the NSB CEMS Assessment. The CEMS NSB TWG also developed an iterative workplan to identify short- and long-term activities and the associated steps, timelines, resources, and capacity required to accomplish each task. The co-development of the Project Charter and workplan built trust and fostered productive relationships between the CEMS NSB TWG by highlighting accountability and promoting transparency early in the CEMS process.

**TABLE 1 The NSB CEMS Pilot Area consists of a Technical Working Group with representatives from TC and PNC First Nations from four sub-regions within the NSB.**

<p><b>NORTH COAST</b></p> <ul style="list-style-type: none"> <li>• Lax Kw’alaams Band</li> <li>• Gitxaala Nation</li> <li>• Metlakatla First Nation</li> <li>• Gitga’at First Nation</li> </ul>	<p><b>CENTRAL COAST INDIGENOUS RESOURCE ALLIANCE</b></p> <ul style="list-style-type: none"> <li>• Kitsoo / Xai’Xais First Nation</li> <li>• Heiltsuk Nation</li> <li>• Nuxalk First Nation</li> <li>• Wuikinuxv First Nation</li> </ul>
<p><b>NANWAKOLAS COUNCIL SOCIETY</b> (NORTH VANCOUVER ISLAND)</p> <ul style="list-style-type: none"> <li>• Mamalilikulla Nation</li> <li>• Tlowitsis Nation</li> <li>• Da’naxda’xw Awaetlatla First Nation</li> <li>• Wei Wai Kum First Nation</li> <li>• K’ómoks First Nation</li> </ul>	<p><b>COUNCIL OF THE HAIDA NATION</b></p> <ul style="list-style-type: none"> <li>• Skidegate, Old Massett</li> </ul>
	<p><b>OBSERVER</b></p> <ul style="list-style-type: none"> <li>• Nisga’a Lisims Government</li> </ul>

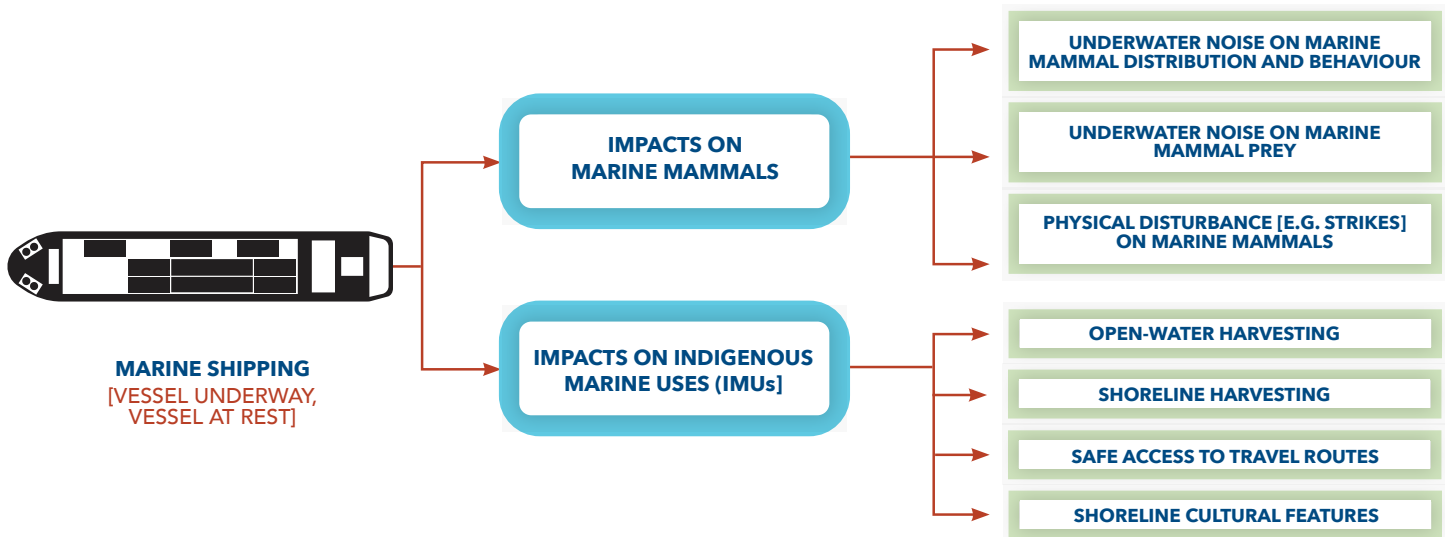
<sup>1</sup> In the RFA, Collaborative Governance and Management means “nation-to-nation, government to government arrangements that support decision making, authorities, responsibilities, laws and jurisdictions being exercised collaboratively, including working together on planning, decision making, decision implementation processes and management.”

## 2 Scoping (2019)

To begin the scoping phase of the CEMS NSB Pilot Area assessment, the CEMS NSB TWG developed the following criteria to facilitate the selection and prioritization of regional marine shipping issues: ensuring the issues were regionally relevant, there was data available to support assessment work, there was an ability to influence existing management measures, among other considerations to focus the scope of the NSB Pilot Area. Knowledge of each PNC First Nations' concerns regarding marine shipping activities was gathered by each First Nations' representative through direct engagement with their community members and/or Leaderships, and/or by collating existing information from relevant project-level Environmental Assessments. Various reference materials were also available and used to help identify marine shipping issues including a list of common NSB Valued Components developed through the Cumulative Effects Monitoring Initiative (CEMI), the BC Environmental Stewardship Initiative, and the Marine Area Plan Partnership.

A scoping discussion was held with members of the CEMS NSB TWG to identify marine shipping issues of concern that would be included in the regional CEMS NSB Pilot Area assessment. The discussion involved amalgamating the knowledge gathered for each PNC First Nation and then identifying themes and connections between the First Nations' shared interests. The criteria was then applied to identify each PNC First Nations' top marine shipping stressors and impacts of concern that would be shared at the regional CEMS NSB TWG table. Through this process, the CEMS NSB TWG were able to prioritize and confirm regional marine shipping issues as outlined in Figure 2.

Conceptual diagrams were then jointly developed to establish linkages between the stressors of marine shipping activities and their effects on Valued Components identified by the PNC First Nations.



**Figure 2:** Simplified conceptual diagram of the prioritized marine shipping activities (red) and the associated effects (blue) on valued components (green). For a more detailed summary of the conceptual diagrams please reach out to a member of the CEMS NSB TWG.

### 3 Assessment (2020–2022)<sup>2</sup>

## Vessel Traffic Impacts on Marine Mammals

In January 2020, the CEMS NSB TWG hosted an in-person workshop with First Nations' representatives, government and non-government subject matter experts, as well as academia, to establish a shared understanding of the current state of knowledge on the impacts of underwater noise and vessel strikes on marine mammal species that are present in the NSB. To achieve this goal the participants were encouraged to share relevant datasets and information, highlight ongoing knowledge or data gaps, discuss applicable assessment methodologies, and identify opportunities for collaboration to further ongoing data collection and assessments. Following the workshop the CEMS NSB TWG hired an agreed-to 3rd party contractor to develop a Data and Research Amalgamation Report on Underwater Noise and Vessel Strikes in the NSB (see report in References). The report contained an amalgamation of the information brought forward at the workshop and summarized the results from the various completed and ongoing research efforts that were identified. The CEMS NSB TWG held a second workshop with the same group of participants as the first workshop to review and validate the key findings of the report. The workshop participants also discussed strategies to effectively assess the impacts of underwater noise and vessel strikes on marine mammals such as identifying appropriate metrics, indicator species, and research objectives.

A key takeaway from the workshop is the current lack of ambient noise modeling in the NSB which is necessary to understand how vessel noise contributes to the marine underwater soundscape and the associated impacts to marine mammals. To address this knowledge gap, the CEMS NSB TWG commissioned JASCO Applied Sciences Ltd to conduct hydroacoustic modeling of vessel noise within a large spatial area in each of the four NSB sub-regions for 3 time periods using 2019 Automatic Identification System (AIS) vessel data collected by the Canadian Coast Guard. The final scope and metrics used in JASCO's study were informed by guidance provided by subject matter experts during the CEMS workshops and subsequent discussions. For instance, the study includes a Listening Space Reduction metric that quantifies the amount of space available for marine mammals to communicate or echolocate in the presence of vessels. Vessel noise was modeled in this study with JASCO's Acoustic Real-Time Exposure Model for In-motion Sources, whereby a large dataset of historical vessel noise measurements is used to simulate the sound footprints for other AIS vessels. A next step for the CEMS NSB

TWG is to validate the simulated levels of vessel noise from JASCO's model by comparing the results against calibrated measurements of underwater noise recorded during periods when vessels were present within the four NSB sub-regions. The CEMS NSB TWG also collaborated with the Prince Rupert Port Authority to align the study with modeling of underwater noise within the Prince Rupert area of the North Coast sub-region. As such, these efforts will provide a comprehensive analysis of current underwater noise conditions in the NSB (before the COVID-19 pandemic) and how vessel noise may be impacting marine mammals.

Another key takeaway from the workshop and amalgamation report is that little is known about how underwater noise affects marine mammal prey species such as herring, sand lance, and eulachon at this time. Analysis of acoustic data to determine the vocalization patterns of prey species and how they respond to vessel noise is limited and current research efforts typically focus only on commercial species (e.g. salmon). As such, additional research efforts would be required to complete a comprehensive CEMS assessment on the impacts of underwater noise on marine mammal prey.

To assess the impacts of vessel strikes on marine mammals, the CEMS NSB TWG identified a multi-step assessment approach based on input and guidance received from subject matter experts. The first step (in 2022) is to develop probabilistic density and distribution maps of prioritized marine mammals within the NSB to estimate where the whales are. This effort will involve using advanced surface modeling techniques and incorporating the best available marine mammal data collected from systematic line-transect surveys and opportunistic sightings, which are being completed through a services contract with Oceans Initiative. The next step (in 2022) is to conduct a focused vessel strike risk analysis to estimate where and when whales and vessels are most likely to overlap. Lastly, the findings of the vessel strike risk analysis will inform the identification of locations within the NSB to recommend deploying vessel strike mitigation tools.

<sup>2</sup>The CEMS NSB TWG has not yet finalized the Assessment phase at the time this document was written. More assessment work is needed to inform the next phases of work for this pilot area.

## Vessel Traffic Impacts on Indigenous Marine Uses

In consideration of the large spatial scope of the NSB, time limitations and concerns about data availability, discussions were held between the PNC First Nations to identify a suitable approach for assessing vessel impacts on Indigenous marine uses (IMU). An agreement was made for the North Coast (NC) sub-region to 'pilot' an IMU assessment to produce an outcome that, while specific to the NC First Nations, could test a potential structure for the other NSB sub-regions to follow. The goal of the NC IMU pilot project was to understand the current and future pressures of vessel traffic on IMUs in each First Nations' territory, and to co-develop potential management recommendations that can be implemented to address adverse cumulative effects on IMUs, when and where necessary.

Using an agreed-to GIS contractor, Coastal Resource Mapping Ltd, TC and the NC First Nations (hereby referred to as the "NC Team") were able to collaboratively estimate, with limitations, the conditions of AIS vessel traffic in 2019 in key pilot Areas of Interest (AOI) and the associated preferences and behavioral responses from Indigenous users for each IMU valued component.

To do so, the NC Team developed a list of indicators and metrics to be assessed for each IMU VC, which included shoreline harvesting, open-water harvesting, and safe access to travel routes. For instance, assessing the total amount of vessel transits and total residence time within an AOI were metrics used to indicate the impacts to shoreline harvesting. By capturing the various levels and patterns of vessel traffic in key AOIs and during important times (e.g. seasonal harvesting, practicing cultural traditions), the NC First Nations were able to pilot implementing a CE methodology that informed the development of management recommendations to address impacts that Nations have continuously witnessed. Following the guidance and lessons learned from the NC's IMU pilot project, First Nations from the other NSB sub-regions will conduct similar IMU assessments (in 2022).

## Other Efforts to Support Assessment Work

An analysis of vessel traffic has been a fundamental component of each Pilot Area assessment, which relies on marine traffic data collected using Automatic Identification Systems (AIS). However, many small vessels using NSB waterways, particularly recreational vessels, do not meet the specifications<sup>3</sup> to require AIS carriage and, therefore, the AIS data provides an incomplete view of total marine traffic. To address this known data gap, since 2018 Transport Canada's National Aerial Surveillance Program (NASP) has conducted flight surveys that use high-resolution cameras to collect data of AIS and non-AIS vessels in the NSB along routes selected by the CEMS NSB TWG. The observational and opportunistic data collected by the NASP surveys continue to provide insight into the types of vessels that are typically equipped with AIS as well as the likely proportion of AIS versus non-AIS vessels found in various areas in the NSB. The CEMS NSB TWG has continually integrated the findings of the NASP surveys into the various pilot area assessments to estimate the extent to which non-AIS vessel traffic may be impacting cetaceans and IMUs.

In addition to assessing the cumulative effects of current marine vessel traffic, a key objective of the NSB CEMS Pilot Area is to also assess the cumulative effects from forecasted marine vessel traffic. The CEMS NSB TWG has not yet completed an analysis of forecasted vessel traffic in the NSB at the time this document was written. However, as discussed in Section 3.3.5, the CEMS initiative commissioned a review of methodologies for predicting future vessel traffic in the NSB. The report currently serves as a useful tool for helping the CEMS NSB TWG refine the scope of upcoming efforts to forecast vessel traffic in the NSB by ensuring the outcomes can be used to evaluate how cetaceans and IMUs may be impacted by future vessel traffic.

<sup>3</sup> <https://tc.canada.ca/en/marine-transportation/marine-safety/ship-safety-bulletins/expanding-ais-requirements-ssb-no-09-2019>

## 4 Decision Making (2022–2023 and onwards)

In completing the regional and sub-regional assessments, a suite of suggested management recommendations will be developed to mitigate identified impacts. The management recommendations will continue to be refined through continuous feedback from each First Nations' marine users and Leadership, through alignment with other OPP initiatives to make the most efficient use of resources, and by technical reviews from relevant stakeholders.

The CEMS NSB TWG has not yet entered into the Decision Making phase at the time this document was written. The Decision Making phase will include the development of and collaboration on any recommended mitigation and management strategies with appropriate audiences; establishing linkages with other tables as needed to make the most efficient use of resources and identifying processes for implementing and/or piloting management measures and/or strategies.





# KITSELAS FIRST NATION AND KITSUMKALUM INDIAN BAND, BRITISH COLUMBIA

## Introduction

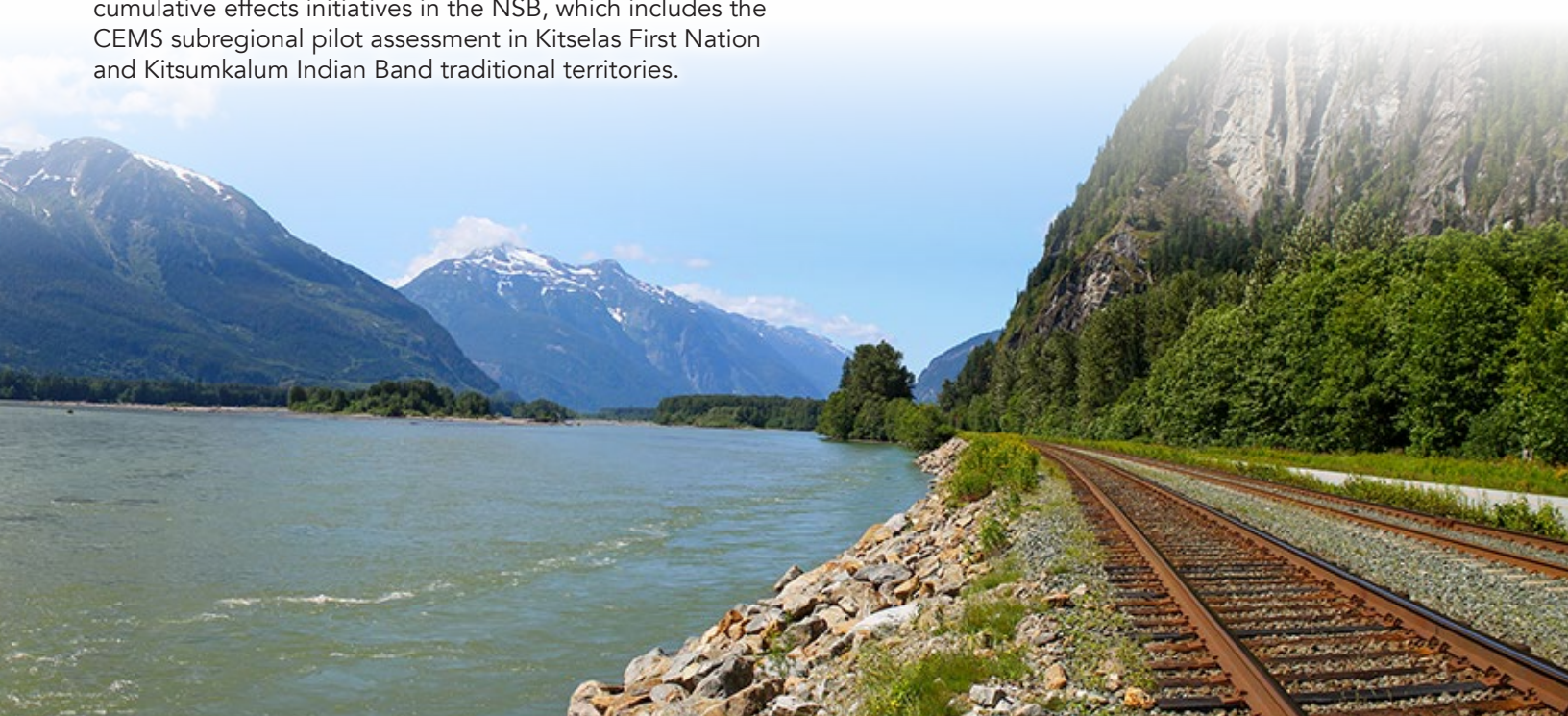
The asserted traditional territories of Kitsumkalum Indian Band and Kitselas First Nation are located in the North Coast sub-region of the Northern Shelf Bioregion, British Columbia. Kitsumkalum and Kitselas are Tsimshian First Nations who have a deep cultural relationship with their marine and terrestrial territories, which have been accessed and stewarded by their Peoples since time immemorial. Both Kitsumkalum Indian Band and Kitselas First Nation have significant concerns regarding the potential adverse cumulative effects of marine shipping activities and recognize the need to identify, assess, and manage such impacts for the continued wellbeing of their territories, resources, and communities.



## 1 Early Planning and Engagement

In 2020, the Government of Canada, Kitselas First Nation, and Kitsumkalum Indian Band signed a Reconciliation Framework Agreement for Bioregional Oceans Management and Protection (the "RFA"). The RFA serves as an important commitment to partnership in the task of ocean management and an opportunity to develop a Nation-to-Nation approach to oceans protection between Canada, Kitselas First Nation, and Kitsumkalum Indian Band. The RFA commits the Parties to advance Collaborative Governance and Management on matters related to Marine Planning and Oceans Management and Shipping, Marine Safety, and Ocean Protection. Schedule B of the RFA specifies the commitment of all Parties to work on cumulative effects initiatives in the NSB, which includes the CEMS subregional pilot assessment in Kitselas First Nation and Kitsumkalum Indian Band traditional territories.

After the signing of the RFA, Transport Canada, Kitselas First Nation, and Kitsumkalum Indian Band developed a Collaborative Working Group (CWG) that meets monthly to jointly conduct the CEMS subregional assessment. To guide the assessment, the CWG co-developed a Terms of Reference to align the expectations of all Parties as well as an iterative workplan to identify short- and long-term activities and the associated steps, timelines, resources, and capacity required to accomplish each task.



## 2 Scoping

Through early CWG discussions, the impacts of vessel activities on Indigenous marine uses (IMU) was selected as the priority CEMS assessment to be completed. Discussions are currently ongoing to prioritize marine shipping activities that are of concern to Kitselas First Nation and Kitsumkalum Indian Band as well as the IMU valued components. To help refine developing the pathways of effects, data and knowledge are currently being amalgamated following appropriate and agreed to information sharing protocols, which will also help inform future assessment work.

## 3 Assessment

The CEMS pilot site assessment with Kitselas First Nation and Kitsumkalum Indian Band in the North Coast sub-region of the NSB has not entered into the Assessment or Decision Making phases at the time this document was written. The Assessment phase will involve collaboratively conducting a CEMS subregional assessment for key marine shipping issues and assessment priorities identified by Kitselas First Nation and Kitsumkalum Indian Band.

## 4 Decision Making

The Decision Making phase will include the development of and collaboration on any recommended mitigation and management strategies with appropriate audiences, and identifying processes for implementing and/or piloting management measures and/or strategies.







## SOUTH COAST, BRITISH COLUMBIA

### 1 Early Engagement and Planning

In the early stages of the Oceans Protection Plan within the South Coast of BC, OPP-CEMS engaged a number of First Nations in the South Coast BC in a variety of ways to better understand how Transport Canada and First Nations could foster a collaborative partnership. A number of themes emerged from these early engagement activities, which informed current CEMS South Coast BC practices. They included:

- Investing more time in understanding the concerns, interests, and current practices of local communities.
- Improving the communication and coordination of OPP and other regional initiatives.
- Understanding the importance of UNDRIP and the Truth and Reconciliation Commission recommendations in partnership-building.
- Clarifying the use of historical, ongoing input from Indigenous groups and establishing clear protocols for sharing local knowledge.
- Identifying solutions to improve meaningful participation by addressing capacity challenges.



The Commitment to Actions and Results (C2AR) Accord was developed in 2019 as a response to this early feedback from First Nations in South Coast BC. The C2AR was signed between TC, Fisheries and Oceans Canada, Canadian Coast Guard, Environment and Climate Change Canada, and the First Nations Fisheries Council of BC (FNFC). The agreement represented a non-legally binding framework that would focus on supporting First Nations involvement in implementing the OPP in the South Coast of BC, through joint work planning efforts.

Several guiding principles were developed to support the collaborative efforts of the C2AR, which included: Respect, Inclusiveness, Flexibility, Sustainability, Stewardship, and Accountability. These principles underpin the working relationship between TC and FNFC on shared OPP priorities in the South Coast of BC—and have contributed to several positive outcomes through establishing regional commitments to shared priorities, like marine shipping.

The C2AR also identified three priority streams of work with associated coordinating committees: Ship Movement and Vessel Management (VMCC); Marine Research and Science and Emergency Preparedness and Response. Each coordinating committee consists of South Coast BC First Nations delegates who work alongside representatives from FNFC and Federal Government Departments. This provides a platform to convene South Coast Nations to discuss their respective priorities in a regional context.

### Ship Movement and Vessel Management Coordinating Committee

The Ship Movement and Vessel Management Coordinating Committee (VMCC) focuses on providing recommendations and feedback related to CEMS, to enhance the role of First Nations in the South Coast in governance, planning, and contributions towards advancing Canada’s marine safety and transportation system to better respond to impacts that are occurring on SC BC coastlines. The VMCC is providing direction and guidance to the CEMS initiative and is the primary mechanism to advancing the work of CEMS on a regional level in the South Coast of BC.

The relationship between TC, FNFC and the VMCC is outlined in the CEMS-VMCC co-developed Living Workplan. The Living Workplan includes a project background, key definitions, project goals, resources for participation and a flexible project process timeline and was collaboratively developed throughout 2020.

## Multilayered Assessment Approach

One major and reoccurring concern heard though early engagement was the need to also engage First Nations in South Coast BC at a bilateral or collaborative level around localized marine shipping issues. Since the geographic scope of the South Coast BC CEMS assessment is large (see Figure 1 below), some First Nations were concerned about their interests being lost at the regional table.

To address this, TC began meeting with interested First Nations in South Coast BC on a bi-lateral and/or collaborative basis in Spring 2020 and established a set of sub-regional CEMS assessments with the following interested First Nations/First Nation groups:

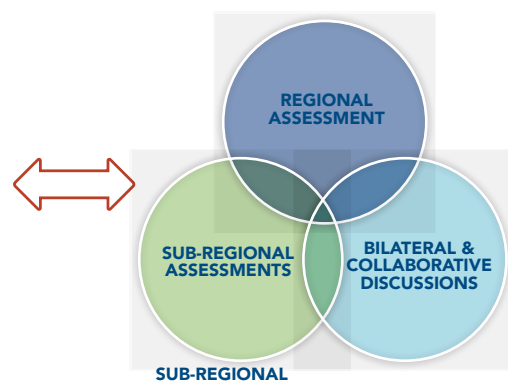
- Nuu-Chah-Nulth Tribal Council
- Maa-nulth Treaty Society

- Pacheedaht First Nation
- Tsleil-Waututh First Nation
- T'Sou-ke First Nation
- Esquimalt First Nation
- W̱SÁNEĆ Leadership Council
- Malahat First Nation
- Cowichan Tribes
- Snuneymuxw First Nation
- Salish Sea Indigenous Guardians Society (Tsawwassen, Semiahmoo and Kwantlen First Nations)

This multilayered assessment approach is depicted below.



**Indigenous CE Frameworks and Management systems** will inform and drive all layers of assessment



Implemented through the **Ship Movement and Vessel Management Coordinating Committee (VMCC)**

Implemented within **Sub-regions** of South Coast BC; help to inform the Regional Assessment and vice versa

**Bilateral and Collaborative** discussions will inform the other layers of Assessment

**Figure 1:** Multilayered Assessment Approach

## 2 Scoping

### Geographic Scope(s)

The regional scope of this Assessment area is inclusive of BC First Nation's territories from Smith's Inlet to the USA border and includes both East and West Coast Vancouver Island and the lower mainland coastal area within Canadian jurisdiction (see Figure 2 below).

The sub-regional assessment areas vary in size depending on what priority is being assessed, however are generally depicted with green dots in Figure 2, and include partnerships with:

- The Salish Sea Indigenous Guardians Association (Tsawwassen, Semiahmoo and Kwantlen First Nations)
- Tseil-Waututh First Nation
- Snuneymuxw First Nation
- Cowichan Tribes
- Malahat First Nation
- WSÁNEĆ Leadership Council
- Esquimalt First Nation
- T'Sou-ke First Nation
- Pacheedaht First Nation
- Maa-nulth Nations
- Nuuchahnulth Tribal Council



Figure 2: South Coast, BC Regional Scope of Assessment

# Regional Scoping Assessment Priorities

The scoping phase of the South Coast BC regional CEMS assessment spanned a series of seven workshops with the VMCC from March 2021–December 2021. Each workshop was graphically facilitated by consultants agreed to by TC and FNFC. The first few scoping workshops laid the foundation for the scoping phase by placing it within the context of the VMCC-CEMS Living Workplan and ensuring VMCC members had the information they needed to participate in the scoping exercises. Since all workshops were virtual, online collaborative tools like Google JamBoard and Mentimeter were utilized and essential for

encouraging opportunities for anonymous input into the marine shipping activities, connections/values, and effects of concern in South Coast BC as well as to provide input into the overall design of the scoping process.

From the input received by the VMCC, the following PoE diagrams were developed to document the inventory of marine shipping stressors, effects and connections in South Coast. The circular approach to these diagrams is meant to align with the Indigenous worldview and theme of input around interconnectedness.



After the development of the connection wheel inventory diagrams above, scoping criteria were then collaboratively developed to further refine the inventory into a manageable set of parameters for the assessment. The collaboratively developed scoping criteria included:

- Is the connection representative of ecosystem health?
- Is the connection a species or habitat of environmental importance (i.e. a keystone species)?
- Is the connection a species or feature of economic importance to the Nations?
- Is the connection a species or feature of cultural importance (i.e. linked to cultural practices or world views)?
- Is the connection linked to food/harvesting opportunities for the Nation?
- Are there species or habitats at risk considerations associated with this connection?
- Can the connection be combined or represented and assessed by another connection?
- Is it regionally relevant and representative?
- Is data available or obtainable within our timeframe?
- Is there some ability to influence management? (i.e. regulatory, legislative, policy, programs)
- Are the features susceptible to change from vessel impacts?
- Is it concise? (i.e. easy to link and measure change in its condition and quality, e.g. quantify)
- indicators/effects of marine shipping stressors?)
- Does it provide a good opportunity for analysis and a good 'pilot' exercise?
- Is it covered under another initiative?

These scoping criteria were then assessed against each connection in the above wheels through a survey completed by the VMCC over the summer of 2021, which allowed the opportunity for community input. The responses were populated into a matrix resulting in an ordered list of connections, based on the number of scoping criteria each connection aligned with (i.e. the connection at the top of the list aligned with the most amount of scoping criteria, and the connection at the bottom of the list aligned with the least amount of scoping criteria).

The connections were categorized into focused themes and based on the results of the scoping criteria and on previous discussions (including linkages made to other initiatives/projects in SC BC), the South Coast CEMS assessment was scoped to the impacts of marine shipping activities on marine habitats, breeding grounds and sensitive ecosystems by looking at:

- Shoreline habitats
- Crab habitats
- Bi-valve habitats
- Estuaries
- Eelgrass beds
- Kelp beds
- Glass sponge reefs

This can also be visualized in a more refined connection wheel in Figure 3.

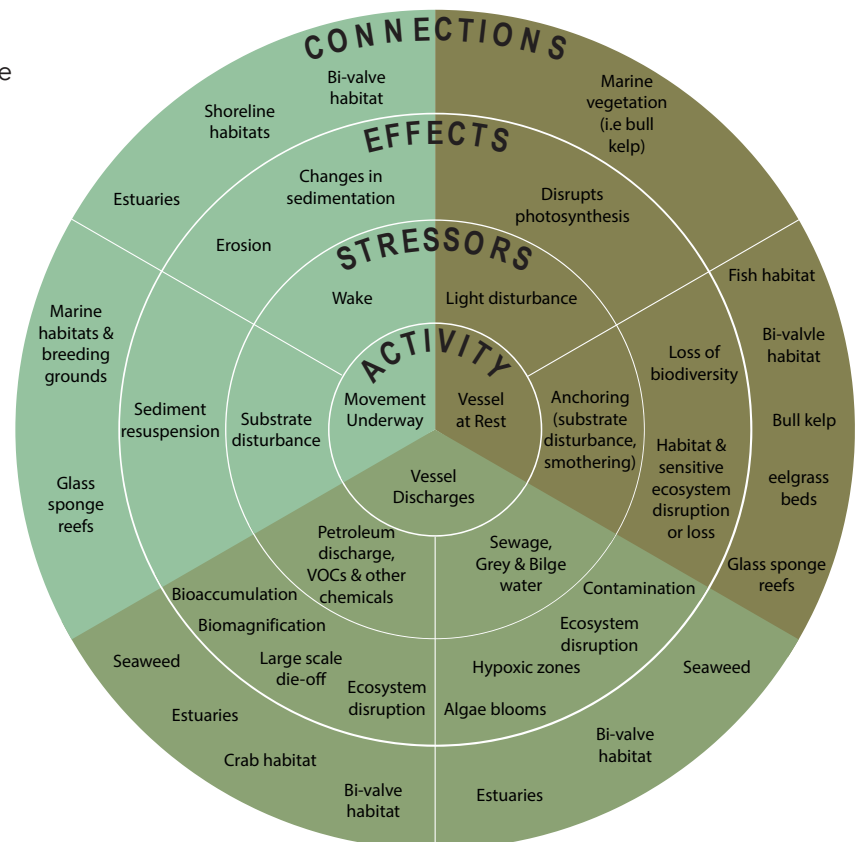


Figure 3: CEMS-VMCC Scope

## Sub-Regional Scoping Assessment Priorities

The scopes of sub-regional assessments are being driven by bilateral and/or collaborative engagement and the assessment priorities of sub-regional partners. Each layer of assessment will be conducted in collaboration with interested and identified First Nations in the South Coast and as such all timelines will be iterative and flexible to accommodate the needs of the collaborators.

At the time of writing this report, progress has been made on differing time scales with Nations on a sub-regional basis. Most sub-regional assessments are either in the Early Engagement and Planning phase or Scoping phase, as summarized in the table below. TC continues to welcome new sub-regional CEMS assessments with Indigenous peoples in South Coast BC.

**TABLE 1 Status of current current sub-regional regional assessments in South Coast BC**

INTERESTED NATIONS AT SUB-REGIONAL LEVEL (*Also participating in the VMCC)	TOR / WORKPLAN	SCOPING / ISSUE SELECTION
Maanulth*	<b>Complete</b>	In progress
Pacheedaht	In progress	In progress
T'Sou-ke*	<b>Complete</b>	<b>Complete</b>
Esquimalt*	In progress	<b>Complete</b>
Malahat*	<b>Complete</b>	<b>Complete</b>
WSÁNEĆ Subregion*	<b>Complete</b>	In progress
Cowichan Tribes*	In progress	In progress
Snuneymuxw	In progress	In progress
Tseil-Waututh	In progress	In progress
Tsawwassen, Semiahmoo*, Kwantlen	<b>Complete</b>	In progress
Nuu-chah-nulth Tribal Council*	In progress	In progress

## Developing a strategic vision for the multilayered assessment

At the time of writing this summary, TC has contracted the development of a strategic vision for the multi-layered assessment approach that will allow for concurrent CEMS assessments at different regional and temporal scales to synergistically build on and inform each other. The regional level of assessment will most likely identify areas for advancing common interests that are of regional significance and that would benefit from integrated and joint action, whereas the sub-regional assessments will most likely identify more localized interests and therefore sub-regional management related recommendations. Although conducted separately, both layers of assessment, at the regional and sub-regional scales, should support and inform one another and allow for the braiding and

aligning of both indigenous knowledge and western science. The multi-layered assessment approach should also be informed by any existing or future Indigenous owned cumulative effects frameworks and management systems in South Coast BC. The vision will also allow for and support the involvement of outside parties like other government departments, academia, ENGO's or the marine shipping industry (if or when applicable).

### 3 Assessment

The South Coast CEMS regional/subregional work has not yet entered the Assessment phase at the time this document was written. The Assessment phase will include collaboratively choosing our assessment methodologies, amalgamating data and knowledge that would be used to support the assessment, the conduct of the regional/subregional assessments, understanding the assessment conclusions, knowledge sharing/collaborative workshops and advancing collaborative work on identifying tools and strategies to mitigate the adverse cumulative effects of marine shipping on identified assessment priorities.

### 4 Decision Making

The South Coast CEMS regional/subregional work has not yet entered into the Decision Making phase at the time this document was written. The Decision Making phase will include the discussion and development of potential and feasible management strategies and implementation methods.



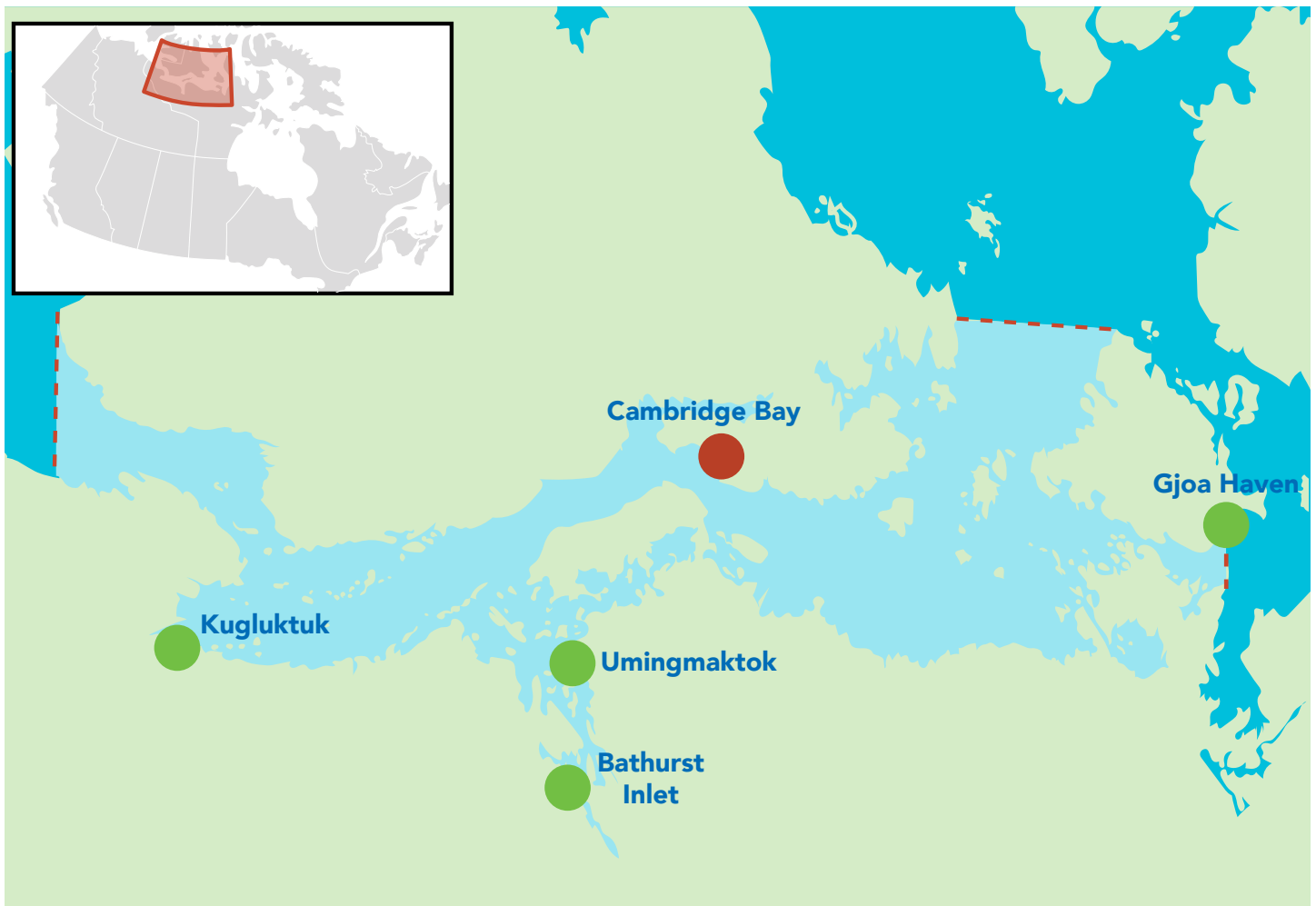


# CAMBRIDGE BAY, NUNAVUT

## Introduction

Situated along the arctic coastline of Canada’s Northwest Passage, Iqaluktuuttiaq (or Cambridge Bay, as it was renamed by settlers) is a hamlet on the southeastern shore of Victoria Island in the Kitikmeot region of Nunavut (see Figure 1). This area is currently home to roughly 2,000 Iqaluktuurmiut people who have been closely linked to and reliant upon the land and marine environment for food security, transportation, and cultural connections since it was inhabited over 4,000 years ago. The Arctic region of Canada is a unique environment due in part to its cold climate, distinct tundra landscapes, sensitive coastal habitats, and the seasonal or permanent presence of sea ice, all of which support a diversity of aquatic and terrestrial wildlife populations. The community of Cambridge Bay has stewarded their lands and waters for centuries and, in doing so, holds Inuit Qauijimajatuqangit (Inuit Traditional Knowledge) of the actions that must be

taken to protect the area and to continue their traditional ways of life. Propelled by climate change and the loss of sea ice, the solitude of the north is changing as the Arctic waters are becoming more accessible to marine shipping. Between 1990 and 2015 Cambridge Bay had the third-highest increase in vessel traffic in Nunavut due to an increasing number of passenger vessels, cargo vessels, tankers, and pleasure vessels traversing the Northwest Passage (Dawson et al. 2018). To accommodate an increase in vessel traffic, local people and communities have expressed a need to better understand the risks and cumulative effects posed by marine shipping activities in the region. In doing so, actions can be identified to effectively mitigate current and foreseen marine shipping impacts and enable vessels to better respect local communities, their land and waters, and the ecosystems surrounding them.



**Figure 1:** Location of Cambridge Bay, Nunavut (denoted by a red circle) and the spatial boundary of the CEMS regional pilot area (in light blue).



## 1 Early Planning and Engagement (2017–2018)

To raise awareness and understanding of the Oceans Protection Plan and how Arctic coastal communities could get involved, TC held multiple in-person engagement workshops in Cambridge Bay (and other Arctic communities) focused on sharing information on various OPP initiatives including CEMS. Space was also provided for Inuit and community members of Cambridge Bay to share their perspectives and receive feedback on any preliminary questions related to OPP. The early engagement workshops fostered building new relationships and partnerships as well as strengthening existing ones, and helped the participants achieve consensus on the goals and objectives of OPP. Following these workshops, a Steering Committee was organized with officials from TC, the Government of Nunavut, and Nunavut Tunngavik Inc., which used a consensus-based decision making process to select Cambridge Bay as a pilot area for CEMS as well as for the Proactive Vessel Management (PVM) and Enhanced Maritime Situation Awareness (EMSA) OPP initiatives.

The local Ekaluktutiak Hunters & Trappers Organization (EHTO) agreed to partner with TC and Oceans North to jointly conduct the CEMS Cambridge Bay pilot area assessment. To guide the development and implementation of the project, the Victoria Island Waterways Safety Committee (VIWSC) was formed under the authority of the EHTO (as well as to support PVM and EMSA work). The VIWSC consists of representatives from various federal and territorial government organizations, relevant Inuit organizations, and Cambridge Bay community members (see full list of VIWSC representatives in Table 1) that have met on a quarterly basis since its inception to advance OPP work in the region. Once the VIWSC was established, a Terms of Reference (TOR) was co-developed to consolidate the goals of the OPP work, the responsibilities of each party, and outline the preferred engagement and decision making processes. The TOR also highlights various mandates of the VIWSC with the collective goal of developing and recommending best practices to ensure a safe, efficient, and predictable operating environment for all users of the waterway.

**TABLE 1 Organizations and groups represented in the Victoria Island Waterways Safety Committee**

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>• Ekaluktutiak Hunters &amp; Trappers Organization</li> <li>• Oceans North</li> <li>• Nunavut Tunngavik Inc.</li> <li>• Kitikmeot Inuit Association</li> <li>• Inuit Marine Monitoring Program</li> <li>• Canadian Coast Guard Auxiliary</li> </ul> | <ul style="list-style-type: none"> <li>• Kitikmeot Regional Wildlife Board</li> <li>• Canadian Rangers</li> <li>• Cambridge Bay Elders and local hunters</li> <li>• Representatives from other Arctic communities involved in OPP initiatives</li> <li>• Transport Canada</li> <li>• Canadian Coast Guard</li> </ul> |
|--|--|



## 2 Scoping

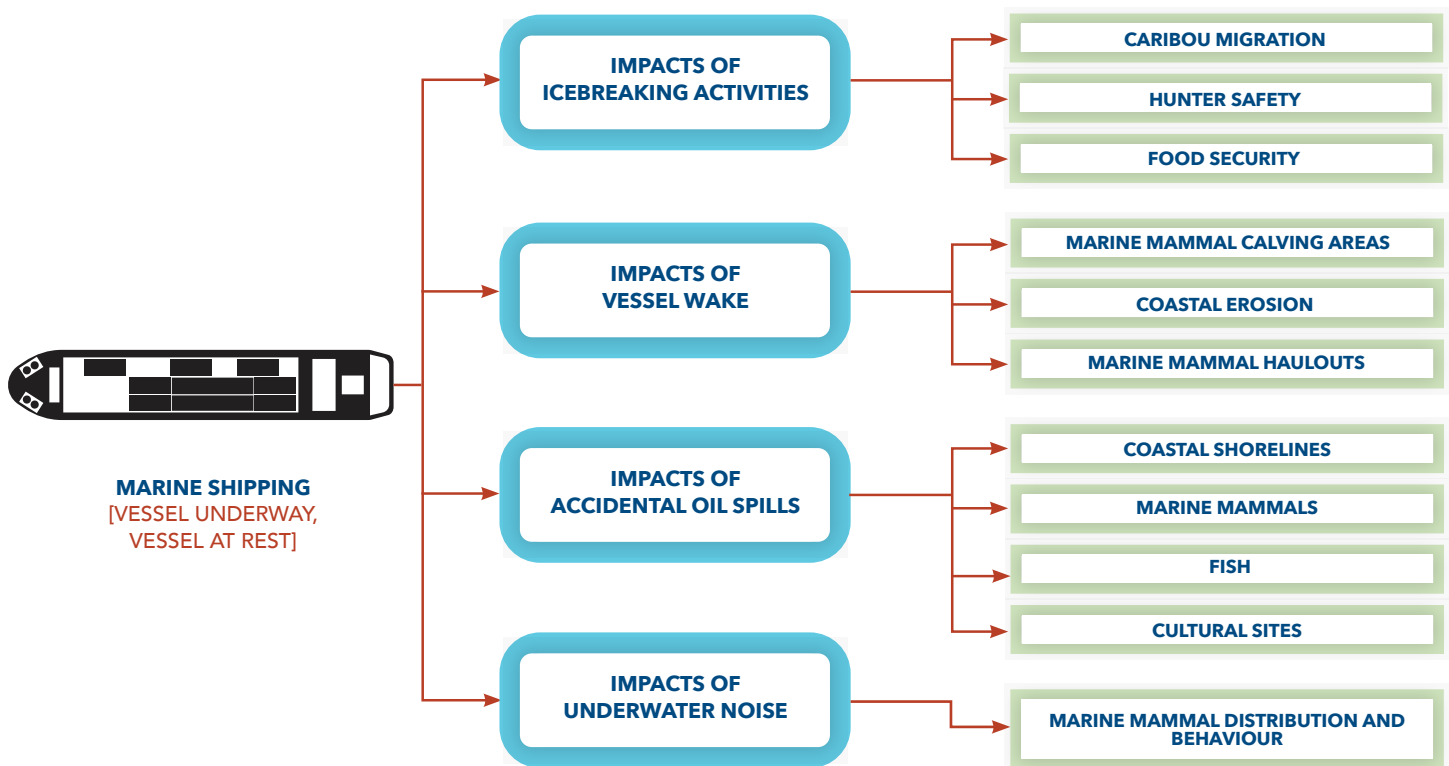
In order to assist with early VIWSC discussions around CEMS and the prioritization of marine shipping issues to scope into the regional assessment, TC pulled together previously documented discussion papers and community reports relevant to Cambridge Bay and presented them for discussion with the VIWSC. From those reports, the VIWSC was able to prioritize the following marine shipping impacts and activities to scope into the CEMS regional assessment as outlined in Figure 1:

- Impacts of icebreaking activities on caribou migration, food security, and hunter safety
- Impacts of vessel wake on coastal erosion as well as marine mammal haulouts and calving areas
- Impacts of accidental oil spills on coastal shorelines, marine mammals, fish and cultural sites
- Impacts of underwater noise on marine mammal distribution and behavior.

Conceptual diagrams were then developed to help understand the pathways between the stressors of marine shipping activities and their effects on VCs. To help refine the PoEs, an inventory of available data and knowledge was also developed by reviewing available research and weaving Inuit Qauijimajatuqangit shared by the EHTO and VIWSC when appropriate. After the VIWSC endorsed the

final PoEs, a workplan was co-developed to specify the work objectives, milestones, participants, funding needs, and timelines required to achieve the goals and objectives of the Cambridge Bay CEMS pilot area as outlined in the TOR.

The impacts of icebreaking activities on caribou migration, food security, and hunter safety emerged as a top priority issue through 2019. The urgency had stemmed from a recent situation where a local hunter had been following a caribou herd and after his arrival back home observed an icebreaker moving through the same frozen waterways he had traveled by snow machine the day before. As such, if the vessel had come through a day earlier the hunter would have been cut off from the community until the ice could refreeze potentially weeks later. Consensus was made among the VIWSC to complete a full assessment on the impacts of icebreaking activities as well as develop and implement mitigation actions (using a Proactive Vessel Management Approach) before focusing on the remainder of the assessment pathways.



**Figure 1:** Simplified conceptual diagram of the prioritized marine shipping activities (red) and the associated effects (blue) on valued components (green).

### 3 Assessment (2019–2022)

## Impacts of Icebreaking Activities

Every fall when sea ice begins to form around Cambridge Bay, Dolphin and Union caribou herds begin their annual migration over the frozen and intact waterways between Victoria Island and the mainland, which also serve as travel routes for hunters to use in pursuit of their local food source. The waterways also provide safe connections between the residents of neighboring Arctic communities, allowing Inuit to maintain cultural connections, practices and traditional ways of life. Each spring, the Canadian Coast Guard deploys ice breakers to allow the safe and efficient movement of vessels and goods in northern waters, which is key to community resupply and providing other essential services. As climate change continues to reduce the extent of sea ice in the Arctic and impact the predictability of its formation, Northern communities are concerned the ability of icebreakers to begin their activities earlier will disrupt the seasonal migration of caribou and jeopardize the safety of people traveling on the ice. As such, the VIWSC wanted to address the need for improved communication and coordination with icebreaking vessels as well as other domestic and foreign vessels transiting the Cambridge Bay region.

In late 2019, the EHTO and the VIWSC hosted a two-day workshop with participants from local and surrounding communities of the Kitikmeot Region, federal and territorial governments, non-governmental organizations, academia, marine stakeholders, and industry with the purpose of co-developing a solution to proactively

mitigate the risks of icebreaking activities. Through presentations, interactive mapping exercises, and group discussions, the attendees of the workshop presented relevant scientific and Inuit Qauijimajatuqangit that helped identify the time (seasonal) and area (location of caribou and people on the ice) considerations that operators traveling through the region should be made aware of. The workshop and subsequent engagement sessions resulted in the development of a *Notice to Mariners (NOTMAR) for Vessels Intending to Navigate the Kitikmeot Region in Canada's Northern Waters* that has been in place since 2020.

With the NOTMAR in effect from April through November, vessels are required to provide one week's notice over the phone to a list of communities and follow-up 24 hours in advance of their passage. The NOTMAR also includes voluntary measures for vessels to slow down to minimum safe speeds if caribou or people are encountered as well as avoid opening multiple leads through the open ice. Through enhanced communication with vessels, in real-time and ahead of their transits, vessel operators and the community of Cambridge Bay can stay well-informed of one another's activities. As such, the NOTMAR, penned through a joint effort between the EHTO, VIWSC, CEMS, and PVM, is a tool that addresses the concerns of the Cambridge Bay community by effectively mitigating the risks of shipping to wildlife and people using the waterways.



## Impacts of Accidental Oil Spills

Oil spills were prioritized by the VIWSC as a marine shipping stressor of concern due in part to the observed trend of increasing traffic volumes and the possible increased chance of an accident occurring. Also, because of the remoteness of Cambridge Bay and harsh conditions common in the region, responding to an oil spill presents unique challenges which increases the need for an appropriate level of preparedness in order to mitigate major environmental, cultural and social impacts. To address these concerns, TC and CCG began working with the VIWSC in early 2020 to conduct a ship-source oil spill risk assessment for the Cambridge Bay region guided by the International Petroleum Industry Environmental Conservation Association's good practice guides on oil spill preparedness and response.

To begin this work, TC facilitated a participatory mapping exercise with the VIWSC to identify areas around southern Victoria Island that have environmental or cultural significance and some level of perceived risk associated with oil spills. An analysis of available AIS data from 2015 to 2019 was also completed by TC to identify trends in the amounts of traffic and types of vessels transiting the region, and to understand the types and volumes of oil being transported as bunker and cargo. By combining the results of the vessel traffic analysis with the information shared by the VIWSC, a risk registry was developed that assigned qualitative risk scores to each of the prioritized areas based on nautical miles sailed and consequence rating. In addition, TC created a variety of hypothetical oil spill scenarios, such as most-likely spills and worst-case spills, to generate discussion on what responding to an oil spill would involve and what preparedness is required. To complete the oil spill risk assessment, a workshop will be held in 2022 with the VIWSC, TC, CCG, and other relevant stakeholders to further investigate oil spill scenarios and the preparedness and response required with the intended outcome of developing recommendations that can enhance oil spill prevention, preparedness, and response in the region.

In addition to conducting an oil spill risk assessment, geo-referenced aerial images and videos are being collected by the EHTO using drone technology to increase the availability of baseline condition information for coastal areas in southern Victoria Island. In the event of an oil spill in Canadian waters, compensation is available through the Ship-Source Oil Pollution Fund (SOPF) for oil pollution damage caused by any type of oil from any type of vessel, even when the cause of the spill is not known. This includes compensation to cover the costs of reasonable environmental reinstatement work, which could include post-spill studies like an assessment of the environmental impacts, aimed at speeding up the natural recovery process. Through CEMS, the collection of drone images and videos will be collated with datasets of other researchers and federal government agencies to better understand how and where to prioritize the response as well as document the pre-spill conditions of coastal areas around southern Victoria Island. In doing so, the community of Cambridge Bay will have a benchmark for the pre-spill state and be able to measure the extent of damages in the event of a ship source oil spill. This will help to provide necessary documentation required by the SOPF to receive compensation.



## Impacts of Underwater Noise

As shipping traffic in the Arctic continues to increase, the VIWSC recounted the growing concern among Inuit of the increasing levels of underwater noise from ships and its impacts on marine wildlife, particularly for marine mammals hunted for subsistence. To assess the impacts of underwater noise, the VIWSC chose to hire researchers from Wildlife Conservation Society Canada (WCSC) to provide analytical and technical support. Using existing acoustic data collected by DFO near the shipping lane outside of Cambridge Bay during the 2017 and 2018 shipping seasons, WCSC analyzed the recordings to measure vessel noise levels and detect marine mammal vocalizations. The recordings captured noise from a number of ships transiting through the region and also a large amount of marine mammal activity, including fish, ringed seal, bearded seals, and one beluga. The results of the study provide measurements of ship noise in the region, provide estimates of the exposure of various marine mammals to ship noise, and help identify ways to improve future research efforts.

## Impacts of Vessel Wake

Due to increasing permafrost melt from a warmer climate as well as decreasing amounts of sea ice that buffer coastlines against waves and storm surges, the rate and extent of coastal erosion is increasing throughout much of the Arctic which many Inuit, local communities and researchers continue to witness firsthand. In Cambridge Bay, some shorelines have eroded or are beginning to erode, which prompted the VIWSC to prioritize assessing how vessel wake influences the rate of shoreline erosion. Currently, minimal data exists in the Cambridge Bay area that documents the retreat of shorelines and could be used to quantify the rates of erosion occurring. To address this data gap, TC has collaborated with the EHTO to install trail cameras along shorelines near Cambridge Bay that are experiencing erosion and are in close proximity to vessel traffic.

## 4 Decision Making

Other than developing the NOTMAR to address and mitigate the impacts of icebreaking activities, the CEMS Cambridge Bay pilot area has not entered into the Decision Making phase for the other pathways of effects, at the time this document was written. The Decision Making phase will include the development of

To further inform this assessment, WCSC researchers are working with the EHTO to conduct passive acoustic monitoring by deploying acoustic recorders near the shipping lanes outside of Cambridge Bay. In doing so, WCSC is providing the EHTO with virtual training on how to construct, deploy, and retrieve the acoustic recorders as well as how to analyze the data, with the intention of building capacity within the Cambridge Bay community to monitor underwater noise into the future. The equipment will record acoustic data continuously throughout the open-water season and may be left beneath the sea ice to detect marine mammal vocalizations and record noise from spring icebreaking activities. Efforts to monitor underwater noise in the Cambridge Bay area now will aid in proactively mitigating the impacts of increasing marine shipping traffic and protecting the area's pristine acoustic environment in the future.

The trail cameras at each monitoring station will capture time-lapse images that will be analyzed by Arctic geomorphology researchers to measure the rates of erosion occurring and estimate whether vessel wake is exacerbating the erosion process. In addition to impacts on shoreline erosion, the VIWSC also wanted to assess the impacts of vessel wake on haulouts and calving areas used by marine mammals. To inform this assessment, the EHTO is working with the VIWSC and other local Inuit Knowledge holders to identify marine mammal haulouts and calving areas around Cambridge Bay through a participatory mapping exercise. By collecting data and gathering shared knowledge, a more comprehensive assessment can be conducted to understand how vessel wake is affecting these sensitive valued components and how to reduce any identified impacts.

and collaboration on any recommended mitigation and management strategies with appropriate audiences; establishing linkages with other tables as needed to make the most efficient use of resources and identifying processes for implementing and/or piloting management measures and/or strategies.



## Introduction

The St. Lawrence River is one of the largest hydrological systems in the world and is a vital route of transit between the Great Lakes, the Atlantic Ocean, and the rest of the world. This vast river is a unique ecosystem constituting a treasure of biological wealth, providing a home to numerous birds, fish and plant species ([St. Lawrence River | St. Lawrence Action Plan, 2022](#)). Its watershed supports millions of Canadians and allows large groups of Indigenous peoples to exercise their rights, share cultural knowledge, hunt, and trap. The Saguenay River is also an important waterway for the development of the region. In recent years, the increase in the number of cruise ships and new industrial development projects have led to an increase in environmental pressures ([Conseil régional de l'environnement et du développement durable Saguenay-Lac-Saint-Jean, 2015](#)). Considering trends in increasing marine vessel activities in both rivers, a study to better understand the cumulative effects of these activities will allow local and regional actors to sit together to determine how these anthropogenic activities can coexist while promoting the mitigation of environmental and socio-cultural effects ([Navigating the St. Lawrence: Challenging Waters, Rich History and Bright Future | Clear Seas, 2018](#)).



### 1 Early Engagement and Planning (2017–2018)

The work in this pilot site started in November 2017 with engagement workshops held with Indigenous peoples and stakeholders in Quebec City, QC. In order to identify interested collaborators, an invitation was sent to a broad distribution list of potentially interested parties to participate in the initial workshop. As the engagement continued, new participants joined, and the door was always open to additional participants. While the arrival of new collaborators initiated innovative discussions and creative solutions, the consistent and regular participation from many participants throughout the engagement sessions facilitated the development of positive and productive relationships. The collaboration model consists of regular check-ins with all collaborators (Stakeholders and Indigenous peoples, see table 1 for a list) to provide updates on the work underway and confirm the next steps. All collaborators actively participated throughout the entire assessment.

At the request of Indigenous communities engaged in the assessment, the initial discussions with Indigenous peoples and stakeholders were held separately to facilitate discussions amongst Indigenous communities and understand their concerns and needs. As discussions progressed, Indigenous representatives requested that the

two groups be brought together to allow everyone's views to be heard and to facilitate discussions.

Once the purpose, timelines and deliverable of the initiative were introduced, discussions were held to identify areas of concern. Information was gathered on various stressors related to marine vessel activities that are of concern to Indigenous communities and multiple stakeholders, and Indigenous representatives were interviewed about the potential impacts on traditional uses. Considerations regarding the spatial and temporal boundaries of the pilot project were also discussed. Additional workshops were held to present summaries of input received to Indigenous collaborators, and existing forums (regional Canadian Marine Advisory Council and Comité de concertation navigation) were leveraged to present the information to stakeholders.

Under the St. Lawrence Action Plan collaboration agreement, the government of Quebec joined the pilot project to develop a common approach for assessing the cumulative effects of marine vessel activities on the St. Lawrence and Saguenay Rivers.

**TABLE 1 Information on Indigenous representatives, stakeholders, and government representatives**

INDIGENOUS REPRESENTATIVES	STAKEHOLDERS	GOVERNMENT REPRESENTATIVES
<ul style="list-style-type: none"> <li>• Agence Mamu Innu Kaikusseht</li> <li>• Association de gestion halieutique autochtone Mi'gmaq et Malécite</li> <li>• Ekuanitshit (Mingan)</li> <li>• Essipit</li> <li>• Grand Conseil de la Nation Waban-Aki</li> <li>• Mohawk Council of Kahnawà:ke</li> <li>• Matimekush-Lake John</li> <li>• Mi'gmawei Mawiomi Secretariat</li> <li>• Mohawk Council of Akwesasne</li> <li>• Conseil de la Nation Huronne-Wendat</li> <li>• Nutashkuan</li> <li>• Native Women Association of Canada</li> <li>• Pessamit</li> <li>• Première nation des Pekuakamiulnuatsh</li> <li>• Uashat mak Mani-Utenam</li> <li>• Wolastoqiyik Wahsipekuk</li> <li>• Institut de développement durable des Premières Nations du Québec et du Labrador</li> <li>• Wolinak (Abénakis)</li> <li>• Gouvernement de la Nation Crie</li> <li>• Hurons-Wendake</li> </ul>	<ul style="list-style-type: none"> <li>• Comité ZIP Les Deux Rives</li> <li>• Comité ZIP Saguenay-Charlevoix</li> <li>• Comité ZIP de Québec et Chaudière-Appalaches</li> <li>• Comité ZIP Gaspésie</li> <li>• Comité ZIP Sud-de-l'Estuaire</li> <li>• Stratégies Saint-Laurent*</li> <li>• Croisières AML</li> <li>• Administration de pilotage des Laurentides</li> <li>• Oceanex</li> <li>• Observatoire global du Saint-Laurent</li> <li>• Administration portuaire de Montréal (APM)</li> <li>• Administration portuaire de Québec (APQ)</li> <li>• Administration portuaire du Saguenay (APS)</li> <li>• FedNav</li> <li>• Société de développement économique du Saint-Laurent</li> <li>• Université Laval</li> <li>• Canada Steamship Lines</li> <li>• Fonds mondial pour la nature (WWF)</li> <li>• Conservation de la nature Canada</li> </ul>	<ul style="list-style-type: none"> <li>• Impact Assessment Agency of Canada</li> <li>• Fisheries and Oceans Canada (DFO)</li> <li>• Parks Canada Agency</li> <li>• Natural Resources Canada</li> <li>• Canadian Coast Guard</li> <li>• Transport Canada</li> <li>• Ministère des Forêts, de la Faune et des Parcs du Québec (MFFP)</li> <li>• Ministère de l'Environnement et de la Lutte contre les changements climatiques du Québec</li> <li>• Ministère sécurité Publique du Québec – Centre d'expertise en gestion des risques d'incidents maritimes</li> </ul>

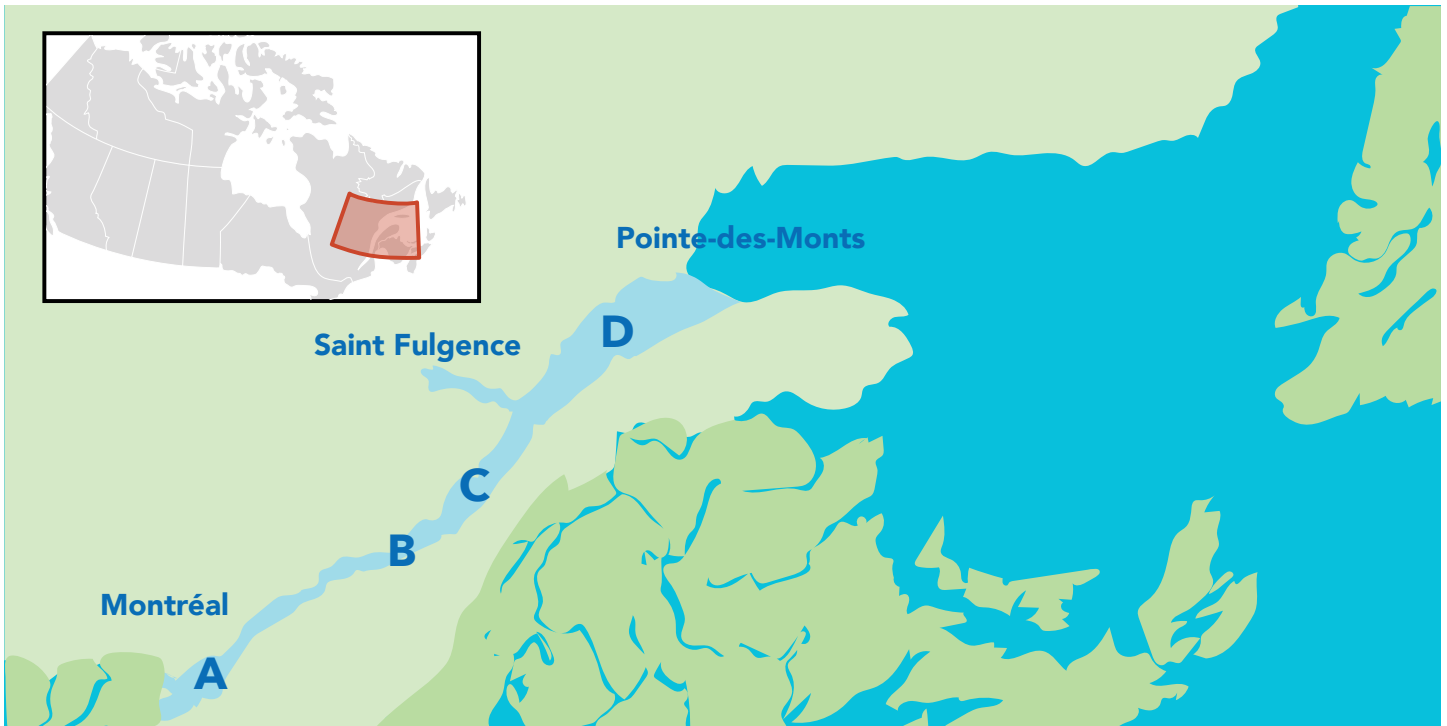
\* *Stratégies Saint-Laurent* is an umbrella Non-Governmental Organization (NGO) gathering the 12 ZIP committees (zones d'intervention prioritaire – Area of prime concern). ZIP committees invite active actors in their territory to discuss environmental issues related to the St. Lawrence River and to identify, by consensus, intervention priorities. For more information refer to: <https://www.strategiessl.qc.ca/english>

## 2 Scoping (2019)

### Spatial Boundary

The spatial boundaries for this study area were chosen by collaborators based on the number and location of proposed marine terminal projects. The spatial boundary was set early in the process to define the marine shipping activities in the area and identify which additional collaborators should be brought to the table. For example, the Quebec government has most of the information on freshwater environment (zones A-B) and DFO has information on the marine environment (zones C-D).

The spatial boundary of the study area is between Montréal and Pointe-des-Monts (fluvial section and estuary) and Saint-Fulgence on the Saguenay River:



**Figure 1:** Graphic rendition of the spatial boundary of the study area, which is between Montréal and Pointe-des-Monts (fluvial section and estuary) and Saint-Fulgence on the Saguenay River. Source of the original map: [planstlaurent.qc.ca](http://planstlaurent.qc.ca).



## Biophysical effects

A series of discussion workshops were held in Wendake, QC, to select the valued components (VCs) to be assessed and confirm the spatial boundary. These discussions considered all possible activities, stressors, and VCs. To inform these discussions, a list of potential VCs identified through previous engagement and consultation activities, local concerns and knowledge and recent environmental assessments of projects proposed along the St. Lawrence and Saguenay rivers, was circulated to all participants. The following criteria were utilized to select appropriate VCs for this study:

- Relevant (linked to one of the biotic, physical, cultural environments)
- Within the spatial boundary
- Comprehensible (easy to link to the activities and stressors)
- Representative (of the most important natural/human environment and features to be affected)
- Responsive (responds to concerns from Indigenous people, maritime stakeholders, scientists, general public)

## Socio-cultural effects

Following the identification of the biophysical VCs, concerns were raised by Indigenous participants regarding the absence of socio-cultural considerations. Professor Roxane Lavoie at Laval University was then hired to lead the analysis of cumulative socio-cultural effects of marine vessel activities on Indigenous communities. In order to support the research team, Indigenous representatives were invited to participate in an Indigenous Working Group specific to this aspect of the assessment. A series

The selection of the VCs was then informed by presentations from each Indigenous Nation, as well as an NGO representing non-Indigenous coastal communities, of their top 5 VCs, as well as presentations from federal and provincial departments (Environment and Climate Change Canada, DFO, MFFP) on studies completed or ongoing that could inform the cumulative assessment. To finalize the selection, participants prioritized VCs and selected the following for each environment (freshwater and marine):

**TABLE 2 Prioritized Valued Components in Freshwater and Marine Environments**

FLUVIAL SECTION	ESTUARY/SAGUENAY
Water quality/marine pollution	
Wildlife and plant habitats (coastal, benthic, pelagic)	
Significant sites (places of interest): tourism, traditional, cultural, archeological / hunting sites, gathering sites, fishing sites, protected areas, etc.	
Shoreline/sediment integrity (linked to the stressor erosion from ship wake)	Marine mammals (whales, seals and in particular, belugas and their acoustic environment)

of webinars were held with an Indigenous Working Group to define the parameters of the assessment and confirm the VC. The discussions at these webinars centered on concerns related to the increase of marine shipping including in relation to access to the rivers, river ownership, and the use of existing data vs new data collection. The identified VC is the connection to the land (the rivers and territory) as it includes multiple dimensions (environmental, cultural, linguistic, territorial, economic and participatory).



### 3 Assessment (2020–2022)

#### Biophysical effects

In January 2020, a contract was signed with Professor Philippe Archambault's team from Laval University to conduct the cumulative effects analysis of the selected biophysical VCs within the assessment area.

During this phase, two webinars with all collaborators were organized to present the assessment methodology proposed by Laval University and the progress on data collection. The proposed methodology evaluated the vulnerability of the valued components to stressors caused by marine vessel activities. A qualitative approach based on the opinion of experts and bibliographic research was used to generate a vulnerability scoring matrix for all combinations of valued components and stressors. <https://effetscumulatifsnavigation.github.io/Methodology/>

Data collection relied on the cooperation of collaborators and was used to characterize the vulnerability of VCs to stressors. Refer to <https://effetscumulatifsnavigation.github.io/2021-04-21-TC-WebinarProgress/#1> for preliminary observations.

#### Socio-cultural effects

Discussions on the VC, indicators and methodology for the evaluation of socio-cultural effects were held in a collaborative manner. The working group members were asked to bring forth any ideas for methods to collect data for incorporation into the final methodology plan for the work to be undertaken.

The main research question identified was: What role have the effects of the development of marine activities on the St. Lawrence and Saguenay rivers played in the attachment to the territory of the Indigenous communities linked to these rivers?

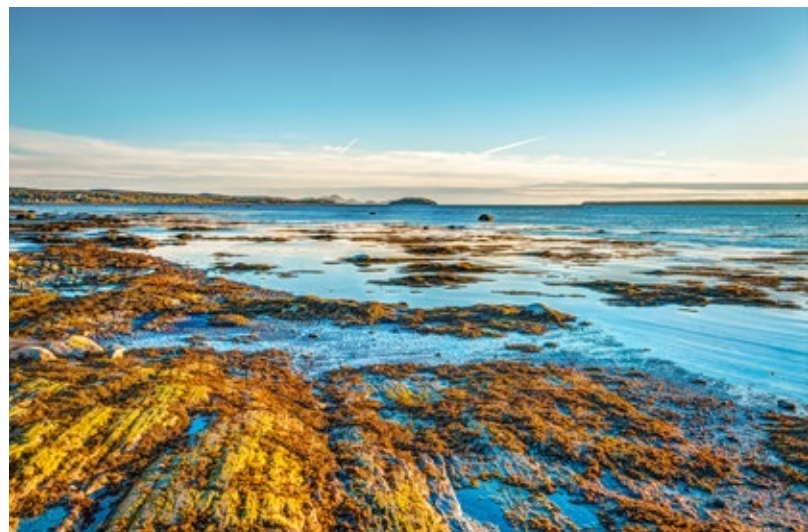
### 4 Decision Making

Once both assessments are completed, the results will help guide future discussions. Recommendations, including potential management measures or, if necessary, additional analysis, will be developed in collaboration with participants.

In March 2022, the overall results and findings from the assessment were presented to collaborators indicating, among other things, that:

- Large port cities and the shipping channel are particularly exposed to cumulative stressors;
- Coastal environments have a greater diversity of valued components;
- Cumulative effects are particularly intense and concentrated within the fluvial sector and more diffuse within the Estuary/Saguenay sector;
- Sites of cultural, heritage and archaeological interest are particularly exposed to the effects of marine shipping. This finding reflects the significant overlap between sites of interest of First Nations and marine vessel activities in the study area.

An outline of the methodology was shared with the working group. In order to address data gaps, some new data was collected with Indigenous peoples. Data collection will be undertaken via sharing experiences relative to effects observed within the communities to increase understanding of the identified VC. As this collection should be done in person, it has been delayed due to COVID.





# PLACENTIA BAY, NEWFOUNDLAND AND LABRADOR

## Introduction

Placentia Bay is located on the western end of Newfoundland's southern shore, between the Avalon and Burin Peninsula. Home to commercial fisheries and a burgeoning aquaculture industry, Placentia Bay also hosts several public and private ports including Come-By-Chance, Marystown and the Port of Argentia. Along with fishing boats and other small vessels, various larger vessels, such as tankers, supply ships, and cargo and container ships access Placentia Bay throughout the year. A seasonal ferry runs between North Sydney, Nova Scotia and Argentia, Newfoundland from mid-June to late September.



## 1 Early Engagement and Planning

The initial outreach for the Cumulative Effects of Marine Shipping (CEMS) work in Placentia Bay focused on sharing information about the initiative as broadly as possible to generate interest and foster awareness. Engagement included presentations and networking at general Ocean Protection Plan (OPP) events and other forums, online discussion platforms, and direct communication (such as email). Interested parties were encouraged to self-identify. The working group includes participants from the following groups and communities:

- Environmental Non-Government Organizations (ENGOS)
- Academic community
- Federal Government Departments
- Provincial Government Departments
- Nunatukavut Community Council
- Local Industry
- The Atlantic Pilotage Authority

The CEMS initiative in Placentia Bay is progressing inclusively with participants coming together at various points in the assessment process as described throughout this document. Smaller group work and bilateral discussions occur as requested and required for the work to progress. There is no formal terms of reference or working agreement in place, and new participants are welcome to join and provide input at any time.



## 2 Scoping (Spring 2020–Winter 2022)

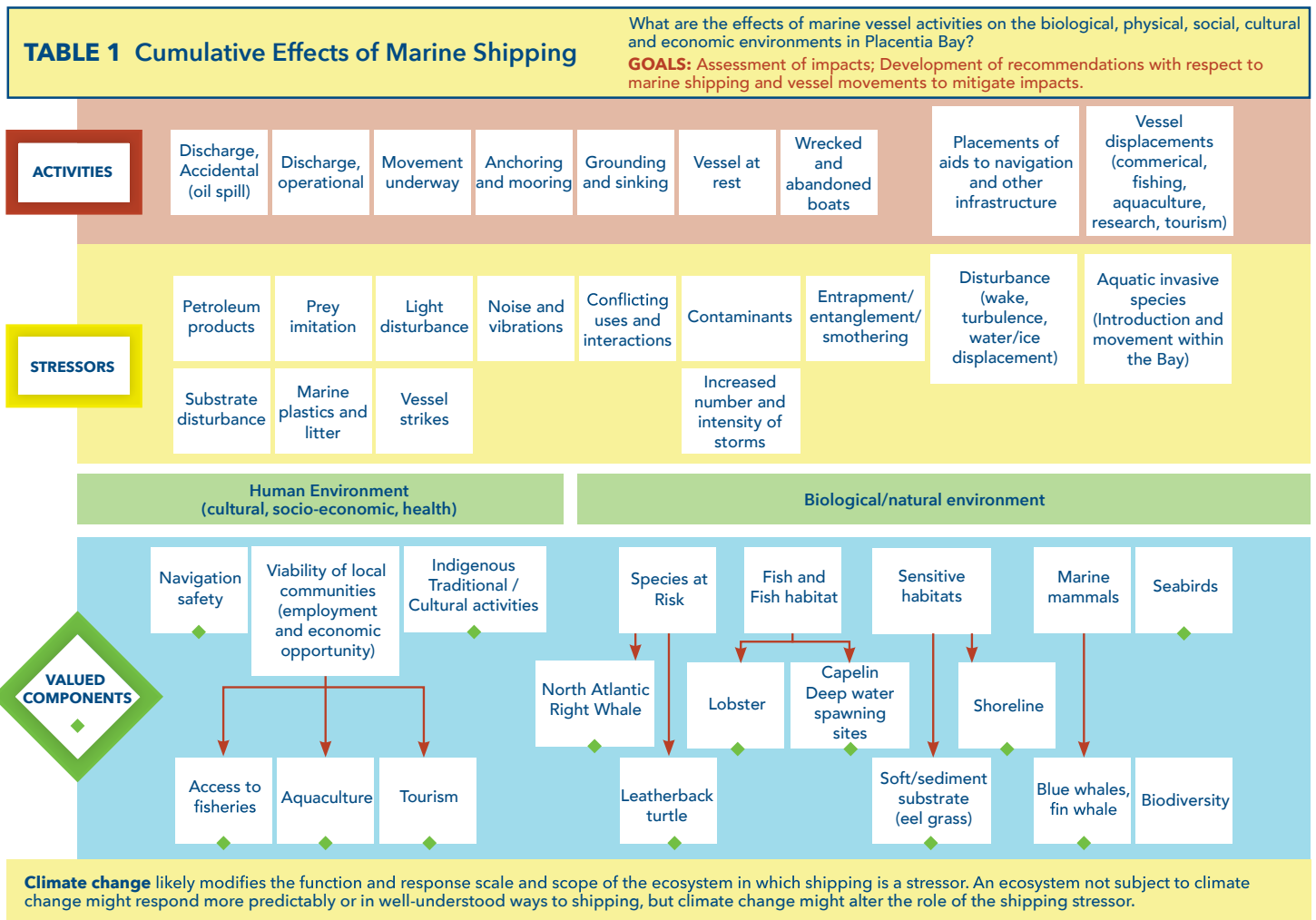
Scoping discussions have highlighted several regionally relevant environmental, socio-economic and cultural areas of interest for the CEMS pilot assessment in Placentia Bay.

Following early engagement and planning, the scoping phase for Placentia Bay CEMS assessment was launched with a two-part workshop for all interested participants in June 2020. These initial discussions brought everyone together and identified a preliminary list of vessel activities and stressors of concern, as well as possible valued components for further discussion and possible assessment. General concerns and issues related to vessel traffic in the Bay were also discussed.

This initial workshop was followed-up with a series of meetings, discussions, and presentations, including a three-part winter 2021 workshop series designed to further delineate the scope of assessment. Conducted in smaller groups with 3 dates to choose from, these sessions allowed participants more time to discuss their areas of

interest and provide input. At each session, participants were encouraged to work together to short-list a selection of primary issues of concern or valued components related to vessel activity in Placentia Bay. Following these sessions, a written survey was developed and circulated asking working group members to select their top 5 assessment priorities. A final two-part scoping workshop, in September 2021, brought all participants together again to discuss the results of the workshop series, and the survey, and to work together to build the scope of assessment as illustrated in Table 1 below.

As the assessment moves forward, bilateral, and multilateral discussions will continue to further refine this scope based on available data to support the assessment. Discussions on the temporal and spatial boundary are ongoing and will be informed by the availability of data and the individual characteristics of each valued component.



**Table 1:** Following several months of engagement and discussion, the scope of assessment was determined collectively by participants in a 2-part virtual workshop in September 2021.

### 3 Assessment (Fall 2021–Spring 2023)

Dillon Consulting was retained in July 2021 to undertake the assessment process. The Dillon team led and participated in the final scoping workshop in September 2021, and will be responsible for:

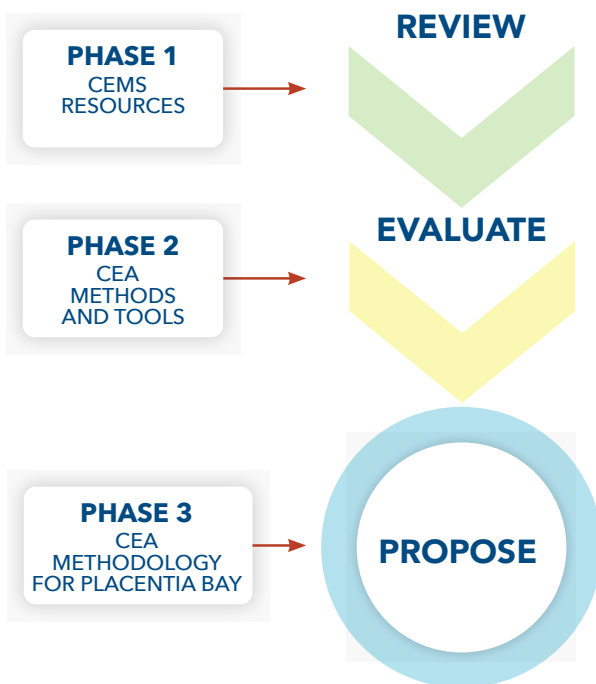
- Developing the assessment methodology
- Sourcing and amalgamating relevant data and information
- Analyzing the data with respect to the approved methodology
- Presenting the results and conclusions of the assessment process



## Developing the Assessment Methodology

In establishing their proposed assessment methodology, the Dillon team applied a 3-phase approach, detailed in Figure 1 below:

- Review resources, the CEMS framework, case studies, methodologies, and tools
- Evaluate and qualitatively rank to compare methods
- Select the preferred method to conduct the regional assessment



**Figure 1:** Derived from the proposed TC Placentia Bay Draft Methodology, the phased approach to determining a proposed cumulative effects assessment (CEA) methodology for Placentia Bay (Dillon, 2021).

Once a list of available methodology was compiled, they were assessed using the following criteria (criteria 1 – 3 identified by Pickard et al. (2019); criteria 4 – 6 developed by the Dillon team to support the evaluation process) (Dillon 2021):

- 1. Feasibility:** From a general standpoint, feasibility focuses on the ease to implement the method.
- 2. Rigor:** Describes the strength and justification of the method.
- 3. Relevance:** Denotes on how generally useful the method is for cumulative effects assessment.
- 4. Availability and accessibility of data:** Focused on the feasibility of the method on the basis of currently acquired and potential future availability data for Placentia Bay.
- 5. Interpretability and ease of communication:** Centres on the feasibility of a non-technical person understanding the method and the outputs. It is very important that the results and conclusions derived from the CEA methods and tools are easily communicated among a wide range of collaborators and interested parties.
- 6. Adaptability to Placentia Bay:** Evaluates the adaptability of the method and tools to evolve and develop over time as new data and priorities emerge in Placentia Bay.

It is important to note that at the time of writing, the proposed approach has been provided to all participants for their review and comment. At an upcoming (winter 2022) information session, the Dillon Team will present their proposed methodology for review and comment. It has not yet been finalized.

A summary of the proposed 3-step cumulative effects assessment methodology approach is provided below in Figure 2:



**Figure 2:** Proposed integrative 3-step cumulative effects assessment methodology for Placentia Bay. An EBM-DPSEER Conceptual model is an Ecosystem Based Management Drivers – Pressures – State – Ecosystem Services – Response Model (Dillon, 2021).

## Sourcing and amalgamating relevant data and information

Sourcing and amalgamating data is an ongoing effort, aided by an Arc GIS web application developed by the Dillon team and open to all participants. Participants are encouraged to provide links to data sources directly in the web application.

The steps of analyzing the data with respect to the approved methodology and presenting the results and conclusions of the assessment process are yet to come.

## 4 Decision Making

Once the assessment is complete, the results will inform future discussions. Recommendations, including potential management measures, will be developed in collaboration with participants.



# APPENDIX II: LESSONS LEARNED

## PURPOSE OF THE LESSONS LEARNED DOCUMENT

This document is an account of the learnings associated with Transport Canada's work done to date (as of Spring 2022) for the Cumulative Effects of Marine Shipping (CEMS) initiative at the national level. It is important to note that our work is ongoing, and learnings continue.

This document is intended to be widely sharable to government departments, industry, and other Indigenous partners in order to help organizations better understand how they can work effectively with Indigenous peoples from a regional point of view. It should be noted, however, that every engagement is unique and requires tailoring to the diverse needs of various involved Indigenous groups.

While the lessons learned in this document are drawn primarily from our continued experience engaging with Indigenous communities across Canada, many of these same principles also apply in a broader engagement context including with local communities, academics, environmental non-governmental organizations, and stakeholders.

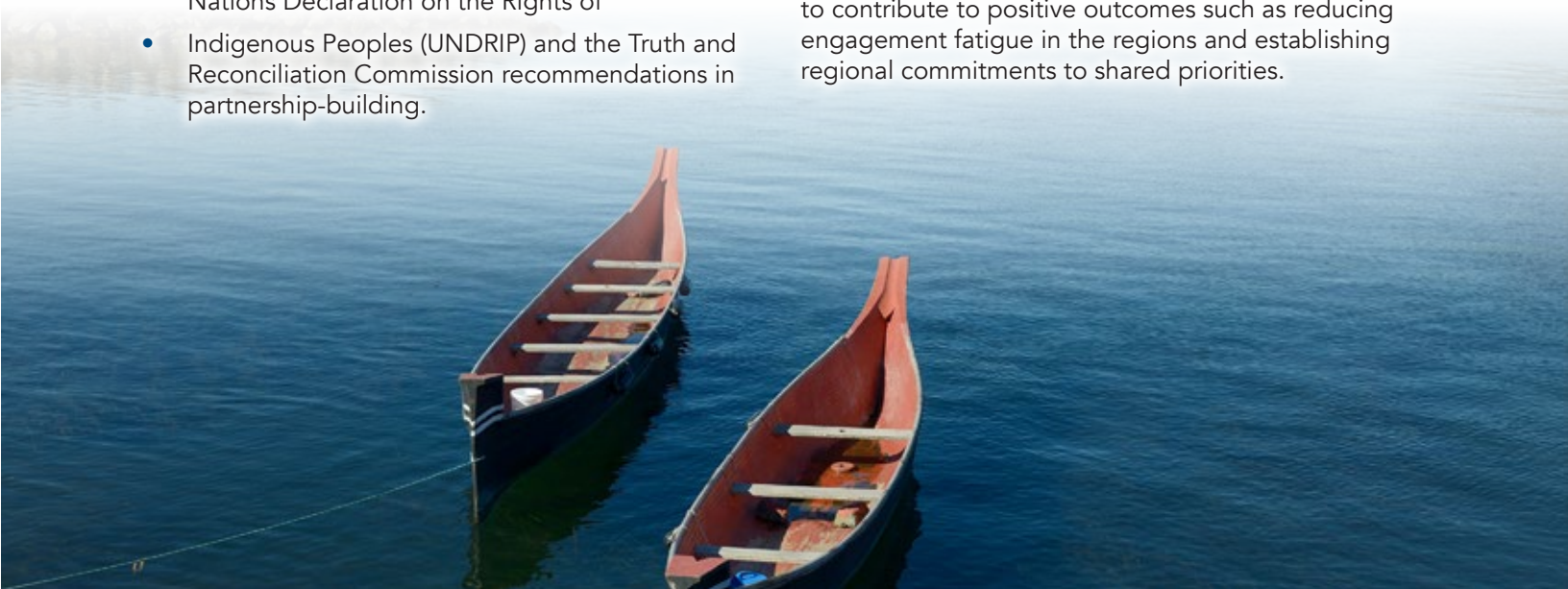
## THE OCEANS PROTECTION PLAN AND EARLY ENGAGEMENT OVERVIEW

Several themes and areas of focus have come from early engagement activities, which continue to inform CEMS practices. They include:

- Investing more time in better understanding the concerns, interests, and current practices of local communities.
- Improving the communication and coordination of Ocean Protection Plan (OPP) and other regional initiatives.
- Understanding the importance of the United Nations Declaration on the Rights of
- Indigenous Peoples (UNDRIP) and the Truth and Reconciliation Commission recommendations in partnership-building.

- Clarifying the use of historical, ongoing input from Indigenous groups and establishing clear protocols for sharing local knowledge.
- Identifying solutions to improve meaningful participation by addressing capacity challenges.

A number of guiding principles have been discussed and developed across regional tables to support the collaborative efforts of CEMS discussions, which include but are not limited to: Respect, Inclusiveness, Flexibility, Sustainability, Stewardship, and Accountability. These principles underpin the working relationship and continue to contribute to positive outcomes such as reducing engagement fatigue in the regions and establishing regional commitments to shared priorities.





## DEFINING SUCCESS FOR CEMS

The purpose of the CEMS initiative is to establish a shared, co-developed approach to better understand the potential cumulative effects of regional marine shipping activities on coastal ecosystems (i.e. the environment and the people living within it). The initiative is committed to improving understanding of cumulative effects from marine vessel activities through a collaborative approach to decision making. To measure these high-level objectives, there are a few identified key measures to monitor progress and define success:

- Advancing reconciliation and developing stronger relationships with Indigenous groups in areas with increased marine shipping.
- Increasing awareness and confidence in Canada's marine safety system as well as the practice of regional cumulative effects assessment.
- Achieving initiative deliverables, nationally and regionally.



## KEY CEMS LEARNINGS

There are a number of factors that continue to contribute to the success of the CEMS Initiative, including:

### 1. Building a Partnership with Open Dialogue and Trust

Communication is one of the most important factors contributing to the relationships developed through CEMS and it requires two-way dialogue. All parties are in regular and frequent communication to inform project updates, provide opportunities to brainstorm ideas/solutions, and foster a healthy, ongoing working relationship. The honest and open nature of these communications has contributed to an environment that allows for parties to feel comfortable bringing forward ideas and having productive conversations. This process within the CEMS initiative is based on mutual respect.

### 2. Designing to Include Project Flexibility

The CEMS initiative was designed to be collaborative in nature and the project team did not allow preconceived notions to bias the work. Their approach was instead open and flexible to the input of its partners. The initiative's design also allowed collaborators to provide direct input on how and when to accomplish key project deliverables. Flexibility has been embedded within the CEMS process, supporting a positive and productive working relationship.

### 3. Linking CEMS Work with Other Initiatives

Throughout the CEMS initiative, the team has proactively explored new opportunities to link CEMS work with other ongoing work in the region. This has helped to align CEMS work with shared interests and reduce the capacity requirements of Indigenous peoples.

### 4. Coordinating Activities and Distributing Workloads

The groups of people working on the CEMS initiative, both within and outside TC, are small with limited capacity. This places an emphasis on the need to be as efficient as possible with project resources and to actively coordinate activities across various projects. The TC CEMS team found developing initial drafts of deliverables and incorporating collaborators' input to limit engagement fatigue to be effective approaches. Investing in coordination also provided efficiency and effectiveness benefits to the project work even though coordination requires an effort to regularly and frequently communicate.

### 5. Providing Time for Community-level Discussion

An important planning element that contributed to the success of the CEMS initiative was allowing time for Indigenous peoples to meet and discuss the initiative amongst themselves and internally within their communities, as required and requested. CEMS work allows for space between bilateral and multilateral conversations for Indigenous peoples to discuss and



receive feedback from leadership, knowledge holders, and community members to inform the initiative. Meetings and workshops within communities are scheduled without government involvement. These discussions create an opportunity for Indigenous peoples to talk about aspects of the CEMS project more freely, provide high-level input into the CEMS process, and validate proposed project approaches. Allowing time for these kinds of discussions has benefitted the initiative overall by ensuring that CEMS processes and deliverables were relevant to the needs of Indigenous peoples as well as the values and interests of their respective communities.

## 6. Allocating Accessible Capacity Funding

The CEMS initiative utilizes a capacity funding source through the Community Participation and Funding Program (CPFP), which compensates Indigenous peoples for their work and time to prepare for, attend, and debrief from CEMS activities. The CPFP was designed to support short-term, ad-hoc engagement activities and was not originally intended to facilitate ongoing, frequent engagements. This limitation placed an additional administrative burden on Indigenous peoples, which the project team attempted to reduce by communicating early and frequently and developing informational materials to assist Nation members in completing applications.

## 7. Developing a Collaborative Approach

Throughout the CEMS process, the project team has actively sought the input and validation of collaborators on the process, principles and values that would guide the project, and the pace of the work. Regular check-ins were also conducted to ensure that expectations were being met and involvement was meaningful. The collective data was helpful in guiding the CEMS process as a whole.





## IDENTIFIED KEY SUCCESS FACTORS

The lessons learned through the CEMS process have helped to develop a blueprint for what successful engagement can look like and provide examples of how marine initiatives can move forward by involving and partnering with Indigenous peoples, stakeholders, non-governmental organizations, academia and other levels of government, to ensure their interests are considered and incorporated from the initial planning stages. Some identified key success factors from the CEMS experience to date are included below:

1

### Commit to early and ongoing relationship building

- a. Often overlooked and requires more time than usually anticipated
- b. Build over time through various approaches and not just plan for one-off events

2

### Understand the macroscopic environment to realize synergies

- a. Understand where capacity, interests, and priorities lie within all ongoing work and initiatives in the regional area
- b. Be proactive in identifying common areas for cooperation and coordination with other initiatives
- c. Understand and strive to use existing forums, where possible, to prevent engagement fatigue

3

### Embrace a flexible approach that is not restricted by pre-conceived notions

- a. Build partnerships early within the planning process
- b. Consistently incorporate input when developing workplans and identify areas for co-development to occur

4

### Respect the Nation-to-Nation relationship

- a. Provide different channels to have different levels of communication

5

### Facilitate opportunities for meaningful two-way dialogue

- a. Develop communications processes that incorporate output, input, and feedback with Indigenous peoples
- b. Be prepared to incorporate the input of Indigenous peoples and allow it to influence the process and outcomes while maintaining ongoing open dialogue

6

### Proactively provide capacity support

- a. Actively look for ways to address capacity issues
- b. Press for 'outside the box' solutions to address the capacity needs of Indigenous peoples

7

### Devote effort in project management best practices

- a. Create regular calls, rolling agendas, provide calendars/timelines, etc.

# APPENDIX III: CUMULATIVE EFFECTS OF MARINE SHIPPING TOOLKIT

The following documents and resources are used as tools by TC to inform and advance the work of the CEMS initiative both nationally and regionally through CEMS pilot areas. This list is evergreen and will continue to grow as the initiative progresses.

**Fisheries and Oceans Canada** (DFO). (2020).

*Science Advice for Pathways Of Effects for Marine Shipping In Canada: Biological and Ecological Effects.* (DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2020/030).

Retrieved from Fisheries and Oceans Canada Canadian Science Advisory Secretariat website: [https://www.dfo-mpo.gc.ca/csas-sccs/Publications/SAR-AS/2020/2020\\_030-eng.pdf](https://www.dfo-mpo.gc.ca/csas-sccs/Publications/SAR-AS/2020/2020_030-eng.pdf)

**Lerner, J.** (2018).

*Review of Cumulative Effects Management Concepts and International Frameworks.* (Contract T8080-170062).

Retrieved from the Transport Canada website: <https://tc.canada.ca/en/marine-transportation/marine-pollution-environmental-response/cumulative-effects-marine-shipping?1>

**Pelot, R.** (2021).

*Review of Methodologies for Predicting Future Vessel Traffic in the Northern Shelf Bioregion, British Columbia* for Transport Canada's Cumulative Effects of Marine Shipping (CEMS) Initiative.

**Pickard, D., de la Cueva Bueno, P., Olson, E., and Semmens, C.** (2019).

*Evaluation of Cumulative Effects Assessment Methodologies for Marine Shipping.* (T8080 – 180068).

Retrieved from the Transport Canada website: <https://tc.canada.ca/en/marine-transportation/marine-pollution-environmental-response/cumulative-effects-marine-shipping?1>

**Stratos Inc.** (2019).

*Cumulative Effects Assessment: Technical Workshop Report.*

Retrieved from the Transport Canada website: <https://tc.canada.ca/en/marine-transportation/marine-pollution-environmental-response/cumulative-effects-marine-shipping?1>

**Ramsey, E., G.A. Warner, A.O. MacGillivray, Z. Li, and K.A. Kowarski.** (2021).

*Hydroacoustic Modelling of Vessel Noise: British Columbia Northern Shelf Bioregion.*

Technical report by JASCO Applied Sciences for Innovation Centre of Transport Canada.



# APPENDIX IV: POTENTIAL MANAGEMENT MEASURES AND LEVERS

The following is a list of possible management levers and management measures with respect to waters within Canadian jurisdiction. For definitions, please refer to page 9 of this publication. This list is intended to share information, but it is non-exhaustive. Other management levers/measures not listed here may exist and can always be suggested for addition.

**Management levers** are labeled in the tables as **(ML)** and **management measures** are labeled as **(MM)**.

TABLE 1 Possible management levers and management measures with respect to waters within Canadian jurisdiction		
LEGISLATION OR PROGRAM	RELEVANT SECTION OR REGULATION	MANAGEMENT LEVERS AND MEASURES
<a href="#">Canada Shipping Act, 2001</a>	Section 10.1: Powers of the Minister – Interim Order	An Interim order by the Minister of Transport may be issued if he or she believes that immediate action is required to deal with a direct or indirect risk to marine safety or to the marine environment. The order will last up to one year with potential for cabinet to extend up to two years or make the order into regulation. (ML)
<a href="#">Canada Shipping Act, 2001</a>	Section 35.1: Powers of GIC – Regulations	The Governor in Council (GIC) may make regulations respecting the protection of the marine environment from vessel activities such as compulsory or recommended routes, restrictions on operation, navigation, anchorage, mooring, and berthing. (ML)
<a href="#">Canada Shipping Act, 2001</a>	Section 120(1): Powers of GIC – Regulations	The GIC may create regulations respecting vessel safety for the purpose of protecting shorelines or environmentally sensitive areas. (ML)
<a href="#">Canada Shipping Act, 2001</a>	Section 136(1)(f): Powers of GIC – Regulations	The GIC may create regulations or restrictions to navigation, anchoring, mooring or berthing of vessels for the purpose of protecting the public interest or the environment. (ML)
<a href="#">Canada Shipping Act, 2001</a>	Section 175.1(1) and 189: Powers of the Minister or Pollution Response Officer	A pollution response officer or the Minister may direct any vessel carrying, discharging or at risk of discharging a pollutant to follow specific routes. (MM)
<a href="#">Canada Shipping Act, 2001</a>	Navigation Safety Regulations 2020	Part 3, Division 1: It is prohibited for a vessel to anchor within the waters described in Schedule 5. (ML)
<a href="#">Canada Shipping Act, 2001</a>	<a href="#">Ballast Water Control and Management Regulations</a>	Prevents the introduction of non-native species to waters under Canadian jurisdiction. (MM)
<a href="#">Canada Shipping Act, 2001</a>	<a href="#">Collision Regulations</a>	<b>Section 7:</b> Every vessel shall comply with any instructions and directions contained in Notices to Mariners or Notices to Shipping that are issued as a result of threats to marine safety or to the marine environment. (ML)

**TABLE 1 Possible management levers and management measures with respect to waters within Canadian jurisdiction**

LEGISLATION OR PROGRAM	RELEVANT SECTION OR REGULATION	MANAGEMENT LEVERS AND MEASURES
<a href="#">Canada Shipping Act, 2001</a>	<a href="#">Collision Regulations</a>	Rule 10: Vessels must follow routing measures, such as Areas to be Avoided (ATBA), precautionary areas and traffic separation schemes. These management measures can be imposed for various purposes, including the protection of off-shore infrastructure, the environment or wildlife. (MM)
<a href="#">Canada Shipping Act, 2001</a>	<a href="#">Marine Machinery Regulations</a>	Standards for construction and installation of machinery on certain vessels. (MM)
<a href="#">Canada Shipping Act, 2001</a>	<a href="#">Small Vessel Regulations</a>	Small vessels safety construction standards. They can also address elements such as noise for pleasure craft and other small vessels. (MM)
<a href="#">Canada Shipping Act, 2001</a>	<a href="#">Vessel Operation Restriction Regulations</a>	Modify <b>Schedules 1-3</b> in order to restrict certain vessel access in certain waters. (ML)
<a href="#">Canada Shipping Act, 2001</a>	<a href="#">Vessel Operation Restriction Regulations</a>	Modify <b>Schedule 6</b> in order to set speed restrictions for power-driven vessels and vessels driven by electric propulsion in certain waters. (ML)
<a href="#">Canada Shipping Act, 2001</a>	<a href="#">Vessel Operation Restriction Regulations</a>	<b>Section 6(1):</b> The Minister may authorize in writing any person or class of persons to place a sign in an area for the purpose of indicating that a restriction on the operation of vessels has been imposed by any of sub-sections 2(1) to (6) and 11(2). (ML)
<a href="#">Canada Shipping Act, 2001</a>	<a href="#">Vessel Pollution and Dangerous Chemicals Regulations</a>	Aims to mitigate environmental impacts by preventing pollution (e.g. oil, noxious liquid substances, sewage, grey water, garbage, air emissions, and antifouling systems) from vessels in waters under Canadian jurisdiction through inspections, certification and operational requirements. (MM)
<a href="#">Canada Shipping Act, 2001</a>	<a href="#">Vessel Traffic Services Zones Regulations</a> (VTS Regulations), the Eastern Canada Vessel Services Zone Regulations (ECAREG), the Northern Canada Vessel Traffic Services Zone Regulations (NORDREG)	Vessel Traffic Services (VTS) refers to the collection, dissemination, and exchange of marine traffic information (e.g. vessel certificates vessel destinations, estimated times of arrival (ETA) to certain points, pertinent weather or navigational information, etc.) to maintain awareness on the water, and to ensure that mariners have the information they need to transit safely. Mariners are required, based on their type of vessel and geographical area, to provide certain information pertaining to their vessel and voyage to the Canadian Coast Guard MCTS officers, such as the type of cargo on board and the vessels intended route, that is then used to grant clearances and facilitate the safe and efficient movement of vessel traffic. (MM)

**TABLE 1 Possible management levers and management measures with respect to waters within Canadian jurisdiction**

LEGISLATION OR PROGRAM	RELEVANT SECTION OR REGULATION	MANAGEMENT LEVERS AND MEASURES
<a href="#">Pilotage Act, 1985</a>	Section 52(f): Powers of GIC – Regulations	The GIC may make regulations establishing compulsory pilotage areas. (ML)
<a href="#">Canada Marine Act, 1998</a>	Section 56(1): Powers of port authorities – Procedures	A port authority may establish procedures or traffic control zones for the purpose of promoting safe and efficient navigation or environmental protection in the waters of the port, with respect to ships or classes of ships. (ML)
<a href="#">Canada Marine Act, 1998</a>	Section 62(1), 74(1) and 98(1): Powers of GIC – Regulations	The GIC may make regulations respecting the use, management and environmental protection of a port, public port, or the St. Lawrence Seaway including the regulation or prohibition of equipment, structures, works and operation. (ML)
<a href="#">Arctic Waters Pollution Prevention Act, 1985</a>	<a href="#">Arctic Shipping Safety and Pollution Prevention Regulations</a>	Implements the IMO's Polar Code, as well as additional requirement for vessel safety. Sets additional pollution prevention measures from various sources such as sewage, garbage and oil from vessels in polar waters (e.g. Arctic). Applies to Canadian vessels navigating in polar waters and foreign vessels navigating in a shipping safety control zone. (MM)
<a href="#">Arctic Waters Pollution Prevention Act, 1985</a>	<a href="#">Arctic Waters Pollution Prevention Regulations</a>	Standards for depositing and reporting the deposit of domestic or industrial waste in Arctic waters, including limits of liability. (MM)
Guideline	<a href="#">Guidelines for Passenger Vessels Operating in the Canadian Arctic</a>	General guidelines, including references to requirements and certifications, to aide passenger vessel operators and Designated Vessel Representatives on voyages through the Canadian Arctic. (MM)

**TABLE 2 Possible management levers and management measures under Transport Canada and Fisheries and Oceans Canada Jurisdiction**

LEGISLATION OR PROGRAM	RELEVANT SECTION OR REGULATION	MANAGEMENT LEVERS AND MEASURES
<a href="#">Canada Shipping Act, 2001</a>	Part 8 and 9	Supported by enabling regulations, the framework sets requirements for vessels, oil handling facilities and TC certified oil spill response organizations. Prevents and mitigates the impacts of a ship source oil spill in the marine environment. (ML)

**TABLE 3 Possible management levers and management measures under Fisheries and Oceans Canada Jurisdiction**

<b>LEGISLATION OR PROGRAM</b>	<b>RELEVANT SECTION OR REGULATION</b>	<b>MANAGEMENT LEVERS AND MEASURES</b>
<a href="#"><u>Oceans Act, 1996 (with Bill C55 Amendments)</u></a>	Section 31 & 32: Power to implement integrated management plans	The Minister, in collaboration with any other relevant authorities, may implement plans for the integrated management of all activities or measures in waters within Canadian jurisdiction. (ML)
<a href="#"><u>Oceans Act, 1996 (with Bill C55 Amendments)</u></a>	Section 35(3): Powers of GIC – MPAs	The GIC may make an interim marine protected areas, where the Minister of Fisheries and Oceans Canada has the authority to establish MPAs. (ML)
<a href="#"><u>Oceans Act, 1996 (with Bill C55 Amendments)</u></a>	Section 35.1(2): Designation of marine protected area - Minister's order	The Minister of Fisheries and Oceans Canada has the authority to designate new Marine Protected Areas. (ML)
<a href="#"><u>Oceans Act, 1996 (with Bill C55 Amendments)</u></a>	Section 32(d): Powers of the Minister – Quality measures	The Minister may establish marine environmental quality (MEQ) measure(s) for the purpose of an integrated management plan. (ML)
<a href="#"><u>Oceans Act, 1996 (with Bill C55 Amendments)</u></a>	Non-regulatory	Marine Spatial Planning (integrated management planning). (MM)
<a href="#"><u>Fisheries Act, 1985</u></a>	Section 43: Biodiversity Protection Regulations	Biodiversity protection regulations are used to create marine refuges. (MM)
<a href="#"><u>Fisheries Act, 1985</u></a>	<a href="#"><u>Marine Mammal Regulations</u></a> (currently does not apply to vessels in transit)	Procedure for reporting accidental contact with marine mammals. (MM)
Other Programs	Canadian Coast Guard Programs	Notices to Mariners (ML)

**TABLE 4 Possible management levers and management measures under Environment and Climate Change Canada Jurisdiction**

LEGISLATION OR PROGRAM	RELEVANT SECTION OR REGULATION	MANAGEMENT LEVERS AND MEASURES
<a href="#">Canadian Environmental Protection Act, 1999</a>	<a href="#">Disposal at Sea Permit Application Regulations</a>	Must consider sensitive areas for disposal permit; prohibition on permits. (ML)
<a href="#">Canadian Wildlife Act, 1985</a>	Section 4.1(1): Powers of GIC – MPAs	The Governor in Council may establish protected marine areas in any area of the sea that forms part of the internal waters of Canada, the territorial sea of Canada or the exclusive economic zone of Canada Marine protected area. (ML)
<a href="#">Species at Risk Act, 2002</a> (DFO jurisdiction for aquatic species)	Section 11(1) & 12(1): Powers of the Minister	A Minister may enter into a conservation agreement with any government in Canada, organization or person to benefit a species at risk or non-species at risk or enhance its survival in the wild. (ML)
<a href="#">Species at Risk Act, 2002</a> (DFO jurisdiction for aquatic species)	Section 28(1): Powers of any person with knowledge of species – Imminent threat assessment	Any person who considers that there is an imminent threat to the survival of a wildlife species may apply to COSEWIC for an assessment of the threat for the purpose of having the species listed on an emergency basis under subsection 29(1) as an endangered species. (ML)
<a href="#">Species at Risk Act, 2002</a> (DFO jurisdiction for aquatic species)	Section 32(1) & 33: Measures to Protect Listed Wildlife Species	General prohibitions protecting listed wildlife species and their habitats. (MM)
<a href="#">Species at Risk Act, 2002</a> (DFO jurisdiction for aquatic species)	Section 71(1): Powers of GIC – Regulations	The Governor in Council may, on the recommendation of the competent minister, make any regulations with respect to aquatic species that the Governor in Council considers appropriate for the purpose of implementing the measures included in the management plan of a species of special concern. (ML)
<a href="#">Species at Risk Act, 2002</a> (DFO jurisdiction for aquatic species)	Section 80: Powers of GIC – Emergency protection order	The Governor in Council may, on the recommendation of the minister, make an emergency order to provide for the protection of a listed wildlife species. The emergency order may identify habitat that is necessary for the survival or recovery of the species and include pro-visions prohibiting certain activities. (ML)
<a href="#">Species at Risk Act, 2002</a> (DFO jurisdiction for aquatic species)	Non-regulatory	Conservation agreements (MM)



**TABLE 5 Possible management levers and management measures under Parks Canada Jurisdiction**

LEGISLATION OR PROGRAM	RELEVANT SECTION OR REGULATION	MANAGEMENT LEVERS AND MEASURES
<a href="#">Canada National Marine Conservation Areas Act, 2002</a>	Section 16(1): Regulations	The GIC may make regulations for the control and management of marine conservation areas. (ML)
<a href="#">Canada National Marine Conservation Areas Act, 2002</a>	Section 29(1): Pollution clean-up	Any person who has charge, management or control of a pollutant shall take reasonable measures to prevent or mitigate degradation or injury. (MM)
<a href="#">Saguenay-St. Lawrence Marine Park Act, 1997</a>	<a href="#">Marine Activities in the Saguenay-St. Lawrence Marine Park Regulations</a>	<b>Section 14.1:</b> The Minister shall establish a temporary exclusion area if it is necessary for the protection of ecosystems or any elements of ecosystems, in the park ( <b>s. 14.1(b)</b> ), the protection of the cultural resources submerged in the park ( <b>s. 14.2(c)</b> ), or the protection, health or safety of the public in the park ( <b>s. 14.1(d)</b> ). The decision will be communicated in a Notice to Shipping or a Notice to Mariners. (ML)

**TABLE 6 Possible management levers and management measures under the Impact Assessment Agency of Canada**

LEGISLATION OR PROGRAM	RELEVANT SECTION OR REGULATION	MANAGEMENT LEVERS AND MEASURES
<a href="#">Impact Assessment Act, 2019</a>	Section 92, 93 & 95: Regional and Strategic Assessments	The Minister of Environment and Climate Change Canada may authorize a regional or strategic assessment. (ML)
<a href="#">Impact Assessment Act, 2019</a>	Section 97(1): Minister's obligations – request for assessment	Any regional or strategic assessment can be requested to the Minister through the Agency. (ML)

**TABLE 7 Possible management levers and management measures under the International Maritime Organization (IMO)**

LEGISLATION OR PROGRAM	RELEVANT SECTION OR REGULATION	MANAGEMENT LEVERS AND MEASURES
<a href="#">Convention on the Safety of Life at Sea V (SOLAS V)</a>	Regulation V.10(g): Adhering to IMO measures concerning ship routing	Under the IMO, governments can impose voluntary measures to vessel routing, such as designation of Areas to be Avoided (ATBA), precautionary areas and traffic separation schemes. These management measures can be imposed for various purposes, including the protection of off-shore infrastructure, the environment or wildlife. (ML)
Guidelines	<a href="#">Guidelines for the Reduction of Underwater Noise from Commercial Shipping to Address Adverse Impacts on Marine Life (MEPC.1/Circ.833)</a>	These non-mandatory Guidelines are intended to provide general advice about reduction of underwater noise to design-ers, shipbuilders and ship operators. (MM)

**TABLE 8 Indigenous Laws**

Indigenous peoples may have their own set of Indigenous laws relevant to the marine environment.

## Other Potential Measures<sup>1</sup>

- Vessel speed reductions
- Additional communications and reporting procedures
- Changes in timing of traffic
- Changes in shipping practices
- Changes in ship design and retrofits to existing ships
- Redirection of traffic
- Changes in maintenance procedures (e.g. hull cleaning)
- Operational responses to observed presence of marine mammals
- Grouping vessels (e.g. convoy)
- Escort tugs
- Creating periods of quiescence
- Develop a Waterway Safety Committee

<sup>1</sup> It may be advantageous to conduct a risk assessment to assess and potentially mitigate the risk to the safety of navigation that some of the following potential measures represent.