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ARCTIC AWARENESS: A COMPLEX PROBLEM

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By Lieutenant-Commander Jason Knowles

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ARCTIC AWARENESS: A COMPLEX PROBLEM

AIM

1. Canada is a large and diverse country, full of inhospitable and hard to reach areas. Nowhere is this truer than in the Canadian Arctic. The Arctic represents nearly 40% of Canadian territory, an area roughly the same size as India, however less than 1% of our population resides there¹, making it one of the least dense regions in the world. Maintaining appropriate Arctic regional situational awareness is a difficult and complex task, but also extremely important given the increasing use of the area and Canada's responsibility to maintain safety and security through rules-based order² for transit, tourism, and natural resource exploitation³. This service paper will examine what capabilities the Royal Canadian Navy (RCN) requires in order to attain and contribute to situational awareness in the Arctic, which will feed into the larger Canadian Armed Forces (CAF) and Government of Canada (GOC) common operating picture.

INTRODUCTION

2. What is situational awareness? It is a commonly used, but seldom defined term, found throughout military documents. Albert A. Nofi in *Defining and Measuring Shared Situational Awareness* compiled several fragmented definitions including “a relevant picture distributed evenly,” “information superiority,” and “provides a clear and accurate common picture of battlespace to commanders at all levels⁴”. Drawing from these definitions, this paper will use the term situational awareness (SA) as a tool to gather, communicate, and analyze information. As it relates to the role of the RCN/CAF in maintaining Arctic SA, the focus will be on the detection/tracking of vessels or maritime occurrences of interest, reporting this information, and finally coordinating the information in order for commanders to be able to act on it as needed. These principles are fully in line with the CAF policy of “detect, deter, and defend⁵” the Arctic as described in *Strong, Secure, Engaged*.

3. Naval, military, and government presence in the Arctic is minimal given the vastness of the region, making detection/tracking and reporting difficult. The introduction of Arctic Offshore Patrol Vessels (AOPVs) into RCN service along with the venerable Canadian Ranger force may be able to fill some of the detection deficiencies if enabled with the necessary tools. Once a contact is detected, that information must be reported in

¹ Global Affairs Canada, “Canada and the circumpolar Arctic,” last modified 30 December 2020, https://www.international.gc.ca/world-monde/international_relations-relations_internationales/arctic-arctique/index.aspx?lang=eng.

² Crown-Indigenous Relations and Northern Affairs Canada, “The Government of Canada Launches Co-Development Arctic and Northern Policy Framework,” last modified 10 September 2019, <https://www.canada.ca/en/crown-indigenous-relations-northern-affairs/news/2019/09/the-government-of-canada-launches-co-developed-arctic-and-northern-policy-framework.html>.

³ Special Senate Committee for the Arctic. *Northern Lights: A wake up call for the future of Canada*. (Ottawa: Government of Canada, 2019), 73.

⁴ Albert A. Nofi, *Defining and Measuring Shared Situational Awareness* (Alexandria: Center for Naval Analyses, 2000), 4-5.

⁵ Department of National Defence, *Strong Secure Engaged* (Ottawa: Government of Canada, 2017), 83.

order to be relevant. The Arctic presents unique communications problems not found anywhere else in Canada, however, linking together current available equipment along with the development of innovative communications technology may be a simple and possibly cost effective solution. Finally, once reported, the information must be coordinated. Maritime SA coordination in Canada is done through three Maritime Security Operation Centers (MSOCs), located in Victoria, Niagara, and Halifax⁶. With increasing interest and shipping in Canada's North, as well as the government's commitment to ensuring the safety and security of all those who live and pass through the region, the MSOC organization should be re-examined to ensure that it is best postured to meet these growing needs.

DISCUSSION

4. Currently the RCN deploys one to two naval vessels a year to the Arctic as part of Operation *Nanook*, "the CAFs signature Northern operation"⁷. This deployment is very limited owing to the restricted navigation season for non-ice strengthened vessels in the Arctic⁸. The AOPVs, which are beginning to enter RCN service, and are built to a Polar Class 5 standard, meaning they are capable of "year-round operation in medium first year ice"⁹, will greatly improve the RCN's ability to operate throughout the ice-covered waters of the Arctic. In addition to the AOPV's ice capabilities, they also have the facilities to embark a CH-148 Cyclone helicopter, a significant force multiplier for the ships. Given the limited range of the ship's surface search radar, nominally just beyond the visual horizon of 10-15 miles, the Cyclone will extend the surveillance range of the ships out hundreds of miles¹⁰; added importance given the difficulty radar can have in an archipelago like the Arctic and in the presence of ice.

5. Reporting is the next element in maintaining SA. In the case of the AOPVs and their embarked Cyclone helicopters, communicating information between them and beyond to the larger CAF Common Operating Picture (COP) is vital. The limitation of employing the Cyclone with an AOPV is the ship's lack of Tactical Data Link, commonly referred to as Link. Link is a communications system for passing real-time data¹¹ that would allow an AOPV to compile information from its sensors and that of the helicopter in order to create a COP for the area of the Arctic in which they are operating. As discussed by a senior officer with the JCSP cohort, the CAF has made the

⁶ Transport Canada, "Marine Security Operation Centers," last modified 23 September 2020, <https://tc.canada.ca/en/marine-transportation/marine-security/marine-security-operation-centres>.

⁷ Department of National Defence, "Operation NANOOK," last modified 1 October 2018, <https://www.canada.ca/en/departement-national-defence/services/operations/military-operations/current-operations/operation-nanook.html>.

⁸ Cdr Paul Forget, "Bridging the Gap: The Limitations of Pre-AOPS Operations in Arctic Waters," Canadian Naval Review 7, no. 4 (Winter 2012): 16-17.

⁹ Transport Canada, "Polar Classes," last modified 14 January 2010, <https://tc.canada.ca/en/marine-transportation/arctic-shipping/polar-classes>.

¹⁰ Department of National Defence, "Maritime Helicopter Project," last modified 21 July 2009, https://web.archive.org/web/20090902035911id_/http://www.forces.gc.ca/admmat/maritimehelicopterprojecctmhp-projetdhelicopteremaritimephm-eng.asp#fact.

¹¹ BAE Systems, "What is Link 16?," accessed 3 February 21, <https://www.baesystems.com/en-us/definition/what-is-link-16>.

establishment of a Command, Control, Communications, Computer, Intelligence, Surveillance, and Reconnaissance (C4ISR) spine a top priority¹². Link capability would allow AOPVs to connect to the C4ISR spine, which would connect their COP with the larger CAF/GOC COP, therefore much improving the SA in any region in which they are operating, including the Arctic.

6. Given the capabilities of the AOPV, the RCN's contribution to Arctic SA will greatly increase, however, given the vastness of the region, alternative and persistent means of maintaining SA should be developed as well. The backbone of the CAF's presence in the North is the Canadian Rangers. Ranger Patrols are located throughout the Arctic, in particular in coastal regions along key sea lines of communications, such as the Northwest Passage. Two of the main roles of the Rangers are to "report unusual activities or sighting and collect local data for the CAF¹³". Their unique knowledge of and persistent presence in the Arctic make Rangers well suited to detect and track maritime contacts, potentially contributing to greater regional SA. Following the First World War, the Royal Air Force (RAF) established the Royal Observers Corps (ROC) in order to act as the eyes and ears of the RAF, detecting and tracking aircraft that flew over Britain¹⁴. In the era prior to modern long-ranger radar, the ROC filled the gap, providing SA to the RAF so that they could direct forces as needed for the defence of Britain. The Arctic of today is not very different from Britain in the 1940s. The lack of long-range radar coverage in the region, coupled with the inability of the RCN to maintain a persistent presence, leaves potential gaps in Arctic SA. As one of the CAF's priorities is to "enhance the effectiveness of the Rangers¹⁵"; bestowing on them an increased role as a key element of Arctic maritime SA would meet that objective.

7. Again, like in the case of the AOPVs, reporting information collected by the Rangers is an essential component to maintaining Arctic SA. Most information relayed by Rangers is done using landline or satellite telephone communication, requiring verbal relay of data, often delaying and possibly degrading the information. Given the proliferation of smartphone technology, an application (app) could be developed to allow Rangers to more quickly communicate data, photos, and other potentially time sensitive information in near real-time. While cellular coverage in the Arctic has lagged behind the rest of Canada, many communities have 4G or better coverage and are projected to have 5G coverage in the near future¹⁶. The maps found in Annex A provide a quick comparison showing that many of the communities with Ranger Patrol have or will have cellular coverage and are located in key strategic points along the Northwest Passage and other Arctic waterways. This app would not only allow for the central reporting of information, it could also be used as a simplified means by which information could be passed between Ranger Patrols and other CAF units, such as AOPVs. The Israeli Defence Force, as part of their digital transformation, has launched an app that can be downloaded

¹² "Guest speaker presentation to JCSP 47," (presentation: Zoom, 16 December 2020).

¹³ Department of National Defence, "Canadian Rangers," last modified 28 January 2021, <http://www.army-armee.forces.gc.ca/en/canadian-rangers/index.page>.

¹⁴ Royal Observer Corps Association, "Heritage of the Corps," accessed 1 February 2021, <http://www.roc-heritage.co.uk/>.

¹⁵ Department of National Defence, *Strong Secure Engaged* (Ottawa: Government of Canada, 2017), 80.

¹⁶ Bell, "Coverage map," accessed 3 February 2021, https://www.bell.ca/Mobility/Our_network_coverage.

onto personal cellphones that allows for secure operational chat as a means by which information can be rapidly passed and disseminated as needed¹⁷. An app of this type in the hands of the capable Ranger Patrols would not only allow for greater SA in the Arctic, it would be fully in-step with strategic policies that call for digitization of the force, such as the RCN's *Digital Navy*¹⁸.

8. Coordination is the final element of SA. From a defence and security perspective, maritime SA in Canadian waters is coordinated by the three MSOCs. These multi-agency organizations bring together the Royal Canadian Mounted Police, Department of Fisheries and Oceans, Canadian Border Services Agency, Transport Canada, Canadian Coast Guard (CCG) and the CAF in order to gain access to the full spectrum of GOC resources should a security situation develop in the maritime domain¹⁹. Arctic SA is coordinated through MSOC East in Halifax. MSOC East is also responsible for the Atlantic approaches to Eastern Canada, the St. Lawrence Basin, as well as a portion of the St. Lawrence River. Included in Annex B is a map showing the areas of responsibility for all three MSOCs.

9. As already discussed, maintaining and coordinating Arctic SA is difficult and will become more so as traffic flow in the region increases. In a report published by MSOC East, they note that Arctic voyages are increasing at a rate of 37.8% over the last five years²⁰. The rapidly increasing amount of vessel traffic, when coupled with the unique concerns associated with maritime occurrences in the Arctic, such as emergency and environmental management situations, could become a recipe for disaster. An example where this might have been the case was the 2018 grounding of the vessel *Akademik loffe*. Had her sister ship not been there to assist with the rescue, it is unlikely that CAF or GOC resources dispatched from Southern Canada would have arrived in the North in time to render appropriate assistance²¹.

10. A dedicated Arctic MSOC would have had much better SA on the *Akademik loffe*'s location and the location of other ships in the region that may have been capable of providing assistance. An Arctic MSOC would not only be a coordination hub for maritime occurrences in the Arctic, it would also act as a Northern center of awareness and knowledge for maritime security matters. An MSOC with a dedicated focus on the North would allow for the strengthening of important regional partnerships, such as those with the Rangers²² and the CCG, and would send a strong message of Canada's

¹⁷ Zac Doffman, "Israeli Military Launches Radical New WhatsApp Alternative," *Forbes*, 14 November 2020, <https://www.forbes.com/sites/zakdoffman/2020/11/14/whatsapp-soundly-beaten-by-new-release-for-secure-apple-iphone-and-google-android-smartphones/>

¹⁸ Department of National Defence, *RCN Digital Navy* (Ottawa: Government of Canada, 2020), 9.

¹⁹ Transport Canada, "Marine Security Operation Centers," last modified 23 September 2020, <https://tc.canada.ca/en/marine-transportation/marine-security/marine-security-operation-centres>.

²⁰ Maritime Security Operations Center East, *2019 Arctic Shipping Statistics* (Halifax: Government of Canada, 2020), 11.

²¹ Katie Toth, "Investigators, experts ask questions after ship grounded in the Arctic," *CBC News*, 28 August 2018, <https://www.cbc.ca/news/canada/north/investigators-kugaaruk-nunavut-ship-run-aground-1.4801273>.

²² Department of National Defence, *Strong Secure Engaged* (Ottawa: Government of Canada, 2017), 80.

commitment to monitor and defend the critical sea lines of communications that run through the Arctic²³.

CONCLUSION

11. Arctic SA is a complex problem; however, the solutions need not be complicated, nor extravagant. In addressing each of the contributing factors to SA: detection/tracking, reporting, and coordination, this paper has charted a course for several partial solutions and a possible “system of system solutions²⁴” as is sought out through *Strong, Secure, Engaged*.

12. Through forward looking, long-range planning and continuous engagement with local residents, the RCN and the CAF are well situated to adapt their capabilities, which could rapidly improve Arctic SA. The AOPVs and Canadian Rangers hold the potential to cover wide swaths of the Arctic. Relatively small improvements to their capabilities and communications abilities would dramatically improve their ability to contribute to Arctic SA through detection/tracking and reporting. A clear signal that the CAF and the GOC are attentive to Arctic security and emergency response concerns would be the development of a dedicated Arctic MSOC. Such a facility would coordinate more effectively and with more focused information regarding maritime movements and occurrences throughout the Arctic, enabling decision makers the best possible data with which to act.

13. As Canada is committed to “strengthening the rules based international order in the Arctic²⁵,” it is key that the GOC is aware of what is happening in that vast and vital region. SA is the key to that commitment. Given the increased maritime interest in the North, the RCN has and will continue to have an increasingly important role in maintain that SA. Thus, they should look both inwardly at their own abilities, as well as outwardly at the abilities of their partners in the region at what must be done now to be ready for a future where the Arctic is a much busier and place.

²³ *Ibid*, 79.

²⁴ *Ibid*, 80.

²⁵ Crown-Indigenous Relations and Northern Affairs Canada, “The Government of Canada Launches Co-Development Arctic and Northern Policy Framework,” last modified 10 September 2019, <https://www.canada.ca/en/crown-indigenous-relations-northern-affairs/news/2019/09/the-government-of-canada-launches-co-developed-arctic-and-northern-policy-framework.html>.

RECOMMENDATIONS

14. This paper briefly outlined the difficulty in maintaining SA in the Canadian Arctic. In order to posture for anticipated future interest in the region, I believe the following recommendations would allow the RCN and the CAF a more diverse range of easily achievable options for maintaining Arctic SA:

- a. Work with the Canadian Rangers for the detection and tracking of vessels and maritime occurrences including:
 - (1) Develop training and procedures for vessel identification; and
 - (2) Develop improved communications capabilities in order to effect real-time communications, for example the launch of a secure app dedicated for this purpose.
- b. Improve AOPV communications and coordination capability by:
 - (1) Examining options to install Link capability in the class; and
 - (2) Improving the Link capability of the CH-148 Cyclone to allow real-time imagery to be passed to supporting ships.
- c. Examine the potential for the creation of a dedicated Arctic MSOC, seasonal or year-round.

Annexes:

Annex A – Comparative Maps of Ranger Patrol Locations and Cellular Network Coverage

Annex B – Map of MSOC Areas of Responsibility

BIBLIOGRAPHY

- BAE Systems. "What is Link 16?" Accessed 3 February 2021.
<https://www.baesystems.com/en-us/definition/what-is-link-16>.
- Bell. "Coverage map." Accessed 3 February 2021.
https://www.bell.ca/Mobility/Our_network_coverage.
- Crown-Indigenous Relations and Northern Affairs Canada. "The Government of Canada Launches Co-Development Arctic and Northern Policy Framework." Last modified 10 September 2019. <https://www.canada.ca/en/crown-indigenous-relations-northern-affairs/news/.2019/09/the-government-of-canada-launches-co-developed-arctic-and-northern-policy-framework.html>.
- Department of National Defence. "Canadian Rangers." Last modified 28 January 2021.
<http://www.army-armee.forces.gc.ca/en/canadian-rangers/index.page>.
- Department of National Defence. "Maritime Helicopter Project." Last modified 21 July 2009.
https://web.archive.org/web/20090902035911id_/http://www.forces.gc.ca/admma/t/maritimehelicopterprojectmhp-projetdhelicopteremaritimephm-eng.asp#fact.
- Department of National Defence. "Operation NANOOK." Last modified 1 October 2018.
<https://www.canada.ca/en/department-national-defence/services/operations/military-operations/current-operations/operation-nanook.html>.
- Department of National Defence. *RCN Digital Navy*. Ottawa: Government of Canada, 2020.
- Department of National Defence. *Strong Secure Engaged*. Ottawa: Government of Canada, 2017.
- Doffman, Zac. "Israeli Military Launches Radical New WhatsApp Alternative." *Forbes*. 14 November 2020.
<https://www.forbes.com/sites/zakdoffman/2020/11/14/whatsapp-soundly-beaten-by-new-release-for-secure-apple-iphone-and-google-android-smartphones/>
- Forget, Cdr Paul. "Bridging the Gap: The Limitations of Pre-AOPS Operations in Arctic Waters." *Canadian Naval Review* 7, no. 4 (Winter 2012): 16-20.
- Global Affairs Canada. "Canada and the circumpolar Arctic." Last modified 30 December 2020. https://www.international.gc.ca/world-monde/international_relations-relations_internationales/arctic-arctique/index.aspx?lang=eng.
- "Guest speaker presentation to JCSP 47." Presentation: Zoom, 16 December 2020.

- Maritime Security Operations Center East. *2019 Arctic Shipping Statistics*. Halifax: Government of Canada, 2020.
- Noñ, Albert A. *Defining and Measuring Shared Situational Awareness*. Alexandria: Center for Naval Analyses, 2000.
- Royal Observer Corps Association. "Heritage of the Corps," Accessed 1 February 2021. <http://www.roc-heritage.co.uk/>.
- Special Senate Committee for the Arctic. *Northern Lights: A wake up call for the future of Canada*. Ottawa: Government of Canada, 2019.
- Toth, Katie. "Investigators, experts ask questions after ship grounded in the Arctic." *CBC New*. 28 August 2018. <https://www.cbc.ca/news/canada/north/investgiators-kugaaruk-nunavut-ship-run-aground-1.4801273>.
- Transport Canada. "Marine Security Operation Centers." Last modified 23 September 2020. <https://tc.canada.ca/en/marine-transportation/marine-security/marine-security-operation-centres>.
- Transport Canada. "Polar Classes." Last modified 14 January 2010. <https://tc.canada.ca/en/marine-transportation/arctic-shipping/polar-classes>.

Annex A – Comparative Maps of Ranger Patrol Locations and Cellular Network Coverage

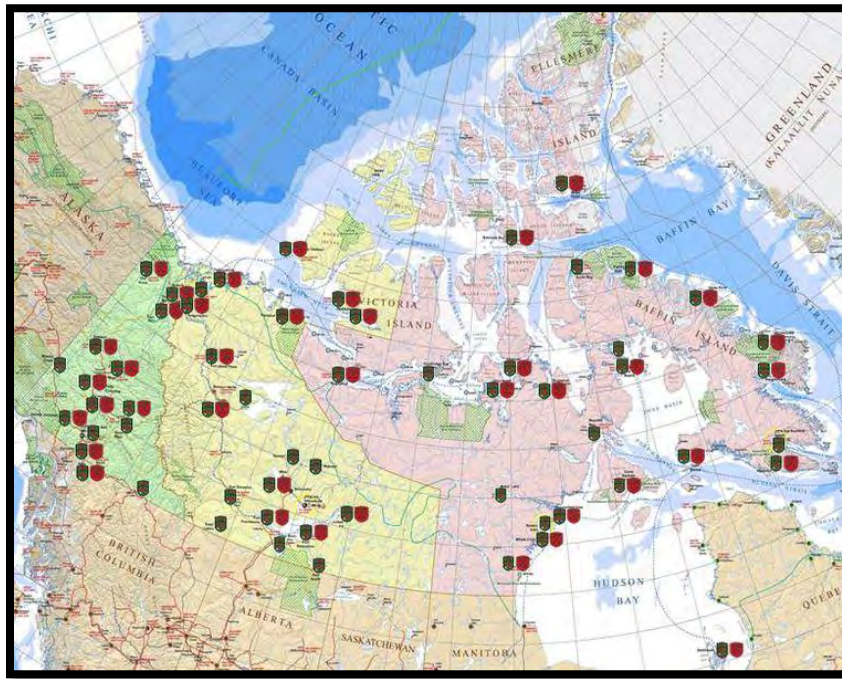


Figure A1 – Location of Canadian Ranger Patrol in the Arctic

Source: Canadian Army.

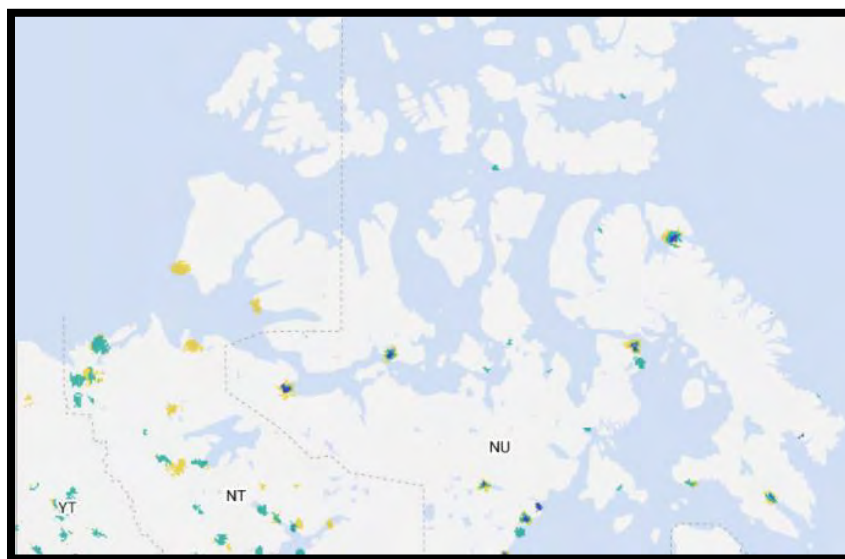


Figure A2 – Cellular Network Coverage in the Arctic

Source: Bell

Annex B – Map of MSOC Areas of Responsibility



Figure B1 – MSOC Areas of Responsibility

Source: MSOC East.