National Research Vessel Task Team (NRVTT)

Workshop Report

April 23-25, 2024

Introduction

Members of the National Research Vessel Task Team (NRVTT), hosted by the Marine Environmental Observation Prediction and Response (MEOPAR) Network with support from Reformar, met in Ottawa, ON from April 23-25 at the Alt Hotel. Discussion topics and actionable objectives for the NRVTT Summit included:

1. *Future Ships & Ship-based Infrastructure*
    a. Summarize current plans for ship construction/refit and the new designs/technologies that may be utilized by "ships of the future".
    b. Assess Canada's needs to balance research from ships of opportunity with purpose-built research vessels.
    c. Develop a comprehensive long-range plan for CFI (Canada Foundation for Innovation) IF (Innovation Fund) and MSI (Major Science Initiatives) bids over the next four years, including identifying priority research areas, funding requirements, and potential collaboration opportunities.

2. *Coordination and Access*
    a. Establish mechanisms for improving coordination and utilization of existing assets, such as research vessels, equipment, and facilities, among NRVTT members.
    b. This includes creating a framework for sharing resources, optimizing scheduling, coordinating academic and government-led cruises, improving access for Canadian researchers on visiting foreign vessels, and coordinating ship-time funding.

The intention for the workshop was for these discussions to lead to the development of a multi-year plan, outlining specific goals, objectives, and milestones for the future of the NRVTT. This plan included discussions around a program plan for MEOPAR's ship-time funding.

1. Co-Chair(s) Opening

The NRVTT Co-Chairs Douglas W. Bancroft and Heather Reader opened the meeting with an overview of the current state of access to vessels for scientific cruises in Canada, as well as some of the major issues being faced by the community. The Coast Guard science fleet has been significantly reduced, and it is not certain how much longer existing ships will last. While several ships are being constructed in Canada, these will not be one-for-one replacements.

The scientific community does not know when or how it will have access to the replacements for science. Scientific time aboard these vessels is needed by federal scientists, such as those from Fisheries and Oceans Canada (DFO), Natural Resources Canada (NRCan), and Defence Research and Development Canada (DRDC). Further, it is anticipated that scientists from these departments and others may have further need for scientific vessel access beyond the planned replacements. Meanwhile, Canadian academic access to vessels for oceanographic research is ad hoc and relationship based.

When vessel access is available, funding to go to sea is difficult to obtain, and the Natural Sciences and Engineering Research Council of Canada (NSERC)'s Ship-Time program is insufficient for accessing commercial ships. NSERC has made it clear that the funding envelope will not change.

Fundamentally, the model that is viewed as the most effective is that of the Canadian Coast Guard Ship (CCGS) Amundsen in partnership with Amundsen Science. If it is possible to replicate the Amundsen model on other coasts, this would make a significant difference in oceanographic research planning for the academic community, as there would be months of at-sea access on either coast.

To work toward this option and other methods to address current issues, the NRVTT is considering:

- The upcoming Major Science Initiatives (MSI) call in 2027, preceded by a Canada Foundation for Innovation (CFI) Innovation Fund application, for which the task team needs to understand and exchange on which ocean science questions will drive the application(s);
- The future of the Arctic Offshore Patrol Ships (AOPS) and which options exist there for academic-led research aboard; and,
- A plan for stronger coordination to enable individual academics to better understand the lay of the land for how to get to sea for science in Canada.

2. MEOPAR Overview

MEOPAR was successful with its SSF application, a portion of which is dedicated to the future of the NRVTT and improving access to ocean-going vessels for academic research in Canada. Opportunities from MEOPAR will support ship access, coordination for all, more flexibility beyond funding academic partners, and must align with core federal responsibilities and priorities.

Relevant opportunities available under MEOPAR's new five-year funding window have been classified under "Objective B1", which is *to improve access to and use of major ocean research infrastructures.*

There are two major areas of support, and multiple programs. The first area focuses on *supporting the use of Canada's existing major ocean infrastructure*. This fund, called the Major Ocean Science Infrastructure Access Fund, will be made available to make use of facilities such as, but not limited to, the Churchill Marine Observatory (CMO), Ocean Networks Canada (ONC), and others. The purpose is to fund science at these large research investments that do not have direct funding for the science itself.

The second area focuses on *establishing a national, coordinated approach for Canadian-led seagoing expeditions*. This includes three separate funds/programs: a) the Major Expedition Fund; b) Modular Ocean Research Infrastructure (MORI) operations; and c) the NRVTT itself.

a) The MEF is meant to be complementary to NSERC's Ship-Time program, with $1.25M available per year over five years, but redistribution of the total amount over the timeframe is possible. The fund is meant to be inclusive of researchers who do not have Discovery Grants (DG), including non-academic researchers. During the workshop, MEOPAR sought to discuss:
    - How best to integrate the MEF with NSERC's Ship-Time program
    - Feedback on proposed criteria, dates, administration of the program, etc.
    - Whether the focus should be one major expedition per year or multiple.

Eligibility for the fund is not yet defined but can be expanded past only Tri-Council eligible applicants. Further, the funding will not be restricted to those with funded MEOPAR projects. The discussion noted it would not be possible to move funds this summer and it was highly recommended that MEOPAR work with the NSERC Ship-Time team to find a way to leverage time and process. An efficient method recommended would be to augment the committee and run one meeting instead of two, thus also streamlining the deadlines.

The last point of clarification on the MEF is that the fund will not focus on any one vessel, and MEOPAR will not be directing which platforms or scientific objectives are appropriate.

b) MORI operations are funded at $60k per year to maintain existing assets and host meetings and workshops, working toward a consortium agreement for the storage and maintenance of existing assets, and targeting future CFI competitions.
    - A program needs to be developed to work with partners who may need equipment for other cruises and set up a system to lease or rent out assets. Requires a staff person to manage assets and seek clients.

c) The third area of support is for the NRVTT to continue to grow as a coordination body and explore national needs and opportunities for ocean-going research platforms of the

future. Moving forward, the NRVTT should facilitate advanced planning of cruises and other coordinated efforts.

3. Partner and Member Presentations

NRVTT members presented, highlighting existing capacity to support marine science across the country as well as upcoming opportunities through major applications including:

- Centre de recherche sur les milieux insulaires et maritimes (CERMIM)
- Institut des sciences de la mer de l'Université du Québec à Rimouski (ISMER-UQAR)
- Churchill Marine Observatory (CMO)
- Université Laval associated initiatives - Takuvik, Amundsen Science, and Transforming Climate Action (TCA)
- Arctic Research Foundation
- Modular Ocean Research Infrastructure (MORI)

Freire Shipyard also presented, highlighting the disparity in shipbuilding between Canadian and foreign manufacturers. World class research vessels can be designed, constructed and at sea within 24 months with a foreign shipbuilder.

The Canada Foundation for Innovation (CFI) presented on their main program areas of interest, as well as highlighting their most recent funding call. They did note that for a future application, a consortium of CFI eligible institutions could be considered. Lastly, key contacts were noted as:

- Sarah Coogan, Senior Programs Officer
- Sandra Zohar, Ocean Science Facilities

The largest discussion centred around the NSERC presentation on the Ship Time program. Representatives noted that the number of applications has decreased and that they are working on improvements to the program. They are open to suggestions and are currently working to potentially remove the Canadian Common CV (CCV) as a requirement for application as well as the moving the deadline to spring.

Discussion topics included:

- Clarification regarding “urgency”, which requires justification for the use of a specific platform versus another, and why a certain vessel is needed. Other examples of urgency include availability of HQP, impact on the completion and/or future of the research.
- There is understanding regarding the apathy of applicants toward the program due to low success rate and insufficient funds. However, the funding envelope cannot increase unless there is a large demand for it.
- The NSERC program is unable to share applications with another program as each application is confidential. Regulations would be required to enable this, which would take at least a couple of years through legal.

- There is potential to open the program to past DG recipients, but this decision must be made at a higher level than the program staff.

Following this discussion, it was recommended that the NRVTT host a workshop two months out from the deadline for the NSERC Ship-Time program, to coordinate applications between various oceanographers attempting to go to sea in the following field season. This can also be coordinated with the new MEF, and NSERC can promote the opportunity. Additional conversations around how these two programs can work together was discussed in the Coordination and Access breakout sessions.

Lastly, it was noted that Ship-Time program funds are directly sent to the Coast Guard from NSERC. This is because Coast Guard cannot be directly contracted. The NRVTT wishes to communicate that this works well, but it would be efficient to have a better understanding of all the research needs for vessels across the government, as well as the platforms available. A team at DFO science is working on capturing this information in one place, but this is not yet ready. The representative will follow up to see if the Canadian Integrated Ocean Observing System (CIOOS) team has been looped in.

4. Breakout Discussions - Future Ships and Ship-Based Infrastructure

There were several breakouts across the three days of the workshop that focused on this topic area.

a) Existing Instrumentation

There is an impressive array of instrumentation across the country, but there is not a repository where it can be managed. Often, these instruments are managed by overburdened individuals and their technical teams, who are maintaining and dealing with requests for gear. MEOPAR could support in coordination, as well as creating a database of operators. There should also be consideration for managing assets that the government is disposing of and making them fit for modular infrastructure.

b) Existing Vessels

There is a good distribution of coastal vessels and demonstrated capacity to convert fishing vessels into research ones. Offshore research capacity is limited and diminishing. There may be unused capacity for near-shore and mid-shore vessels, but the academic community will have a difficult time accessing offshore research vessels. DFO expects that the Hudson replacement and the Coast Guard AOPS will be fully subscribed upon delivery, as DFO needs are expanding and AOPS will need to prioritize North Atlantic fishery patrols.

c) Target Demographic

One of the ocean science gaps identified focuses on mid-career scientists who are unable to lead expeditions. Ideally, vessels will be available for expeditions ranging from three weeks to two months, with the ability to conduct deep sea work. Existing vessels in Canada are not large

enough for some of this work. While investigators can work on non-Canadian ships with partners, they do not have the opportunity to lead or scope these missions.

d) Federal Relationships

Relationships with federal departments vary across the country. NRCan has seemingly lost its sea-going days, though used to share some with academia (Douglas Bancroft to meet with Jennifer Vollrath and Sonia Talwar). The relationship with Coast Guard is positive, and there is appetite from the NRVTT to build on that relationship to replicate the Amundsen model on other coasts. It was noted that the Navy is supportive of research, but academic access does not currently exist, and it is the United States Office of Naval Research that has recently funded several Canadian oceanographic projects. There may be opportunities for opportunistic research on Navy vessels, but this needs to be explored.

e) Modular Ocean Research Infrastructure

MORI can serve as a bridge between current circumstances and the plans for research vessel access and potential ownership in the future. Short-term investments in MORI in the interim can expand research capabilities on flexible ships. Additionally, the equipment can be used later aboard purpose-built research vessels, if they are designed for modular approaches. Coordination will remain a large issue for modular infrastructure, and it must be built strongly, safely and professionally to ensure proper certification.

f) Vessel Purchase and Models of Private/Public Ownership for Consideration

If the NRVTT is to pursue the purchase of a vessel that is purpose-built for research, this will need to be done in partnership, as it is not possible for the consortium to fund a vessel on its own.

a. Industry owns and operates the research vessel
    i. If academia can guarantee a significant number of research days per year, on the order of 100-150 days/year, over a long period of time (at least five years, but ideally 20), then private industry could finance a purpose-built research vessel. Arctic Research Foundation (ARF) representatives noted that they could do this with 60 confirmed days.
    ii. NSERC, at this time, is not able to guarantee the dedicated $10M-$20M this would require to oceanographic research each year.

b. Government and academia own the research vessel, and industry operates it
    i. Many European countries, and the States, operate on this model.
    ii. The country/university struggles to find work for the vessel year-round. Without industry owning the vessel, they have no incentive to find non-research work for it. Further, this causes a significant issue, as an academic-funded research ship should not be competing with industry ships for contracts.

c. Academia and industry share ownership of the vessel, and industry operates it

i. Reduced capital costs would lower the threshold of guaranteed research days necessary for private industry to invest in a purpose-built research vessel.
ii. Would require a strong contract for academics to guarantee a certain number of days at preferred dates, otherwise access will get out-bid by industry contracts.

CFI representatives noted that it is unlikely that existing programs would be able to support a vessel that is co-owned by academia and industry, as there is a requirement for the infrastructure to be 100% university owned. However, this needs to be investigated further, and they recommended that NRVTT representatives request a meeting with the new President and CEO of CFI once appointed to discuss potential paths forward.

g) CFI Application Considerations and Planning

A major application for a vessel could be feasible for the 2028 Innovation Fund. The NRVTT membership will need to be prepared in about two and a half years to be campaigning for envelope from target universities. An efficient model would be to identify two or three large universities to serve as lead, contributing a significant envelope, and then approach other universities for small contributions to have "a seat at the table". This could be a two-phased approach where the 2028 focuses on a ship for one coast, and then a future application would be for a ship on the other coast.

Landscape Analysis

- What is available? What are the gaps? Where are the ship and infrastructure needs?
- What are the science questions?
- What are the needs beyond academia?

Canadian shipbuilding is slower than anywhere else in the world. Foreign shipbuilders can produce world class vessels in 24 months. CFI noted that foreign vessel purchase is possible, it is simply easier to justify Canadian purchases.

5. Breakout Discussions – Coordination and Access

There were several breakouts across the three days of the workshop that focused on this topic area.

a) Centralized Database

One of the key discussions across all areas of the workshop was the significant need for a hub that outlines resources available and the mechanisms by which they are accessible to academics and other federal representatives. Key information available should include:

- Dates, locations, and objectives of upcoming cruises (vessel availability)
- Equipment, ship class/capabilities, and typical operating locations
- Port infrastructure, logistics (where to refuel, safety, etc.)

Current examples include:

- CFI's Research Facilities Navigator
- REFORMAR's website
- DFO's internal list of vessels that identifies some of the key capabilities of the vessels made available to other federal departments for procurement purchases

b) Coordinator

Strong support for a full-time position to be established to work on a website of the vessels that are available in Canada, as well as links to operators and where they are. This person would create and/or oversee the creation of the database described above, and work with DFO Science to get more broad access to the COIP database. The coordinator can also organize an annual meeting for the community to come together, likely at MEOPAR's Annual Scientific Meeting (ASM). It was recommended that this coordinator look at the IRSO planning. It will be difficult for this single position to do the ship coordination across the country, but instead should have strong relationships in the regions with other ship coordinators. Their responsibility would be to connect the various ship coordinators across the country. IRSO software planning for ship coordination was referenced as a best practice.

c) MEF and NSERC Ship-Time

The NSERC Ship-Time program intends to move their submission date from September 1 to May 1, in order to communicate results sooner and improve ship planning. It is a process for NSERC to switch to a model where the programs are funded two years out and would need to be discussed with the President. This is something the NRVTT can work on, and the MEF could opportunistically support in the meantime. The MEF will align timing with NSERC, and work more closely with program staff to identify further efficiencies.

DFO is planning ship availability two years out. They have a model where they can keep some space available for NSERC recipients who are aware of their funding six months in advance, but this may limit some opportunities.

d) Challenges and Opportunities

- Ship operators host most of their clients between May to October of each year. It is difficult for individual academics to schedule short cruises when long contracts are available from other customers. It is important to develop critical mass for large academic projects to ensure ship access and should be planned more than a year in advance.
- Access to foreign vessels coming to Canada may present an opportunity for Canadian researchers, if DFO can identify and communicate available berths. Delays in the process happen often, as when a foreign vessel intends to come to Canada, it is done at a state-to-state level. A Marine Science Request (MSR) first goes to Global Affairs Canada (GAC) before coming to CCG for scientific review. While the standard is six months, the timeline can be as short as two weeks, and there is insufficient time to communicate the

opportunity. An established coordinator with an academic network could share the message more readily if in close contact with representatives at CCG.

- Conversion of fishing boats to support certain types of science can be beneficial, including a stronger connection to local communities and expertise. There is significant demand for such vessels, however if there is not sufficient backing from other industry, there may be significant financial risks, as well as a steep learning curve for operators.

6. Shaping New MEOPAR Funds and Programs

The MEF has a $6M working budget over five years and will require a Call for Proposals (CFP). The fund is meant to complement what NSERC's Ship-Time program is good at, and not to replace it. For the MEOPAR fund, the definition of a "major expedition" means that it is multi-investigator, and at least 3-5 different institutions working on their own elements but as a collective.

Discussion noted that there are not ships available in Canada that can support this definition, and the international fleets will require a minimum two-year planning window. Further, a major expedition could be spanned over 12-24 months, but broken up regionally if the scientific objectives are coherent. Additionally, the fund could allow leveraging of some existing plans. A Letter of Intent (LOI) process is necessary, and investigators will be limited to 1-2 applications per call. There are three different approaches that can be considered:

1. Multiple expeditions on multiple vessels combined into one major expedition;
2. A planned major expedition on a single vessel; and,
3. An opportunistic portion.

Further, it was noted that Coast Guard cannot be directly chartered by this fund. MEOPAR will need to speak with their new funders at the Strategic Science Fund (SSF) at Innovation, Science and Economic Development (ISED) about creating a Memorandum of Understanding (MOU) between the departments to enable the MEF to function.

7. Next Steps

a) Letter to NSERC President

The NRVTT will write a letter to the NSERC President, requesting changes to the Ship-Time program. Outline points include:

- Explain the value of the program, but that the paradigm has shifted, and thus the community's response to the fund has changed. Reference fleet changes between when the program was first designed and now.
- Request the ability to apply for funding for two years, providing a clear example such as the need to be able to have funding secured to both deploy and retrieve moorings.
    - Note the risk of equipment and potential loss of government investments.
- The letter needs to be concise and coming from the community as a whole and not from the viewpoint of a few disgruntled professors.

b) Working toward a CCG AOPS

NRVTT Chairs to meet with Gordon Roy from the Central and Arctic fleet.

- Understand the Amundsen model from his perspective, and how the NRVTT can consider working toward a similar model for CCG AOPS.
- DFO should not be present for the first meeting but can be for follow up meetings with vessel planners from Coast Guard and DFO.

c) Working toward a vessel

NRVTT will work toward a CFI submission for a research vessel, with details to be sorted in the next two and a half years. MORI can fill some of the need in the meantime.

- The aim will be to work toward a vessel six or seven years from now (2031).
- The task team will have to focus on the 2025 CFI Innovation Fund, as the 2025 one is too soon.
- Preparation will include an advanced design from a naval architect that can be presented at a future NRVTT meeting for discussion, with an aim to be as modular as possible.

d) Hiring a coordinator

As defined during the Coordination and Access breakout, MEOPAR will aim to hire a coordinator under SSF funding in the coming months.