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The Royal Canadian Navy in a Changing Arctic

Lieutenant-Colonel Kyle Aubrey

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The Royal Canadian Navy in a Changing Arctic

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READY, ICE READY?

THE ROYAL CANADIAN NAVY IN A CHANGING ARCTIC

Since the end of the Cold War, the Arctic has been defined by a quarter century of geopolitical cooperation. This era was formally ushered in with the 1996 Ottawa Declaration, establishing the Arctic Council as "a means for promoting cooperation, coordination and interaction among the Arctic States."[1] The eight Arctic nations that comprise the Arctic Council[2] – Canada, the United States, Russia, Denmark, Finland, Sweden, Iceland, and Norway – have focused their collaborative discourse on matters of sustainable development, environmental protection, and scientific research. Notably, the Ottawa Declaration explicitly precludes matters of military security from the Council's agenda. Since its inception, the Arctic Council has stood as the pre-eminent governance forum for the Arctic region. Its mandate, rooted in peaceful collaboration, has significantly contributed to the concept of "Arctic exceptionalism." This normative concept refers to the Arctic's unique geopolitical safe-haven from conflict and over-securitization, independent of frictions between Arctic states in other regions of the world.

This period of Arctic exceptionalism may be coming to an end. There are two major factors which contribute to this. First, as climate modelling improves, it is becoming clear that the Arctic will become increasingly more accessible. Second, the American unipolar moment is being challenged. A rising China and an increasingly

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[1] Arctic Council, "Declaration on the Establishment of the Arctic Council," accessed 3 April 2022, https:/ / oaarchive.arctic-council.org/ bitstream/ handle/ 11374/ 85/ EDOCS-1752-v2-ACMMCA00_Ottawa_ 1996_Founding_Declaration.PDF?sequence=5&isAllowed=y.

[2] Henceforth referred to as the 'Arctic states'.

belligerent Russia have opened the door to a new era of strategic competition. Together, these trends will challenge the notion of Arctic exceptionalism as Arctic states, and near-Arctic states, look to increasingly influence Arctic matters.

In Canada, Arctic security appropriately focuses on promoting sustainable development, protecting the fragile Arctic ecosystem, and supporting its inhabitants. Does the end of Arctic exceptionalism necessitate more defence capabilities to reinforce established norms and deter aggression? This paper sets out to explore how climate change and strategic competition have shaped Canada's extant policies and priorities for defence in the Arctic thus far. Because foreign and domestic policy directly shape the role of a national defence force, it will examine how these national priorities might translate into employment for the Royal Canadian Navy (RCN).

A Changing Arctic

Climate Change and Arctic Accessibility

In a century potentially defined by climate change, the Arctic will be the region most transformed by its effects. The Arctic continues to warm at over twice the global rate.[3] This natural phenomenon has led to unprecedented levels of melting sea ice. Over the last decade, summer sea ice has reduced by 13% across the greater Arctic – the biggest decrease in recorded history.[4]

When discussing sea ice reduction and maritime accessibility it is important to note the difference in Arctic regions. Canada's Arctic, for example, is experiencing sea

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[3] Intergovernmental Panel on Climate Change, "Sixth Assessment Report Regional Fact Sheets – Polar," accessed 17 April 2022, https:/ / www.ipcc.ch/ report/ ar6/ wg1/ downloads/ factsheets/ IPCC_AR6_WGI_Regional_Fact_Sheet_Polar_regions.pdf.

[4] Canada, Environment and Climate Change, "Sea Ice in Canada," last modified 24 February 2021, https:/ / www.canada.ca/ en/ environment-climate-change/ services/ environmental-indicators/ sea-ice.html.

ice reduction 30% less than the greater Arctic.[5] This distinction is important in understanding the timeframe and nature of emerging security threats in Canada relative to other Arctic regions. Accessibility will not be the same for different regions of the Arctic so it follows that different regions will have unique security considerations.

In the domestic and continental theatres, Canada's Northwest Passage presents potential as a viable shipping route. While usage will remain limited to ice-strengthened ships for the foreseeable future, the navigable season has increased and will continue to do so.[6] Over the last half century, the distance travelled by sea in Canada's Arctic has tripled.[7] This has been mostly attributable to a considerable increase in bulk carriers, chemical tankers, cargo ships, and cruise ships.[8] Modelling predicts that in the examined timeframe, Canada's northern waters could see the navigable season increase by up to two months, depending on the specific route.[9] This increase in maritime traffic, and greater accessibility more broadly, represents the biggest consideration in Canadian maritime Arctic security. This necessitates a practical focus on maritime and environmental safety vice a defence-oriented one.

The European Arctic provides a safer and better supported shipping option.[10] The Northern Sea Route, or Northeast Passage, extends from the Kara Sea to the Bering Strait

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[5] Ibid.
[6] Maritime traffic in the Northwest Passage is modest, and will likely remain modest for the foreseeable future. For example, in 2019, the busiest year recorded, there were 160 ships operating in the Passage.
[7] Lawrence R. Mudryk, Jackie Dawson, Stephen E.L. Howell, Chris Derksen, Thomas A. Zagon, and Mike Brady, "Impact of 1, 2 and 4º C of global warming on ship navigation in the Canadian Arctic," *Nature Climate Change* 11 (August 2021): 673.
[8] Arctic Council, "Report on Shipping in the Northwest Passage Launched," accessed 20 April 2022, https:/ / arctic-council.org/ news/ report-on-shipping-in-the-northwest-passage-launched/ .
[9] Mudryk et al, Impact of 1, 2 and 4º C: 678.
[10] P. Whitney Lackenbauer, Adam Lajeunesse, James Manicom, and Frédéric Lasserre, *China's Arctic Ambitions, and What They Mean for Canada* (Calgary: University of Calgary Press, 2018), 73.

through Russia's Exclusive Economic Zone (EEZ). This shipping route is already accessible for longer periods of the navigable season and offers more benefits to commercial shipping when compared to Canada's Northwest Passage.[11] It will play a critical role in connecting Russia's gas and oil projects to global markets.

Besides potential advantages to commercial shipping, a more accessible Arctic also means greater access to coveted natural resources. It is believed that the Arctic holds the largest undeveloped hydrocarbon reserves – an estimated 13% of the world's undiscovered oil and 30% of the world's natural gas.[12] Receding ice and warming sea temperatures will allow greater access to commercial fishing stocks. Deposits of desirable minerals, such as iron, copper, zinc, and nickel among others, will become exploitable. Access to these natural resources have previously been either impossible or cost-prohibitive.

A more accessible Arctic means economic potential, through either commercial shipping or new access to resources. Nations such as Russia and China are starting to exploit these economic potentials for their own benefit. Within Canada, greater accessibility namely means a greater risk to the environment and Northern communities. Canada needs to be ready to address different security challenges at home and abroad.

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[11] Ibid, 80.
[12] United States Energy Information Administration, "Arctic oil and natural gas resources," accessed 12 April 2022, https:/ / www.eia.gov/ todayinenergy/ detail.php?id=4650#:~:text=The%20Arctic%20holds%20an%20estimated,U.S.%20Geological%20Survey%20(USGS).

Renewed Strategic Competition

In his 1990 article for *Foreign Affairs*, Charles Krauthammer introduced the concept of the American "unipolar moment."[13] Since the collapse of the Soviet Union, the United States has enjoyed unrivaled military, economic, and diplomatic hegemony. This era appears to be ending as China looks to directly compete with the United States and Russia reasserts its relevancy. Russia and China both have renewed interest in the Arctic with their own individual motivations.

Russian Arctic strategy is centered around economic development. Russia continues to invest significantly in Arctic oil and gas. In 2020, it offered significant tax incentives and invested $300 billion in northern oil and gas development projects.[14] Russia appears determined to double down on oil and gas development, a sector which already accounts for up to 60% of its export revenues.[15]

Concurrently, Russia has been recapitalizing its Arctic military presence. Since the turn of the century Russia has reopened 50 Cold War-era Arctic military installations. This northern recapitalization has focused mainly on early air and maritime warning and defence, as well as improved Arctic training.

Russia's Arctic economic interests underpin its reinvestment in its northern military presence. Russia envisions the Northern Sea Route and hydrocarbon infrastructure as its economic future and has secured its Arctic EEZ accordingly. A

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[13] Charles Krauthammer, "The Unipolar Moment," accessed 3 April 2022, https:/ / www.foreignaffairs.com/ articles/ 1990-01-01/ unipolar-moment.
[14] Canadian Broadcasting Corporation, "What Russia's $300B investment in Arctic oil and gas means for Canada," accessed 3 April 2022, https:/ / www.cbc.ca/ news/ canada/ north/ russian-arctic-oil-and-gas-explained-1.5462754.
[15] Eugene Rumer, Richard Sokolsky, and Paul Stronski, "Russia in the Arctic – A Critical Examination," accessed 3 April 2022, https:/ / carnegieendowment.org/ 2021/ 03/ 29/ russia-in-arctic-critical-examination-pub-84181.

burgeoning relationship with China offers a *quid pro quo* opportunity for the two states to progress their own Arctic agendas.

In 2013 China was admitted to the Arctic Council as an observing nation. Five years later China released its first Arctic policy. In it, it declared itself a "near-Arctic state" and "an important stakeholder" in Arctic affairs.[16] This position, despite not being an actual Arctic state, is self-justified through China's economic interests in the Arctic. The policy's goals are "to understand, protect, develop, and participate in the governance of the Arctic."[17] While the policy does not explicitly detail its economic interests in the Arctic, China's actions and investments indicate an interest in research focused on commercial shipping, commercial fishing, and resource exploitation.

China's near term Arctic strategy is centered on normalizing its presence in the Arctic. Strengthening its relationship with Russia is certain to help advance this strategic goal. In February 2022, a joint announcement of cooperation between Russia and China stated, "the sides agreed to continue consistently intensifying practical cooperation for the sustainable development of the Arctic."[18]

China already significantly invests in Russia's hydrocarbon sector.[19] Given the unique Arctic environment, developing these projects are costly and complex. China has stepped up to become Russia's primary foreign partner in liquid natural gas (LNG)

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[16] China, State Council, "China's Arctic Policy," accessed 19 April 2021, http:/ / english.www.gov.cn/ archive/ white_paper/ 2018/ 01/ 26/ content_281476026660336.htm.
[17] Ibid.
[18] Kremlin, President of Russia, "Joint Statement of the Russian Federation and the People's Republic of China on the International Relations Entering a New Era and the Global Sustainable Development," accessed 20 April 2022, http:/ / en.kremlin.ru/ supplement/ 5770.
[19] Vita Spivak and Alexander Gabuev, "The Ice Age: Russia and China's Energy Cooperation in the Arctic," accessed 3 April 2022, https:/ / carnegiemoscow.org/ commentary/ 86100.

projects such as the Yamal LNG and Arctic LNG 2 projects.[20] As Western sanctions have piled up against Russia over the last decade, China has been Russia's partner in enabling their own Arctic strategic goals.

One can conclude that the Arctic relationship between China and Russia is mutually beneficial. Investing in Russia's Arctic economy and inserting itself into Arctic forums moves China closer to normalizing their Arctic presence.

In response to the Russian land invasion of Ukraine in February 2022, the Arctic Council paused cooperation. This is unprecedented in the Council's 25-year history. The announcement stated, "The core principles of sovereignty and territorial integrity, based on international law, have long underpinned the work of the Arctic Council, a forum which Russia currently chairs."[21] Pausing participation in this forum marks a notable divergence from established Arctic cooperation. Canada must question how a growing partnership between Russia and China might look to erode established Arctic norms, with force if necessary, for their own benefit.

It is clear that both climate change and strategic competition are influencing Arctic security. This has, to some degree, shaped Canada's current national Arctic and defence policies. The role of the RCN in the Arctic will be informed by these policies. The next section will explore Canada's national approach to Arctic security and discuss how the RCN contributes to national Arctic security priorities.

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[20] Ibid.
[21] United States of America, Department of State, "Joint Statement on Arctic Council Cooperation Following Russia's Invasion of Ukraine," accessed 3 April 2022, https:/ / www.state.gov/ joint-statement-on-arctic-council-cooperation-following-russias-invasion-of-ukraine/ .

Canada's Arctic Policies

Canada's Arctic and Northern Policy Framework, was released in 2019 and was designed to guide federal activities and investment in Canada's north through 2030.[22] As such, it is the current cornerstone directive on national Arctic matters, including security. The Framework identifies climate change and increased challenges to the rules-based order as two of the biggest factors changing the Arctic. The Framework focuses heavily on Whole of Government cooperation in delivering on its Arctic agenda.

The centrality of Canada's northern and Indigenous peoples in the Framework represents a notable and significant shift in Canadian Arctic policy. Until now, Canadian Arctic policies have not adequately prioritized the concerns of its northern Indigenous populations with damaging, inter-generational effects. Listening and considering the needs of these populations vis-à-vis a changing Arctic is a persisting and long overdue theme. Perhaps unsurprisingly, then, there is no specific focus on traditional defence roles outside of those which contribute to this priority.

Canada's Arctic Framework includes eight national goals. The CAF is only directly implicated in one of these goals, generically titled "The Canadian Arctic and North and its people are safe, secure and well-defended."[23] This goal is further broken down into six detailed objectives in its own separate chapter. Even within these six security-specific objectives the CAF has limited ownership and responsibility. The six objectives have a strong focus on improved situational awareness, presence, and cooperation. It notably focuses on cooperation both with other government departments

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[22] Arctic and Northern Policy
[23] Ibid.

(OGD) in Canada, and with the North Atlantic Treaty Organization (NATO) and the North American Aerospace Defense Command (NORAD). While it identifies these partnerships as important, it lacks any meaningful detail on *how* Canada will contribute.

An addendum chapter of the Arctic Framework focuses on strictly international Arctic priorities. Absent a formal Canadian foreign policy, this chapter provides national priorities in the Arctic outside of Canada. "The rules-based international order in the Arctic responds effectively to new challenges and opportunities"[24] is the first stated goal. While there are no defence-specific points within the goal, it is notable that coordination with NATO on Arctic matters is mentioned.

Canada's current defence policy, *Strong, Secure, Engaged* (SSE), was released in 2017. The policy identifies climate change as a significant factor shaping Canada's Arctic, and to a lesser degree, strategic competition. SSE is coherent with the federal Framework in that it focuses on themes such as cooperation, improved situational awareness, presence, and an improved ability to operate in the Arctic.[25] It notably mentions NATO on several occasions, including Arctic exercises and information sharing. This offers a potential opening to focus on "hard" security requirements with the Alliance in the international Arctic.[26]

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[24] Canada, Indigenous Relations and Northern Affairs, "Arctic and Northern Policy Framework International Chapter," last modified 22 October 2019, https:/ / www.rcaanc-cirnac.gc.ca/ eng/ 1562867415721/ 1562867459588.

[25] It is not within the scope of this paper to extract an exhaustive list of Arctic priorities from SSE, but rather to iterate that SSE is coherent with the over-arching Canadian Arctic policy.

[26] P. Whitney Lackenbauer, "Policy Brief: Threats Through, To, and in the Arctic: A Framework for Analysis," accessed 28 April 2022, https://www.naadsn.ca/wp-content/uploads/2021/03/ Lackenbauer_Threats-Through-To-and-In-the-Arctic.pdf.

With climate change and the return to strategic competition comes a refreshed interest in continental defence. NORAD modernization looks to be on the horizon, and with it comes a new binational focus on the Arctic. A joint statement in August 2021 by Canada's Minister of National Defence and the U.S. Secretary of Defense provided some insight on NORAD modernization. It prioritizes situational awareness in the Arctic and maritime approaches which requires, "a system-of-systems approach including a network of Canadian and U.S. sensors from the sea floor to outer space."[27] While the announcement doesn't expand its maritime role beyond warning, its prioritization of Arctic situational awareness will have implications for the CAF and RCN. Underwater surveillance as a capability that is notably lacking where the RCN may be able to directly contribute.

In reviewing these key directives, Canadian priorities in the Arctic are clear and defence is only one piece of the Whole of Government approach. It follows that while the RCN will need to be prepared to conduct traditional defence roles, it will also have a more practical, constabulary role in the Arctic. From these directives emerge some salient themes which guide RCN employment in the Arctic.

The most prominent is an emphasis on cooperation and collaboration. This theme applies equally across the domestic, continental, and global theatres and should not come as a surprise. As a middle power liberal democracy, Canada has thrived in a system of international cooperation. Whether at home or abroad, it is almost certain that any RCN tasks will include some form of integration. These may be with other government

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[27] Canada, Department of National Defence, "Joint Statement on NORAD Modernization," last modified 14 August 2021, https:/ / www.canada.ca/ en/ department-national-defence/ news/ 2021/ 08/ joint-statement-on-norad-modernization.html.

departments within Canadian waters, the United States in NORAD, or with other allies in defence partnerships such as NATO.

The second notable theme is the requirement for improved situational awareness in the Arctic. Being able to act in the high north is dependent on the ability to maintain persistent, all-domain surveillance. This is no easy feat. Canada's Arctic is 16.5 million km^2, which represents about 40% of Canada's total landmass.[28] It is sparsely populated – only 200,000 inhabitants cover that area. The maritime challenge is equally monumental. Canada's Arctic maritime EEZ is 6.2 million km^2, touching three oceans.[29] Nearly all of this is inaccessible, except by icebreakers, for a majority of the year. While space-based satellite tracking has improved situational awareness on the surface, the extremely harsh conditions in the Arctic make it difficult to leverage technology for underwater surveillance. Despite climate change, the Arctic will remain mostly inaccessible for the foreseeable future. Accordingly, maintaining situational awareness, especially underwater, will continue to be a challenge.

The third theme is presence. Canadian claims to its Arctic are buttressed by historical use by its northern Indigenous peoples. Through sustainable northern development and increased presence, Canada intends to solidify this sovereignty position. Increased presence will come in many forms, but the RCN is certain to be a key contributor. Linked with presence is the requirement to integrate with local communities. As highlighted in the 2019 Arctic Framework, the CAF has already done a commendable

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[28] Canada, Global Affairs, "Canada and the Circumpolar Regions," last modified 28 October 2021, https:/ / www.international.gc.ca/ world-monde/ international_relations-relations_internationales/ arctic-arctique/ index.aspx?lang=eng.

[29] Royal Canadian Navy, Director General Naval Force Development, "Arctic/ Offshore Patrol Ship Concept of Employment," 12 January 2011: 4.

job in collaborating with northern peoples. Presence in the north, and continued partnership with northern communities, will be an increasing and enduring demand.

Presence extends beyond Canada's borders to include commitment to established governance forums and defence partnerships. It is clear from the over-arching policies that Canada remains steadfastly committed to these cooperative bodies and alliances and will continue to pursue collaborative approaches to Arctic security within them.

Understanding these overarching defence-oriented themes, it is now possible to understand how the RCN will support Canada's national priorities at home in Canada's Arctic, and abroad.

Constabulary Support

Within Canadian waters there is a shared responsibility for regional safety and security between government departments. The Department of National Defence and CAF, the Canadian Coast Guard (CCG), Transport Canada, the Royal Canadian Mounted Police (RCMP), Environment Canada, Public Safety, and Canada Border Services Agency (CBSA) are all key stakeholders in Arctic security. Jurisdiction and responsibility in the Arctic is spread across departments, so cohesiveness and collaboration are critical to meeting federal priorities. Many of the responsibilities are shared and assigned resources are often "dual-use," providing utility across departments.[30] For example, the Royal Canadian Air Force (RCAF) has primary air search and rescue (SAR) responsibilities but the CCG owns maritime SAR. The CAF also has a SAR Command and Control function, alongside the CCG, through the Joint

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[30] Michael Byers and Nicole Covey, "Arctic SAR and the 'Security Dilemma,'" *International Journal* 74, no. 4 (December 2019): 499.

Rescue and Coordination Centres (JRCC). The RCN, however, has no direct jurisdiction in the Arctic. It follows that RCN domestic activities will often be in a support role to constabulary tasks.

These constabulary tasks will likely require that the RCN "lead from the back." The RCN routinely provides access to isolated areas by sea, and the Arctic is likely to offer the same opportunity – simply getting to the Arctic in Canada by sea is no small feat. While the CCG has a greater ability to move into and within the Arctic, the RCN brings an armed presence to Arctic waters should it be required. The capability also brings some intangible qualities that are unique to the CAF, such as expert planning and high readiness responsiveness. In this regard, the RCN could be used to support OGDs such as the RCMP and CBSA in exercising their respective jurisdictions in the north, especially at short notice, or when force may be required. Neither of these departments have an organic, armed capability to exercise their authorities in the Arctic.

A class of ship like the *Harry DeWolf* class of Arctic and Offshore Patrol Ships (AOPS) provides an ice-capable, lightly armed platform from which sub-teams from these departments could seamlessly operate. The RCN's Concept of Employment document for the AOPS, issued by the Director General Naval Force Development (DGNFD), envisions tasks like these. The document highlights its three main tasks as, "sovereignty patrol, maritime domain awareness, and assistance to OGDs."[31] It is purpose-built to support law enforcement activities, from the main armament to its integration of OGD small boat operations.

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[31] DGNFD, AOPS Concept of Employment: 7.

The class has come under scrutiny for its inability to conduct traditional warfare as well as its perceived lack of purpose.[32] The *Harry DeWolf* class have been described as "Frankenboats"[33] and "slushbreakers"[34] for its lack of conformity with either a traditional warship or icebreaker design and limited armament. These critiques miss the mark of the capability gap that they are intended to fill. Despite the changing nature of the Arctic, a traditional surface warship is not a capability needed, or useable, in the Canadian Arctic. The Canadian Arctic is nowhere near accessible enough for the possibility of surface warfare during the service life of any class being built today. Any other traditional warfare capabilities that a surface warship might bring to the Arctic – such as ballistic missile defence, air, or underwater surveillance – can be achieved cheaper or more persistently through other means. Icebreaking is capably handled by the CCG, a world-leader in this expertise. The AOPS was designed to operate in first-year ice. In other words, in areas where other Arctic-specific ships would operate during the navigable season. There is just no practical requirement for either an armed icebreaker, or traditional warship capability in Canada's Arctic right now.

In 2012, then Commander of Maritime Forces Atlantic, Rear-Admiral David Gardam, aptly described the AOPV as a "a big empty ship, with the potential to embark doctors, dentists, scientists, marine biologists, police and fisheries officers,

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[32] Michael Byers and Stewart Webb, "Titanic Blunder, Arctic/ Offshore Patrol Ships on Course for Disaster," Canadian Centre for Policy Alternatives (April 2013), https:/ / policyalternatives.ca/ sites/ default/ files/ uploads/ publications/ National%20Office/ 2013/ 04/ Titanic_Blunder_0.pdf.
[33] Ottawa Citizen, "DND says it can still meet a 2014 delivery date for the Canadian Navy's Arctic 'Frankenboat,'" last modified 2 December 2009, https:/ / ottawacitizen.com/ news/ national/ defence-watch/ dnd-says-it-can-still-meet-a-2014-delivery-date-for-the-canadian-navys-arctic-frankenboat.
[34] Canadian Broadcasting Corporation, "Canada should do more to protect Arctic sovereignty: Layton," last modified 6 August 2007, https:/ / www.cbc.ca/ news/ canada/ north/ canada-should-do-more-to-protect-arctic-sovereignty-layton-1.690482.

environmentalists and many other personnel with an interest in, or a mandate for, the development and sustainment of Canada's north."[35] His "big empty box" concept offers some insight on how else the AOPV might be employed.

In 2021, the inaugural ship of its class, HMCS *Harry DeWolf,* trialed the Towed Reelable Active-Passive Sonar (TRAPS) system in Canada's Arctic. The generous payload and berthing capacity of the class enabled embarkation of a small team of Defence Research and Development Canada (DRDC) staff, as well as a sea container containing the sonar equipment and a small work station. This capability brings a highly mobile, modular, mission-fit underwater listening capability to the Arctic. This sea lift capability could also be used for humanitarian assistance and disaster relief (HADR), community support in northern communities, and in supporting scientific endeavours.

The *Harry DeWolf* class is the first Arctic-specific warship in the RCN. As the Canadian Arctic changes over the coming decades, so will the roles of the successor of the *Harry DeWolf class*. Until then, while it may not conform to traditional conceptions of a warship or icebreaker, it delivers the capabilities that are realistically needed in Canada's Arctic during the expected service life of the class.

Situational Awareness

A recurring theme in Canadian Arctic and defence policy is the need for increased situational awareness. The *Harry DeWolf* class will undoubtedly, as part of its core tasks, contribute to this mission. Despite this, the most powerful tools for Arctic surveillance will be through leveraging technology and a modern, ice-capable submarine fleet.

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[35] Canadian Naval Review, "The Admiral's View of the Arctic and Offshore Patrol Ships," accessed 12 April 2022, http:/ / www.navalreview.ca/ 2012/ 02/ the-admirals-view-of-the-arctic-and-offshore-patrol-ship/ .

Technology has already helped advance this through investments such as the RADARSAT Constellation Mission (RCM). The RCM is capable of providing near-real time tracking of surface vessels in any weather conditions by fusing data from satellite-based radar and Automatic Identification System (AIS). While underwater surveillance technology is being developed through programs such as DRDC's Canadian Arctic Underwater Sentinel Experiment (CAUSE), there are some significant limitations to these capabilities. First, the Artificial Intelligence technology needed to process and classify the amount of raw acoustic data is still under development, and untested. Second, projects such as these rely on underwater passive hydrophones to provide data. The sheer size of the Arctic means that hydrophones can only be placed in select areas, likely choke points or areas deemed most strategic. Projects such as CAUSE will be one part of Arctic underwater surveillance. Augmenting this with ice-capable submarines and autonomous underwater vehicles (AUV) would complement this capability greatly to improve the most difficult aspect of maritime domain awareness in the Arctic.

A submarine in the Arctic brings a significant and unmatched capability. Its ability to be covert and mobile, while contributing to the Recognized Maritime Picture (RMP) and Joint Intelligence, Surveillance and Reconnaissance (JISR) is unmatched by any other Arctic platform or capability. Submarines also provide an anti-submarine warfare capability, hedging against the most plausible traditional warfare consideration in Canada's Arctic.

The current fleet of four *Victoria* class submarines makes a limited contribution to Arctic surveillance. The class has deployed only three times to the Arctic: HMCS *Corner*

Brook in 2007 and 2009, and HMCS *Windsor* in 2016.[36] As conventional, diesel-electric submarines, they are unable to operate under ice for any extended period or distance, which limits their capabilities to the Marginal Ice Zone (MIZ) – essentially the periphery of the Canadian Arctic. In addition to the inherent limitations of a conventional submarine, the *Victoria* class has had well-documented issues with readiness, which has limited their operational impact in the Arctic. The *Victoria* class is unlikely to meet the future needs in the Arctic.

The ongoing *Victoria* class modernization (VCM) will not fundamentally change the limitations of the class. While VCM is a significant upgrade designed to operate the class into the 2030s, it mostly focuses on hotel services to improve quality of life for submarine crews. The current fleet of four boats, to serve both coasts and the Arctic, is also insufficient. A 2017 Senate Committee report on CAF reinvestment deemed a fleet of twelve submarines to be appropriate for future demands.[37]

While there is no announced submarine replacement project, DGNFD released a recapitalization strategy for the *Victoria* class in February, 2022. While the recapitalization strategy lacks any formal constraints, it does outline a working assumption that the new fleet will consist of eight to twelve diesel-electric submarines.[38] While diesel-electric submarines are not the best-suited submarine design for Arctic operations, they can effectively monitor the approaches to the Northwest Passage. As sea

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[36] Vanguard, "The Capabilities and Challenges of Canada's Future Fleet," accessed 3 April 2022, https:/ / vanguardcanada.com/ the-capabilities-and-challenges-of-canadas-future-fleet/ .
[37] Canada, Senate, "Report on the Standing Senate Committee on National Security and Defence, May 2017," accessed 3 April 2022, https:/ / sencanada.ca/ content/ sen/ committee/ 421/ SECD/ reports/ SECDDPRReport_FINAL_e.pdf: 38.
[38] Royal Canadian Navy, Director General Naval Force Development, "Victoria Class Submarine Recapitalization Strategy 2022," 16 February 2022: 7.

ice continues to recede, areas of operations will theoretically increase, rendering conventional boats more effective than present day.

While a future generation of conventional submarines will be able to operate further into the Arctic, it is still highly unlikely that their limitations will prevent extensive under-ice operations. Employing either ship or submarine launched AUVs would help fill this capability gap. Ideally, these vehicles could be launched by submarine torpedo tubes. This would extend the reach of conventional submarines as they would be able to launch and operate AUVs under the ice from a safe distance.

One of the capabilities needed most in Canada's Arctic is increased situational awareness. Within this, underwater surveillance is the capability in which the RCN can contribute most. The RCN can complement systems such as CAUSE with a modern, adequate fleet of submarines and AUVs to deliver a mobile and specialized underwater surveillance capability.

Deterrence in the High North

The Russian land invasion of Ukraine has raised the stakes, and the urgency, on possible NATO involvement in Arctic security. The invasion sows suspicion of Russia's motives in other regions deemed strategically important to its own national interests. As the most prominent and militarized Arctic nation, Russian aggression elsewhere can no longer be decoupled from Arctic matters.

The likely accession of Finland and Sweden into NATO is an example of how quickly the war in Ukraine has changed national priorities. Prior to February 2022, it looked highly unlikely that these two nations would look to join the Alliance out of fear of Russian counteraction. In only a few months, public opinion has dramatically shifted.

In Finland, support for entry into NATO has jumped from around 25% to nearly 70%.[39] It seems likely that both countries will be admitted to NATO at the June 2022 summit.

Russia has been clear on how they intend to respond. Russia warned that should the two countries join NATO, it would move increasing numbers of nuclear weapons and hypersonic missiles to its Baltic exclave in Kaliningrad.[40] This move would act to further destabilize the Baltic and European Arctic regions. Norway, who has led the charge on NATO Arctic readiness for the last half-century, would be joined by another two Arctic military powers. This would result in a stronger push from NATO membership for deterrence measures to contain Russia in the Arctic.

Historically, Canada has been reticent in encouraging NATO activity in the Arctic. In 2009, at the NATO Strasbourg/Kehl summit, Canada voted against a declaration statement for a NATO role in the Arctic. Canada's policy has been to pursue Arctic matters with Arctic states in the appropriate forums, such as the Arctic Council, and the Arctic Chiefs of Defense for security related matters. The Arctic Chiefs of Defense haven't convened since 2014, and the Arctic Council has paused indeterminately. There is an emerging demand for an appropriate, established, and enduring Arctic security forum. One might consider if this might soften Canada's traditional approach to NATO exclusion from Arctic security.

While Canada has looked to exclude NATO from the Arctic under previous governments, there is some evidence of a softened stance under the current Liberal

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[39] Elisabeth Braw, "The NATO Accession Sweden Never Saw Coming," accessed 28 April 2022, https:/ / foreignpolicy.com/ 2022/ 04/ 29/ sweden-finland-nato-ukraine-russia/ .

[40] Arctic Today, "Russia warns of nuclear, hypersonic deployment if Sweden and Finland join NATO," accessed 22 April 2022, https:/ / www.arctictoday.com/ russia-warns-of-nuclear-hypersonic-deployment-if-sweden-and-finland-join-nato/ .

government. The Arctic Framework International and Security chapters note a willingness to work with NATO on Arctic matters. SSE identifies a new Arctic initiative to "Conduct joint exercises with Arctic allies and partners and support the strengthening of situational awareness and information sharing in the Arctic, including with NATO."[41] Recently, in March and April 2022, Canada participated in NATO Exercise COLD RESPONSE. The exercise, which included 30,000 participants from 27 countries across the land, air, and sea domain, focused on improving interoperability in the Arctic.[42]

A formal role for NATO in Arctic security feels like a safe bet eventually given the changing nature of the Arctic and geopolitical instigators. It is likely that Canada will seek to keep NATO defence matters out of its domestic Arctic, but will continue to support Alliance deterrence measures in the High North.[43] The RCN will likely have a direct and enduring contribution.

The most persistent form of contribution in NATO for the RCN is the *Halifax* class patrol frigates as part of NATO task groups in exercises and operations. Canada has countered Russian aggression by contributing a ship to the Standing NATO Maritime Groups (SNMG) as part of Operation REASSURANCE consistently for nearly a decade. Canada has commanded both SNMGs in the last three years. In March 2022, the RCN dispatched a second frigate, HMCS *Halifax*, to join SNMG1 in northern Europe. With *Halifax* joining HMCS *Montreal*, this is the first time that Canada has employed a frigate

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[41] Canada, Department of National Defence, "Strong, Secure, Engaged - Canada's Defence Policy," accessed 20 April 2022, http:/ / epe.lac-bac.gc.ca/ 100/ 201/ 301/ weekly_acquisitions_list-ef/ 2017/ 17-23/ publications.gc.ca/ collections/ collection_2017/ mdn-dnd/ D2-386-2017-eng.pdf: 80.
[42] North Atlantic Treaty Organization, "Exercise Cold Response 2022 – NATO and partner forces face the freeze in Norway," accessed 10 April 2022, https:/ / www.nato.int/ cps/ en/ natohq/ news_192351.htm.
[43] NATO uses the terminology "High North" to describe the Nordic region above the Arctic circle. NATO is careful to use nuanced language, avoiding "Arctic" as that word describes the greater Arctic region.

in each of the SNMG simultaneously in recent memory. As ice conditions permit, it is likely that the *Halifax* class and the future Canadian Surface Combatant (CSC) will continue to contribute to NATO deterrence missions in the Baltic and High North.

Traditionally Canada has avoided the topic of NATO in the Arctic. A growing demand for a security forum to contain illiberal powers in the Arctic begs the question of how Canada might soften its stance. While Canada is unlikely to pursue deterrence activities in its own Arctic, it will likely contribute to Alliance activities in the High North as ice conditions permit. Other RCN capabilities, such as the *Kingston* and *Victoria* classes, have demonstrated they can effectively contribute to NATO deterrence actions during Ex BALTOPS and Ex DYNAMIC MONGOOSE. Despite this, the lion's share of true NATO deterrence commitments are likely to be done by surface combatants.

Conclusion

This paper has set out to explain the relationship between a changing Arctic and employment of the Royal Canadian Navy. It described how the Arctic is moving away from an era of unprecedented cooperation and low tension. It discussed Canadian national policy and how it shapes the roles for the RCN in the Arctic today and in the future. Seeking to explain the relationship yields more questions on the future of Canada's strategic direction and future RCN Arctic capabilities.

The era of Arctic exceptionalism has been defined by regional control by Arctic states. Cooperation through the Arctic Council helped frame the effects of climate change as "soft" security issues and downplayed the potential for conflict in the Arctic. While there is no guarantee that conflict in the Arctic is on the horizon, it is hard to deny that the Arctic is becoming increasingly international with "hard" security considerations.

Do Canada's extant policies on Arctic security adequately address this shift away from Arctic exceptionalism? Canada's Arctic Framework is appropriately centered on the sustainable development of the north and its Indigenous communities. Despite this, does it meet emerging "hard" security requirements vis à vis Russian aggression and potentially nefarious Chinese intentions?

The current Liberal government, in the wake of the invasion of Ukraine, committed to increased defence spending and a review of the current defence policy. The statement, "the world accelerated much more quickly than we anticipated… we were overtaken by events, and there may be a different ordering of things that need to be invested in" by former Deputy Minister of National Defence Jody Thomas reads as an admission that SSE is no longer fit for purpose – a sentiment echoed by defence analysts.[44] How will a new defence policy effectively balance the "security versus defence" dilemma in the Arctic?[45]

A defence policy review is unlikely to address deep-seated procurement issues within DND and the CAF. Is military procurement adequately agile, expeditious, and bipartisan to address a rapidly changing security environment such as the Arctic? Major capital projects such as the future CSC and *Protecteur* class replenishment vessels have experienced significant delays. Without a government-announced replacement project for the *Victoria* class, Canada risks, at best, a gap in underwater surveillance and deterrence or, at worst, the loss of the submarine capability altogether. This would eliminate

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[44] Brett Boudreau, "Re-imagining Canadian defence and security," accessed 10 April 2022, https:/ / policyoptions.irpp.org/ magazines/ re-imagining-canadian-defence-and-security/ .

[45] A security dilemma, according to Encyclopedia Britannica, is "a situation in which actions taken by a state to increase its own security cause reactions from other states, which in turn lead to a decrease rather than an increase in the original state's security."

arguably the best option for agile, responsive underwater surveillance and strategic deterrence in the Arctic.

This paper has sought to demonstrate that climate change and strategic competition are effectively ending the era of Arctic exceptionalism. Realistically, Canada, and the RCN as a result, must be prepared to respond to a spectrum of security issues – perhaps ones that weren't expected, or downplayed, since national policies were developed. Will Canada be prepared to effectively meet these challenges in protecting the homeland and deterring Arctic conflict?

BIBLIOGRAPHY

Arctic Council, Protection of the Arctic Marine Environment. "Shipping in the Northwest Passage: Comparing 2013 with 2019." Accessed 6 April 2022. https:/ / pame.is/ document-library/ pame-reports-new/ pame-ministerial-deliverables/ 2021-12th-arctic-council-ministerial-meeting-reykjavik-iceland/ 795-assr-3-shipping-in-the-northwest-passage-comparing-2013-to-2019/ file.

Arctic Council. "Declaration on the Establishment of the Arctic Council." Accessed 3 April 2022. https:/ / oaarchive.arctic-council.org/ bitstream/ handle/ 11374/ 85/ EDOCS-1752-v2-ACMMCA00_Ottawa_1996_Founding_Declaration.PDF?sequence=5&isAllowed=y.

Arctic Council. "The Programme of Russia's Chairmanship in the Arctic Council Presented to SPIEF Participants." Accessed 6 April 2022. https:/ / arctic-council.org/ news/ the-programme-of-russias-chairmanship-in-the-arctic-council-presented-to-spief-participants/

Arctic Today. "Canada would be supportive of Sweden and Finland joining NATO, says Trudeau." Accessed 23 April 2022. https:/ / www.arctictoday.com/ canada-would-be-supportive-of-sweden-and-finland-joining-nato-says-trudeau/ .

Arctic Today. "Finland, Sweden could decide together on NATO ties." Accessed 28 April 2022. https:/ / www.arctictoday.com/ finland-sweden-could-decide-together-on-nato-ties/ ?utm_source=rss&utm_medium=rss&utm_campaign=finland-sweden-could-decide-together-on-nato-ties.

Arctic Today. "Why Putin faces more NATO in the Arctic after Russia's invasion of Ukraine." Accessed 22 April 2022. https:/ / www.arctictoday.com/ why-putin-faces-more-nato-in-the-arctic-after-russias-invasion-of-ukraine/ .

Arctic Today. "Russia warns of nuclear, hypersonic deployment if Sweden and Finland join NATO." Accessed 22 April 2022. https:/ / www.arctictoday.com/ russia-warns-of-nuclear-hypersonic-deployment-if-sweden-and-finland-join-nato/ .

Åtland, Kristian. "Interstate Relations in the Arctic: An Emerging Security Dilemma?" *Comparative Strategy* 33, no. 2 (2014): 145-166.

Auerswald, David P. "Geopolitical Icebergs." *Proceedings* 141 no. 12 (December 2015): 18-23.

Auerswald, David. "NATO in the Arctic: Keep its Role Limited, For Now." Accessed 25 April 2022. https:/ / warontherocks.com/ 2020/ 10/ nato-in-the-arctic-keep-its-role-limited-for-now/ .

Barents Observer. "Isolated Russia says it will invite 'non-Arctic' states to develop its North." Accessed 20 April 2022. https:/ / thebarentsobserver.com/ en/ arctic/ 2022/ 04/ isolated-russia-says-it-will-invite-non-arctic-states-develop-its-north.

Bercuson, David J. "Canada's Sovereignty: The Threats of a New Era." Accessed 8 November 2021. https:/ / www.cgai.ca/ canadas_sovereignty_the_threats_of_a_ new_era.

Bildt, Carl. "NATO's Nordic Expansion." Accessed 28 April 2022. https:/ / www.foreignaffairs.com/ articles/ europe/ 2022-04-26/ natos-nordic-expansion.

Blatchford, Andy. "Top Trudeau adviser: Canada's defense blueprint 'overtaken by events.'" Accessed 29 April 2022. https:/ / www.politico.com/ news/ 2022/ 03/ 11/ canada-defense-strategy-needs-update-00016262.

Borgerson, Scott G. "Arctic Meltdown." Accessed 3 April 2022. https:/ / www.foreignaffairs.com/ articles/ arctic-antarctic/ 2008-03-02/ arctic-meltdown.

Boudreau, Brett. "Re-imagining Canadian defence and security." Accessed 10 April 2022. https:/ / policyoptions.irpp.org/ magazines/ re-imagining-canadian-defence-and-security/ .

Brands, Hal. "The Eurasian Nightmare: Chinese-Russian Convergence and the Future of American Order." Accessed 3 April 2022. https:/ / www.foreignaffairs.com/ articles/ china/ 2022-02-25/ eurasian-nightmare.

Braw, Elisabeth. "The NATO Accession Sweden Never Saw Coming." Accessed 28 April 2022. https:/ / foreignpolicy.com/ 2022/ 04/ 29/ sweden-finland-nato-ukraine-russia/ .

Broadhead, Lee-Anne. "Canadian Sovereignty versus Northern Security: The Case for Updating Our Mental Map of the Arctic." *International Journal* 65, no. 4 (December 2010): 913-930.

Brun, James. "A Modern Canadian Submarine Force." Joint Command and Staff Program Paper, Canadian Forces College, 2021.

Buchanan, Elizabeth. "Cool change ahead? NATO's Strategic Concept and the High North." Accessed 28 April 2022. https:/ / www.ndc.nato.int/ news/ news.php?icode=1680.

Byers, Michael. "Cold peace." *International Journal* (Autumn 2010): 899-912.

Byers, Michael, and Nicole Covey. "Arctic SAR and the 'Security Dilemma.'" *International Journal* 74, no. 4 (December 2019): 499-517.

Byers, Michael, and Stewart Webb. "Titanic Blunder, Arctic/ Offshore Patrol Ships on Course for Disaster." Canadian Centre for Policy Alternatives (April 2013). https:/ / policyalternatives.ca/ sites/ default/ files/ uploads/ publications/ National%20Office/ 2013/ 04/ Titanic_Blunder_0.pdf.

Canada, Canada Energy Regulator. "Offshore Drilling." Last modified 29 September 2020. https:/ / www.cer-rec.gc.ca/ en/ about/ north-offshore/ offshore-drilling.html.

Canada, Canada Energy Regulator. "Review of Offshore Drilling in the Canadian Arctic." Last modified 16 September 2021. https:/ / www.cer-rec.gc.ca/ en/ about/ north-offshore/ archive/ publication/ arctic-offshore-drilling-review/ 2011-final-report/ index.html.

Canada, Department of National Defence. "Strong, Secure, Engaged - Canada's Defence Policy." Accessed 20 April 2022. http:/ / epe.lac-bac.gc.ca/ 100/ 201/ 301/ weekly_acquisitions_list-ef/ 2017/ 17-23/ publications.gc.ca/ collections/ collection_2017/ mdn-dnd/ D2-386-2017-eng.pdf.

Canada, Department of National Defence. "Joint Statement on NORAD Modernization." Last modified 14 August 2021. https:/ / www.canada.ca/ en/ department-national-defence/ news/ 2021/ 08/ joint-statement-on-norad-modernization.html.

Canada, Department of National Defence. "Quantum S&T Strategy: Preparing for Technological Disruptions in the Future Operating Environment." Accessed 9 April 2022. https:/ / www.canada.ca/ content/ dam/ dnd-mdn/ documents/ reports/ DGM-61120-DD8_DNDCAF_QuantumSTStrategy_EN_v3.pdf.

Canada, Department of National Defence. "Government of Canada announces contract award to the University of Waterloo for research and development in support of Arctic surveillance." Last modified 12 April 2018. https:/ / www.canada.ca/ en/ department-national-defence/ news/ 2018/ 04/ government-of-canada-announces-contract-award-to-the-university-of-waterloo-for-research-and-development-in-support-of-arctic-surveillance0.html.

Canada, Defence Research and Development Canada. "All Domain Situational Awareness Science and Technology Program." Last modified 12 February 2018. https:/ / www.canada.ca/ en/ defence-research-development/ programs/ all-domain-situational-awareness-program.html.

Canada, Environment and Climate Change. "Sea Ice in Canada." Last modified 24 February 2021. https:/ / www.canada.ca/ en/ environment-climate-change/ services/ environmental-indicators/ sea-ice.html.

Canada, Global Affairs. "Canada's Arctic Foreign Policy." Last modified 12 May 2017. https:/ / www.international.gc.ca/ world-monde/ international_relations-relations_internationales/ arctic-arctique/ arctic_policy-canada-politique_arctique.aspx?lang=eng.

Canada, Global Affairs. "Canada and the Circumpolar Regions." Last modified 28 October 2021. https:/ / www.international.gc.ca/ world-monde/ international_relations-relations_internationales/ arctic-arctique/ index.aspx?lang=eng.

Canada, House of Commons. "Nation-Building at Home, Vigilance Beyond: Preparing for the Coming Decades in the Arctic. Report on the Standing Committee on Foreign Affairs and International Development." Accessed 23 March 2022. https:/ / www.ourcommons.ca/ Content/ Committee/ 421/ FAAE/ Reports/ RP10411277/ faaerp24/ faaerp24-e.pdf.

Canada, Indigenous Relations and Northern Affairs. "Arctic Offshore Oil and Gas." Last modified 4 October 2018. https:/ / www.rcaanccirnac.gc.ca/ eng/ 1535571547022/ 1538586415269.

Canada, Indigenous Relations and Northern Affairs. "Canada's Arctic and Northern Policy Framework." Last modified 18 November 2019. https:/ / www.rcaanccirnac.gc.ca/ eng/ 1560523306861/ 1560523330587#s3.

Canada, Indigenous Relations and Northern Affairs. "Arctic and Northern Policy Framework: Safety, security, and defence chapter." Last modified 10 September 2019. https:/ / www.rcaanc-cirnac.gc.ca/ eng/ 1562939617400/ 1562939658000.

Canada, Indigenous Relations and Northern Affairs. "Arctic and Northern Policy Framework International Chapter." Last modified 22 October 2019. https:/ / www.rcaanc-cirnac.gc.ca/ eng/ 1562867415721/ 1562867459588.

Canada, Royal Canadian Navy. "New sonar system tested aboard Harry DeWolf." Last modified 6 December 2021. http:/ / www.navy-marine.forces.gc.ca/ en/ news-operations/ news-view.page?doc=new-sonar-system-tested-aboard-harry-dewolf/ kwewgonf.

Canada, Royal Canadian Navy. "Canada in a New Maritime World: Leadmark 2050." Accessed 23 March 2022. http:/ / navy-marine.forces.gc.ca/ assets/ NAVY_Internet/ docs/ en/ rcn_leadmark-2050.pdf.

Canada, Senate. "Report on the Standing Senate Committee on National Security and Defence (May 2017)." Accessed 3 April 2022. https:/ / sencanada.ca/ content/ sen/ committee/ 421/ SECD/ reports/ SECDDPRReport_FINAL_e.pdf.

Canadian Broadcasting Corporation. “Canada should do more to protect Arctic sovereignty: Layton.” Last modified 6 August 2007. https:/ / www.cbc.ca/ news/ canada/ north/ canada-should-do-more-to-protect-arctic-sovereignty-layton-1.690482.

Canadian Broadcasting Corporation. “Canadian Military Developing Surveillance System to Monitor Arctic Waters.” Accessed 10 April 2022. https:/ / www.cbc.ca/ news/ canada/ north/ cause-array-drdc-test-1.4232348.

Canadian Broadcasting Corporation. “What Russia’s $300B investment in Arctic oil and gas means for Canada.” Accessed 3 April 2022. https:/ / www.cbc.ca/ news/ canada/ north/ russian-arctic-oil-and-gas-explained-1.5462754.

Canadian Naval Review. “The Admiral’s View of the Arctic and Offshore Patrol Ships.” Accessed 12 April 2022. http:/ / www.navalreview.ca/ 2012/ 02/ the-admirals-view-of-the-arctic-and-offshore-patrol-ship/ .

Center for Strategic and International Studies. “China Launches the Polar Silk Road.” Accessed 20 March 2022. https:/ / www.csis.org/ analysis/ china-launches-polar-silk-road.

Charron, Andrea, and James Fergusson. *Beyond NORAD and Modernization to North American Defence Evolution*. Calgary: Canadian Global Affairs Institute, 2017.

Charron, Andrea. “NORAD’s Maritime Warning Mission: The Most Overlooked, Yet Critically Important Mission for the Foreseeable Future.” *Canadian Naval Review*. Accessed 3 April 2022. https:/ / www.navalreview.ca/ 2020/ 06/ norads-maritime-warning-mission-the-most-overlooked-yet-critically-important-mission-for-the-foreseeable-future/ ?utm_source=rss&utm_medium=rss&utm_campaign=norads-maritime-warning-mission-the-most-overlooked-yet-critically-important-mission-for-the-foreseeable-future.

Charron, Andrea. “NATO and The Geopolitical Future of the Arctic.” Accessed 22 April 2022. https:/ / arcticyearbook.com/ arctic-yearbook/ 2020/ 2020-briefing-notes/ 363-nato-and-the-geopolitical-future-of-the-arctic.

Charron, Andrea. “NATO, Canada and the Arctic.” Accessed 22 April 2022. https:/ / www.cgai.ca/ nato_canada_and_the_arctic.

Charron, Andrea, and James Fergusson. “NORAD’s Maritime Warning Role: Origins and Future.” *Canadian Naval Review* 17, no. 2 (Autumn 2021): 10-14.

China, State Council. “China’s Arctic Policy.” Accessed 20 April 2022. http:/ / english.www.gov.cn/ archive/ white_paper/ 2018/ 01/ 26/ content_281476026660336.htm.

Coffey, Luke and Daniel Kochis. "NATO Summit 2021: The Arctic Can No Longer Be an Afterthought." Accessed 22 April 2022. https:/ / www.heritage.org/ defense/ report/ nato-summit-2021-the-arctic-can-no-longer-be-afterthought.

Collins, Jeffrey F. "Towards a Renewed Canadian Submarine Capability." Accessed 20 March 2022. https:/ / www.navalassoc.ca/ wp-content/ uploads/ 2020/ 09/ Collins-Submarine-Capabilities.pdf.

Collins, Jeffrey F. "Without plan for new submarines Canada faces defence gap in the Arctic." Accessed 20 March 2022. https:/ / nationalpost.com/ opinion/ jeffrey-f-collins-without-plan-for-new-submarines-canada-faces-defence-gap-in-the-arctic.

Collins, Jeffrey. "On the Arctic Watch: Why we need to protect Canada's sovereignty and security in the Far North." Accessed 3 April 2022. https:/ / macdonaldlaurier.ca/ what-we-need-vs-what-we-have-assessing-canadas-defence-capabilities-in-the-arctic-jeff-collins-for-inside-policy/ .

Conley, Heather A. "The Arctic Spring." Accessed 3 April 2022. https:/ / www.foreignaffairs.com/ articles/ commons/ 2019-09-24/ arctic-spring.

Dean, Ryan, and P. Whitney Lackenbauer. "Geostrategy and Canadian Defence: From C.P. Stacey to a Twenty-First Century Arctic Threat Assessment." *Journal of Military and Strategic Studies* 20, no. 1: 33-96.

Defense News. "NATO is the right forum for security dialogue in the High North." Accessed 22 April 2022. https:/ / www.defensenews.com/ opinion/ commentary/ 2020/ 07/ 28/ nato-is-the-right-forum-for-security-dialogue-in-the-high-north/ .

Dolata, Petra. "A Global Arctic? Chinese Aspirations in the North." Accessed 20 April 2022. https:/ / www.cgai.ca/ a_global_arctic_chinese_aspirations_in_the_north.

"Arctic Stability and Climate Change." *Defence Deconstructed*, 15 October 2021. https:/ / www.cgai.ca/ arctic_stability_and_climate_change.

"A Pan-Domain Approach to North American Defence." *Defence Deconstructed*, 17 December 2021. https:/ / www.cgai.ca/ a_pan_domain_approach_to_north_american_defence.

"Security Management in the Arctic." *Defence Deconstructed*, 11 September 2020. https:/ / www.cgai.ca/ security_management_in_the_arctic.

European Parliament. "Fisheries Management and the Arctic in the Context of Climate Change." Accessed 7 April 2022. https:/ / www.europarl.europa.eu/ RegData/ etudes/ STUD/ 2015/ 563380/ IPOL_STU(2015)563380_EN.pdf.

Eurasian Times. "Russia Warns NATO of Clashes in Arctic; Says Accession of Sweden and Finland to US-led Military Block Wil Worsen Situation." Accessed 22 April 2022. https:/ / eurasiantimes.com/ russia-warns-nato-of-clashes-in-arctic-says-accession-of-sweden-finland/ .

Eyes on the Arctic. "Report: Finland and Sweden joining NATO would increase security in the Baltic Sea region." Accessed 20 April 2022. https:/ / www.rcinet.ca/ eye-on-the-arctic/ 2022/ 04/ 13/ report-finland-and-sweden-joining-nato-would-increase-security-in-the-baltic-sea-region/ .

Geddert, Jeremy Seth. "Right of (Northwest) Passage: Toward a Responsible Canadian Arctic Sovereignty." *Canadian Journal of Political Science* 52 (3): 595–612.

Greaves, Wilfrid. "Climate Change and Security in Canada." *International Journal: Canada's Journal of Global Policy Analysis* 76, no. 2: 183–203.

Greaves, Wilfrid. "As Russia upends the global order, Canada must secure the Arctic." Accessed 1 April 2022. https:/ / www.nationalobserver.com/ 2022/ 03/ 23/ opinion/ russia-upends-global-order-canada-must-secure-arctic.

Greaves, Wilfrid, and P. Whitney Lackenbauer, eds. *Breaking Through: Understanding Sovereignty and Security in the Circumpolar Arctic*. Toronto: University of Toronto Press, 2021.

Hall, Matthew. "A new Cold War: mining geopolitics in the Arctic circle." Accessed 3 April 2022. https:/ / www.mining-technology.com/ analysis/ a-new-cold-war-mining-geopolitics-in-the-arctic-circle/ .

Headland, R.K., and colleagues. *Transits of the Northwest Passage to the end of the 2020 Navigation Season, Atlantic Ocean – Arctic Ocean – Pacific Ocean*. Scott Polar Research Institute, University of Cambridge, Cambridge, UK, 7 April 2021.

Huebert, Rob. "The Arctic and the Strategic Defence of North America: Resumption of the 'Long Polar Watch.'" in *North American Strategic Defense in the 21st Century*, edited by Christian Leuprecht, Joel J. Sokolsky and Thomas Hughes, 174–186. New York: Springer International Publishing, 2018.

Huebert, Rob, and P. Whitney Lackenbauer. "Debating Arctic Security, Selected Writings 2010-2021." North American and Arctic Defence and Security Network. Accessed 20 March 2022. https://www.naadsn.ca/wp-content/uploads/2021/11/DebatingArcticSecurity-RH-PWL-nov2021.pdf.

Intergovernmental Panel on Climate Change. "Polar Regions — Special Report on the Ocean and Cryosphere in a Changing Climate." Accessed 10 April 2022. https:/ / www.ipcc.ch/ srocc/ chapter/ chapter-3-2/ .

Intergovernmental Panel on Climate Change. "Sixth Assessment Report Regional Fact Sheets - Polar." Accessed 10 April 2022. https:/ / www.ipcc.ch/ report/ ar6/ wg1/ downloads/ factsheets/ IPCC_AR6_WGI_Regional_Fact_Sheet_Polar_regions.pdf.

Intergovernmental Panel on Climate Change. "Sixth Assessment Report Summary for Policymakers." Accessed 10 April 2022. https:/ / www.ipcc.ch/ report/ ar6/ wg1/ #SPM.

James, Carolyn C., and Patrick James. 2014. "Canada, the United States and Arctic Sovereignty: Architecture Without Building?" *American Review of Canadian Studies* 44, no. 2: 187–204.

Johnson, Benjamin T., "Sensing the Arctic: Situational Awareness and the Future of Northern Security." *International Journal* 76, no. 3 (September 2021): 404-426.

Khorrami, Nima and Andreas Raspotnik. "Great Power Competition is Coming for the Arctic. NATO Should Prepare." Accessed 3 April 2022. https:/ / www.worldpoliticsreview.com/ articles/ 30434/ for-nato-russia-ukraine-war-forecasts-tensions-in-the-arctic.

Krauthammer, Charles. "The Unipolar Moment." Accessed 3 April 2022. https:/ / www.foreignaffairs.com/ articles/ 1990-01-01/ unipolar-moment.

Kremlin, President of Russia. "Joint Statement of the Russian Federation and the People's Republic of China on the International Relations Entering a New Era and the Global Sustainable Development." Accessed 20 April 2022. http:/ / en.kremlin.ru/ supplement/ 5770.

Lackenbauer, P. Whitney. "Policy Brief: Threats Through, To, and in the Arctic: A Framework for Analysis." Accessed 28 April 2022, https://www.naadsn.ca/wp-content/uploads/2021/03/Lackenbauer_Threats-Through-To-and-In-the-Arctic.pdf.

Lackenbauer, P. Whitney. "Indigenous Communities are at the Heart of Canada's North." *Journal of Military and Strategic Studies* 19, no. 2: 157-192.

Lackenbauer, P Whitney, and Heather Nicol. *Whole of Government through an Arctic Lens*. Antigonish: Mulroney Institute of Government, St. Francis Xavier University, 2017.

Lackenbauer, P. Whitney, and Peter Kikkert. "Archipelagic Analogues? Indonesian Baselines, Canadian Arctic Sovereignty, and the Framing of Mental Maps, 1957–62." *International Journal of Canadian Studies* 50 (January): 227–252.

Lackenbauer, P. Whitney, and Peter Kikkert. "An Important International Crossroads: Implementing Canada's Arctic Priorities in *Strong, Secure, Engaged."* Report from Centre for National Security Studies, Canadian Forces College, Ottawa, 10-11 October 2018.

Lackenbauer, P. Whitney, and Adam Lajeunesse. "The Canadian Armed Forces in the Arctic: Building Appropriate Capabilities." *Journal of Military & Strategic Studies* 16, no. 4: 7-66.

Lackenbauer, P. Whitney, Adam Lajeunesse, James Manicom, and Frédéric Lasserre. *China's Arctic Ambitions, and What They Mean for Canada*. Calgary: University of Calgary Press, 2018.

Lajeunesse, Adam. *The Canadian Armed Forces in the Arctic: Purpose, Capabilities, and Requirements*. Canadian Defence and Foreign Affairs Institute, 2015.

Lajeunesse, Adam, and Rob Huebert. "Preparing for the next Arctic Sovereignty Crisis: The Northwest Passage in the Age of Donald Trump." *International Journal: Canada's Journal of Global Policy Analysis* 74, no. 2: 225–239.

Lajeunesse, Adam, and Whitney Lackenbauer. "Canadian Arctic Security: Russia's Not Coming." Accessed 12 April 2022. https:/ / opencanada.org/ canadian-arctic-security-russias-not-coming/ .

Lajeunesse, Adam. "Finding 'Win-Win': China's Arctic Policy and What It Means for Canada." Accessed 3 April 2022. https:/ / www.cgai.ca/ finding_win_win_chinas_arctic_policy_and_what_it_means_for_canada.

Lajeunesse, Adam. "Unarmed Warships: What Are the AOPS For?" Accessed 20 April 2022. https:/ / www.cgai.ca/ unarmed_warships_what_are_the_aops_for.

Lajeunesse, Adam. "Consider the Significant and Rapid Changes to the Arctic and the Impacts on Original Inhabitants." Accessed 3 April 2022. https:/ / www.cgai.ca/ consider_the_significant_and_rapid_changes_to_the_arctic_and_the_impacts_on_original_inhabitants.

Lajeunesse, Adam. "Polar Silk Road: Deconstructing Chinese Ambitions in the North.' Accessed 3 April 2022. https:/ / cdainstitute.ca/ adam-lajeunesse-polar-silk-road-deconstructing-chinese-ambitions-in-the-north/ .

Lanteigne, Marc. "The changing shape of Arctic security." Accessed 23 April 2022. https:/ / www.nato.int/ docu/ review/ articles/ 2019/ 06/ 28/ the-changing-shape-of-arctic-security/ index.html.

Lawrence, Quil. "NATO troops conducted a routine war exercise in the Arctic This year felt different." Accessed 23 April 2022. https:/ / www.npr.org/ 2022/ 04/ 15/ 1091492248/ nato-arctic-war-game-had-a-cold-war-feel.

Leuprecht, Christian, Joel J. Sokolsky, and Thomas Hughes. "The Strategic Defense of North America in the 21st Century." In *North American Strategic Defense in the 21st Century:*, edited by Christian Leuprecht, Joel J. Sokolsky, and Thomas Hughes, 189–193. New York: Springer International Publishing, 2018.

MacDonald, Adam P. "Becoming an 'Arctic-Capable' Navy: Not Just the Arctic and Offshore Patrol Ship." Canadian Military Journal 22, no. 2 (Spring 2022): 6-16.

Melino, Matthew and Heather A. Conley. "The Ice Curtain: Russia's Arctic Military Presence." Accessed 22 April 2022. https:/ / www.csis.org/ features/ ice-curtain-russias-arctic-military-presence.

Millard, Bryan J.R. and P. Whitney Lackenbauer. "Trojan Dragons? Normalizing China's Presence in the Arctic." Accessed 1 November 2021. https:/ / www.cgai.ca/ trojan_dragons_normalizing_chinas_presence_in_the_arctic.

Mudryk, Lawrence R., Jackie Dawson, Stephen E.L. Howell, Chris Derksen, Thomas A. Zagon, and Mike Brady. "Impact of 1, 2 and 4º C of global warming on ship navigation in the Canadian Arctic." *Nature Climate Change* 11 (August 2021): 673-679.

National Post. "Declaring Itself a 'near-Arctic State,' China to Build a 'Polar Silk Road' off Canada's North." Accessed 6 November 2021. https:/ / nationalpost.com/ news/ canada/ declaring-itself-a-near-arctic-state-china-to-drive-a-polar-silk-road-off-canadas-north.

National Post. "Liberal budget is vague on greater defence spending amid Ukraine war, pending 'review.'" Accessed 29 April 2022. https:/ / nationalpost.com/ news/ politics/ defence-spending-federal-budget-2022-01.

Newsweek. "Russian Defense Minister Threatens Response if Sweden and Finland Join NATO." Accessed 22 April 2022. https:/ / www.newsweek.com/ russian-defense-minister-threatens-response-if-sweden-finland-join-nato-1040806.

Nolin, Mathieu. "Heated Conflict over the Northwest Passage: Is Canada's Sovereignty Melting Away?" *Journal of Maritime Law & Commerce* 48, no. 3 (July 2017): 341-364.

North American and Arctic Defence and Security Network. "Understanding the Future Arctic Security Environment: Applying NATO Strategic Foresight Analysis to

Canadian Arctic Defence and Security 2020." Accessed 22 March 2022. https:/ / www.naadsn.ca/ wp-content/ uploads/ 2021/ 01/ NAADSN-Arctic-Strategic-Foresight-Analysis-WEB-Final-2020.pdf.

North American and Arctic Defence and Security Network. "A Comparison of Strategies and Policies of the Eight Arctic States." Accessed 23 March 2022. https:/ / www.naadsn.ca/ wp-content/ uploads/ 2021/ 11/ Arctic-Strategies.pdf.

North Atlantic Treaty Organization. "NATO 2030: United for a New Era." Accessed 25 April 2022. https:/ / www.nato.int/ nato_static_fl2014/ assets/ pdf/ 2020/ 12/ pdf/ 201201-Reflection-Group-Final-Report-Uni.pdf.

North Atlantic Treaty Organization. "NATO standing naval forces participate in the 50th iteration of Exercise BALTOPS." Accessed 22 April 2022. https:/ / mc.nato.int/ media-centre/ news/ 2021/ nato-standing-naval-forces-participate-in-the-50th-iteration-of-exercise-baltops.

North Atlantic Treaty Organization. "Exercise Cold Response 2022 – NATO and partner forces face the freeze in Norway." Accessed 10 April 2022. https:/ / www.nato.int/ cps/ en/ natohq/ news_192351.htm.

North Atlantic Treaty Organization. "Strategic Foresight Analysis, 2017 Report." Accessed 20 March 2022. https:/ / www.act.nato.int/ images/ stories/ media/ doclibrary/ 171004_sfa_2017_report_hr.pdf.

Oddleifson, Evan, Tom Alton, and Scott N. Romaniuk. "China in the Canadian Arctic: Context, Issues, and Considerations for 2021 and Beyond." Accessed 9 November 2021. https:/ / www.ualberta.ca/ china-institute/ research/ analysis-briefs/ 2021/ arctic_analysis_brief.html.

Ottawa Citizen. "DND says it can still meet a 2014 delivery date for the Canadian Navy's Arctic 'Frankenboat.'" Last modified 2 December 2009. https:/ / ottawacitizen.com/ news/ national/ defence-watch/ dnd-says-it-can-still-meet-a-2014-delivery-date-for-the-canadian-navys-arctic-frankenboat.

Purdy, Margaret, and Leanne Smythe. "From Obscurity to Action: Why Canada Must Tackle the Security Dimensions of Climate Change." *International Journal: Canada's Journal of Global Policy Analysis* 65, no. 2: 411–433.

Raymond, Camille and Marco Munier. "Continental Defence Modernization and the Future of Canadian Defence Policy." Accessed 3 April 2022. https:/ / ras-nsa.ca/ continental-defence-modernization-and-the-future-of-canadian-defence-policy/ .

Royal Canadian Navy, Director General Naval Force Development. "Arctic/ Offshore Patrol Ship Concept of Employment." 12 January 2011.

Royal Canadian Navy, Director General Naval Force Development. "Victoria Class Submarine Recapitalization Strategy 2022." 16 February 2022.

Rumer, Eugene, Richard Sokolsky, and Paul Stronski. "Russia in the Arctic – A Critical Examination." Accessed 3 April 2022. https:/ / carnegieendowment.org/ 2021/ 03/ 29/ russia-in-arctic-critical-examination-pub-84181.

Sens, Allen. "Canada's New Defence Policy and the Security of North America." in *North American Strategic Defense in the 21st Century:*, ed Christian Leuprecht, Joel J. Sokolsky, and Thomas Hughes, 108–121. New York: Springer International Publishing, 2018.

Soroka, George. "Putin's Arctic Ambitions." Accessed 3 April 2022. https:/ / www.foreignaffairs.com/ articles/ russia-fsu/ 2016-05-05/ putins-arctic-ambitions.

Spivak, Vita and Alexander Gabuev. "The Ice Age: Russia and China's Energy Cooperation in the Arctic." Accessed 3 April 2022. https:/ / carnegiemoscow.org/ commentary/ 86100.

Sukhankin, Sergey. "Russia and the Arctic in an Era of Strategic Competition." Accessed 7 April 2022. https:/ / www.naadsn.ca/ wp-content/ uploads/ 2021/ 08/ Sukhankin-Russia-Arctic.pdf.

Tallis, Joshua. "For a Biden Arctic Agenda, Look to Governance." Accessed 3 April 2022. https:/ / foreignpolicy.com/ 2021/ 02/ 16/ biden-arctic-agenda-china-climate-governance/ .

The Strategy Bridge. "Establishing an Arctic Security Institution: Essentials from NORAD and NATO." Accessed 3 April 2022. https:/ / thestrategybridge.org/ the-bridge/ 2020/ 3/ 3/ establishing-an-arctic-security-institution-essentials-from-norad-and-nato.

Teeple, Nancy, and Ryan Dean, eds. *Shielding North America: Canada's Role in NORAD Modernization*. North American and Arctic Defence and Security Network Engage Series no. 4, 2021.

United States of America, Department of State. "Joint Statement on Arctic Council Cooperation Following Russia's Invasion of Ukraine." Accessed 3 April 2022. https:/ / www.state.gov/ joint-statement-on-arctic-council-cooperation-following-russias-invasion-of-ukraine/ .

United States Energy Information Administration. "Arctic oil and natural gas resources." Accessed 12 April 2022. https:/ / www.eia.gov/ todayinenergy/ detail.php?id=4650#:~:text=The%20Arctic%20holds%20an%20estimated,U.S.%20Geological%20Survey%20(USGS).

Vanguard. “The Capabilities and Challenges of Canada’s Future Fleet.” Accessed 3 April 2022. https:/ / vanguardcanada.com/ the-capabilities-and-challenges-of-canadas-future-fleet/ .

Villalobos, Fabian. “As U.S. Shifts Arctic Strategy to Counter Russia, Allies Offer Valuable Info.” Accessed 3 April 2022. https:/ / www.rand.org/ blog/ 2021/ 09/ as-us-shifts-arctic-strategy-to-counter-russia-allies.html.

Weislander, Anna. “NATO Must Engage in the Arctic.” Accessed 22 April 2022. https:/ / www.defenseone.com/ ideas/ 2019/ 09/ its-time-nato-arctic/ 159887/ .

Wilson Center. “Canada’s Arctic and Northern Policy Framework.” Accessed 22 April 2022. https:/ / www.wilsoncenter.org/ event/ canadas-arctic-and-northern-policy-framework.

Wright, David Curtis. “The Dragon and Great Power Rivalry at the Top of the World: China’s Hawkish, Revisionist Voices Within Mainstream Discourse on Arctic Affairs.” Accessed 8 November 2021. https:/ / www.cgai.ca/ the_dragon_and_great_power_rivalry_at_the_top_of_the_world.