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Ensuring the Canadian Coast Guard Doesn't
'Miss the Boat'**

by Mark McWhinney
April 2023

POLICY PERSPECTIVE

CONNECTING ICEBREAKERS TO C4ISR: ENSURING THE CANADIAN COAST GUARD DOESN'T 'MISS THE BOAT'

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Icebreakers have played a critical role in maintaining national security by allowing states with persistent sea ice cover to access and exercise control over their sovereign territory, even in the harshest conditions. In the Arctic, icebreakers are predominantly used to clear paths for shipping lanes and to support resource exploration and extraction activities where there is seasonal or permanent ice coverage. They also support scientific research activity, search and rescue operations, oil spill responses and other operations that help maintain the safety and security of people in those otherwise remote regions. While long-term projections demonstrate that sea ice decline in the Arctic is bound to continue, this does not mean that operating conditions will be any less challenging in the coming years, nor does it suggest that the need for icebreakers will decline in the foreseeable future. On April 4, the Canadian government announced that Davie Shipyard would officially become the third National Shipbuilding Strategy yard for large procurements, providing them with the responsibility to build the Canadian Coast Guard's (CCG) fleet of program icebreakers in addition to one polar icebreaker. The concurrency of these procurements and return to strategic competition in the Arctic region is the perfect opportunity to explore an enhanced maritime domain awareness (MDA) role for the impending fleet of new CCG icebreakers.

Icebreakers offer the only means for consistent maritime surface presence in the high North. While naval offshore patrol vessels (OPVs) may have some icebreaking capability in littoral waters due to hull reinforcement, icebreakers are purposely built to handle the harsh weather conditions and heavy ice-covered waters where they carry out their typical escort function. The CCG is the federal organization responsible for ice management and icebreaking services in the Arctic. The CCG oversees several other tasks that pertain to maritime navigation, traffic management, search and rescue and pollution control. The national security role that the CCG provides as part of its icebreaking activity, alongside the manner in which the organization interfaces with the Department of National Defence (DND) and the Canadian Armed Forces (CAF), requires contextualization. Because access to northern waters is restricted to a select few vessels, and because ice levels vary from year to year, the Royal Canadian Navy (RCN) is unable to retain a consistent and persistent presence. As a result, CCG icebreakers occupy the unique role of providing a persistent, physical presence that can also, if properly equipped, significantly contribute to MDA. As the Arctic returns to a place of geo-strategic importance in an increasingly competitive global landscape, inclusion of the CCG's next generation of Arctic-capable ships into the continental defence system-of-systems (command, control, communication, computers, intelligence, surveillance and reconnaissance – C4ISR) will be critical for providing decision-makers the best possible information for effective decisions and mission execution in the Arctic.

C4ISR, which broadly refers to the integration and co-ordination of various military systems and activities for decision-making and mission execution, is the key to operational effectiveness in a network-centric environment. New challenges in the operating domain, fast-paced developments in military and civilian technologies and new ways of conducting operations (including with other government agencies and coalition forces), require C4ISR systems to have greater levels of



flexibility, adaptability and interoperability.¹ C4ISR is the catalyst controlling the speed at which military capability can actually be applied, particularly through the intelligence, surveillance and reconnaissance (ISR) portions of the concept. If there is a plethora of information available that can be substantiated as of adequate quality, then decision times can be sharp and decisive (and vice versa). Icebreakers, given their well-established mandate of surveillance and MDA and their functional capacity to operate in a networked environment, therefore constitute a primary node of information attainment and capture in the high North for C4ISR in Canada's case.

To highlight the value and opportunities icebreakers present in the context of C4ISR activities, we must examine the concept CCG of operations, and then determine if there is need, budget and capacity to expand their mission set. The impetus for this examination is fourfold: first, *Strong, Secure, Engaged* (SSE) is clear in articulating that the growing complexity of global security demands a sophisticated awareness of the operating environment in all domains.² If system-of-systems networks will provide the connectivity and the real-time flow of information needed to ensure tactical advantage and operational success in that environment, then integration of all possible strategic assets will be necessary to maximize the data collection and enable the information dominance and subsequent decision superiority that decision-makers require. Second, it is critically important that Canada is aware of what is going on in its Arctic waters. Nestled in the *2022 Reports of the Auditor General of Canada* was a particularly eye-opening audit of Arctic surveillance and MDA which suggested that a number of longstanding issues centred on incomplete surveillance, insufficient traffic data, poor means of information sharing and a notable inability to respond to safety and security incidents could result in the CCG losing presence in the Arctic.³ While the audit cited weaknesses in satellite surveillance capability, patrol aircraft reaching the end of their service lives and a lack of adequate infrastructure for patrol equipment, the point raised on a potential icebreaking capability gap, compounded with further delays on Arctic OPV procurements, rings alarm bells over Canada's ability to maintain sovereignty-based intentions in the high North. Third, recent procurement announcements made by Russia and China provide cause to reconsider the function of the humble icebreaker as a strategic maritime asset. Multiple Chinese Arctic deployments of the icebreakers Xue Long and Xue Long 2, using scientific research as a pretence, have allowed China to map underwater infrastructure and survey potential SSBN bastions. China sees the strategic value of presence and domain awareness in the Arctic: Canada must also. Finally, for several years, Canada and the United States have been increasingly concerned over the defence and security of continental North America, leading to actions directed at the mitigation of known capability gaps. Last summer, Canada committed to modernizing the aerospace aspects of continental defence through its NORAD modernization proposals, including improvements to "domain awareness of North

¹ Flexibility focuses on the ability to quickly create new processes, altering both the flow of information and resource allocation to achieve mission objectives. Adaptability, on the other hand, surrounds the long-term goal of using military systems for missions outside their original purpose, in response to changing circumstances and real-time events. For more on this concept, see: National Research Council, *C4ISR for Future Naval Strike Groups*, (Washington, DC: The National Academies Press, 2006).

² *Strong, Secure, Engaged: Canada's Defence Policy* (Ottawa: National Defence, 2017), 55-56.

³ See: *2022 Reports of the Auditor General of Canada - Report 6: Arctic Waters Surveillance*, especially 7, 8-22.



American approaches,” yet neglected to make any tangible enhancements to Canada’s established maritime defence and security arrangements.⁴

This is worth additional consideration. Icebreakers’ ability to operate in the Arctic for extended periods provides considerable advantage in MDA efforts through the provision of means to keep track of other vessels in the region. If submarines are the key strategic asset to provide this capability at the subsurface level, icebreakers may serve as their on-water counterpart. Capabilities such as signals intelligence (SIGINT), electronic signals intelligence (ELINT), electronic warfare (EW) and anti-submarine warfare (ASW) sensing systems can be placed on any Canadian government platform to contribute to a national or continental recognized air and maritime picture. Coast Guard vessels can be and, with their unique Arctic role, are ideally suited to do this in North America’s most vulnerable avenue of approach, the Arctic. While own-ship noise considerations would impact passive sonar (towed array) and fixed hydrophone operation while deployed, there may be a role for icebreakers in certain situations.⁵ This means that icebreakers can deliver enhanced capability for broader MDA activities in the Arctic.

This paper sets out to do three things. First, it outlines the CCG’s national security role and how conceptualizations of that role have waxed and waned since the publication of *Securing an Open Society* in 2004. Second, it provides a brief overview of the in-service icebreakers and ongoing icebreaker procurements of the eight states which constitute the Arctic Council. China will also be considered, given its growing interest in the region alongside its self-designated label as a “near-Arctic state.”⁶ This will provide a basis of comparison to show that Canada is not the only country among its Arctic counterparts with impending procurements necessary to maintain operational presence in an increasingly competitive region. Third, it considers the role of icebreakers in the generic context of C4ISR-related activities and in the context of an enhanced concern for continental defence, arguing that the CCG’s operational presence in the Arctic for the foreseeable future not only demands, but necessitates innovation in sensor and systems integration on icebreaking platforms, lest they fall behind their adversaries’ potential efforts and incursions in the domain.

The Canadian Coast Guard and National Security: Keepers (?) of the High North

Tracing key developments in Canadian policy that have highlighted the importance of maintaining a significant presence in the Arctic is necessary for two reasons. First, it demonstrates that despite what appears to be continued prescience from the government indicating that the Arctic would become a region characterized by competition, force development efforts have

⁴ Prime Minister of Canada, “Prime Minister Justin Trudeau and President Joe Biden Joint Statement,” March 20, 2023. Available at: <https://pm.gc.ca/en/news/statements/2023/03/24/prime-minister-trudeau-and-president-biden-joint-statement>.

⁵ Active sonar deployment is challenging for icebreakers given the noise they generate from propulsion and from pushing through pack ice. In addition, sound propagation under sea ice is complex because ice tends to scatter signals and acoustic energy is unevenly absorbed at the ice-water interface. For further information on acoustic interference challenges in icebreaking, see for instance: E. H. Roth, V. Schmidt, J. A. Hildebrand and S. M. Wiggins, “Underwater Radiated Noise Levels of a Research Icebreaker in the Central Arctic Ocean,” *The Journal of the Acoustical Society of America*, 133(4), 2013.

⁶ People’s Republic of China, State Council, “China’s Arctic Policy,” White Paper, January 26, 2018.



consistently fallen short to ensure that DND/CAF and the CCG maintain an adequate operating presence in the domain. Second, it highlights that CCG icebreakers, as envisioned by successive policy statements, are the quintessential means to enable, engender and exercise the full extent of Canadian sovereignty in the high North.

A formal security role for the CCG was established in *Securing an Open Society: Canada's National Security Policy*, published in 2004 under the Liberal government of Paul Martin. This “first-ever policy of its kind in Canada” stressed the need for an integrated approach to addressing security issues across the “whole of government.”⁷ To strengthen marine security specifically, the government focused on clarifying responsibility across domains; increasing the on-water presence of the CAF and the CCG alongside the aerial surveillance capability of the Department of Fisheries and Oceans (DFO); enhancing secure fleet communications; augmenting the security of marine facilities; and calling for greater co-ordination with U.S. marine partners.⁸ This policy also catalyzed the formation of the Marine Security Operations Centres (MSOC) which hold the authority to respond to real and perceived marine security threats in Canadian waters.⁹ Headed by Canadian Forces Maritime Command, the MSOCs were set up to include staff from the Canada Border Services Agency (CBSA), Transport Canada (TC), the Royal Canadian Mounted Police (RCMP) and the CCG to leverage resources and expertise to generate MDA.¹⁰ The MSOCs were meant to have a higher degree of focus and integration than the Interdepartmental Marine Security Working Group (IMSWG), which was established under TC in the wake of 9/11 in 2001.¹¹

The 2005 International Policy Statement (IPS) featured the Arctic as a priority area in light of increased security threats, a changing distribution of global power, challenges to international institutions and a notable transformation of the global economy. Citing the potential for greater resource extraction, increased air traffic and changes in shipping lanes dictated by climate change, the IPS was clear in its call for greater surveillance and control in the North.¹² While icebreakers were not explicitly mentioned as one of the requisite tools to manage events in sovereign territory, surveillance priorities predicated on the necessity of infrared sensors, patrol aircraft, satellites and unmanned aerial vehicles (UAVs) echo calls that we still hear today.¹³ More interesting, perhaps, is that the piece does not mention the CCG's security role.

Before the Conservatives presented the *Canada First Defence Strategy* (CFDS), the Standing Committee on National Security and Defence released *Managing Turmoil* nine months into former prime minister Stephen Harper's tenure, invigorating discussion on security in the Canadian Arctic. While the report reaffirmed the previous government's attempts to articulate the

⁷ *Securing an Open Society: Canada's National Security Policy* (Ottawa: National Defence, 2004), vi.

⁸ *Ibid.*, ix-x.

⁹ *Ibid.*, 38-39. The policy established the East and West Coast MSOCs (located in Halifax and Esquimalt respectively) in 2004, while the Great Lakes-St. Lawrence Seaway MSOC (located in Niagara) opened in 2006. The Arctic is under the area of responsibility of MSOC East.

¹⁰ Canadian Forces Maritime Command was the official designation until 2011, when the “Royal Canadian Navy” title was restored. The current federal partner composition of the MSOC is DND/CAF, RCMP, CBSA, CCG, DFO and TC.

¹¹ The IMSWG is a co-ordination organization for 17 federal departments, which provides strategic policy oversight on higher level marine security frameworks with policy, operations and legal working groups supporting decision-making. Because the transport minister's mandate is to co-ordinate marine security policy across the federal government, the IMSWG is chaired by Transport Canada's Director General of Marine Security.

¹² *Canada's International Policy Statement: A Role of Pride and Influence in the World* (Ottawa, National Defence, 2005), 17.

¹³ *Ibid.*, 17. See juxtaposition with *2022 Reports of the Auditor General of Canada - Report 6: Arctic Waters Surveillance*, 8-22.



importance of remaining vigilant in the Arctic, it suggested that the CAF “should not be the primary tool used by the Government of Canada to protect and defend our country’s Arctic sovereignty.”¹⁴ The committee argued that there was no serious military threat through the Arctic because its lack of people, assets and general remoteness made it an unattractive military target. At the same time, they thought that any attempts to challenge Canada’s claims to the Northwest Passage on legal grounds were dubious at best.¹⁵ Regardless, they still said that Canada should maintain a strong position in the Arctic, and that the best way to accomplish this would be through consistently deploying icebreakers, not through large deployments of military personnel. Because the CCG patrolled the Arctic’s littoral waters, it was considered the “principal marine sovereignty and national presence in the North,” contrary to perceptions that the RCN held such a role.¹⁶

Yet, the fleet of CCG icebreakers required significant upgrades, pushing the committee to call for a revitalization and recapitalization of the CCG with newly established constabulary powers. They sought three armed icebreakers capable of operating year-round in the Arctic, with a construction date of no later than 2012.¹⁷ This contrasted with Conservative calls to procure three armed naval icebreakers for the RCN, despite the CCG’s operational history. Instead, the committee said it made more sense to direct the capital investment to renewing the CCG fleet, for the sudden transition of responsibility over to the RCN would hinder its capacity and capability in maintaining its established mission set. Not long after, the Harper government announced that it intended to procure six to eight Arctic Offshore Patrol Ships (AOPS) for the RCN in the face of new sovereignty challenges that were expected to come from energy access, critical mineral exploration and climate change.

Released in 2008, the CFDS outlined four principal Arctic defence missions. Relevant to our case was the call to “conduct daily domestic and continental operations, including in the Arctic and through NORAD.”¹⁸ The report recognized that climate change was altering the operating environment’s predictability, and that retreating ice cover would inevitably lead to changes in shipping, tourism, resource exploration and transport routes. Sovereignty infringements, security imperatives and illicit activities were the primary concerns, but icebreakers had no place among the smattering of procurements discussed in the policy document. The Conservatives formalized their plans to procure the AOPS to aid the CAF’s ability to operate in northern waters, but the language around departmental responsibility seemed to change. The document was explicit in stating that as activity in the Arctic began to increase, the military would play an increasingly vital role in showcasing the Canadian presence, and would supplement other government agencies like the CCG should the need arise.¹⁹

The Standing Senate Committee on Fisheries and Oceans seemed to take note of the overt emphasis on military capability in its report on the Coast Guard in the Canadian Arctic, published

¹⁴ *Managing Turmoil: The Need to Upgrade Canadian Foreign Aid and Military Strength to Deal with Massive Change* (Ottawa, Standing Senate Committee on National Security and Defence, 2006), 88.

¹⁵ *Ibid.*, 217.

¹⁶ *Ibid.*, 96.

¹⁷ *Ibid.*, 94.

¹⁸ *Canada First Defence Strategy* (Ottawa, National Defence, 2008), 3.

¹⁹ *Ibid.*, 8.



later that year. The committee was keen to remind the Conservatives that the CCG had numerous responsibilities in the Arctic, including the management of fisheries and hydrographic surveys, assistance in law enforcement and security, and perhaps most notably, icebreaking.²⁰ Expressing concerns over insufficient funding for the CCG writ large, the committee noted that the fleet of medium and heavy icebreakers were reaching the end of their service life. The committee recommended that two polar-class icebreakers would allow for prolonged presence in the Canadian Arctic and would enable the maintenance of sovereignty and assurance of jurisdiction in addition to ice-breaking activities.²¹ Testimony provided to the committee suggested that the importance of maintaining physical presence in the high North with consistent icebreaker coverage was a winning formula despite the CCG not having a formal constabulary role. This subsequently motivated a call which echoed sentiments in previous years, that the CCG should arm its vessels to expand their suite of security-related duties. The compromise would be that weaponry would remain under the control of DND and managed by DND/CAF personnel. In addition to the polar-class procurement, replacing the rest of the CCG's aging fleet with Arctic-class multi-mission icebreakers (as opposed to OPVs) presented a cost-effective means to shore up the security and surveillance patrols called for in the CFDS. This represented a fulsome attempt to bolster the Canadian presence in the Arctic and would signal to adversaries and allies alike that Canada would not be settling for the status quo as a long-term option.²²

The government responded in kind to the committee's recommendations, pivoting to *Canada's Northern Strategy*, which situated the Arctic as one of the government's top priorities and subsequently stressed the importance of exercising sovereignty in the high North.²³ Surrounding the *Northern Strategy* was an acknowledgment that CCG vessel activity supported all of the northern policy priorities, and was a key instrument in ensuring Canadian security and safeguarding Canadian values.²⁴ Calls for new icebreakers capable of operating year round in Arctic waters fell short because the government contended that lack of demand for icebreaking services in the summer months made the acquisition of a broad fleet neither feasible nor necessary. The government still supported the idea of deploying multi-mission icebreakers, but cited the new polar icebreaker CCGS John G. Diefenbaker to demonstrate that advancements in this area were already being addressed.²⁵ On the question of enforcement, the Conservatives reiterated that there were no intentions to change the CCG's constabulary role, yet (somewhat confoundingly) it was the only agency capable of actually providing on-water support to other departments in challenging ice conditions, and served as principal agent in the pursuit of maritime surveillance and domain awareness. This changed briefly after the Senate Standing Committee on Fisheries and Oceans published the report *Controlling Canada's Arctic Waters*:

²⁰ *The Coast Guard in Canada's Arctic: Interim Report [Fourth]* (Ottawa, Standing Senate Committee on Fisheries and Oceans, 2008), 1-2.

²¹ *Ibid.*, 27.

²² *Ibid.*, 24.

²³ *Canada's Northern Strategy: Our North, Our Heritage, Our Future* (Ottawa, Indian Affairs and Northern Development, 2009), 9-10.

²⁴ Security and sovereignty played heavily into former prime minister Stephen Harper's Arctic discourse for a substantial portion of his tenure. For more on how his conceptualizations of Arctic securitization developed over time, see: Ryan Dean, "Speaking Security: Constructing Canada's 2009 Northern Strategy," *The Polar Journal* 12:2, 2022; and Andrea Charron, "The Recasting of the Arctic Sovereignty Theme: Assessing Harper's Arctic Foreign Policy," in *Harper's World: The Politicization of Canadian Foreign Policy, 2006-2015*, Peter McKenna, ed. (Toronto, ON: University of Toronto Press, 2022)

²⁵ P. Whitney Lackenbauer, Adam Lajeunesse and Ryan Dean, *Canadian Arctic Defence Policy: A Synthesis of Key Documents, 1970-2013*. Documents on Canadian Arctic Sovereignty and Security No. 1 (2014), 56-57.



Role of the Canadian Coastguard later that year, with the government pledging that it would arm CCG icebreakers with deck guns and operate with law enforcement onboard as an interim measure until the AOPS had been delivered.²⁶

The Standing Committee on National Defence released *Canada's Arctic Sovereignty* report the following year, noting two items of particular importance. First, they suggested that as part of Canada's increasing presence in the Arctic, there was a pressing requirement to be aware of activity "on, underneath and above" the domain's waters.²⁷ Second, there was a realization that procurement delays were beginning to take hold. The committee was losing confidence that any of the Arctic pledges (AOPS, polar icebreaker, Joint Support Ships) would be delivered on time, and that a capacity and capability gap would inhibit a Canadian presence in the Arctic. As a result, there was a call to expedite the procurement of the CCGS John G. Diefenbaker so that the CCG could effectively ensure its mandate in the Arctic was met, but this of course never materialized. Attempts at asset materialization, or a lack thereof, would come to characterize the remainder of the Harper government's tenure. Little else was done on icebreakers or improvements to the CCG outside of retrofits and modernization to ensure maintenance of capability, with the upgrades to the CCGS Amundsen serving as a focal point.

Fast forwarding to the release of *Strong, Secure, Engaged* in 2017, icebreakers were not considered in the policy, and the CCG was only mentioned in reference to upgrades directed at the RCN. However, the Arctic featured prominently throughout the white paper as "an international crossroads where issues of climate change, international trade, and global security meet."²⁸ *Canada's Arctic and Northern Policy Framework*, released in 2019 in tandem with the Oceans Protection Plan, reiterated intentions to enhance Canada's presence in the Arctic, citing the CCG's vital role as "the only federal presence in many areas of the Arctic [with] the capacity to protect Canada's economic interests" and to exercise national sovereignty.²⁹ Now also having five years' worth of DFO annual reports to look back on under the Trudeau government, it is clear that the security role in the current CCG mission set specifically pertains to MDA, yet previous tensions surrounding a constabulary role for the organization, and concerns over how to reconcile a non-military organization being called upon to defend and exercise Canadian sovereignty in the Arctic continue to proliferate.³⁰

This brief policy review suggests that the national security role supposedly outlined for the CCG (and its icebreakers) has yet to receive any semblance of substantive formalization which cements the conflicting visions of the surrounding policy community for the past two decades. In the absence of such CCG policy documents, it is difficult to point to how its role (as it pertains to national security) is to be manifested. There is a notable lack of consensus across government on how the security and sovereignty projection expectations are to be ameliorated with the CCG's

²⁶ *Controlling Canada's Arctic Water: Role of the Canadian Coast Guard* (Ottawa, Standing Senate Committee on Fisheries and Oceans, 2009), 31.

²⁷ *Canada's Arctic Sovereignty* (Ottawa, Standing Committee on National Defence, 2010), 5.

²⁸ *Strong, Secure, Engaged*, 50.

²⁹ *Canada's Arctic and Northern Policy Framework* (Ottawa: Crown-Indigenous Relations and Northern Affairs, 2019), 78.

³⁰ There are a plethora of examples to exemplify the point on MDA. See for example: CCG Departmental Plan 2022-2023, 2-3., CCG Departmental Plan 2021-2022, 30., CCG Departmental Plan 2020-2021, 27., and CCG Departmental Plan 2019-2020, 3.



required mandate as defined by the DFO. There seems to be a recognition that CCG icebreakers are net providers of MDA and that their on-water presence in the high North enables a greater sense of connectivity, yet the manner in which they are expected to interface with DND as they carry out these responsibilities is less than clear.

This brings us to the current status of icebreakers and the CCG in the context of Canadian defence policy, which we may now turn to, alongside the icebreaking efforts by other Arctic states. By no means comprehensive, the intention of the following section is to provide a brief overview of where Canada sits in line with allies and competitors while we think about the role of Arctic icebreakers as a node in C4ISR. This is not meant to be a systems-level analysis of the vessels in particular or a comparison of relative spending, nor does it assume that icebreaking is approached in a similar manner across jurisdictions given variations in domestic priorities, mission sets and operating areas. Rather, it serves as a concise reference for situating Canada's icebreaking asset density as we consider their role in maintaining national security. Asset density in this case refers to the relative number of icebreaking vessels active in each Arctic Council member's exclusive economic zone (EEZ) in comparison to other states. This comparison will reveal a notable disparity between Russia and all other parties, providing cause to reconsider the potential benefits of expanding the traditional mission set of CCG icebreakers.

Ongoing Icebreaker Procurements and Asset Density

The CCG's icebreaker fleet includes six ships that are capable of operating in the high North. These vessels have been in service for a long time and have required numerous refits and ongoing service-life extensions to ensure they meet their capability requirements until replacement. As part of the National Shipbuilding Strategy, Canada is obtaining six icebreakers to replace the current fleet, and two polar icebreakers which will allow them to move further into the high North and for longer periods than what is feasible with existing icebreakers.³¹ Through Operation Resolute, the government recently purchased three second-hand medium icebreakers from Viking Supply Ships as an interim measure to maintain Arctic icebreaking capability while the remainder of the fleet continues its maintenance and life-extension programs.³²

The operational icebreaker fleet of the United States Coast Guard (USCG) consists of one heavy icebreaker and one medium icebreaker.³³ Plagued by issues similar to the CCG, the heavy icebreaker Polar Star is now more than 10 years beyond its originally intended 30-year service

³¹ Public Services and Procurement Canada, "Shipbuilding Projects to Equip the Royal Canadian Navy and the Canadian Coast Guard," Government of Canada, July 26, 2022. Available at: <https://www.tpsgc-pwpsc.gc.ca/app-acq/amd-dp/mer-sea/sncn-nss/grandnav-largeves-eng.html>.

³² CCGS Captain Molly Kool (formerly Vidar Viking) entered service in 2018. CCGS Jean Goodwill and CCGS Vincent Massey entered service in 2020 and 2022 respectively. A light icebreaker (CCGS Judy LaMarsh, formerly Mangystau-2) was purchased from Atlantic Towing Limited and brought over from Turkmenistan in November 2021 to service the Great Lakes, St. Lawrence and Atlantic regions. For more on the current status and figures associated with this renewal process, see: the Department of Fisheries and Oceans 2022-23 Departmental Plan.

³³ The USCG has a second heavy icebreaker (Polar Sea) but it has been non-operational since 2010 due to engine failure. It is being used for spare parts to maintain the Polar Star's operational service until the second PSC is delivered. For a fulsome picture of USCG PSC efforts, see: U.S. Library of Congress, Congressional Research Service, Coast Guard Polar Security Cutter (Polar Icebreaker) Program: Background and Issues for Congress, by Ronald O'Rourke, RL34391 (2022).



life. As a result, the medium icebreaker Healy has had to take on a larger mission set to maintain a presence in both Arctic and Antarctic waters. Current procurement efforts are directed at six polar icebreakers (three heavy, three medium) which will provide year-round access to the polar regions, alongside three medium Arctic icebreakers. The USCG emphasizes that its new heavy Polar Security Cutters (PSC) will be multi-mission and will conduct a variety of operations comparable to the mission set of general-purpose cutters. The USCG is also in talks to purchase and retrofit a commercially available polar icebreaker as an interim measure for icebreaking activity in the Alaska Basin until the new PSCs enter service.³⁴

Russia operates the largest Arctic icebreaker fleet in the world with well over 40 active vessels, including the only existing and functioning nuclear icebreakers. While most of these ships are not naval vessels, a number are outfitted for defence purposes and ensure year-round access to Russian navy bases spread across the country.³⁵ Seven nuclear icebreakers are in service, with procurement efforts directed at four additional Project 22220 and one Project 10510 Leader vessel to bolster Russia's northern military presence.³⁶ The Leader class is expected to be the first icebreaker in the world powerful enough to lead ships through the Northern Sea Route in four-metre-thick ice throughout the year.³⁷ Three diesel-electric Project 21900M vessels capable of icebreaking operations in the Arctic are also in service, with two more under construction (21900M2) but are currently undergoing redesign and seeking domestic bids due to sanctions imposed on Russia after the invasion of Ukraine.³⁸ Two Project 23550 armed patrol icebreakers have also been launched, with one under construction and an additional one planned. These icebreakers bear a resemblance to the Norwegian Svalbard and Canadian Harry DeWolf-class vessels, but the Russian ships are fully featured combatants with significant armaments, including cruise missiles.

Finland has an in-service fleet of eight icebreakers under the state-owned enterprise Arctia, which works jointly with the Finnish Transport Infrastructure Agency. Icebreakers are classified in accordance with their mission set as either oil-recovery, conventional or multipurpose. The Finnish navy operates a multipurpose spill response vessel that has icebreaking status in the Baltic Sea but cannot venture into the Arctic without heavy icebreaker assistance. There are no icebreaker procurements at this time, although it is expected they will begin soon given the age of the existing fleet, and their inability to make wider breaks in pack ice demanded by industry. Any procurement efforts will have to be conscious of the full slate of construction ongoing at Finnish

³⁴ This remains an ongoing process dependent on congressional funding, but the top candidate is the Aiviq from Edison Chouest, which is one of the largest private icebreakers in the world. It was a candidate to replace the CCGS Louis S. St-Laurent before the Canadian government partnered with Viking Supply Ships on Operation Resolute.

³⁵ Russian LNG exports are heavily dependent on icebreaking along the Northern Sea Route so year-round access is a requirement.

³⁶ The original plan was to build three Leader-class icebreakers. On Feb. 27, 2023, the European Union imposed its 10th wave of sanctions as a result of the war in Ukraine, specifically targeting Russia's nuclear icebreaker operator Atomflot. In turn, Russia's Arctic Strategy was updated to reflect that only one Leader-class will be built by 2035, and more vessels of the Project 22220 class would be built to fill the gap. See Atle Stallsen, "Moscow Lowers Ambitions in Nuclear Icebreaker Program, Will Not Build Fleet of New Super-powerful Vessels After All," *The Barents Observer*, March 1, 2023. Available at: <https://thebarentsobserver.com/en/2023/03/moscow-lowers-ambitions-nuclear-icebreaker-program-will-not-build-fleet-new-super-powerful>.

³⁷ Martin Manaranche, "Russian Shipyard Lays Down Leader Nuclear-Powered Icebreaker," *Naval News*, July 6, 2021. Available at: <https://www.navalnews.com/naval-news/2021/07/russian-shipyard-lays-down-leader-nuclear-powered-icebreaker/>.

³⁸ Margarita Afanasyeva, "Ледокол разворачивают в Россию," *Kommersant*, October 11, 2021. Available at: <https://www.kommersant.ru/doc/5028328>.



shipyards, alongside the four Pohjanmaa multi-role corvettes with ice-strengthened hulls being developed for the Finnish navy.

Sweden operates four icebreakers, three of which (Alte class) are identical in construction to vessels owned by Finland. The fourth (Oden) was the first non-nuclear icebreaker to reach the North Pole and has participated in a number of expeditions throughout the Canadian archipelago, including a 2016 voyage with the CCGS's Louis S. St-Laurent.³⁹ As described in the Finnish case, the three Alte-class vessels are reaching the end of their lifecycle and will require replacement. The Swedish Maritime Administration recently announced it had been granted funding to acquire two icebreakers for the Baltic Sea, with an option to buy a third in the near future. It appears that Sweden intends on augmenting the vessels' defensive capabilities, but the extent of that is unclear.⁴⁰

Norway operates two Arctic-capable icebreakers (both of which have made successful trips to the North Pole), but only one is fully operated by the Norwegian Coast Guard (NoCGV). The dual-purpose Svalbard is a polar icebreaker in addition to a reasonably armed OPV with a chemical, biological, radiological and nuclear defence (CBRN)-conscious construction.⁴¹ The Kronprins Haakon is a polar research vessel owned by the Norwegian Polar Institute and used mainly by the University of Tromsø. Norway has no other icebreaker-specific procurements, though a mid-life update for the Svalbard has been scheduled to upgrade operational capability.⁴² The new Jan Mayen OPVs being built for the NoCGV are designed to withstand operations in Arctic areas and will feature a strengthened hull for minor icebreaking.

Denmark does not have a specific coast guard agency, as the Royal Danish Navy is responsible for providing maritime service. The country does not have any native icebreaking capacity and has traditionally relied on chartering icebreaking vessels from the privately owned Viking Supply Ships when necessary. The Danish Joint Arctic Command, in co-ordination with Greenland and the Faroe Islands, uses Knud Rasmussen-class ice-resistant OPVs alongside Thetis-class ice-reinforced ocean patrol vessels to safeguard sovereignty.⁴³ The new Danish Defence Agreement, which will outline the next cycle of procurement priorities, is scheduled to come into force in January 2024.⁴⁴ The Icelandic Coast Guard similarly does not operate any icebreakers, relying instead on two recently delivered OPVs to carry out maritime-related duties, in addition to co-operative arrangements with its Danish allies.

China operates two polar icebreakers powered by conventional means. One vessel was acquired from Ukraine (Xue Long) and refitted for research purposes while the other was domestically built

³⁹ "Research Ship Mapping Arctic Ocean Near North Pole," CBC News, August 20, 2016. Available at: <https://www.cbc.ca/news/science/mapping-north-pole-arctic-ocean-1.3727952>.

⁴⁰ As part of Sweden's 2023 budget, 100 million SEK in additional funding was earmarked for the Swedish Maritime Administration on top of previously announced funds for this purpose.

⁴¹ This vessel also provided the model for the RCN AOPS design.

⁴² "Future Acquisitions for the Norwegian Defence Sector 2021-2028," (Oslo, Ministry of Defence, 2021), 20, 23.

⁴³ The Knud Rasmussen class can operate in first-year Arctic ice.

⁴⁴ For a full examination of the storied history of Royal Danish Navy force development see: Timothy Choi, "Danish Naval Evolution in the Arctic" in *Navies in Multipolar Worlds: From Age of Sail to the Present*, Paul Kennedy and Evan Wilson, eds. (New York: Routledge, 2021).



(Xue Long 2) but based on a Finnish design.⁴⁵ Current procurement efforts are directed toward a third heavy icebreaker as part of a five-year development plan aimed at increasing the Chinese presence in the Arctic, eventually paving the way for China's Polar Silk Road trade ambitions. Naval security experts have speculated that China may be pursuing a nuclear option for Xue Long 3, which could serve as a testbed for other large nuclear-powered vessels (potentially aircraft carriers) but the status of the chosen propulsion system for the new icebreaker remains unclear. The People's Liberation Army Navy also operates two Type 272 Yanrao-class icebreakers as part of the North Sea Fleet, but it is unlikely that the hulls are reinforced enough to venture beyond the Bohai and Yellow seas into Arctic waters.

This brief overview of icebreaking assets immediately suggests that there are magnitudes of difference in overall deployable capability between Russia and other Arctic Council states. While this is in part indicative of the integral role Arctic shipping and transit play in maintaining the Russian economy, a situation which does not exist in Canada, one cannot ignore the disparity between Canada and Russia, considering they hold two of the largest EEZs in the Arctic. Quantifying exact area measurements for Arctic EEZs is no easy task, and the pursuit is further complicated by the plethora of disputes over borders and jurisdictions in the high North.⁴⁶ Yet, rough estimates would indicate that for every Canadian icebreaker venturing into the Arctic, there are at least six Russian icebreakers operating in the same amount of recognized territory.⁴⁷ In other words, the relative icebreaking asset density (referring to the number of icebreaking vessels deployable in a bounded space at any given time) of Canada requires each CCG icebreaker to cover over six times the amount of territory a comparable Russian vessel would be responsible for to ensure parity.⁴⁸ Canada's relatively low icebreaking asset density, when compared to the scale of its geographic jurisdiction then, increases the imperative to get as much capability out of each asset as possible.

Icebreakers as C4ISR Nodes

Despite the alarming revelations on overall asset densities in the Arctic, remedial efforts to shore up capability seem to be underway considering recent activity by Arctic states as far as icebreaker and ice-capable OPV (where Arctic icebreakers are not as prominent) procurements are concerned. It would appear then, that visible surface icebreaker presence constitutes a recognizably integral component of Arctic geopolitical posturing in this era of renewed strategic

⁴⁵ For more on the construction and polar activities of these two Chinese vessels see: Bryan J. R. Millard and P. Whitney Lackenbauer, "Trojan Dragons? Normalizing China's Presence in the Arctic," Canadian Global Affairs Institute, June 2021.

⁴⁶ For the most comprehensive set of mapping on Arctic territorial disputes, see the work of the International Boundaries Research Unit at Durham University. Maps available at: <https://www.durham.ac.uk/research/institutes-and-centres/ibru-borders-research/maps-and-publications/databases/>.

⁴⁷ This estimate is based on figures from an archived University of British Columbia dataset from 2005 which delineates EEZ areas by country. I have factored the Black Sea out of area considerations for the Russian case, the same with Bouvet Island for the Norwegian case and have retained inland areas for Canada as they constitute CCG transversal jurisdiction. The rough EEZ asset density ratios per icebreaker are as follows: Canada 1:933,179.5 km²; United States 1:1,885,010 km²; Russia 1:144,227 km²; Norway 1:974,587 km²; Finland 1:3,635 km²; and Sweden 1:15,000 km². The dataset is available at: <https://web.archive.org/web/20060427022538/http://saup.fisheries.ubc.ca/eez/eez.aspx>.

⁴⁸ The icebreaking asset density ratio for Canada is therefore comparable to those of the United States and Norway based on the previous footnote. Finland and Sweden have more favourable ratios, but their efforts are largely geared toward the Baltic Sea and the Gulf of Bothnia rather than the high North. Denmark, Iceland and China are special cases that do not factor as prominently in this discussion.



competition. The plethora of economic and ecologically focused activities that icebreakers provide, in addition to the potential of their security capacity, cannot be replaced by frigates, submarines or aircraft. It follows then that icebreakers are a win-win asset class that can hybridize efficiency for domestic and international security needs regardless of the operating nation. Viewed in this light, medium and heavy icebreakers are a linchpin to Arctic maritime surveillance and domain awareness as a platform, or as an enabler to another platform part of a larger network. Herein lies the connection which features icebreakers as an integral node in C4ISR activity.

As the policy review demonstrated, the national security role played by the CCG seems to demonstrate an inkling of an identity crisis. While there appears to be historic consensus that the CCG is the best-suited agency to manage security concerns in the high North, the government has not acted in the agency's best interest to maintain its required capability. While it can be argued that this point would hold against a wide range of large capital acquisition mismanagements, the abundance of focus directed toward the Arctic in successive policies, yet with only intermittent value placed upon the CCG's role, suggests that Canada has struggled to not only understand how best to approach the Arctic security context, but also to see the value of closer alignment between the CCG and DND/CAF. If there is a perception that threats "in, to and through" the Arctic would be conventionally military in nature, then leveraging assets through the RCN in the form of frigates, OPVs and submarines would appear to make sense.⁴⁹ As Adam Lajeunesse argues in a recent piece, however, preparing for an Arctic that is more active and tied to global great-power competition "requires a degree of restraint and the ability to place the region within the broader strategic picture."⁵⁰ Lajeunesse notes that while much of the attention in the Arctic is paid to the conventional military threat posed by Russia, it is unlikely that the Arctic would feature as a centre of gravity given the likelihood that such a conflict with Russia (or China for that matter) would be a global struggle of a much different form. Instead, focus should be placed on unconventional safety, hybrid or below-the-threshold security threats.⁵¹ Responding to these threats requires improvements in visible presence, surveillance and situational awareness that the government and epistemic networks alike have demanded for almost 20 years. Leveraging icebreaking assets as part of a wider C4ISR network provides an excellent prescription for that diagnosis.

It is clear that the CCG's maritime security portfolio contains a range of initiatives designed to deliver valuable services and information across a multitude of government departments and agencies. Therefore, the CCG's effectiveness is rooted in ensuring that the abundance of information it collects, or has the potential to collect, is captured and subsequently disseminated to relevant stakeholders.⁵² This of course reflects the responsibilities provided to the DFO in the *Oceans Act* and the *Canada Shipping Act*, yet a grey area is found in a lack of articulation on how the CCG is expected to support government departments through the provision of assets and

⁴⁹ On the "in, to, through" conceptual framework see: P. Whitney Lackenbauer, "Threats Through, To, and In the Arctic: A Framework for Analysis," NAADSN Policy Brief, March 23, 2021.

⁵⁰ Adam Lajeunesse, "Arctic Perils: Emerging Threats in the Arctic Maritime Environment," Canadian Global Affairs Institute, November 2022, 7.

⁵¹ Ibid.

⁵² Several ongoing modernization efforts and procurement projects suggest that the CCG is taking this task seriously. The CCG is finalizing a modernization strategy for marine navigation and safety services and implementing e-Navigation initiatives while digitizing a larger extent of CCG services. The Oceans Protection Plan committed to a number of technology-centred initiatives, including the addition of eight new radar coverage areas for traffic monitoring, augmented by upgrades to the operations network (OpNet) to increase system robustness.



services. The line between providing MDA for the benefit of DND/CAF is rather easy to draw, but the delineated role of the CCG as a protector of Canadian sovereignty since the publication of *Securing an Open Society* remains confounding because the task should arguably be in the hands of the Canadian military. This leads to the argument that successive governments' abject reliance on the CCG to maintain Canadian sovereignty in the Arctic as the primary security actor reflects the recidivistic tendencies of the procurement enterprise's inability to provide the CAF with the requisite military assets to carry out the task. Icebreakers have been, and will continue to be, called upon to complete this task until Canada catches up on its long list of procurements, and will eventually work in tandem with these assets. Thus, considering their potential as C4ISR nodes is imperative.

Concluding Thoughts

In a recent statement to the United States Senate Armed Services Committee, NORAD commander Gen. Glen VanHerck reiterated the necessity of improving all domain awareness and updating capabilities to reflect rising competition near the U.S. and Canada respectively. NORAD modernization efforts in Canada and the U.S. have been predicated on the requirement to improve the collection and flow of information to decision-makers for continental defence, not only steeped in domain awareness, but also in information dominance, decision superiority and connective integration.⁵³ Success in these pursuits is grounded in the effective collection and distribution of data, but unlocking the potential for that success requires integration across all of the possible security landscape to incorporate a host of intelligence gathering and sensor network capacity. Yet, as VanHerck suggested, the defence enterprise at large has had difficulty facilitating this integrative process, and as a result, has created lags in efficiency which do not reflect the severity of current challenges, especially those in the Arctic. VanHerck, rather bluntly, stated to the committee that NORAD lacks the infrastructure, the communicative potential and the networking ability to be persistent in the Arctic, and that more icebreakers and bolstered radar capabilities were fundamental to closing the Arctic gap.⁵⁴

This policy perspective was premised on an idea that the humble icebreaker occupies a potentially significant role. Canada's moves to enhance continental defence through NORAD modernization, reinforced by the topics discussed during President Joe Biden's visit to Canada, point clearly to the need for enhanced Canadian defence and security presence in Canada's Arctic, and greater incorporation of sensors and platforms that can contribute to C4ISR enhancements. It was also premised on the thought that icebreakers can act as a platform to contribute to ASW, EW, SIGINT, ELINT and autonomous system activities. While ascertaining whether those systems are being developed or are actually in place on newer icebreakers deployed by Russia and China is a task

⁵³ See for instance: Andrea Charron and James Fergusson, "Beyond NORAD and Modernization to North American Defence Evolution," Canadian Global Affairs Institute, May 2017.

⁵⁴ Icebreaker comments were in testimony as part of the question period. Gen. Glen D. VanHerck, "Opening Statement Before the House Armed Services Committee," Full Committee Hearings: U.S. Military Posture and National Security Challenges in North and South America, March 8, 2023, 20-21. Available at: <https://armedservices.house.gov/hearings/full-committee-hearing-us-military-posture-and-national-security-challenges-north-and-south>.



better left to the intelligence community, the theory should invoke the realization that icebreaking is an absolute necessity from a strategic perspective and a value powerhouse from an operational perspective. How those strategic and operational benefits play out across a spectrum of possibilities presents options which need to be leveraged at home and paid attention to abroad. As Canada continues to procure seemingly everything, everywhere, and all at once with the most ambitious ongoing roster of projects in recent memory, this point must be kept top of mind. The proper fielding of C4ISR in any context requires a successful execution of implementation at a foundational level on a platform-by-platform basis. Ensuring capability across platforms and across different organizations therefore represents a major technical and managerial challenge that needs to be addressed. Should DND/CAF wish to do this effectively as they plan and prop up efforts around their sophisticated acquisition targets, the CCG and its icebreakers must be brought into the fold.

Despite differences in political orientation, the three tenures examined in the policy review agree that the need for surveillance and monitoring capacity to maintain Canada's security requirements is of utmost importance. The evidence presented in the *2022 Reports of the Auditor General of Canada*, that there is significant risk of capability gaps manifesting in Canada's surveillance, patrol and presence in the Arctic, is unacceptable considering the almost 20 years of acquisition effort dedicated to those tasks. While ongoing procurements suggest that gaps are being filled, Canada should not forget how these attempts have previously fallen through the cracks. The national security role provided by CCG icebreakers should not be understated, nor should awareness of their vital necessity in maintaining Canada's principal objectives in the Arctic be subject to policy contestation. The dual-use potential of icebreakers in their ability to serve as a platform for surveillance assets from a defence perspective, and as a mission-critical domestic platform from a security perspective, presents an outwardly benign asset class that can be leveraged without nearly as much concern over risking provocation from adversaries. Innovative, operationally focused and intelligence-infused systems enabled through electronic sensor suites, data processing and information sharing on icebreaking platforms are essential inclusions for the CCG to monitor maritime activity and respond to threats and incidents. Bringing C4ISR into the icebreaker conversation ensures Canada has an awareness of how adversaries may deploy technologies on their own respective vessels, and how the CCG may ultimately benefit from continuing to leverage its potential. It would be in Canada's best interest not to miss the boat.

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