Chapter 8

Canadian Icebreaker Operations and Shipbuilding: Challenges and Opportunities

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Abstract

This chapter surveys the tasks of icebreakers in the Canadian context to answer what challenges and opportunities the Canadian Coast Guard (CCG) may face as a function of Canada’s ongoing icebreaker recapitalization attempt under the National Shipbuilding Strategy (NSS). It will examine the NSS’s icebreaker component, which initially aimed to replace the CCG’s current fleet of aging Arctic icebreakers through domestic construction. Despite early goals aimed at timely delivery of replacements while strengthening Canadian shipbuilding industry, not a single icebreaker construction contract had been signed ten years after the strategy’s promulgation. Instead, the Liberal Government has procured foreign second-hand icebreakers to fill gaps in the fleet’s availability. Meanwhile, the Royal Canadian Navy and the CCG are receiving eight new Arctic and Offshore Patrol Vessels. Despite not being designed as dedicated icebreakers, their ability to sail through substantial amounts of first year ice may well result in their fulfilling a narrow range of roles formerly exclusively conducted by CCG icebreakers. The utility of such (para)military vessels in civilian icebreaking roles will be explored with reference to the Danish Navy’s experience in Greenland, where their patrol ships engage in icebreaking tasks in the absence of icebreakers.

Keywords

icebreakers – shipbuilding – Royal Canadian Navy – Canadian Coast Guard – National Shipbuilding Strategy – Arctic and Offshore Patrol Ships – Greenland – Denmark – offshore patrol vessels

1 Introduction

Within the global discourse concerning the so-called ‘race for the Arctic,’ one major element that is often held as a metric of competition in the region is the
number of modern icebreakers possessed by each Arctic State. An oft-touted point of concern amongst Western observers is that there is an ‘icebreaker gap’ between the Russian Federation’s fleet and that possessed by the other four Arctic Ocean States. This concern is especially prevalent in the United States, where popular and policy discussions often highlight how Russia has over forty icebreakers operating in their Arctic while the United States only possesses two aging vessels, albeit with six new ships on the way. For Canada, the disparity is somewhat less extreme as the Canadian Coast Guard (CCG) operates a fleet of sixteen icebreakers (as of March 2022) of varying capabilities, though the same ‘gap’ discourse is prevalent as well with an emphasis on age rather than numbers.

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Such ‘gap’ discussions ignore each Arctic Ocean state’s unique requirements for surface vessels capable of operating in Arctic sea ice. Icebreakers serve different functions either on their own or in support of other users of the seas. They do not operate in a vacuum where their existence only serves to balance their counterparts in the neighbouring State as though they were bumper boats on a fairground.\(^5\) This chapter thus surveys the tasks and purposes of icebreakers in the Canadian context. It also seeks to answer what challenges and opportunities Canadian maritime activities in the Arctic may face as a function of Canada’s ongoing attempt at acquiring new icebreakers.

This chapter will examine the history of Canada’s 2010 National Shipbuilding Strategy (NSS, originally known as the National Shipbuilding Procurement Strategy) from the perspective of its icebreaking component, which initially aimed to replace the CCG’s current fleet of aging icebreaking vessels through new domestic construction.\(^6\) Despite early goals that aimed to balance timely delivery of replacements with establishing an enduring Canadian shipbuilding industry, no new icebreakers have begun to be built ten years after the Strategy’s promulgation. This has resulted in some disruption within the Canadian shipbuilding sector as shipyards that did not succeed in the initial NSS bids have been able to convince both the government and industry partners to incorporate them into the NSS over the past three years.\(^7\) Meanwhile, the

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\(^7\) Seaway Marine & Industrial Inc. was one of the original bidders for the NSPS, though its Port Weller/St. Catharines drydocks at 340 Lakeshore Road has been taken over by Heddle Shipyards since 2017 and it is this company that has teamed up with Seaspan Vancouver Shipyards to build their polar icebreaker; Davie Shipyards in Quebec, meanwhile, is in the midst of government negotiations to become the third NSS construction yard to build the
Liberal Government has procured second-hand icebreakers from abroad to fill gaps in the fleet’s operational availability. In some instances, however, the unique mission requirements of the Canadian icebreaking fleet may not be met by the very limited market supply, throwing into question the limits of such approaches. At the same time, the Royal Canadian Navy and the CCG are slated to receive eight new Arctic and offshore patrol ships (AOPSS). Despite not being designed for icebreaking duties, their ability to sail through substantial amounts of first year ice in an era of decreasing Arctic multiyear ice may well result in their fulfilling a narrow range of roles formerly exclusively conducted by Coast Guard icebreakers. The utility of such ice-capable (para) military vessels in civilian icebreaking roles will be explored with reference to the Danish Navy’s experience in Greenland, where their patrol ships often engage in icebreaking tasks in the absence of dedicated icebreakers.

2 Icebreaker Missions in Canada: Challenges and Requirements


8 CCG, “Canadian Coast Guard’s Latest Icebreakers” (n 4).

and the Great Lakes.10 The scope of this chapter will be limited to ships which are employed in Arctic waters, though they do operate in southern waters during winter as well. For the CCG, ‘icebreaker’ refers specifically to “a ship specially designed and constructed for the purpose of assisting the passage of other ships through ice.”11 Therefore, a ship that is designed simply to sail through ice but not having the responsibility to assist other vessels in doing the same is not considered an icebreaker even though it will be breaking ice.

In the Arctic, then, the Canadian Coast Guard employs its fleet of icebreakers for the following services: route assistance; ice routing and information services; harbour breakouts; Northern resupply; and Arctic sovereignty.12 Scientific and hydrographic surveys are also included, albeit subsumed under Arctic sovereignty.13 The term ‘icebreaking’ refers specifically to the organized program whose objectives are to employ ice-capable ships to carry out these four major sets of services in the Arctic. The icebreaking program includes additional services that apply to the southern parts of Canada, such as flood prevention in the St. Lawrence River, but those will not be discussed here.

The service of route assistance is probably the one that is most commonly associated with the popular conception of what icebreakers do. It includes “freeing vessels beset in ice, maintaining shipping routes, escorting ships through ice-covered waters, [and] organizing convoys (escorts of 2 or more ships) to maximize services in favourable conditions.”14 In Arctic waters, these services are provided only during the summer months in order to support other users of the seas and science missions.15 The act of ‘escort’ in this context refers to the literal breaking of sea ice by the escorting icebreaker as it sails closely in front of other ships that are not capable of independent sailing through and maneuvering within that ice. An alternative to this approach would be what is often done in southern Canada, where icebreakers maintain a relatively clear

11 Id.
13 CCG, “Icebreaking in Canada” (n 12).
14 Id.
path through shore-fast ice that allows commercial and civilian traffic to pass through without close escort. The more dynamic nature of sea ice in Arctic waters and the much less frequent traffic likely precludes such an approach for the Arctic. Not all ships traversing Canada's ice-covered waters require close escort by an icebreaker due to their own ice-strengthened hulls, but in the event that they become trapped ('beset') in ice beyond their own capabilities, CCG icebreakers can be requested to assist with freeing them from the ice.

While there had been an increasing number of maritime transits through and to the Canadian Arctic, the COVID-19 pandemic drastically curtailed the number of such voyages due to restrictions on non-essential users. For example, the 2020 summer saw only eight vessels, which included cargo and CCG icebreakers, making complete transits of the Northwest Passage (NWP) in comparison to 27 such transits in 2019. A similar phenomenon occurred for the number of ice escort missions, though with a much lower disparity: 45 escorts occurred in 2020, 51 in 2019, an unusual 93 in 2018, and around 50 in 2017. These figures suggest that the vast majority of CCG escort missions in the Arctic are for escorting commercial resupply vessels, which are vital to Arctic communities and which must continue regardless of the pandemic situation. Indeed, a list of all NWP transits by Cambridge University’s Scott Polar Research Institute shows most vessels simply passing through NWP do so without CCG escort. The spike in activity in 2018 illustrates a busy season for CCG icebreakers, which would also result in local users of sea lanes to seek an alternative solution to CCG icebreaking services.

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Illustrating the limited availability of CCG icebreakers for escort tasks, the Baffinland Mary Rivers iron mine has contracted the Estonian icebreaker *Botnica* to service their shipping needs for the summer periods of at least 2018–2022. With the CCG warning Arctic stakeholders that the 2018 ice season would be especially severe and limit the availabilities of its icebreakers, Baffinland decided to acquire the services of its own icebreaker. This decision also speaks clearly to the issue of purpose-built icebreakers versus ships that are only ‘ice-strengthened.’ The hiring of foreign ships requires a coasting trade license, which can only be granted by the Canadian Transportation Agency if no Canadian-registered ship is available under the *Coasting Trade Act*. Baffinland’s hiring of a foreign vessel met with objections by the Canadian firms Canship Innu Marine and Amarok Enterprises in 2021, which put forth their own Canadian-registered ships as alternatives. Amarok withdrew their objection for undisclosed reasons, while Canship Innu continued with the Newfoundland-based cargo-ferry MV *Northern Ranger* that they acquired in 2020. These objections were overturned by the Canadian Transportation Agency, which accepted Baffinland’s argument and evidence that the *Botnica* had dedicated icebreaking capability which the *Northern Ranger* lacked as a mere ‘ice-strengthened’ ferry. Such capability included sufficient width to clear a path for wide ore carriers in a single pass, engine power, and crew expertise. Baffinland argued these were necessary to ensure ore carriers could enter and leave the mine’s port at the beginning and end of the shipping season when the ice conditions would approach the limits of those carriers’ ability to deal with ice. Using a non-icebreaker like *Northern Ranger* would require multiple passes to clear sufficient ice for the PANAMAX-sized carriers to proceed and, in a worst-case scenario of heavy ice, require CCG icebreaking assistance which defeats the purpose of having a contracted icebreaker. Given that it was

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23 MacKeigan (n 21).
the lack of availability of CCG icebreakers that drove the decision to resort to contracted private icebreakers in the first place, it became clear to the CTA that Baffinlands was justified in retaining the services of the Botnica.\textsuperscript{24}

While close escort of shipping is one of the CCG icebreakers’ core purposes, the limited number of icebreakers means other vessels are best served by taking routes that do not require icebreakers. This is enabled through the provision of ice routing and information services by the CCG in close coordination with the Canadian Ice Service.\textsuperscript{25} The information for this is provided by a combination of icebreakers, aerial assets, satellites, and other sources that are processed and made available via land-based CCG centres. Some of this information is disseminated by the CCG as it deems necessary while maritime users in the Arctic can request more specific information tailored to their needs. The information collected by the CCG’s various sources range from the tactical to the strategic, which describes the level of fidelity regarding the state of the ice in relation to the user’s position and objectives.\textsuperscript{26} Users who are entering ice-infested waters will be prioritized for this information while those who are still in the voyage planning stages will be deprioritized.\textsuperscript{27}

Harbour breakouts refer to breaking ice that is preventing vessels from both accessing port infrastructure and leaving their ports for open water. This applies to both commercial and fishing harbours, though the latter are a “low priority compared to the other icebreaking services.”\textsuperscript{28} Indeed, it is not offered for the CCG’s Arctic region, though it is offered for the Labrador and Newfoundland coasts.\textsuperscript{29} The response times for icebreaker assistance for fishing harbour breakouts are also the longest out of all icebreaking services regardless of region, with a target response time of twenty-four hours instead of eight to twelve for more highly prioritized services in both Arctic and southern Canada.\textsuperscript{30} Commercial harbour breakouts do occur in the CCG’s Arctic area of operations, though it is not common. In the 2018 and 2020 seasons, for example, there was only one instance.\textsuperscript{31}
Northern resupply is another notable service provided by the CCG’s icebreakers in the Arctic. This involves icebreakers carrying and directly delivering vital goods to remote Arctic civilian and military communities which could not access commercial resupply services. This appears to be due to especially severe ice conditions that prevent commercial cargo ships from entering these communities’ waters. CCG icebreakers carry dry goods and fuel that can be transported to these communities via barges and helicopters. Still, the vast majority of communities receive their resupplies from private commercial carriers: by 2014, the only Nunavut communities still receiving annual CCG resupply were Kugaaruk (formerly Pelly Bay) and Eureka weather/science station. This situation has been around since at least 2000. It is worth noting that Kugaaruk’s and Eureka’s supplies were delivered first to the deep water station of Nanisivik by private shipping companies, from where they were picked up for final delivery to Kugaaruk or Eureka by the CCG’s icebreakers. In rare instances, attempts to conduct resupply fail due to excessive ice, such as 2014’s efforts to supply Kugaaruk, which resulted in the temporary storage of goods in Churchill, Manitoba. This incident helps illustrate the need for powerful icebreakers even as the Arctic undergoes rapid warming. Kugaaruk no longer depends on CCG resupply, with arrangements made after the 2014 failure of its CCG deliveries to receive direct commercial resupply via Nunavut Sealink and Supply Incorporated’s vessels, which can deliver the increasing volume of goods to Kugaaruk.

35 Gregoire (n 33).
38 Gregoire (n 33).
goods in a single trip. This was followed by a Government of Nunavut contract with Nunavut Eastern Arctic Shipping Inc., which now supplies Kugaaruk and 17 other Nunavut communities directly without going through the CCG. This is especially important because the much smaller cargo volume of CCG icebreakers requires multiple trips over a greater period of time, which can result in a higher risk of incomplete cargo deliveries due to sea ice accumulation in excess of CCG icebreaking capabilities such as what happened in 2014. By 2019–2021, the only northern resupply missions carried by the CCG appear to be Eureka Station and Killiniq radio transmitter, and even these trips were limited to refuelling rather than dry goods. It is important to note that this section only discusses the direct resupply of communities by CCG icebreakers. It does not cover the use of icebreakers as escorts for commercial resupply vessels, which falls under the ‘route assistance’ role of the icebreakers. It also does not include deliveries such as bicycle donations to local communities under the Polar Bike Project.

Finally, the ‘Arctic sovereignty’ mission includes several core CCG responsibilities that are also conducted in southern Canada: search and rescue, environmental response, and Marine Communications and Traffic Services (MCTS). These efforts, made possible in part by the physical presence of CCG icebreakers, “elicits recognition of Canadian sovereignty, through requests for, dependence on, efficient government support to authorized foreign ship transits. Historic occupancy and the ability to monitor and manage activity in an area are sovereignty characteristics exercised by CCG icebreaking operations.”

While physical challenges to Canadian sovereignty over its Arctic waters have

38 Rogers 2017 (n 36); Rogers 2015 (n 32).
41 For more discussion of northern resupply by commercial vessels, see Lasserre in this volume.
43 CCG, “Icebreaking in Canada” (n 12).
44 CCG, Icebreaking Operations: Levels of Service (n 26), p. 33.
been limited in recent years, there have been instances where CCG icebreakers played their part in asserting Canadian jurisdiction and sovereign responsibility in Arctic waters. The most dramatic of these in recent years was the 2018 grounding of the Russian-owned cruise/expedition vessel Akademik Ioffe around 78 nautical miles north-northwest of Kugaaruk, which saw both the CCG medium icebreakers Amundsen and Pierre Radisson coming to its assistance.\(^\text{45}\) Otherwise, the Arctic sovereignty element of the CCG’s icebreaking program relies on its ability to routinely and reliably carry out its other main services listed in this section, rather than any explicit dedicated duty aimed at challenging foreign assertions.

The number of occurrences of each of these five services helps to illustrate the limited, though regionally vital, demand for the CCG icebreaking fleet. Unlike Russia’s maritime Arctic, Canada’s Arctic has relatively little in the way of frequent maritime trade that requires the massive number of ships in Russia’s fleet.\(^\text{46}\) This being said, the gradual reduction in the number CCG Arctic icebreakers since the 1990s has led to increased strain on the remaining fleet, especially as they increase in age and require more time in maintenance or refits.\(^\text{47}\) This has led to the CCG’s decision to lease five icebreakers between 2018 and 2038 to help meet demand as the older vessels undergo life extensions.\(^\text{48}\) This relationship between supply of and demand for CCG icebreaking services is reflected in the CCG’s documents and plans, most notably in the Icebreaker Requirements, which has been updated every five years since 2009.\(^\text{49}\) The latest version covers the years 2017–2022, and thus one can expect an updated version by the time this volume has been published.


\(^{46}\) For detailed comparison between Russia and Canada on their respective traffic levels and users, see Lasserre in this volume.


\(^{48}\) Fabian Manning and Marc Gold, When Every Second Counts: Maritime Search and Rescue (Ottawa: Senate of Canada, 2018), 12.

3 **Current Arctic Icebreaking Fleet**

To provide the services above, the CCG’s icebreaker fleet of mid-2022 includes two heavy icebreakers, six medium icebreakers, and nine multi-purpose vessels/light icebreakers.\(^{50}\) Two air-cushioned vehicles (hovercrafts) are also employed for icebreaking duties in southern Canada, while an additional second-hand medium icebreaker and light icebreaker are currently undergoing conversion for CCG service after their purchases from previous commercial owners. With the exception of the hovercrafts and the second-hand light icebreaker, the remaining ships are expected to contribute to Arctic icebreaker services during the summer navigable season in accordance with their respective capabilities.\(^{51}\) This includes the light icebreakers, which have operated in the Arctic though not regularly or frequently.\(^{52}\) The navigable season changes year by year depending on ice conditions, but it can be expected to last between July and October, inclusive.\(^{53}\)

Many of these icebreakers are approaching or are past thirty years of age and require increasing numbers of refits and maintenance that prevent them from being in service.\(^{54}\) This may not be such a major problem if the CCG operated only in the Arctic, as that would allow them ample months during the winter to conduct such maintenance when Arctic traffic is absent.\(^{55}\) However, both heavy and medium icebreakers, alongside their light cousins, are also needed during the winter for icebreaking in southern Canadian waters.\(^{56}\) While there are more icebreakers in the fleet than the five that industry and the CCG deem the minimum necessary for the Arctic, the fact that winters also require one heavy and all medium icebreakers dramatically limits the opportunities

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50 CCG, “Icebreaker Requirements 2017–2022: Appendices,” Government of Canada, last modified 18 November 2019, https://www.ccg-gcc.gc.ca/publications/icebreaking-deglacage/requirements-besoins/appendices-eng.html. The heavy icebreakers were formerly known as Type 1300 and the mediums as Type 1200. The light icebreakers are also known as high/medium endurance multi-tasked vessels, with the high endurance ships known as Type 1100 while the medium endurance ships are known as Type 1050.

51 CCG, Icebreaking Operations: Levels of Service (n 26), p. 34.


53 CCG, Icebreaking Operations: Levels of Service (n 26), p. 34.

54 CCG, “Icebreaker Requirements 2017–2022: Appendices” (n 50).


56 CCG, “Icebreaker Requirements 2017–2022: Appendices” (n 50).
available for both regular maintenance and lengthy life extensions.57 Furthermore, of the six medium icebreakers, one of them, the Amundsen, is dedicated to science missions when operating in the Arctic and is therefore not included in the icebreaking program except in emergency situations, such as the aforementioned grounding of the Akademik Ioffe.58

Much has been noted about the icebreaker fleet’s age and the urgency of its replacement. This is certainly accurate for some of the most well-known members of the fleet, though others are younger than the average age of the much-touted Russian fleet, which Russian media has pegged at 39 years old by 2022.59 For instance, while the Louis St. Laurent, the largest and most capable of Canadian icebreakers, was built in 1969 and is the focus of most discussions regarding the CCG’s aging fleet, its fellow heavy icebreaker Terry Fox was built much later in 1983. The four mediums built for CCG service were constructed between 1978 and 1987. Rounding this out, the light icebreakers of the high-endurance multitask vessels were built in 1986–1987.60 More recently, the interim medium icebreakers (Captain Molly Kool, Jean Goodwill, and Vincent Massey) purchased from private European owners in 2018 were built in Norway in 2000–2001.61 Compared to the Russian figure of 39 years, Canada comes out slightly ahead at 37.5 years old for the average age of its icebreakers. There are limits to these figures, as it is unknown how the start date of each ship’s ‘life’ is determined: is it the day they were launched, the day they underwent sea trials, the day they had their naming ceremonies, the day they were delivered to their owners, or the day they were commissioned? This could make several years of difference in the final figures. Regardless of the exact age of the Russian or Canadian ships, it becomes clear that their average ages are not as far apart as the ‘icebreaker gap’ discourse suggests. While some may critique the inclusion of light icebreakers into the calculations, limiting the list to only the medium and heavy icebreakers that provide the bulk

57 Id.
58 Id.
60 CCG, “Icebreaker Requirements 2017–2022: Appendices” (n 50).
of Arctic icebreaking services would actually improve the average fleet age to 32 years old thanks to the relative youth of the interim second-hand medium icebreakers. None of this is to say Canada’s icebreaking fleet is young or that the processes behind their replacements do not need to be well underway, only that the Russian fleet does not have the overwhelming age advantage suggested in the discourse.

Ultimately, the age metric should not be used at the expense of other key characteristics of the icebreakers themselves and the contexts in which they serve. There are qualitative issues at play, for instance, most notably that six of Russia’s icebreakers in 2022 are nuclear-powered with much greater endurance and icebreaking capability. At the same time, it has been noted above in this chapter and elsewhere in this volume that commercial traffic in the Canadian Arctic is relatively limited and a capability like Russia’s fleet of nuclear icebreakers remains far in excess of need (see further Lasserre in this volume). The continual but unpredictable accumulation of loose multiyear ice in the western Canadian Arctic due to the Beaufort Gyre and other circulation regimes is expected to continue into the mid-century with its attendant suppression of commercial traffic through the region. In this context, the future of the CCG icebreaking fleet needs to mainly focus on its replacement rather than numerical expansion, which the following section will address.

4 The National Shipbuilding Strategy and the Future Coast Guard Icebreaking Fleet

Despite the favourable average age of Canada’s icebreaking fleet compared to Russia’s, the fact that the most powerful Canadian ship, the *Louis St. Laurent*, is over 50 years old means that Canada’s ability to reliably carry out heavy icebreaking is much more curtailed than the overall fleet age suggests. At the same time, the lengthy decade-long timeframe required to procure and construct large complex vessels like icebreakers means even the younger vessels needed to have their replacements planned by the late 2010s. This replacement effort has been subsumed under the National Shipbuilding Strategy (NSS), formerly

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known as the National Shipbuilding Procurement Strategy (NSPS). Announced by the Conservative Government of Stephen Harper on 3 June 2010, the NSS sought to replace the Royal Canadian Navy and CCG’s major vessels through domestic construction. The construction would occur in two shipyards, one for non-combat vessels and the other for combat vessels. One and a half years later on 12 January 2012, Harper announced that Irving Shipbuilding in Halifax had won the competition to build the latter, while Seaspan Vancouver Shipyards would build the former with its predominantly CCG ships.

Davie Shipyard in Quebec was also in the running for one of the NSS shipyards, which was a status they employed to attract one or more potential purchasers to resolve their debts. The lengthy attempts at canvassing the global market for potential buyers took up much of the time allotted to potential shipyards to prepare their bids. One of the failed negotiations was Italy’s Fincantieri shipyards, while Davie Shipyards was eventually sold to a consortium of Upper Lakes Group, SNC-Lavelin, and South Korea’s Daewoo Shipbuilding and Marine Engineering just shortly before submissions were due for the NSS shipyard bid. Davie itself attributes its failure to become one of the two major NSS partners to “its poor financial position at the time,” during which 1,600 workers had been laid off and the yard was shuttered. It was eventually rescued on a more permanent basis when British firm Zafiro Marine bought Davie’s yard in November 2011. Zafiro would eventually become part of Inocea Group, which is now the parent company behind Davie. As will be seen below, Davie would make a come-back at the end of the decade as the

68 Cardwell (n 67).
Government of Canada realized the two winning NSS yards would be insufficient to replace all CCG vessels.

One of the top priority builds for Seaspan was the polar icebreaker, dubbed the CCGS John G. Diefenbaker as early as 2010. It is expected to replace the Louis St. Laurent, which was already recognized as reaching the limits of its service life. However, a number of factors have led to the Diefenbaker remaining just a set of digital drawings by 2022. Firstly, even though Seaspan was selected in January 2012 to build its package of ships, the yard required massive modernization to make it suitable for building modern large vessels, which was compounded by the need for special machinery to work with the heavy steel plates of a polar icebreaker. This CDN$170 million modernization was completed nearly three years later in October 2014, funded by Seaspan itself.

Secondly, the polar icebreaker would not be built until the completion of three offshore fisheries science vessels (OFSVs) and one offshore oceanographic science vessel (OOSV), while uncertainty concerned whether the Diefenbaker or the Navy’s two joint support ships (JSS) would come first. Consequently, this meant the construction of the Diefenbaker could not begin at the yard until nearly a decade after the yard finished its modernization due to the limited capacity to build multiple ships at once. The order of construction within this non-combat package had been a subject of some debate, though many noted the need to ensure the yard gained sufficient experience building the relatively simple OFSVs before tackling something as complex as the Diefenbaker. By 2022, Seaspan had delivered the three OFSVs, and the first JSS is well underway, having been decided as the greater priority. The OOSV has been rescheduled to fit in between the first and second JSS. The Diefenbaker itself,
on the other hand, remains some years into the future and far from the original 2017 service date optimistically envisioned by the Harper government.⁷⁵

Citing these delays and the importance of having a polar icebreaker in a timely manner, the Liberal Government in June 2019 announced that they would remove the *Diefenbaker* from Seasean's order books, replacing it instead with sixteen multipurpose vessels (MPVs) similar to the existing light icebreakers while looking to build the *Diefenbaker* elsewhere.⁷⁶ Seasean argued the MPVs were already promised by the Harper government, though records only indicate five such vessels and five offshore patrol vessels.⁷⁷ But less than two years after the removal of the *Diefenbaker* from Seasean, Trudeau’s Liberal Government made an abrupt about-face. In May 2021, it announced that not only would the *Diefenbaker* return to Seasean, but that it would be accompanied by a sistership, bringing the total number of heavy Arctic icebreakers to two.⁷⁸ This second ship would go to a third yard that is in the process of being added to the National Shipbuilding Strategy’s main partners: Davie Shipbuilding. The yard that had failed to win either of the NSS packages a decade

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ago had finally succeeded in acquiring what has become a multi-billion-dollar contract, pending its official approval as a formal NSS shipyard.

The original NSS plans only included the polar icebreaker and the light icebreakers, leaving the workhorse mediums untouched. In August 2019, this was addressed when Trudeau’s Liberal Government authorized six ‘program icebreakers’ to replace the Terry Fox heavy icebreaker and the four Cold War-era medium icebreakers.79 These are planned to be built at Davie Shipbuilding as well, and indeed were planned to be Davie’s bread and butter for much of the 2020s and 2030s. It remains to be seen how the program icebreakers and the newly-added second heavy icebreaker will be prioritized in Davie’s shipyard, which requires its own modernization akin to that carried out by Seaspan a decade ago.80 Although Davie has styled itself as an icebreaker specialist with multiple refits and conversions of existing icebreakers under its belt, it has not built an icebreaker from scratch since 1969, and the last vessels it built were a pair of large ferries in 2018.81 Ultimately, the CCG’s icebreaking fleet is at or nearing ages that require their replacement. At present, all of them are covered by existing government plans to build new ships in Canada to replace them. At the same time, the delays, prioritization of other construction, and limited capacity of Canadian shipyards have led to several temporary ‘interim’ measures to cover for the periods when the original fleets need to be taken out of service for their modernizations and refits. These consist of the three medium icebreakers converted from commercial vessels, as well as the ongoing process to convert a light icebreaker acquired in 2021. This latter project is perhaps indicative of the Canadian shipbuilding industry’s perceived capacity limitations. Despite its small size and presumably quicker pace of construction compared to medium and heavy icebreakers, the Canadian Coast Guard and Public Services and Procurement Canada were not willing to publicly discuss the possibility of a new build, whether in

a Canadian or foreign shipyard.\textsuperscript{82} On the part of Canadian shipbuilders, there was certainly no lack of interest as evidenced by both NSS and non-NSS yards being present at the ‘Industry Day’ presentation by the Government of Canada on the proposed light icebreaker.\textsuperscript{83}

Yet, the unique size and draft requirements of Canada’s Great Lakes canal locks meant there were very few international options that existed in a surplus State. Nonetheless, one was found from an unlikely source: Turkmenistan.\textsuperscript{84} Originally acquired for use in supporting the country’s oil and gas projects in the Caspian Sea, the recent oil price collapse likely led to a reduced need for the twelve-year-old Mangystau-2, providing an opportunity for Canada to acquire it as a rapid solution to the reduced availability of its light icebreaking fleet as they enter their vessel life extensions.\textsuperscript{85} While this appears to have little direct relevance for Canada’s Arctic, it must be remembered that even light icebreakers occasionally visit the Arctic, which limits the number of vessels available for duties in the south either due to lack of available hulls or refit cycles. Having an interim vessel can help fill gaps resulting from such operational and maintenance demands. Indeed, one of the question-and-answer documents for the initial 18 February 2019 request for information regarding the prospective interim light icebreaker explicitly mentioned that the new vessel would “supplement the operational capabilities of multiple ships, not just

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It is noteworthy that the latter has escorted resupply vessels to the US Air Force base in Thule, Greenland, making even the interim light icebreaker a potential candidate for Arctic operations.

5 Making Use of Presence: Lessons from Danish Naval Ships in Greenland for RCN AOPS Vessels

Clearly, the CCG’s icebreaking capacity is at a critical juncture where it is meeting its mission requirements in the Arctic but is at risk of no longer being able to do so due to a series of delayed procurement projects aimed at renewing its aging ships. Several interim measures have been implemented to alleviate such concerns, but construction contracts have yet to be signed for the replacement vessels that will each require approximately a half-decade to build. As the CCG fleet ages and the replacements await their time in the water, there will likely be increasing stress on the existing fleet’s availability and reliability, requiring alternative solutions.

One possible path for alleviating this strain would be to order from foreign shipyards with greater experience and capacity that can provide quicker replacements than Canadian yards. Proposals for such an approach have been put forth for the combat portion of the NSS but less so for the CCG’s icebreakers. However, this approach ignores the complex engineering work that is required to convert a ship’s design into instructions and materials that a foreign shipyard can work with, as well as the limited number of available yards. In the last decade, there have only been two icebreakers built in Western shipyards that approach the capabilities of the CCGS Louis St. Laurent, the one most urgently in need of replacement. Australia’s heavy research icebreaker RSV Nuyina was built in Damen’s shipyards in Romania, which took approximately five years to enter service. The United Kingdom’s RRS Sir David Attenborough,

87 Welland Tribune 2018 (n 52).
somewhat smaller than *Nuyina*, took over four years to be built in Cammell Laird’s yard in England, and a further year before its maiden voyage.\(^{91}\) Even if such construction timelines were notably faster than the start-to-finish process of an equivalent vessel in a Canadian yard, the time required to solicit and select a suitable foreign shipyard and then change the ship’s design so that it can be built in that yard using materials from the local supply chains would extend the timeline to something similar to the current plan of building under the National Shipbuilding Strategy using Canadian yards.\(^{92}\) Looking abroad is not, therefore, likely to result in significantly reduced timelines and will not solve the coming strain on the CCG’s icebreaking fleet as they require more and more maintenance.

One near-term solution may be to leverage the *Harry DeWolf*-class Arctic and offshore patrol vessels, six of which are currently being built under the combat portion of the NSS in Halifax for the Royal Canadian Navy with two more on the order books for the CCG after suitable modifications.\(^{93}\) These ships have not been designed as icebreakers. They were not built with the width or power to carve routes in heavy ice while escorting large civilian and commercial vessels. Nonetheless, the first two ships that have conducted their ice trials have demonstrated a respectable ability to operate in the Canadian Arctic in February–March when no other vessels are in the region. During these trials, they have shown an ability to exceed their designed ice capability of 1.2 m of first-year ice with multiyear inclusions, with HMCS *Margaret Brooke* encountering limited amounts of 2 m first-year ice.\(^{94}\)

This performance by the 6,700 t AOPS is important. It exceeds the empirical performance of the Royal Danish Navy’s 3,500 t *Thetis* and 2,000 t *Knud Rasmussen*-class patrol ships operating in and around Greenland, which have considerably lower ice ratings of 80 cm of ice with occasional encounters.
exceeding that.\(^95\) Absent dedicated icebreakers, Denmark employs these patrol ships for many of the icebreaking duties for which CCG icebreakers are responsible on the Canadian side of the Davis Strait. This includes route assistance, harbour breakouts, and freeing small vessels beset in sea ice. The Thetis-class vessel HDMS Triton helped lead cargo ships resupply settlements in Greenland in summer 2020 by breaking ice;\(^96\) in 2015, Triton also escorted the supply ship Arina Arctica to resupply the towns along Disko Bay on the west side of Greenland, during which it freed both Arina Arctica and a smaller cargo ship when they were stuck in the ice.\(^97\) That same season in late March, Triton conducted harbour breakouts in Sisimiut to allow local fishers to reach open waters.\(^98\) Although individuals often request breakout assistance, they are only carried out at the request of the local municipalities, such as when Triton responded to the Avanaata Kommunia's request for its services to open up the seaways to the settlements of Ikerasak and Saattut in June 2022.\(^99\) Later that month, the smaller Knud Rasmussen-class vessel HDMS Lauge Koch broke ice at Nuussuaq south of Kullorsuaq in order to allow supply ships carrying vital fuel to replenish local settlements.\(^100\)

With eight AOPSSs to enter service by 2027, Canadian authorities would be prudent to explore the use of these new assets to help support the CCG’s ice-breaking service in similar ways to their Danish counterparts. It should be kept in mind, however, that the sea ice conditions in western Greenland are much different from that in different parts of the Canadian Arctic, which limit the utility of the Danish comparison. Still, while the AOPSSs were not designed as icebreakers and the RCN is unlikely to make their ships available to the CCG as regular ‘on call’ assets for the icebreaking service, they may nonetheless


\(^{100}\) Arctic Command (@arktiskkommando), “Lauge Koch Breaks Ice at Nuussuaq,” Instagram reel, 8 June 2022, https://www.instagram.com/reel/CEi6by3QjgwI/.
prove useful as emergency vessels in situations with lower ice requirements. As noted in the first section of this chapter, not all CCG Arctic icebreaking tasks involve escorting large commercial vessels through heavy ice. Harbour breakouts and freeing beset vessels and community resupply are additional missions that require CCG resources even though demand for such missions have somewhat reduced in recent years. The potentially less onerous ice requirements for some of these mission (as always, dependent on the location and that year’s specific conditions) may allow the lighter icebreaking capabilities of the AOPSSs to help reduce the operational load on the CCG’s remaining aging icebreakers. Given the relatively smaller dimensions of the AOPSSs compared to the CCG’s heavy and medium icebreakers, they may actually be preferable when operating along some of the northern low-impact shipping corridors currently being planned as they may be less disruptive to sea ice. Their contribution to regional on-water presence can also reduce the need for CCG icebreakers to transit at high speeds during emergencies, thereby reducing engine and noise pollution that may negatively wildlife in the Arctic broadly and in these corridors.

While the AOPSS will not be able to replace the CCG icebreakers in their core task of escorting large commercial vessels through ice, they will likely be able to take some of the burden in situations where less ice capability is required. In some emergency search and rescue (SAR) scenarios, for example, there is a high likelihood that most Arctic traffic will stay in waters relatively clear of ice anyway, making the AOPSSs more than adequate for coming to a vessel in need of assistance (assuming no heavy ice is along the way). While Joint Rescue Coordination Centres already utilize all public and private elements to carry out such SAR activities, new levels of coordination between the RCN and CCG will be required for other tasks requiring icebreaking and pollution control capabilities. This may be accomplished under a memorandum of understanding and/or the embarkation of CCG subject matter experts who specialize in those areas. The latter can help reduce the challenges caused by the ‘up and out’ nature of naval promotion, which sees the departure of personnel from their ships as they are promoted higher in rank soon after they have acquired the specific skills necessary for specific tasks. Regardless, the presence of eight new ships capable of significant operations in sea ice provides an opportunity that cannot be ignored while long-term replacements for the CCG icebreakers are being built. Much as navies often employ a mixed fleet of high-end and low-end combatants each suitable for an array of tasks, the

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101 For more on low-impact shipping corridors, see Dawson and Song in this volume.
same logic may apply to icebreaking requirements in the Arctic. Not all situations require the power of a dedicated medium or heavy icebreaker, and the relatively large numbers of AOPSs can help fill the lower end of the icebreaking spectrum's requirements.

6 Conclusion

The future of shipping in the Canadian Arctic remains somewhat uncertain. While popular media observers expect dramatic increases in the coming years, the past several years have shown a fairly steady level of activity that remains just barely capable of being met by the CCG’s Arctic icebreakers. At the same time, the future remains uncertain especially after the COVID-19 pandemic. While non-essential voyages (i.e., anything other than community resupply) slowed down dramatically during the pandemic, the post-pandemic period is already seeing a limited resurgence of commercial and leisure activities in Canada’s Arctic, and several cruise operators have already been booking tickets for the 2022 summer season. In this context, there is a need to ensure Canada has the ability to maximize its assets capable of providing icebreaking service in the Arctic. With the limited number of CCG icebreakers at present and reduced availability as they further age, there is a need to look elsewhere for additional solutions. The new AOPSs may provide such a solution for very limited situations, which can help free up the medium and heavy CCG icebreakers for tasks that require their unique capabilities. As an indicator of the

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likelihood of such a future, Marc Mes, Director General of Canadian Coast Guard Fleet and Maritime Services, had indicated in May 2022 that the CCG is actively exploring how the RCN’s AOPSS can contribute to the CCG’s missions in the Arctic. In his words, the AOPSS have the potential to serve as effective ‘force multipliers’ for the CCG’s icebreakers. With two AOPSS expected to carry out Arctic patrols in summer 2022 despite only three of the six having been built, it is clear that the AOPSS will have a high degree of presence during the busiest season in the Arctic and will provide much of the federal government’s on-water response capabilities into the future.

103 Marc Mes, Canadian Coast Guard Director General Fleet and Services, interview with author and public remarks, Westin Ottawa, Canadian Global Affairs Institute, Defending the Continent: A Pan-Domain and Pan-Canada Approach, 19 May 2022.

104 Sheldon Gillis, “The @RoyalCanNavy ships @HMCS_NCSM_HDW, #MARGARETBROOKE and #GOOSEBAY will sail with our Danish allies in #HDMSTRITON this summer for CA’s #OPNANOOK22” (@HighSeasSkipper, 13 June 2022), https://twitter.com/HighSeasSkipper/status/153651677470268741.