CANADIAN NAVAL REVIEW

VOLUME 17, NUMBER 3 (2022)

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Winning the Narrative Battle on the High Seas: A Warning for the RCN

Now is the Time for a New Canadian Defence Policy

Illumination for Concealment at Sea

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VOLUME 17, NO. 3 (2022)

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Today's Policy Questions, Tomorrow's Policy Leaders

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Canadian Naval Review is published by the Brian Mulroney Institute of Government at St. Francis Xavier University. It is a professional journal examining a wide range of maritime security issues from a Canadian perspective. In particular it focuses on strategic concepts, policies, operations, history and procurement of the Royal Canadian Navy, plus national security in general and marine/ocean affairs. This initiative brings together members of the Canadian defence and academic communities.

Canadian Naval Review has three primary objectives:

- provide a public forum for the discussion of the maritime dimension of Canada's national security;
- provide a public forum for the discussion of Canada's naval and maritime policies; and
- provide a source for the public examination of Canadian naval and maritime history and for the development of lessons learned.

The material included in *CNR* is presented for the professional and general education of the readers. Articles, commentaries and opinion pieces are invited from the widest possible spectrum for the purpose of informing, stimulating debate and generally challenging readers. **The opinions expressed by the authors do not necessarily reflect the opinions of the Editor, Editorial Board, Brian Mulroney Institute, the Department of National Defence, the Royal Canadian Navy or *CNR* sponsors.**

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Credit: James Charsley, Babcock Canada, via Royal Canadian Navy

*HMCS **Corner Brook** is moved out of the Purpose-Built Repair Facility at Esquimalt, 10 June 2021, in preparation for its refloating.*

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Editorial

Looking Backward and Looking Forward

As Christmas passes and the new year looms, it's a time for reflection about both the year past and the year ahead. We are still struggling with Covid-19, but we must not forget about the other challenges that haven't gone away. There will always be demands on the government's attention, particularly during a pandemic, and defence is low on the list in Canada.

CNR published a smorgasbord of material to attract attention to topics relating to navies, security, defence and oceans. Let's look at the articles *CNR* has published in the past year. Several articles looked forward at future threats and technology. This includes examination of the use of Artificial Intelligence to make logistics, maintenance, training and planning more efficient for the Royal Canadian Navy (RCN). We also published an article that explored 'loitering munitions' at sea. These relatively low-cost unmanned systems will be a consideration in the future both as reconnaissance/surveillance platforms and as weapon systems. An article looked at sea mines, a cheap but effective way to damage expensive warships, and another (included in this issue) discussed the development of camouflage of ships at sea and related the concept to modern-day stealth technology.

Not surprisingly, *CNR* published articles about the Canadian Surface Combatants (CSCs). The CSCs will be high-tech 'digital ships' and closely integrated with the US Navy. An article discussed how this may cause problems, not necessarily for the navy but in the political arena as many Canadians wish to remain at arm's length from the US military. Much of the media attention paid to these ships has been focused on the price to *build* the ships, but *CNR* published an article that compares the costs of operations and sustainment of the CSCs versus the *Halifax*-class frigates.

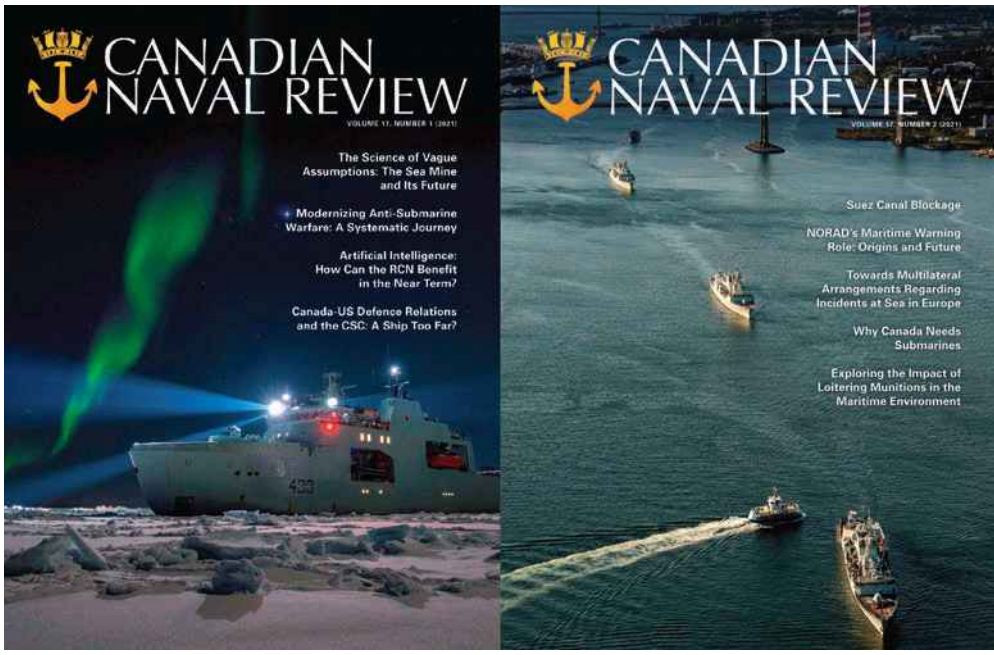
Canada has some defence concerns that are immutable. We cannot change the fact that the United States is our only neighbour. A main focus is, therefore, staying in tune with the United States in defence matters via NORAD. *CNR* published an article that examined NORAD's entry into the maritime warning role, and the future of that role.

Other *CNR* articles published in the past year focused on submarines reflecting the fact that the number of submarines in the world has been growing rapidly in the past decade. One article discussed why Canada needs submarines, and another discussed what the RCN is doing to enhance its anti-submarine warfare capabilities. An article (published in this issue) discusses what capabilities the next generation of Canadian submarines would need.

Security on the oceans is not just about navies. As Covid interrupts trade – because, for example, of production interruptions and personnel shortages at ports – it has become clear that the global supply system contains inherent vulnerabilities. *CNR* published an article that discussed the blockage of the Suez Canal by a container ship in March 2021. This incident should lead to some serious discussion of chokepoints, container ship size, just-in-time production, and implications for economic security around the world.

In the past year, US-China relations have worsened. And since the Chinese and US forces intersect in the maritime arena, it is crucial to ensure that encounters at sea do not escalate. *CNR* published an article discussing the Incidents at Sea (INCSEA) agreement signed between the United States and Soviet Union during the Cold War, and examined what we could learn to apply to both US/West-China maritime interactions and US/West-Russia ones.

In this issue, as you will see, we continue to examine an array of topics. Among other things, there is an article on how information warfare affects navies. Canada and other Western states have been slow to get into this game, and the Canadian Armed Forces (CAF) will need to become



In the past year, CNR has published a wide array of articles about maritime security issues.

better at dealing with misinformation. An article makes the case for a new defence policy, given how much the world has changed since the last one, and another proposes a CAF force structure that focuses as much on the home-game (coastal defence) as it does on the away-game (expeditionary operations).

This gives a sense of the breadth of material that *CNR* has recently published – and if you are not convinced, look at the 28-page index on the website. We've also published reviews of over 100 books about navies, maritime strategy and naval history which illustrates the ongoing interest in maritime security. Broadsides, the *CNR* online discussion forum, is alive and well. We don't always make the RCN happy with material that's published, but we always strive to be insightful and engaging.

The good news, therefore, is that there are people who are interested in and writing about naval/maritime issues. And there are organizations and programs that are doing stellar work to increase the awareness of Canadians about their navy – for example, the RCN/Strategic Outreach program Canadian Leaders at Sea (CLaS), and the Naval Association of Canada's Briefing Note series and its children's books.

The bad news is that there is a gap between the words of the naval community and what is heard by the government and Canadians. The CAF in general, and the RCN in particular, struggle to get their message out to Canadians. This is in part due to the media, which focus on the negative – most recently on sexual misconduct. But it also due in part to slow and slim communication from the RCN, speeches that are filled with puzzling jargon,[1] and government websites that are not regularly updated.[2] This, plus the fact that most of the population lives far from the oceans, means most Canadians know little, if anything, about their navy and what it is doing.

The federal government is, understandably, distracted by the never-ending pandemic but it seems to be losing focus on other matters. An example of the government's focus is the Mandate Letter issued to the Minister of National Defence (MND) after the 2021 election. About half of the defence-specific elements in the letter focus on addressing sexual misconduct in the CAF. This is important – the issue must be dealt with, and the fact that it was not done sooner by the previous MND is infuriating. Other than on the topic of sexual misconduct, the letter provides little direction to the Minister. It mentions the navy by name only once (which is more than the army and air force get) when it states that the Minister should continue working with other departments to "renew the fleet of the Royal Canadian Navy, advance the shipbuilding industry, including the process to add a third Canadian shipyard as

Anita Anand signs into her position as Minister of National Defence following the 2021 federal election. The Mandate Letter for the Minister says little about how to ensure national defence in a world where threats are multiplying.

a strategic partner to the National Shipbuilding Strategy, create middle class jobs and ensure Canada has the modern ships needed." The government has two huge defence procurement projects waiting in the wings – the long-delayed CF-18 replacement and the Canadian Surface Combatants. Wouldn't it be useful at least to mention these? A government must ensure the security of the country, and the Minister of National Defence's job is *defence*. The challenges facing Canada and the world have not disappeared and indeed have multiplied as liberal-democracy is increasingly threatened both internally and externally.

CNR is entering its 18th year of publication and will continue to explore topics relating to the maritime arena. But perhaps we all have to work harder to make sure the message is received in Ottawa.

I would like to thank our contributors, sponsors and supporters, and encourage people to continue to write and think about these important issues.

Dr. Ann Griffiths
Editor, Canadian Naval Review

Notes

1. Some of my favourites are 'when the curve hits the knee,' 'upgunning,' 'evergreening the navy' and 'feeding from the same belly button.'
2. Why at the end of December 2021, for example, is the most recent post in 'Latest News about the National Shipbuilding Strategy' dated 16 September 2020?

Winner of the 2021 CNMT Essay Competition

Winning the Narrative Battle on the High Seas: A Warning for the RCN

Christopher Verklan

Credit: Anto Holoborodko, Wikimedia Commons

'Little Green Men' are pictured at the Perevalne military base during the occupation of Crimea and the city of Sevastopol by Russian troops in 2014.

The modern strategic landscape is becoming one in which traditional binaries such as friend-foe and war-peace have become increasingly convoluted and blurred. The result of this has been the expansion, notably in the West, of the conception of warfare and, with it, the domains in which states now contest and fight. One such domain of increased importance is the information environment, which encompasses "the information itself, the individuals, organizations and systems that receive, process and convey the information, and the cognitive, virtual, and physical space in which this occurs."[1]

Although a topic for debate in the aftermath of the Gulf War during the 1990s, the use of information as an independent tool of state power gained notoriety in the 2010s. This notoriety was in large part due to Russia's use of information in the annexation of Crimea, where it employed a range of media outlets and online resources against Ukraine to legitimize Russian actions and generate distrust of the Ukrainian government.[2] Russia, however, is not alone in its use of information as a tool of state power. In 2015, China's People's Liberation Army (PLA) introduced the Strategic Support Force that has formed the backbone of China's information warfare effort that has targeted Taiwan, among others, in recent years.[3]

The increased use of information operations, notably those targeting the cognitive understanding of an individual or collective, is a concerning – albeit not new – development that will only increase as the competition among China, Russia and the United States intensifies. This is particularly true in the maritime domain, where these three states have competing views regarding the status of the South China Sea and the Northern Sea Route, among other areas. As a member of the North Atlantic Treaty Organization (NATO), a stalwart ally of the United States and a state with maritime interests in the North Atlantic and the South China Sea, the Royal Canadian Navy (RCN) needs to begin considering how the information domain can benefit or harm its objectives at home and abroad.

Unfortunately, the intersection of information warfare and the maritime domain remains under-researched, particularly in a Canadian context. This article aims to rectify this oversight by examining the Black Sea incident that took place in June 2021 between the United Kingdom and Russia and exploring Canada's understanding of, as well as practices in, the information domain. The main finding of this research is that the RCN is ill-prepared to operate in this arena and needs to begin adapting its forces by improving its strategic communications efforts in the short term, and developing new doctrines, force structure and capabilities in the mid- to long term.

The Black Sea Incident

To ground this discussion of information warfare at sea, it is best to begin by reviewing a real-life case. The incident between the United Kingdom and Russia in the Black Sea in June 2021 serves as a representative case from which general insights can be drawn.

The beginnings of the incident can be traced back to March and April 2021, when tensions between NATO and Russia were on the rise due to Russia's massing of military forces along its border with Ukraine in preparation for military exercises.[4] The build-up quickly led to concerns expressed by Ukraine, the European Union and the United States about the possibility of Russian aggression against Ukraine or the inadvertent escalation of the ongoing conflict in the country. These fears, however, proved to be unfounded as Russia did not escalate the conflict using its armed forces or those of its proxies in any meaningful way. Despite this, tensions continued to persist in part due to uncertainty regarding the number of troops and equipment that would remain in the area following the completion of the exercises.

The tensions, and the uncertainty regarding troop and equipment movements, necessitated a Western response to demonstrate solidarity with Ukraine. Aside from supportive rhetoric given by the G7 and NATO members, a notable way that this was done was by using naval diplomacy. The first indications of this came from the United States, which according to reports, planned on sending two warships into the Black Sea in a show of support for Ukraine and to monitor the Russian exercises taking place in the area.[5] This plan was later discarded to prevent escalating tensions with Russia. Instead, the United Kingdom sent two warships shortly thereafter, ostensibly as part of the Royal Navy's (RN) preplanned missions into the Black Sea.[6]

Regional tensions decreased slightly in the weeks that followed, and a joint Russia-US summit in Switzerland was held in June to discuss the conflict in Ukraine, among other aspects of their bilateral relationship. However, shortly after the summit, events in the Black Sea began to deteriorate once again. The first signs of this came on 18 June when automatic identification system (AIS) signals for HMS *Defender* and HNLMS *Evertsen* were spoofed to show that they had sailed to within two miles of Sevastopol in Crimea.[7] While the AIS tracks were quickly proven to be false by open-source researchers, the intent, aims and actors responsible for this incident remain unknown.[8] Interestingly, just one week later – on 23 and 24 June, respectively – these same ships transited through Ukrainian territorial waters around the southern tip of Crimea. In both instances, Russia responded aggressively to what it claimed were incursions by foreign warships in its own territorial waters – using both air and naval forces to threaten and intimidate the transiting warships.[9]

The militarized reaction to the transiting warships is not surprising given Russia's regular use, notably of its aircraft, to harass NATO ships operating in the Black Sea. What is unique, however, is Russia's use of information in the days and weeks that followed in both English-language

Credit: LPhot Dan Rosenbaum, HMS ***Defender***

HNLMS ***Evertsen****, HMS* ***Defender*** *and USS* ***Laboon*** *sail together in the Black Sea on 17 June 2021.*

Table 1. Narratives pushed by various Russian news outlets about the UK following the Black Sea incident, classified by similarity.

Interfax (Russian-language)	RT (English-language)	Tass (English-language)
The passage of HMS *Defender* was an unprecedented, dangerous provocation.	The passage of HMS *Defender* was an unwarranted, unnecessary, counterproductive and irrational action.	-
The actions undertaken by the UK were contradictory to international law.	The actions undertaken by the UK were contradictory to international law (UNCLOS) and norms.	The UK's actions were designed to be provocative, and increase revanchist sentiment in Ukraine.
NATO's activities in the Black Sea are provocative, and anti-Russian in nature.	NATO's activities in the Black Sea are aggressive, increase revanchist sentiment in Ukraine, and prevent real issues from being addressed.	The actions undertaken by the UK could have led to inadvertent escalation.
The Russian Federation's borders are inviolable, and military force will be used to defend them.	More severe consequences will be imposed by Russia in the future, should a similar action occur again.	Russia will choose to escalate should a similar action occur again.
-	-	The actions undertaken by the UK would not have occurred without approval, direction from the United States.

Credit: Provided by Author

and Russian-language news outlets. Focusing on the case of HMS *Defender*, several narratives can be seen in the coverage that followed, as noted in Table 1.

Although the narratives surrounding the events have their differences, all three outlets promoted the Kremlin's core messaging, namely that: (1) the UK's actions in the Black Sea were provocative and uncalled for; (2) the UK's actions were contradictory to international law; and (3) such actions will lead to a stronger military response from Russia in the future. In doing so, Russia was able to advance the idea of itself as a victim of aggressive Western actions, undermine the UK's narrative that was predicated upon the right of innocent passage, and create a narrative to support its deterrent efforts in the region. Equally as important is that the messaging noted here is consistent with previous narratives advanced by the Kremlin such as NATO being an aggressive entity and Ukraine being a revanchist actor.

At a more granular level, these narratives were largely, though not entirely, based on statements from various Russian government officials. However, academics sympathetic to the Russian government's narratives were also used. For example, in an article published by *RT*, a Russian state-sponsored media outlet, a professor at the University of Ottawa concluded that:

> sending signals by military means is a dangerous game, and best avoided. Sadly, it seems that in the UK, moral posturing takes precedence over sound strategic planning. Crimea is a long way from Britain. There's absolutely no need for British ships to be there, and in the long term, this action is unlikely to work to London's advantage.[10]

In addition to these efforts, audio-visual elements and leaked documents were used to delegitimize the UK's version of events, bolster Russia's narratives and justify Russia's actions.[11]

In contrast, the narrative of events communicated by the UK government largely followed the statement made by the Secretary of State for Defence Ben Wallace on 24 June, and corroborated by two journalists aboard HMS *Defender*.[12] Overall, this account stated that: (1) HMS *Defender* conducted an innocent passage through Ukrainian waters in accordance with international maritime law; (2) the actions of HMS *Defender*'s crew were courteous and professional, as compared to Russian units whose actions were at times neither safe or professional; and (3) Russia's claims of warning shots being fired and bombs being dropped in the path of HMS *Defender* were false.[13]

Information Warfare at Sea: Considerations for the RCN

At a superficial level, Russia's efforts in the information domain in the case highlighted above forced the UK as well as the United States to respond in kind. However, beyond this, the case also highlights the need for a deeper understanding of how information warfare may be utilized to affect the perception of events that transpire at sea. For instance, how might the information domain be used to shape the area of operations prior to or following the operations themselves? How might information be used to benefit or harm domestic and international operations? Unfortunately for Canada, these questions have yet to be answered in a meaningful way by either the Canadian Armed Forces (CAF) or the RCN.

The primary reason for this appears to be a lack of attention and the slow pace at which large institutions such as

Credit: LPhot Dan Rosenbaum, HMS **Defender**

*HMS **Defender**, USS **Laboon** and HNLMS **Evertsen** in the Black Sea on 17 June 2021. A Russian **Project 22160**-class corvette watches in the background.*

the CAF and the RCN are able to implement change. For example, Canada's 2017 defence policy *Strong, Secure, Engaged* (SSE) briefly acknowledges the growing importance of grey zone warfare and the threats posed by information in this type of warfare.[14] It also highlights that improved information operations, including military-specific information operations, will be developed going forward.[15] Yet it is unclear based on public documents what, if any, progress has been made – with the CAF likely still relying on part-time reservists to provide a full-time capability.

The *Pan-Domain Force Employment Concept*, which aims to modernize the CAF's approach to competing with and fighting Canada's adversaries, also recognizes the importance of the information domain. Notably, it explicitly states that:

> The information domain has become the decisive domain in contemporary operations. Its centrality stems from the fact that actions in other domains inevitably have impacts in the information domain. Examples include both the transit of RCN vessels through international waters in the South and East China Seas, and *Op REASSURANCE* in Latvia, which use actions in the maritime and land domains to achieve effects in the information domain.[16]

However, much like SSE, it does not prescribe specific actions for the CAF to undertake, despite providing a foundation for Canada's new approach to warfighting.

The lack of strategy and policy documents to guide the CAF, and the RCN, is not without consequences. A prime example of this can be seen in the Canadian army's effort as part of *Operation Reassurance*, in which Canada serves as the framework state for NATO's Enhanced Forward Presence (eFP) mission in Latvia. Here, Russia has become increasingly active in the information space, promoting narratives that undercut the Canadian army's credibility and portray NATO as an aggressive actor. In response to these narratives, a strategic communications cell was established to monitor the information environment and coordinate information operations. Aside from gaining and maintaining situational awareness in the information domain, this new cell has enabled the eFP to craft targeted outreach efforts to specific communities and regions and uncover signals in the information environment that could signal escalatory efforts by the Russians.[17]

Despite these successes, this effort has been hampered by several challenges, including: a reliance on other branches of government and third parties for data; a lack of program-specific funding; a lack of support from headquarters in Canada; and difficulties in integrating strategic objectives with the conventionally focused planning at the eFP headquarters. Taken as a whole, this has led to bureaucratic inefficiency and a degree of improvisation on the ground that has reduced the unity of effort and capabilities in this domain.[18] To put this in more tangible terms, several years after the formation of the strategic communication cell, there are "no translators or cultural advisors attached to the cell. Cell members must use Google Translate to search online sources for Latvian- or Russian-language news articles, or simply to gather basic information about Latvian communities or individuals."[19] This, naturally, is problematic given that knowing the language and culture of those with whom you are trying to communicate is essential to being able to accomplish information operations.

Although occurring on land rather than at sea, this example illustrates that the approach to the information domain is insufficient to meet the challenges of tomorrow. This, in turn, imposes costs on Canadian forces across all domains at the operational and strategic levels. For instance, without a successful military operation being

(Credit: Sgt Juan Camacho enhanced Forward [illegible] Imagery Technician, Ejército de Tierra

A Transfer of Command Authority parade takes place for the enhanced Forward Presence Battle Group Latvia, at Camp Adazi training area in Latvia, 22 January 2021.

translated to the information domain, adversaries can create wedges in domestic politics regarding the success of military forces on a given operation. Similarly, at the strategic level, adversaries could use information to delegitimize Canadian forces and their mission in the area – thereby undermining the strategy of Canada and its allies in a given area of operations.

This reality is particularly concerning as the strategic competition(s) between NATO and Russia, and China and the United States will likely have strong maritime and informational components. In the case of Russia, as evidenced above, the strong information and maritime focus is visible in its approach to the Black Sea. It can also be seen to some extent in the Arctic, where Russia has repeatedly called for the region to be a "zone of peace"[20] despite building up its military forces in the region. Similarly, China has also crafted a strong domestic narrative surrounding the status of the South China Sea and has begun to legitimize its efforts in the Arctic by declaring itself a 'near-Arctic state.'

China's efforts in the information domain have recently affected Canada directly, with one Chinese-affiliated media outlet claiming in September 2021 that a Chinese sailor circumnavigating the Arctic was "illegally stopped" while transiting the Northwest Passage.[21] Canada has since denied that the vessel entered Canadian waters and stated that Transport Canada had informed the vessel's captain that the passage was closed to pleasure craft due to COVID-19.[22] The true intention behind this incident remains unclear, especially given the captain's ties to the Chinese government and his past support of China's maritime endeavours, including contesting waters in the East China Sea. However, it is likely that the voyage was an attempt to shape the information landscape to legitimize China's position as an Arctic actor and "write itself into the Arctic's history."[23]

This type of activity will only grow in the future as tensions continue to rise and as new disruptive technologies are utilized to enable larger and more targeted information operations to take place. Yet even without considering future trends in information warfare, the RCN needs to rethink its approach to the information domain to meet current challenges. Its approach should have the goal of achieving narrative dominance – i.e., ensuring that its narrative is the dominant one for the contested issue. In the short term, this requires that the RCN adopt ways to mitigate attempts by hostile actors to influence the domestic information environment by promoting resilience, engaging in shaping efforts and contesting hostile narratives (as, for example, was done by the CAF during the early stage of *Operation Laser*, the CAF response to the COVID-19 pandemic[24]).

While this approach can be proactive or reactive, there is room to improve the transparency, timeliness and reach of the RCN's current strategic communications. Some recommendations include:

1. Increasing the rapidity at which information is communicated to the public across all media platforms, with the goal of generating more timely and cohesive messaging.[25]
2. Increasing the transparency of the operations of Canadian ships by providing more frequent updates regarding transits and activities, beyond what is done by the monthly "Your Navy Today" operation updates.
3. Broadening the reach and accessibility of the RCN's communications by creating targeted communications for under-exposed demographics, and by legitimizing the RCN's actions by justifying their importance and rationale in basic terms that accord with Canadian beliefs and identity.

In the medium to long term, the RCN's efforts should move beyond denying hostile actors an uncontested permissive environment, and instead focus on developing a more agile strategic communications and information warfare force that is designed to generate influence and maintain narrative dominance abroad. To do so will require the RCN to:

1. Develop clear strategies and policies on information warfare in conjunction with the CAF that will enable the RCN to develop and adopt the relevant tactics, techniques and procedures to accomplish the goals identified by political guidance.
2. Develop an agile force structure that is capable of rapid and decentralized decision-making, with

Credit: Corporal Lynette Ai Dang, Canadian Armed Forces

*Water spouts appear as HMCS **Calgary** transits the Strait of Malacca during **Operation Projection** on 27 June 2021. China has regularly painted Western naval activity as illegal and aggressive.*

Credit: Corporal Simon Arcand, Canadian Armed Forces

*HMCS **Goose Bay**, HMCS **Harry DeWolf** and CCGS **Pierre Radisson** sail through Frobisher Bay during **Operation Nanook-Tuugaalik**, 11 August 2021. CCGS **Terry Fox** was also a participant.*

the goal of being able to develop a strategic communications force with the capability to operate and maintain narrative dominance in contested and fast-changing information environments.

3. Develop domain awareness in the information domain in areas of interest, possibly in cooperation with allies and partners, with the goal of identifying, countering and exploiting flaws in hostile narratives (particularly in local languages) in a way that is consistent with government messaging.

Although not an exhaustive or complete list, these proposed changes provide the basis from which the RCN can begin to utilize the information environment to advance its operational and strategic objectives. These efforts, of course, will take time and consideration of applicable laws, norms and operational security requirements but should nevertheless be pursued given the advantages that the domain brings to modern warfighting.

Conclusion

The increasing importance of the information domain has created new opportunities and vulnerabilities for the CAF to address. This is particularly true in the case of the RCN as the strategic competition with both China and Russia, in conjunction with non-state actors, will have strong maritime and informational elements. The RCN is currently ill-prepared to meet these challenges and must adapt to operate in the information domain to meet the challenges created by the blurring boundaries of warfare in the grey zone. The importance of adapting the practices of the RCN to encompass the information domain cannot be under-stated given the importance of this domain in conflicts that occur below the threshold of armed violence. The June 2021 incident in the Black Sea is emblematic of this fact, and marks a bellwether event the ramifications of which should not be ignored.

Notes

1. North Atlantic Treaty Organization, "NATO Military Policy for Information Operations, Draft MC 0422/6," 11 September 2018, p. 3.
2. Michael Kofman, Katya Migacheva, Brian Nichiporuk, Andrew Radin, Olesya Tkacheva, Jenny Oberholtzer, "Lessons from Russia's Operations in Crimea and Eastern Ukraine," RAND Corporation, 9 May 2017, p. 14.
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4. Rob Lee, "Russia's Coercive Diplomacy: Why Did the Kremlin Mass its Forces Near Ukraine this Spring?" Foreign Policy Research Institute, 23 August 2021, pp. 1-3.
5. Barbara Staarr and Jennifer Hansler, "US Considering Sending Warships to Black Sea amid Russia-Ukraine Tensions," CNN, 9 April 2021.
6. Tim Ripley, "British Warships Head for Black Sea as Russian Troops Mass on Ukrainian Border," *The Times*, 18 April 2021.
7. H.I. Sutton, "Positions of Two NATO Ships were Falsified Near Russian Black Sea Naval Base," *USNI News*, 21 June 2021.
8. Given its recent GPS jamming and spoofing activities, one possibility is that Russia was the actor behind this event, though it is unclear what the intent would be. See Henrik Lied and Martin Gundersen, "Norske Marineskip ble Manipulert inn i Russisk Farvann," *NRK*, 25 September 2021.
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10. See Paul Robinson, "Britannia Fools the Waves: UK Sent Clear Signal to Moscow with Warship in Crimean Waters… Just Probably Not the One it Intended," *RT*, 24 June 2021.
11. For example, see "Russia Releases Video of British Warship's Incursion into Waters near Crimea, Clearly Contradicting London's Version of Events," *RT*, 24 June 2021.
12. See "HMS Defender: Russian Jets and Ships Shadow British Warship," BBC, 23 June 2021; "BBC Journalist Reports from British Warship as Russia 'Fires Warning Shots,'" BBC, 23 June 2021; Mark Nicol, "Russian Jets Thunder Overhead. […] Eyewitness Report as Vladimir Putin's Gunboat Opens Fire on HMS Defender," *Daily Mail*, 24 June 2021.
13. UK Parliamentary Hansard, "Exercises in the Black Sea," 24 June 2021.
14. Canada, Department of National Defence, *Strong, Secure, Engaged: Canada's Defence Policy* (Ottawa, ON: National Defence, 2017), pp. 41, 68-9.
15. *Ibid*., pp. 41, 68-9.
16. Canada, Department of National Defence, *Pan-Domain Force Employment Concept: Prevailing in an Uncertain World* (Ottawa, ON: National Defence, 2020), p. 16.
17. Chris Wattie, "Bringing a Knife to a Gunfight: Canadian Strategic Communications and Information Operations in Latvia, Operation Reassurance 2019-2020," *Canadian Military Journal*, Vol. 21, No. 1 (2021), pp. 57-59.
18. *Ibid*., pp. 59-61.
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20. Kristian Atland, "Mikhail Gorbachev, the Murmansk Initiative, and the Desecuritization of Interstate Relations in the Arctic," *Cooperation and Conflict*, Vol. 43, No. 3 (2008), p. 290.
21. Xu Fanyi, "Canada Stops Chinese Sailboat to Finish Circumnavigate the Arctic," *CGTN*, 16 September 2021.
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24. Suzanne Waldman and Major Marshall Erickson, "Strategic Communication in the Present and Future Military Enterprise," *Journal of Future Conflict*, Defence Research and Development Canada (DRDC), Issue 2 (Fall 2020), p. 7.
25. An example of this can be seen with the seizure of 1,200 kg of cocaine on 8 November 2021 following which it took the RCN's Instagram and Twitter pages 13 days to communicate the seizure to the public, and over three weeks for it to be acknowledged on its official website.

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Now is the Time for a New Canadian Defence Policy

Jeff G. Gilmour

Credit: Official White House Photo by Cameron Smith

President Joe Biden delivers remarks as part of the AUKUS announcement on 15 September 2021, in the East Room of the White House.

The AUKUS agreement signed by Australia, the United Kingdom and the United States was announced on 15 September 2021. Besides supplying Australia with at least eight nuclear-powered submarines, it promises to transfer sensitive technology among the three countries, such as cyber capabilities, artificial intelligence and quantum computing. As a strategic shift, however, this agreement is significant for the United States because it illustrates a dramatic move to counter China. As Stephen Walt of Harvard University writes, "it is a move designed to discourage or thwart any future Chinese bid for regional hegemony."[1] A day after the AUKUS news, the United States announced a substantial increase in its military presence in and around Australia.

Military and defence issues never strike a high priority with the Canadian government around the Cabinet table. With respect to defence, for many years Canada has not had much of a presence or interest in what is now referred to as the 'Indo-Pacific' region. Since the Second World War Canada's defence focus has been primarily on Europe under NATO. Should Canada be shifting its defence focus to the Pacific as well, and does it have the ability to allocate limited resources to a two-front area of operations? Another question is how the AUKUS agreement will affect Canada's national security policies in general and defence policies specifically. This question can only be answered by clear policy and strategic direction that is currently missing. Absent this, Canadian Armed Forces (CAF) activity in the region will likely be ad hoc, reactive, merely symbolic and for the most part ineffective relative to resources spent. This article will examine whether Canada needs a new defence policy, in particular with regard to the Indo-Pacific region.

The AUKUS Agreement

For the past decade China has increased its military presence in Southeast Asia by building artificial islands in the South China Sea which contain airstrips, ports, missile bases and communications centres. These actions have been undertaken despite competing claims from Brunei, Indonesia, Malaysia, the Philippines, Taiwan and Vietnam. As well as the activities at sea, in 2020 Chinese troops confronted Indian Army soldiers on their common border. Chinese aircraft are regularly entering Taiwanese airspace and Chinese warships often enter its territorial waters.

The AUKUS agreement is rooted in the context of Chinese actions and in the now-cancelled project to replace Australia's submarines with the *Shortfin Barracuda* submarines. The nuclear-powered submarines to be acquired by the Australian Navy under the AUKUS agreement will be a significant adversary for the People's Liberation Army (Navy) (PLAN) fleet. The new submarines could stay at sea for lengthy periods of time and their missions could include intelligence gathering and disgorging special forces as well as holding Chinese surface ships and submarines at risk.

The submarines will be built based on either the American *Virginia*-class or Britain's *Astute*-class, with technology from some combination of the two countries' defence contractors. Such submarines are able to project offensive firepower by launching long-range missiles to China's mainland while sitting many miles offshore in the South China Sea. These boats can be based in Darwin on the north coast or Brisbane on the east.

The deal has strategic implications for the United States as well. As the foremost naval power since the end of the Second World War, the US Navy has projected power across the Asia-Pacific region via what historian Bruce Cummings calls an "archipelago of empire."[2] This refers to a series of naval bases established from Hawaii to Guam to Okinawa in Japan and Diego Garcia in the Indian Ocean. With the AUKUS agreement, the United States "has now, in effect, a beefed-up continent-sized base for its own operations as well as a reinvigorated ally."[3]

Canada's Defence Policy and China

Based on the surprise with which the Canadian government reacted when the AUKUS agreement was announced, it was clear that Ottawa was neither involved nor informed. What does the agreement mean for Canada? Was Canada purposely excluded, or simply not considered at all? Canada has been involved in the 'Five Eyes' intelligence-sharing arrangement consisting of Australia, Canada, New Zealand, United Kingdom and United States since its inception. Does this new AUKUS arrangement indicate the exclusion of Canada (and New Zealand) from intelligence information-sharing in the future? Has Ottawa's constant delay about making a decision on Huawei and 5G communication technology meant that security partners are moving on without Canada?

And, for the purposes of this article, does it mean that, after close to five years, it is time for a replacement of the 2017 defence policy *Strong, Secure, Engaged* (SSE), recognizing the international landscape has changed dramatically since this document was published? SSE needs updating in a number of ways – in particular, a new relationship with Russia, more focus on new threats and how to address them – but this article will focus on the changed behaviour of China, and how Canadian defence policy needs to change to reflect this.

In the years since SSE was published, there has been a resurgence of great power competition embodied in the deteriorated US-China relationship. As Camille Raymond and Marco Munier note, "[t]he US is clear in its desire not to let China achieve its goals of power and influence in the world."[4] It is also clear that the United States is opposed to China achieving regional hegemony. In view of the sharper tone to international relations, will the United States call on Canada for support in the region?

What should the new Canadian defence policy look like as a result of the AUKUS agreement? Many critics of SSE would argue that the current defence policy doesn't articulate a strategic direction at all and does not identify Canadian defence priorities. Raymond and Munier state:

> Rising tensions in the Asia-Pacific are bringing back an issue that is often overlooked in this country: identifying and prioritizing threats. The 2017 defence statement is a perfect example of a defence policy without a defence strategy. The document fails to clearly identify threat actors and fails to prioritize threats. Canada will have to make choices to deal with the rise of China and Russia, as its ally Australia, for example, has chosen to join forces with the United States and the UK in the Asia-Pacific.[5]

In formulating a new defence policy, many would argue that Canada must first produce a *China* strategy. David L. Cohen, in his September 2021 Senate confirmation hearing to become US Ambassador to Canada, stated "we are all waiting for Canada to release its framework for its overall China policy."[6] From the beginning of modern relations with China when Pierre Elliott Trudeau was Prime Minister, both Conservative and Liberal governments – as did other Western leaders – assumed that increasing interaction and trade would lead China to adopt democracy and human rights and gradually moderate its political system. This has led to "five decades of Canadian leaders grossly overestimating their ability to bring change to China, failing to recognize that China is uninterested in embracing so-called Western values, and getting mercilessly played by Chinese leaders."[7]

Credit: Maj. Brian Gilbert, US Marine Corps

US Marines and Australian soldiers from 3rd Royal Australian Regiment load on to landing craft which will move them from King Beach in Bowen, Australia, to HMAS ***Canberra*** *(LHD 2), 26 July 2021, during Talisman Sabre 2021.*

Early in October 2021, Foreign Minister at the time, Marc Garneau, indicated that Canada would follow a four-fold approach to China: coexist, compete, cooperate and challenge. Charles Burton, in an article in *The Globe and Mail*, stated that Garneau should have added a fifth approach, "capitulation."[8] In the pursuit of trade issues, Canadian politicians continue to turn a blind eye to events taking place in China. This includes a significant military build-up of the People's Liberation Army and Navy (PLA/PLAN), Uyghur genocide, the repression of freedoms in Hong Kong, extensive espionage and harassment in other countries including Canada, the Belt and Road Initiative, claims in the South and East China Seas, and threats towards Taiwan. In 2017, President Xi Jinping called the reunification with Taiwan an "inevitable requirement for realizing great rejuvenation of the Chinese nation."[9] The Taiwan Defence Minister stated recently that China will be capable of mounting a full-scale invasion of Taiwan by 2025.[10]

After the increasing number of worrisome actions – plus the incarceration of the two Michaels for nearly three years in Chinese jails – it is hard to understand the Liberal government's current position towards China. Canada's Ambassador to China, Dominic Barton, continued to stress doing business there. Barton's background in the business world has been seen by some to conflict with his role of Ambassador. Under his leadership at global consulting company McKinsey, the firm "provided services to at least 22 of Beijing's 100 largest state-owned conglomerates, including the construction corporation that has been illegally building the militarized islands in the South China Sea."[11] If the Trudeau government is serious about restoring Canada's global reputation and handling the security threat posed by Xi Jinping's China, then, to quote an op-ed in the *National Post* by Terry Glavin, "the first thing to do would be to rid us all of Dominic Barton."[12] This first step has been taken, as Barton announced his resignation from the position as of the end of December 2021.

This brings us back to the question of revising/updating *Strong, Secure, Engaged*. The government must re-adjust security and defence issues relative to economic interests in dealing with China. Canada seems to make economic issues paramount over the potential security threats posed by China not only in the Asia-Pacific region but by the Belt and Road initiative as well, which has world-wide strategic implications.

Many people would argue that Canada's position in the Five Eyes intelligence-sharing community has been eroded as a result of the AUKUS agreement which creates a separate group for three of the five members of the pact. Without some revisions and fine-tuning of defence policy pertaining to China, it is possible that AUKUS intelligence sharing with Canada will be substantially reduced in the future. Regardless of whether Canada was even approached to be a party to the AUKUS deal, it is likely there was concern that it has not articulated its interests in policy or strategy in the Indo-Pacific region, and therefore had nothing to bring to the table. There has been little in the way of messaging from Ottawa that it is prepared to join traditional allies in taking a harder line towards China or, more importantly, taking concrete actions such as rejecting Huawei, that has given allies any indication of where this country is headed with respect to China.

Conclusions

It is time for Canada to write a new defence policy to meet the global threats that are now facing this country. The

Credit: Indonesian Coast Guard

Indonesian Coast Guard and Navy ships are pictured in this undated photo at the Surabaya Naval Base. An updated defence policy could indicate if Canada plans enhanced relations with states in the Indo-Pacific region, such as Indonesia.

Credit: Naval Group

*A computer illustration shows the French **Barracuda** submarine design, originally selected to be the Australian navy's next submarine.*

geostrategic situation has evolved rapidly and SSE needs to reflect the new defence environment. Canada's decades-long policy of commercial interaction with China continues to trump human rights and security concerns, despite China's transgressions. As Raymond and Muncier argue:

> In all cases, Canada must clearly identify and prioritize the issues and actors that pose a threat. This identification and prioritization will allow Canada to target the contributions it can make according to their importance to Canadian interests, but also to the expectations of allies.… Canada can no longer afford to sprinkle its capabilities in all regions of the world: it must focus on regions in which it has priority strategic interests. Canada cannot afford to be totally independent of its allies. Canada must therefore prioritize partnerships that support Canada's chosen path, whatever that may be.[13]

The AUKUS agreement was a wake-up call, but Canadian defence policy needs updating for many reasons. As a result of the AUKUS agreement, in light of the build-up of Chinese forces and increased attention by the United States, Canada should be looking at increasing its orientation towards the Indo-Asia-Pacific region. This was not emphasized in the 2017 document. Has Canada's neglect of the region led to an inability to play a useful role there? What would Canada's position be if China attacked Taiwan? Should a China policy clearly articulate that defence and security matters are paramount over trade issues? The decision as to whether Huawei should be banned from Canada's 5G network must be addressed, sooner rather than later. What is Canada's position on China's huge increase in its naval forces, and its maritime claims? By building a number of aircraft carriers China has indicated that the PLAN plans to move towards 'blue water' interests around the globe to compete with the US Navy. Should priority be placed on the RCN moving more warships to the West Coast?

Unlike the general statements comprising the 2017 defence policy, a new defence policy should not only identify the probable threats, but also note the risks to this country. For example, what new weapons can Russia and China deliver which they could not five years ago? What capabilities and weapons are available to the Chinese (and Russians) and what threat do they pose to Canada? What will Canada do to address these threats?

In terms of strategic direction for defence, the current document is lacking so there is a need to update it, if only to give some policy coverage as to where the Department of National Defence (DND) is prepared to allocate resources and whether this includes the Indo-Pacific region. Or

Credit: MC2 Jessica Hattell

*HMCS **Winnipeg** arrives at Okinawa White Beach Naval Facility, 15 November 2021, during **Operation Projection-Neon** while enforcing United Nations sanctions on North Korea.*

Credit: Zhang Lei, via eng.chinamil.com.cn

*The Chinese aircraft carrier **Liaoning** sails as part of a combat exercise at an unidentified area east of the Bashi Channel in the western Pacific in April 2018.*

conversely, the policy could be that Canada has no interest or capacity to participate in that region on a sustained basis or in support of defence initiatives with traditional allies there. But there must be some strategic direction.

The current government has needlessly squandered some of Canada's good relations in the region. For example, in 2017 when Prime Minister Trudeau declined to meet with the leaders of the Trans-Pacific Partnership (TPP), this negatively affected perceptions of Canada and its commitment to the region.[14] As well, despite increased spending on the Royal Canadian Navy (RCN) in recent years, Canada is seen as a laggard with regard to defence spending and international influence.

There are other elements of SSE that need to be rethought or given enhanced emphasis. As a major element of the AUKUS agreement relates to submarines, Canada should indicate if it is serious about replacing its submarines. As well, a new defence policy must examine how best to establish the latest technology such as artificial intelligence, cyber warfare and quantum computing for both defensive and offensive warfare. These technological elements are included in the AUKUS agreement, and Canada must consider them too.

It is clear that the Arctic has become strategically important with the reduction of sea ice in the region, allowing for more foreign shipping. This means that a new defence policy must pay more attention to the Arctic. China and Russia have developed new weapons and new capabilities to enter the Arctic. In a Macdonald-Laurier Institute report released in September 2021, Jeffrey Collins warned that "Canada's ability to exert influence in the vast maritime domain will be tested as the demand for resources and northern sea access increases in the coming decades."[15] Would these weapons be deployed in the Arctic by submarines, surface ships or aircraft? In determining such risks, a new defence policy should table priorities for all three services.

Although this article focuses on the AUKUS agreement and China, Canada must also remember relations with the United States and participation in NORAD. A major defence priority for Canada (and the United States) is the security of North America, and to achieve that means an upgrade of the North Warning System. The Canadian government must make a decision sooner rather than later whether to contribute Canada's share of funding in cooperation with the United States to complete this project.

It is an appropriate time now for the new Liberal government to address security and defence matters by drafting a new defence policy. The government should address new global strategic interests and formulate a document which includes its priorities, threats, risks and regions in which to concentrate Canadian defence planning. And because it is likely that conflict in the Indo-Pacific region will primarily be in the maritime arena, this means some focus on the RCN in Canadian defence policy.

Notes

1. Stephen Walt, quoted in "AUKUS Reshapes the Strategic Landscape of the Indo-Pacific" (also referred to as "Enter AUKUS"), The *Economist*, 25 September 2021, p. 17.
2. Bruce Cumings, quoted in *Ibid*., p. 19.
3. *Ibid*., p. 19.
4. Camille Raymond and Marco Munier, "Continental Defence Modernization and the Future of Canadian Defence Policy," Network for Strategic Analysis (NSA), 29 September 2021, p. 2.
5. *Ibid*., p. 3.
6. See David Cohen quoted in "U.S. Senate Votes to Send Tech Exec David Cohen to Ottawa as Biden's Envoy," CTV News/The Canadian Press, 2 November 2021.
7. "Relations: Trudeau will Face Tough Choices as He Navigates Trade, Security and Tech with China," *The Globe and Mail*, 9 October 2021, p. O-8.
8. Charles Burton, "Canada Can't have it Both Ways When it Comes to China. The Government Must Ban Huawei from Our 5G Infrastructure," *The Globe and Mail*, 8 October 2021.
9. Jesse Snyder, "Years of Neglect Hinder Canada's Support of Taiwan," *Edmonton Journal*, 6 October 2021.
10. "Taiwan Fears China Invasion by 2025," *Calgary Herald*, 7 October 2021.
11. Terry Glavin, "Canada Needs a New Ambassador to China – Dominic Barton Must Go," *National Post*, 14 October 2021.
12. *Ibid*.
13. See Raymond and Muncier, "Continental Defence Modernization and the Future of Canadian Defence Policy," p. 3.
14. For more on the implications of this, see Kim Nossal, quoted in Snyder, "Years of Neglect Hinder Canada's Support of Taiwan."
15. Jeffrey Collins quoted in *ibid*.

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Illumination for Concealment at Sea

Marcus Mau

Credit: Timothy Choi

The Polish destroyer ORP ***Błyskawica****, now a museum ship, is pictured here in Gdynia on 26 July 2016. It is painted in the Admiralty Disruptive Pattern common to many Royal Navy and allied vessels during the Second World War.*

The First World War is when camouflage research was born and the first zig-zag pattern was introduced as protection against submarine attacks. From then on, there was a real camouflage race at sea, especially in the Second World War. Numerous patterns and colour schemes were developed. Hence, camouflage at sea still reminds us primarily of the longest campaign of the Second World War: the Battle of the Atlantic. In commemoration of the 75th anniversary of the end of the Battle of the Atlantic, Royal Canadian Navy (RCN) frigate HMCS *Regina* and Maritime Coastal Defence Vessel HMCS *Moncton* were painted in the dazzle scheme in October 2019, and this was kept until the end of 2020.

In the Battle of the Atlantic such camouflage patterns were usually only useful in daylight. However, since submarines often attacked at dusk, camouflage systems also had to provide protection against a dimly lit sky. This was the beginning of diffused lighting camouflage, an active camouflage technique that used light to offset shadows on the ships' superstructures, thus hiding it from visual detection.

The Camouflage Race at Sea

According to an account by retired RCN Reserve Captain J.R. Hunter, which was published as a letter to the editor of *The Crowsnest* in 1965,

> It was early 1917 and we were on escort and patrol duty in the North Sea when we received an order from the Admiralty. We were ordered to spot a dazzle-painted ship in daylight that we would encounter on our course. The combination of zig-zag patterns and off-centre painted bow was very confusing.[1]

This letter described one of the first attempts at ship camouflage in modern naval history. During the First World War – but especially during the Second World War – research into camouflage boomed worldwide. However, dazzle paint was not simply intended as camouflage. The main intention was to confuse submarines trying to launch their torpedoes, or even to tell which direction to pursue the target.

The RCN commemorative dazzle paint job takes us back in time about 80 years. Different navies, for example the German Reich, the United States, Great Britain and Canada, developed their own colour schemes and patterns. The Germans based the camouflage of *Bismarck* and *Prinz Eugen* on a rather random stripe pattern consisting of black and white bars which were intended to make aiming more difficult. Additionally, a blackened stern and in front of it – just like on the bow – was a false bow wave.[2] In the Royal Navy, the Western Approaches scheme and the Admiralty light disruptive patterns were particularly popular and quite effective in allowing a more stealthy approach on enemy U-boats. The former was later also adopted by the RCN. Commander RCN G.R. Miles ordered on 30 January 1942 that two HMC Ships, *Saguenay* and *Skeena*, be camouflaged with the Western Approaches scheme in order to prepare them for service in the West Atlantic.[3]

No matter which of the countless camouflage patterns were chosen, they all had one weakness in common: they confused the observer almost exclusively only in daylight. Thus, Commander Miles wrote:

> The receipt of confidential book 04050/41 (8), of which Section 5 (c) deals with the camouflage against U-Boats, and copy of Admiralty's secret letter of 13th November, 1941 ... have stressed the most important fact that the requirement for HMC Destroyers and Corvettes, in their present employment, is a night not a day camouflage....[4]

The problem with the camouflage used worldwide until then was that a ship remained visible at dusk or at night against the horizon as a dark silhouette, no matter how it was painted. Thus in certain light conditions – e.g., in moonlight – the ships continued to provide a good target for submarines operating at dusk or during the night.

Royal Navy (RN) Captain Lord Louis Mountbatten observed in this context that red light predominated, especially in the evening hours when submarines preferred to attack the convoys. He developed another camouflage paint – Mountbatten Pink – which with its red component seemed to compensate for this disadvantage compared to the otherwise mostly grey camouflage colours of the Royal Navy. Nevertheless, this colour variant did not catch on and its effectiveness was always highly controversial.[5] But the solution to the problem was in the air, literally.

The story of using illumination for concealment began on 4 December 1940 on the snow-covered runway at Montreal airport, Canada. The moon was rising as an aircraft approached the runway. Professor Edmund Godfrey Burr was watching the landing through binoculars when the plane suddenly seemed first to merge with the sky and finally to disappear altogether for a short time. The fresh snow cover had reflected light from the sky causing the plane's contours to blur due to a reduction of contrast and become 'invisible' to the observer's eye.[6] From then on, Burr could not let go of this observation. It was the birth of diffused lighting camouflage, also known as active camouflage, which he developed. This was a seemingly paradoxical concept: illumination for concealment.

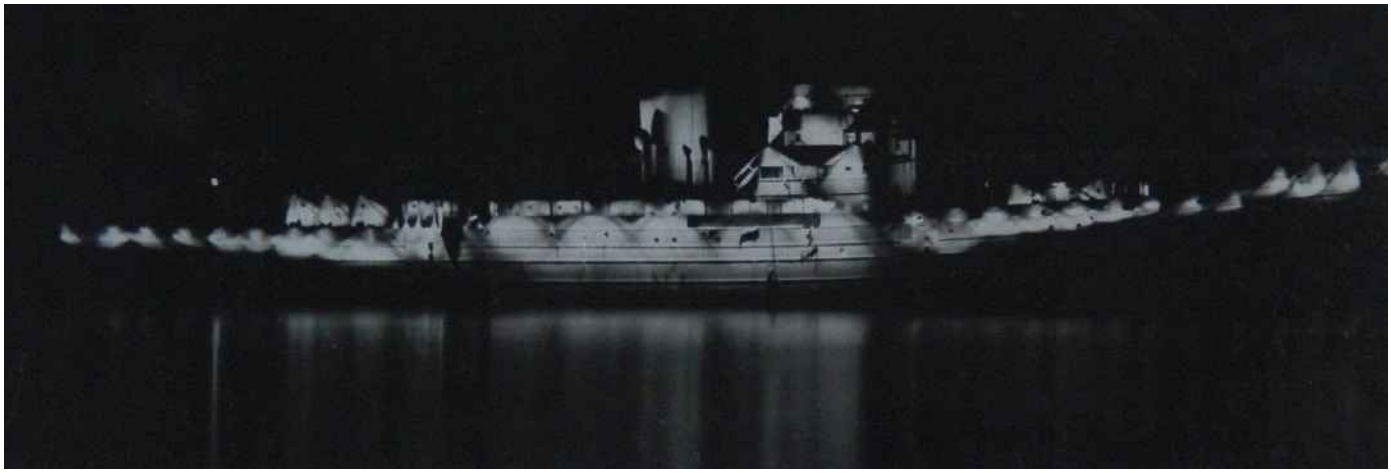
This approach already worked very well with aircraft, as initial experiments by Canada's National Research Council had proven. When military aircraft were equipped with forward-facing lights that automatically adjusted to the light conditions of the sky (the Yehudi counter-illumination system), the airplane's visibility from a ship or submarine was reduced by up to 70 per cent. This allowed aircraft equipped in this way to get much closer to their targets – estimated at 2,700 metres – before being detected.[7]

June 1943: The RCN's Actively Camouflaged Corvettes

Due to the problems with camouflage on ships at night, the idea of adapting the principle of active camouflage from aviation to ships was obvious. Experiments began on board HMCS *Cobalt* as early as January 1941.[8] A short time later, the Royal Navy (RN) became aware of diffused lighting camouflage and started its own series of tests with HMCS *Trillium* and HMS *Largs*. The US Navy also soon became interested in active camouflage and began first experiments on board USS *Hamul*.[9]

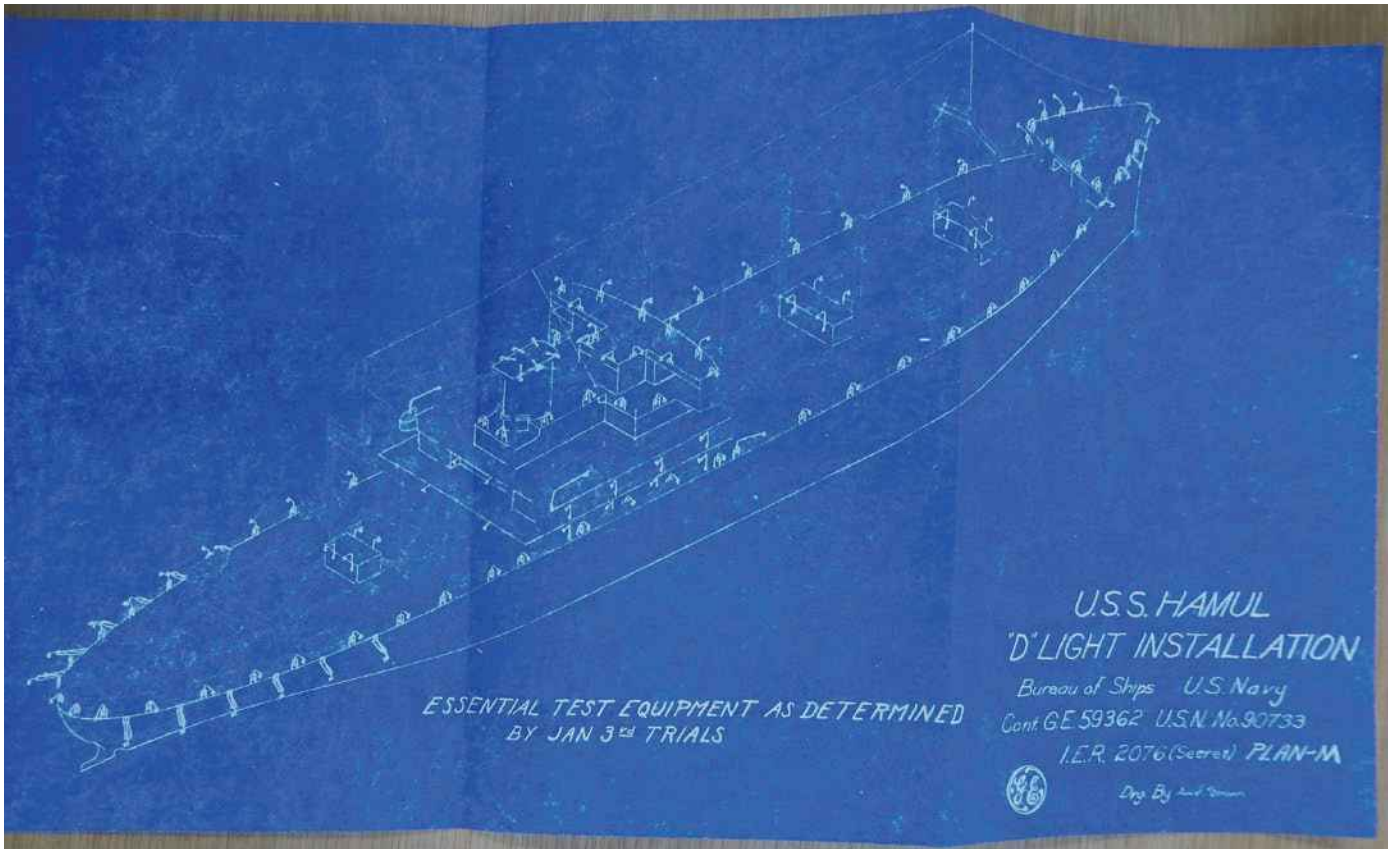
Detailed descriptions of the equipment and technology on board the test ships are provided by Admiralty Technical Records from 1943. The report describes the experiments on diffused lighting camouflage on board HMCS *Edmundston*. The experiments took place on 14 and 16 June 1943 in Halifax, Canada.[10]

HMCS *Edmundston* was painted according to Burr's specifications in a light blue-grey tone, the reflection factor of which was estimated at 35-40 per cent. The Admiralty rejected darker colours because overcast was much more



Credit: Ian Alexander photo of document in The National Archives ADM/116/5026 (Case 10062)

*HMS **Largs** shown at night with incomplete diffused lighting camouflage set to maximum brightness, 1942.*



Credit: Ian Alexander photo of document in The National Archives ADM/116/5027

*USS **Hamul** plan showing the diffused lighting camouflage fittings as used during the trials on 3 January 1942.*

common at sea in daylight. Therefore, highly reflective, lighter paints were better suited to camouflage the ships.[11] The diffused lighting system consisted mainly of rows of lamps mounted alongside the hull and the ship's superstructure with the help of fittings and movable telescopic arms. Such camouflage fittings were installed, for example, on board USS *Hamul*.[12] Diffused lighting was primarily designed to eliminate the darkness of the shadows of a ship and blend it with the ambient light and especially the night horizon. The lights were deployed to eliminate shadows – like under the gun barrel, decks, etc. – and photo sensors regulated the light intensity.

On board *Edmundston* power for the active camouflage system was supplied by a 3-kilowatt, 115-volt alternator. The adjustable light was adequate to replicate degrees of illumination from full moon to a moonless night. The 60-fittings installation was roughly equivalent to the specifications aboard USS *Hamul*. The installation's bulbs were operated with 6 volts and were connected in series. The weight of the power generator was about 2,500 pounds on board *Edmundston*, and the weight of the fittings and lamps added an additional 2,500 pounds.[13]

The night of 14 June 1943 had very high visibility (about 1.5 to 6 miles). There was a nearly full moon, the sky was cloudless and clear – not the best conditions for concealing a ship like HMCS *Edmundston*. At distances that made the unlit ship difficult to see with the naked eye, the diffused lighting system could eventually make *Edmundston* invisible even to binoculars.[14] The maximum range reduction was between 50-70 per cent, as reported later by Burr.[15] The experiments were repeated two days later on the night of 16 June 1943. The weather conditions were comparably good, the sky often not completely dark due to the moonlight. The illumination of the diffused lighting system was initially too low to camouflage the ship completely. Therefore, its dark silhouette was clearly visible at distances of less than a mile against the brighter night sky. Furthermore, at distances less than three-quarters of a mile, *Edmundston* had a clearly visible light reflection on the smooth sea surface.[16]

Overall, the RCN rated the trial results with the diffused lighting camouflage on board HMCS *Edmundston* as definitely better than with the British system. The mounting and distribution of the lamps allowed for a high degree of uniformity of lighting. This allowed optimal illumination of the ship's sides and superstructures – less than one-sixth of the ship was underlit. Lighting was also permitted down to the waterline, as reflections were not considered a serious danger.[17] Without exception, however, the test series took place in very good weather and calm seas. The test conditions thus did not correspond to the conditions that were to be expected in the operational area in the North Atlantic. Doubts therefore arose among those in charge as to whether the fittings for the lamps would be able to withstand the harsh climate in the Atlantic.[18]

Although the trials with active camouflage in the RCN were promising, the project came to its natural end shortly after. But there are some additional elements to the story.

Credit: Ian Alexander photo of document in The National Archives ADM/116/5027

Diffused lighting fitting for USS ***Hamul****. Shown here is the long type of the fittings.*

One of the few proven successes of the diffused lighting system during the Second World War came in September 1943, when HMCS *Rimouski* was able to deceive and approach a German submarine. However, a false signal from shore made the Germans suspicious, so they dived and thus evaded capture.[19] Nevertheless, the diffused lighting camouflage fulfilled the objective to allow a more stealthy approach to a potential target.

After the Allied victory in the Battle of the Atlantic – due to longer range aircraft, radar, deciphering of codes and better escort tactics – the need to camouflage ships from submarine attack decreased significantly. As a result, diffused illumination research became a low priority and work was ultimately discontinued after the end of the war.[20]

Stealth Ships: 21st Century 'Camouflage'

Today we are seeing new developments to protect surface ships from detection and render them practically invisible to radar. The talk is now about so-called stealth ships, which do not primarily rely on camouflage paints or active camouflage systems such as diffused lighting. On the contrary, this approach is about making a ship invisible to radar due to its very structure and the materials used.[21]

Camouflage paints and smoke screens continue to be part of the basic equipment of stealth ships, but usually only in a supplementary capacity to reduce the visibility of the ships at sea.[22]

The features of 'camouflage' in stealth ships are based on different technology. One approach is to avoid using cylindrical shapes or right angles on the ship. This makes it possible to scatter radar beams more strongly so that they can no longer reach the transmitter. In addition, radar-absorbing materials and coatings are used.[23] Furthermore, many of the newly developed stealth ships use special materials and configurations that help to conceal the radiated infrared heat – the same applies to the magnetic signature of surface units and submarines. Quiet propulsion systems reduce noise when the ships are underway, and specially designed low-cavitation propellers reduce vortex and bubble formation on the propeller.[24]

In the 21st century, stealth ships are in development or already in service in major navies around the world. The best-known examples include the *Zumwalt*-class in the United States, the *Daring*-class destroyers in the UK, the K130 corvettes in Germany and the *Lafayette*-class frigates in France.[25] There is currently a shipbuilding project in Canada to replace the old *Halifax*-class frigates and the *Iroquois*-class destroyers. The Canadian Surface Combatant project (CSC) is designed to produce 15 new combat units, with elements of other stealth ships. Delivery of these ships is expected to begin in the 2030s.[26]

Conclusion

Since ancient times, humans have used colours, ornaments and special paintings to modify ships, to highlight them, or to indicate the wealth of their place of origin. But in the age of sail, navies began to alter paints to deceive a possible opponent about their ship's actual size and/or armament.

Credit: via Ken Macpherson / Naval Museum of Alberta - Canadian Navy Heritage website. Image Negative Number MC-2853

HMCS ***Rimouski*** *on duty.*

Credit: Marius Vågenes Villanger, Norwegian Defence Forces

*The Swedish **Visby**-class corvette **Nyköping** sails off the Norwegian coast during Exercise Trident Juncture 2018. The **Visby**-class corvettes exemplify taking modern surface ship stealth technology to its extreme, while retaining traditional paint-based camouflage in accordance with its littoral area of operations.*

With the First World War came the birth of true camouflage research, when the first zig-zag paint pattern was introduced. From then on, there was a real camouflage race at sea and numerous patterns and colour schemes were developed. But such camouflage patterns were mostly only useful in daylight. In submarine warfare, especially, camouflage systems needed to provide protection at night against a dimly lit sky. This was the beginning of diffused lighting camouflage, an active camouflage technique that used light to conceal ships from visual detection.

With the development of radar, ships could be located over long distances. After radars were adopted, camouflage paints were no longer sufficient to conceal a ship, and this also put an end to research into diffused lighting camouflage at the end of the Second World War.

Today, modern surface units and submarines use special construction methods and materials to scatter radar beams and thus literally disappear from the radar screen. Stealth ships are the most modern ships that navies worldwide can employ to gain a tactical advantage over a potential opponent. But it may only be a matter of time before the stealth ship, too, falls victim to technological advances – in the end, it will always be a battle between seeing and not being seen.

Notes

* The author would like to thank the Directorate of History and Heritage, Department of National Defence/Government of Canada for providing the archival materials. He would also like to thank Ms. Kimberley Reeman for proofreading the manuscript.

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Future RCN Structure: A Modest Proposal

Major (Ret'd) Les Mader[1]

Credit: Corporal Simon Arcand, Canadian Armed Forces

*HMCS **Harry DeWolf** seen from a rigid-hull inflatable boat at Crocker Bay, Nunavut, during **Operation Nanook-Nunakput**, 21 August 2021.*

For over a century, Canada has sent forces overseas – in war and peace – as part of collective security arrangements to confront perceived adversaries, rather than isolating itself inside North America. This 'distant defence' strategy has led the Royal Canadian Navy (RCN) to emphasize the creation of expeditionary forces, often complemented by coastal patrol/protection forces. However, for the first time in its history, two international trends require the RCN to maintain both very capable, specialized coastal defence forces – and off Canada's most difficult coast, the Arctic – and separate expeditionary forces able to respond to an increasingly demanding geopolitical environment.

In this context, the RCN's fleet is currently undergoing a major and expensive renewal. When all the announced ships are delivered, the navy will have received: 15 Canadian Surface Combatants (CSC) (replacing both destroyers and frigates); two supply ships (Joint Support Ship (JSS)); and six Arctic and Offshore Patrol Ships (AOPS). Additionally, the project to replace the RCN's four *Victoria*-class submarines is now in its early definition stage. In time, the 12 Maritime Coastal Defence Vessels (MCDV), the navy's only and minimally-useful[2] mine counter-measure ships, will be all that remains of the current fleet.

Some would argue that these purchases will create an unbalanced navy that emphasizes the expeditionary mission too much, both in terms of the funds allotted and the number of vessels being procured. This is a major concern as the new ships will have to meet the navy's needs for decades and it is unlikely that significant additional funding will be available to address the neglected portions. This article will explore this concern and make suggestions for a more balanced structure. It will not discuss vital, related – but not force structure – issues such as recruiting, training, foreign logistics support, interoperability, etc.

The first international trend that shapes the future RCN is the increased capability and willingness of China and Russia (and their proxies) to work to undermine the existing rules-based world system which has underpinned international relations since World War II. In this past decade, in particular, we have seen an increase in Chinese and Russian actions that seek to change this system to their benefit. These include:

- China's claims to a special status in the South China Sea;
- China's development of the offensive means needed to threaten its neighbours – notably Taiwan – within the 'First Island Chain' and to contest/interdict movement and global trade inside the 'Second Island Chain'; and
- Russia's annexation of Crimea in 2014.

These actions, and others, have increased the suspicions and hostility of the liberal democratic (and some non-democratic) states and caused Western media to comment often about China's growing power and aggressive actions and how the West is being left behind.[3] A major result of this process was the statement by the North Atlantic Treaty Organization (NATO) on 14 June 2021 that called out China and Russia by name.[4]

It is very possible that China and Russia may never be as

powerful as many analysts forecast due to their massive and increasingly severe internal problems.[5] Thus, objectively, it is not in their interest to pursue conflict. However, history teaches us that thwarted/declining powers may well be tempted to seize a fleeting moment of perceived military advantage in order to arrest their eclipse by attacking their adversaries before the advantage is lost. Thus, in desperation, Russia and China might well choose to work together and/or with their clients/proxies to strike the liberal democracies (and other states). Such attacks could be direct or a series of seemingly unrelated incidents and crises that seek to over-extend and demoralize opponents.

China has a history of escalating some crises gradually, apparently in order to test or undermine its chosen adversary.[6] Such incrementalism raises the spectre of a 1914-like spiral from minor crisis to unintended conflict. Consequently, Canada could well be pushed to show military solidarity with other liberal democracies early in an international crisis.

While a major conflict is the least likely outcome of such crises, events could unravel quickly, as happened during the Falklands War between Argentina and the United Kingdom in 1982. However, a crisis involving Russia and/or China would more likely involve – especially in the early days – low-level, drawn-out 'squabbling.' The RCN could find itself participating in limited missions, such as mine hunting at strategic chokepoints, freedom of navigation operations, shows of solidarity and resolution, and convoy/ship escorts in regions as dispersed as the Baltic, Barents, Black, Arabian, Bering, East China and South China Seas. The real adversaries in such situations may not be readily identifiable; they may be 'plausibly deniable' proxies for China and/or Russia.

In addition to dealing with such crisis situations, RCN ships could also find themselves involved in what are now routine missions such as overseas anti-drug and anti-pirate patrols, and surprise (i.e., no notice) missions such as East Timor in 1999 and the Arabian Sea from 2001 to 2003. Canadian ships deployed on any of these operations must be very capable and well able to defend themselves, as no one can predict how events will unfold and any weaknesses may actually increase the danger of them being attacked.

The second relevant trend is the opening of the Arctic Ocean and region to ship traffic and resource exploitation due to the growing and massive effects of climate change. Already, environmental changes are affecting human activity in the North and influencing expectations about future actions. Ship traffic is increasing – 75.5 per cent of the ship transits of the Northwest Passage that occurred

An 2006 map by the US Department of Defense shows the general geographic boundaries of the First and Second Island Chains.

between 1903 and 2018 happened in the last 19 years.[7] Additionally, the shipping industry is thinking about using container ships of 400,000+ tons to transit through an ice-free passage and Arctic Ocean[8] to shorten the transit between Asia and Europe. Such expectations, whether realistic or not, will likely push interested countries to consider challenging Canada's Arctic sovereignty for their commercial and strategic benefit during at least the annual navigation season. As well, the Canadian Arctic might be used as an area to test Western unity and resolve. Such testing could be as simple as an adversary laying a few sea mines to stretch Canadian resources and justify a foreign intervention 'to protect international shipping' because Canada is not.

Unlike expeditionary operations, Canadian coastal defence missions will not be discretionary. Canada will have to be able to enforce and defend its Arctic sovereignty, or cede the field with the consequent loss of international respect and authority. Given the dispute with the United States over the status of the Northwest Passage, it may even have to protect this sovereignty unassisted.[9]

Canadian Arctic naval forces will require three key elements: patrol, presence and deterrence. Working with airborne and satellite surveillance assets, the new AOPS will provide a valuable patrol capability throughout Canada's Arctic waters during the annual navigation season.

The information-gathering resources must be supported by presence forces that can deal with an environmental/humanitarian crisis or confront an intruder. In order to be credible, presence forces must be well-armed, able to remain on station for extended periods, and capable of deploying boarding/landing parties when needed. Such forces tell intruders that their incursion has been discovered and is being monitored/contained, while Canada works to resolve the developing crisis. Being physically on scene, the Canadian ships present an intruder with the psychological barrier of having to use violence to remove them. Many intruders may not be prepared to take this step, especially if they know that they could face retribution from nearby specifically constituted Canadian deterrence forces.

There are two naval force structuring 'rules' that will underpin the discussion that follows about the ship types and quantities needed to meet the expeditionary and coastal defence requirements, the results of which are illustrated in Table 1. The first rule is 'four-for-one' – four ships of a given type are needed in order to maintain a rotation of one on task for years.[10] The inability to meet this requirement greatly affected the navy's deployments during *Operation Apollo* in the Arabian Sea from 2001 to 2003 for both its command-and-control (C^2) destroyers and its supply ships.[11] The second rule is 'geography-independent response' which means all naval capabilities must be available in both the Atlantic and Pacific fleets, so that either one can support Canada's initial response to an emerging crisis, until the other fleet sends reinforcements or the next rotation.

The CSCs are expected to be very capable warships and will be the heart of the RCN's expeditionary force. Their acquisition has already generated much discussion and criticism, both for the procurement strategy employed and for its cost. However, it is clear that costs can only be reduced by purchasing fewer or inferior ships than the design selected. This situation creates industrial and political complications for the project, as well as military ones.

One possible approach for deferring costs is to purchase one basic ship design, but with two different capability suites. At least four CSCs could be equipped as C^2 and area-air defence (AAD) destroyers, while the remainder – in multiples of four – could be outfitted as general-purpose frigates that can be upgraded to the destroyer standard, if required. Assuming that at least 12 CSCs are built, the navy will be well placed to sustain an expeditionary contingent, similar to the early rotations of *Operation Apollo*, for several years if necessary. The full suite of destroyers and frigates should be split equally between the Atlantic and Pacific fleets.

The navy's supply ship component has long suffered from inadequate numbers and tardy replacement. The current JSS project will only provide two ships. This is insufficient to support far distant expeditionary missions, let alone also facilitating ship deployments to the Canadian Arctic. A possible solution to make up the shortfall is the use of converted commercial vessels to provide supply ships for some less dangerous missions. One or two such vessels could be purchased and outfitted as proper warships with naval crews and self-defence armaments. If two were purchased, one could be assigned to each fleet alongside a JSS. If only one enters service, it should be placed with the Pacific fleet to afford greater logistics capability and independence for the wide reaches of the Indo-Pacific region.

Having at least one JSS with each fleet would also give

Table 1. Possible Future RCN Force Structure

Ship Type	Quantity	Distribution Pacific / Atlantic	Remarks
CSC – destroyers	4	2 / 2	C^2 and AAD
CSC – frigates	8	4 / 4	General purpose
Supply Ships	JSS – 2 Commercial Conversions – 1 or 2	2 / 1 or 2	Expeditionary and coastal operations; Non-combatant evacuation possible
Submarines	8	4 / 4	AIP; Expeditionary and Arctic operations
AOPS	8	3 / 5	Improved armament; Limited amphibious use; Mine-hunting 'mother ship'?
Arctic Amphibious Ships (if AOPS inadequate)	4	2 / 2	Non-combatant evacuation possible
Mine warfare	8	4 / 4	Expeditionary and coastal operations

Credit: Author

Credit: Capt Trevor Ackland, Canadian Armed Forces

*HMCS **Toronto** conducts a replenishment at sea with MV **Asterix** during Exercise Cutlass Fury, off the coast of Nova Scotia, Canada, on 14 September 2021.*

the RCN a minimal ability to undertake non-combatant evacuation operations (NEO) and humanitarian assistance/disaster relief (HADR) operations. The requirement to be able to conduct such short-notice humanitarian missions has been a staple of Canadian defence policy.[12]

The recently-announced project to look at replacing Canada's current *Victoria*-class submarines will almost certainly provoke the usual discussions about how little value submarines offer Canada.[13] Such comments will probably fail to recognize that modern submarines provide a Canadian expeditionary task group with an additional dimension of capability and can also act as deterrence forces in the Arctic. In this latter role, they could remain hidden on station for long periods leaving an intruding force unsure about how and when Canada would react to the incursion, but knowing that such a reaction could be strong, swift and unavoidable. In order to meet the expeditionary and deterrence roles, the new submarines must be available on both coasts in sufficient numbers, long range, silent and equipped with Air Independent Propulsion (AIP).

Given the need for credible coastal defence, it is fortunate that the AOPS provides the RCN with a valuable Arctic patrol vessel that can operate closely with Canadian and allied surveillance and intelligence assets. These weakly-armed, minimally-manned ships are, however, less well prepared for the presence and deterrence missions. It would be very helpful if the two unarmed Coast Guard AOPS announced in 2019 are built as RCN warships to give greater strength to the navy's patrol fleet and if all eight AOPS are provided with improved armament. The employment of the AOPS should be more heavily weighted towards service with the Atlantic fleet in recognition of the greater ease of access to Canada's Arctic from the eastern side.

It has also been suggested that these ships could act as transports for an infantry platoon (+),[14] giving them an ability to undertake presence operations. The creation of the marine infantry and tactical helicopter units required by such an AOPS-based presence does not have to be very expensive. Existing units and personnel could be repurposed and trained at relatively minimal cost.[15]

It is possible that an AOPS-based amphibious capability will be found to be inadequate for Canada's needs. Two notional, specialist Arctic amphibious ships have been described in earlier *Canadian Naval Review (CNR)* articles.[16] Both concepts offer the ability to transport at least a marine infantry company and three Cyclone helicopters. These embarked capabilities would afford a range of presence options during a crisis. The procurement of one or the other design – or another one – would be worthwhile. Any such ships purchased should be based with the two fleets, in useful quantities, both for use in the Arctic and as another NEO capability.

Finally, sea mines, low-cost but effective tools, could be used by opponents to hamper Canadian naval operations overseas and in national waters.[17] The current MCDVs must be replaced by a useful quantity of ocean-going, capable mine counter-measure vessels. These should be deployed with the two fleets. As well, mine-hunting procedures for Arctic waters – perhaps based on the AOPS as a 'mother ship' for remotely operated vessels and other off-ship procedures – should be investigated.

Credit: MCpl Anthony Laviolette, Canadian Armed Forces

*Crew of HMCS **Shawinigan** and members of Fleet Diving Unit (Atlantic) utilize an unmanned underwater vehicle, REMUS, to locate practice mines on the approaches to Halifax Harbour, Nova Scotia, 23 March 2021.*

Conclusion

For the first time in its history, Canada faces the need to provide capable coastal defence forces off its most demanding coast – very likely on its own – while still being able to provide relevant and effective expeditionary forces for future international crises. While some ships are dual purpose, the unique demands of Arctic operations mean that the RCN cannot simply double-task its expeditionary ships for both its international and coastal missions. It needs capable specialist ships for Arctic patrols and defence. This inability to double-hat requires Canada and the RCN to think carefully about what ships are required – in what quantities and with what capabilities – in order to develop a balanced fleet that is able to respond to a wide range of demands.

This article has briefly discussed the types of ships and forces needed and presented a possible force structure based on this discussion. We can hope that the government, the Department of National Defence, the Canadian Armed Forces and the RCN will have had a thorough debate about what fleet structure to develop, what compromises have to be accepted, and where to devote available resources, with a full understanding of the implications of their choices.

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Capability Considerations for Canada's Next Submarine

James Brun

Canada's *Victoria*-class submarines are capable and effective platforms. However, they are ageing and in need of a replacement plan. A flotilla of four submarines is barely sufficient for continental defence, and insufficient to patrol Canadian waters *and* contribute to collective defence measures abroad. The *Victoria*-class modernization project is upgrading the platform's combat sensors and habitability features such as fresh water and ventilation, allowing the Royal Canadian Navy (RCN) to operate the submarines into the mid-2030s. Defence procurement timelines are long, thus it is necessary for Canada to act now to begin the process of replacing the *Victoria*-class fleet. This article analyses the capabilities Canada should seek with the *Victoria*-class submarine replacement.

Originally designed as the *Upholder*-class, the *Victoria*-class submarines were built for operations in the North Atlantic waters surrounding the United Kingdom and Greenland during the Cold War. The geopolitical environment and expected missions have evolved. Likewise, the threats to Canada and the international system have also evolved. Given the timeline for defence procurement, it would be a failure not to improve Canada's submarine capability and position Canadian maritime forces for future operating environments. The capabilities for the RCN's next class of submarines should contribute to a balanced, combat-effective, multi-purpose submarine force, capable of being forward deployed in support of strategic objectives.

Strategic documents published by Canada's Department of National Defence (DND) are instructive in this analysis. *Strong, Secure, Engaged: Canada's Defence Policy* (SSE) outlines Canada's aspirational strategic objectives for its navy. SSE states that "Canada requires a Navy that is organized and sized to project power responsively and effectively far from Canada's shores."[1] Flowing from SSE, the RCN's *Canada in a New Maritime World: Leadmark 2050* details future requirements and potential threats. *Leadmark 2050* advocates for a forward-postured submarine, able to control sea lanes of communication and maritime chokepoints, enforce Canadian sovereignty and deter conflict.[2] The theme in these strategic documents is that a modern submarine force is essential to a balanced, dispersed, fighting naval force.

In line with the RCN's vision for a blue-water navy, the future Canadian submarine force must be multi-purpose. In order to achieve government objectives, the *Victoria*-class replacement must retain and expand upon a number of capabilities. Increased intelligence, surveillance and reconnaissance (ISR) collection, deterrence, warfighting capacity, survivability, and an ability to operate while remaining undetected are self-evident requirements. However, the future Canadian submarine force should also be able to operate in the high North, contribute to joint operations in the littoral regions, including long-range precision strikes, remain connected to naval and joint networks while submerged and transiting, and operate autonomous underwater vehicles. This globally deployable force envisioned by *Leadmark* must be capable of ocean crossings and of operating anywhere in the world, including Canada's Arctic. This vision foresees a submarine fleet that is operated and sustained in a way that allows Canadian submarines to be forward deployed, routinely and persistently, to regions of Canadian strategic concern.

*HMCS **Victoria** sails off the British Columbia coast during Task Group Exercise 2021, 10 February 2021.*

The RCN must pursue these capabilities in a *Victoria*-class replacement platform. While the *Victoria*-class is suited for continental defence, Canada has demonstrated a desire to deploy submarines abroad in support of alliance and coalition efforts supporting strategic objectives. These overseas deployments have had severe repercussions on maintenance and readiness for the *Victoria*-class flotilla, effectively resulting in a year-long operational pause following the tandem deployment of a Canadian submarine to Europe and a submarine to the Asia-Pacific region. This suggests that there is a greater desire to

employ the *Victoria*-class abroad than is currently possible. These inherent desires and strategic needs must be front of mind in considering the future of the Canadian submarine force.

Balance

A modern submarine fleet is an important component of a balanced naval force structure. The Canadian submarine force provides vessels capable of "unrivalled stealth, persistence and lethality [that] can place an adversary's maritime forces at risk in a given theatre of operations."[3] Currently, the four *Victoria*-class submarines meet the role for which they were intended, mainly exerting sea control in Canada's sea approaches. However, considering maintenance cycles, four boats does not provide much flexibility for employment. The RCN should consider how many submarines it requires to meet the availability requirement of the Canadian force.

The number available for employment determines the force readiness of the RCN submarines. Generally speaking, if a state has three submarines, one will be in deep maintenance, one will be in short-term maintenance, and the third will be available for operations. Four submarines permits one or two boats to be available for operations, with the remainder being used for crew training or undergoing maintenance.[4] If a fleet of six submarines replaced the *Victoria*-class, it is reasonable to assume that four would be operational at any time, with two or three boats available for tasking. This would allow one submarine to operate on each of Canada's East and West Coasts, and in the Arctic when viable. A greater availability rate would necessitate a larger submarine fleet.

Previous Canadian White Papers and operational experiences have regularly assessed that Canada needs more submarines than it currently operates. For example, in 2017, the Standing Senate Committee on National Security and Defence released a report entitled *Reinvesting in the Canadian Armed Forces: A Plan for the Future*. In this report, the committee recommended that Canada should procure 12 modern submarines and divide the force evenly between the Atlantic and Pacific ports.[5] Such numbers would enable the RCN's continuous employment of submarines on both coasts and provide boats, as required, for Arctic and expeditionary operations.

Credit: Master Corporal Nathan Spence

HMCS ***Corner Brook*** *undocks at Esquimalt after an extended docking period, 13 June 2021.*

There is no doubt that submarines are essential to a balanced naval force. While continuous employment of submarines in each ocean is key, it is important to note that the RCN requires additional sub-surface platforms to enable completion of other assigned tasks. Those missions could span the full spectrum of naval operations, from benign humanitarian efforts and ISR, to warfighting. For the force to be truly balanced, each fleet must have a readily available submarine force to execute assigned missions.

Combat Effective

Canada's future submarine fleet must also be combat effective across all domains of naval warfare. A replacement submarine for the *Victoria*-class must be capable of contributing to operations ashore and be interoperable with Canada's allies and defence partners. A new submarine fleet must be able to control Canada's maritime approaches. Additionally, it must capably integrate with allies on operations, conducting tasks ranging from presence and surveillance missions to traditional anti-surface, anti-submarine, littoral operations and long-range precision missile strikes.

A capable, combat-effective submarine force is a valuable deterrent and useful in defensive and offensive roles. In both anti-submarine and anti-surface roles, a modern submarine utilizes the basic characteristics of "endurance, stealth, freedom of movement and versatility" to position itself appropriately to strike or threaten a strike.[6] These enabling characteristics allow the submarine to unleash a torpedo at enemy submarines or surface vessels alike. Such weapons must be fully integrated into the submarine's combat management system, which must be able to communicate with other national and allied combat systems in a network of sensors, processing equipment and weapons systems. To this end, the submarine must be able to prioritize targets and contribute to an integrated maritime campaign.

Beyond traditional combat operations, a modern submarine is ideally suited to contribute to littoral operations. Monitoring an adversary's port facilities, deploying and extracting special forces, providing intelligence for counter-trafficking operations, and contributing to joint targeting ashore are missions that Canada's submarine force

Credit: US Navy

*Sailors load a Harpoon anti-ship missile on to the **Los Angeles**-class submarine USS **Olympia** in preparation for the 2018 RIMPAC exercise, 3 July 2018.*

should expect to execute in future maritime operations. In the modern anti-access area-denial landscape, such as the Asia-Pacific region, a submarine's ability to operate in the littoral regions will be of increasing importance as states tend not to risk surface ships in such environments.[7]

Canada's current submarine fleet has no submarine- or surface-launched missile capability which could be utilized to amplify the depth of warfare units and increase fleet capability. An anti-surface missile would support Canada's system-of-systems approach to maritime operations, and provide a fleet commander with a greater range of options when considering offensive measures, including the targeting of submarine-hunting ships, which must be engaged at ranges well beyond what a submarine-launched torpedo can achieve. This capability, employed in a future Canadian submarine, would provide Canada with a deeper range of tactical and strategic options when engaging targets at sea or ashore at extended ranges.

Canada's future submarine fleet must be combat effective, able to sink ships and submarines, and deter enemy action. In order to achieve this aim, the *Victoria*-class replacement must be able to conduct essential submarine tasks, including anti-surface and anti-submarine warfare in littoral regions, and should be able to integrate into allied and partner operations.

Multi-Purpose

In addition to being combat effective, a modern Canadian submarine must also be able to gather information and intelligence covertly, and communicate that data across national and international communication infrastructures. Canada's next submarine must be able to operate across the spectrum of operations at sea, while integrating with defence and security partners.

Canada's future submarine fleet would ideally incorporate the most modern ISR technology available. This equipment, including sonar and other sensors, enables operators to understand and assess their environment above and below the surface. This capability is not only essential to the safety of the submarine and its crew but also vital to building a wider intelligence picture that shapes broader operations. However, simple information collection does not enable operations. The collected data must be transferrable to an appropriate authority for synthesis and use.

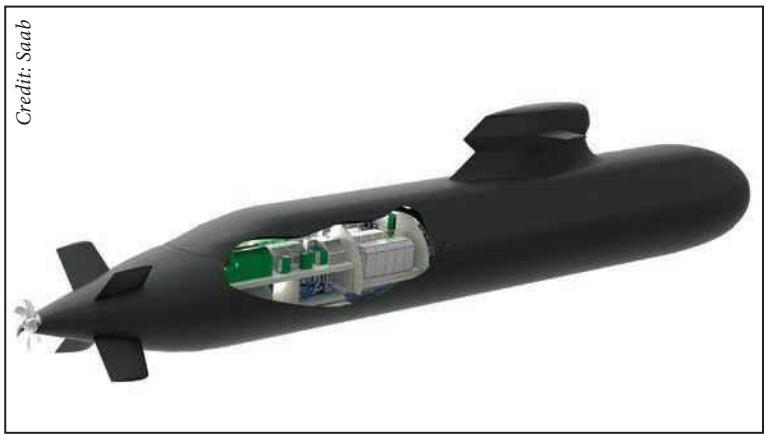
The *Victoria*-class replacement should possess a communications suite that enables liaison with other maritime units and headquarters, while remaining submerged and underway. Without this capability, the vital characteristics of a submarine – stealth, mobility and endurance – are diminished. The communication systems should transmit data collected by the submarine's sensors in order to fulfill a "key element of the system-of-systems approach to maritime domain awareness."[8] In this way, a submarine can contribute to a pan-domain surveillance system, and amplify the utility of a single unit within a broader system of networks.

Globally Deployable

A globally deployable submarine fleet is one that can cross oceans and operate with logistical support for missions of extended duration around the globe. For Canada, this means that a submarine must be able to operate with significant endurance. The *Victoria*-class offers Canada a limited ability to deploy its submarine force overseas. However, given the future security environment, Canada's next class of submarines should be capable of operating further abroad for sustained periods. Given the challenges to the rules-based international order at sea, the ability to deploy a submarine into an adversary's littoral region will provide a significant strategic impact for Canada and its allies.

Endurance will be of immense importance for a Canadian submarine assigned missions overseas, and even domestically. Whether transiting to the Asia-Pacific region, Europe, or Latin America, or even sailing to the high North, Canadian submarines will have to endure long transits and remain on patrol for periods of a month or more to be effective. Endurance relates to the propulsion system a submarine uses. Generally, there are three types of submarine propulsion systems: nuclear-powered; diesel-electric; and air independent propulsion (AIP).

Of these submarine types, nuclear-powered submarines are the fastest and have the greatest endurance. Further, nuclear-powered submarines can safely operate under Arctic ice. However, their large size and constantly operating reactor cooling systems cause increased noise that



*A computer-generated image shows the Oceanic Extended Range version of Saab's AIP-equipped **Blekinge**-class submarine, currently being considered by the Royal Netherlands Navy.*

reduces stealth when compared to conventional counterparts. Ultimately, nuclear-powered submarines are less effective for operation in the littoral regions where their acoustic signatures make them vulnerable to detection.[9]

Conversely, diesel electric submarines have an increased level of stealth but are slow in comparison to nuclear-powered submarines. They owe their stealth to the relative quietness of the batteries that power their propulsion system while submerged. However, they must snorkel fairly frequently to cycle fresh air into their machinery plant and charge batteries. Additionally, diesel submarines are constrained in range by the amount of fuel they can carry. A conventional diesel submarine could refuel and resupply in theatre, but doing so would compromise the submarine's stealth and crew security.[10] Further, their refueling requirement would decrease Arctic capability.

The last option is an AIP system, which enables a non-nuclear-powered submarine to operate without access to oxygen from the atmosphere for prolonged periods.[11] AIP technology uses pressurized liquid oxygen to remain submerged for much longer periods than diesel-electric submarines. Rather than being constrained by battery life, the endurance of an AIP-enabled submarine is limited by its stores of pressurized liquid oxygen.[12] Careful operation of an AIP system is vital to ensure that pressurized liquid oxygen is not depleted, forcing the submarine to switch to the conventional diesel-electric system and negating the benefits of the AIP system.[13]

Due to Canada's size, endurance is an important consideration for a future submarine force charged with patrolling three oceans and the world's longest coastline. A nuclear-powered submarine enjoys limitless endurance and the capacity to travel at high speeds but it suffers from decreased relative stealth. Conventional diesel-electric submarines and AIP-enabled submarines provide stealthier options for a submarine fleet yet both platforms are constrained in range due to their requirement to carry fuel or pressurized liquid oxygen. Further, neither AIP-enabled nor conventional submarines are able to transit around Canada's vast maritime expanses, or across the Pacific or Atlantic Oceans at high speeds. Whether patrolling Canadian waters, or deploying overseas, Canadian submarines will have to transit significant distances to arrive in operational theatres. To be globally deployable and remain effective in operations, Canada's modern submarine force will require substantial endurance.

Arctic-Capable

Victoria-class submarines have operated north of the Arctic Circle throughout their service lives and will continue to do so periodically. For example, in 2007 and 2009, HMCS *Corner Brook* deployed to the Canadian Arctic, and HMCS *Windsor* operated north of the Arctic Circle in 2016.[14] When ice conditions are favourable, the *Victoria*-class can safely operate in the high North or in the chokepoint approaches to the Northwest Passage.[15] As temperatures in the region increase, the operating window in this area will lengthen. The level of under-ice capability the next class of Canadian submarine has will determine Canada's ability to shape maritime operations in the Arctic.

As the region warms, more traffic will transit Canada's Arctic waters. SSE envisions an RCN that is able to operate in all three Canadian oceans and enforce Canadian sovereignty in each region. As climate change leads to more shipping access to the Northwest Passage and changes the transit route of shipping traffic throughout the globe, Canada's Arctic is expected to experience an increase in maritime activity. The importance of ensuring sovereignty and surveillance of this region will increase in tandem.

There are two types of Arctic submarine patrols: those conducted under the ice; and those conducted near the edge of the ice, in the area defined as the Marginal Ice

*The **Los Angeles**-class nuclear-powered submarine USS **Hampton** surfaces through ice at Ice Camp Sargo during ICEX 2016 in the Arctic, 14 March 2016.*

Credit: US Navy photo by Brenna Zinter

Sailors of the US Navy Submarine Development Squadron 5 prepare a LTV-38 uncrewed underwater vehicle, 18 November 2014.

Zone (MIZ). Both types of Arctic environment afford specific challenges but different types of submarines are required to operate in each environment, depending on the desired capability. A conventional diesel-electric submarine, such as the *Victoria*-class, can operate near the MIZ but cannot safely operate underneath solid ice. Similarly, a submarine with AIP can operate near ice but would be limited in its ability to conduct under-ice patrols. As AIP technology advances, however, it is conceivable that within the service life of the *Victoria*-class replacement, this technology may facilitate under-ice operations.[16] The ability to conduct sustained under-ice operations remains an endeavour suited only for nuclear-powered submarines with the ability to create their own air and water and break through the ice's surface with the size and strength of their hull. Whether the government determines under-ice submarine operations to be a requirement will help define the propulsion plant in a new class of Canadian submarine.

If the RCN has ambitions to operate a submarine force in Canada's Arctic, the next class of Canadian submarine must meet certain requirements. The submarines must be appropriately designed to navigate safely near or under Arctic ice, at a long distance from support, while considering the unique environmental aspects of the Arctic. The dangers of under-ice operation are significant and must be carefully considered. Autonomous underwater vehicle (AUV) technology offers the prospect of a naval presence under the ice, with significantly less risk to life. The ability to utilize cutting-edge AUV platforms, with a Canadian submarine operating in the MIZ as a mothership, presents an opportunity.

Even if the process of procuring the *Victoria*-class replacement fleet commenced right away, at least a decade would pass before the next class of submarines joined the RCN. Based on historical evidence, the next Canadian submarine will likely remain in the Canadian order of battle for upwards of four decades. The Arctic environment is increasingly amenable to naval operations and will continue to evolve over this period. Thus, it is likely that maritime activity in the high North will continue to increase. Naval and defence planners must project themselves forward into this potential operating environment when considering Canada's future submarine requirements. The fleet must be Arctic-capable.

Conclusion

The *Victoria*-class submarines are modernized but have at most two decades of service life remaining. By the mid-2030s, they will require replacement by a new class of submarine for Canada to maintain this vital maritime capability. This replacement submarine must be able to operate on at least two of Canada's coasts, and occasionally on the third, as well as periodically operate in areas of strategic national importance. It must also be able to integrate into sophisticated national and international networks and act as a link in a sensor chain that can provide the Canadian government with strategic options, while providing defence in depth for friendly maritime forces.

Notes

1. Canada, Department of National Defence (DND), *Strong, Secure, Engaged: Canada's Defence Policy* (Ottawa: DND Canada, 2017), p. 34.
2. DND, Royal Canadian Navy (RCN), *Canada in a New Maritime World: Leadmark 2050* (Ottawa: DND, 2015), pp. VI, 28.
3. *Ibid*., p. 39.
4. For more on this see Jan Joel Andersson, "The Race to the Bottom: Submarine Proliferation and International Security," *Naval War College Review*, Vol. 68, No. 1 (2015), p. 17.
5. Senate of Canada, *Reinvesting in the Canadian Armed Forces: A Plan for the Future* (Ottawa, Standing Senate Committee on National Security and Defence, 2017), pp. 37-38.
6. Peter Haydon, "Canada and Modern Submarines," *Canadian Naval Review*, Vol. 12, No. 1 (2016), p. 35.
7. For this argument, see Jeffrey Collins, "Towards a Renewed Canadian Submarine Capability," *Niobe Papers*, No. 4, Naval Association of Canada, July 2019, p. 7.
8. Commodore Christopher Robinson (Commander of Canadian Submarine Force 2017-2019) in discussion with the author, February 2021.
9. Hans J. Ohff, "Nuclear Versus Diesel-electric: The Case for Conventional Submarines for the RAN," *The Strategist*, Australian Strategic Policy Institute, 11 July 2017.
10. Peter T. Haydon, "Canada's Future Submarine Capability," Navy League of Canada, July 2004.
11. Norman Jolin, "Future Canadian Submarine Capability: Some Considerations," *Canadian Naval Review*, Vol. 11, No. 1 (2015), p. 17.
12. *Ibid*., p. 17.
13. *Ibid*., p. 17.
14. Marcello Sukhdeo, "The Capabilities and Challenges of Canada's Future Fleet: Interview with Commodore Christopher Robinson, Director General Naval Force Development, Royal Canadian Navy," *Vanguard Canada*, October/November 2020, p. 22.
15. *Ibid*., p. 22.
16. Collins, "Towards a Renewed Canadian Submarine Capability," p. 6.

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Making Waves

(Note: The commentaries included in Making Waves represent the opinion of the authors.)

Reserve Military Forces Should be Under Provincial Jurisdiction

Roger Cyr

In November 2021, catastrophic storms caused great damage and resulted in forced evacuations in British Columbia. The weather left entire cities flooded and evacuated, and major highways closed due to landslides. The dire situation in BC left thousands homeless, and cut transportation and supply routes, rendering parts of the province inaccessible. It showed that Canada is simply not ready to cope with any major disaster. People were left to fend for themselves, some hoarded all they could get their hands on, while others instantly gathered to offer assistance.

After some five days of chaos, the Premier of BC finally asked the federal government to declare a state of emergency and sought military support. On day six, the military flew in a reconnaissance group from Alberta. This group was composed of 64 soldiers who were on site to determine the actual needs of the province and what could be done to help. From this preliminary survey the military indicated it would assemble personnel and equipment in staging bases in Alberta and Quebec, depending on the assessed requirements. With time passing, those affected by the floods were dismayed by the lack of a prompt response from the military, especially since there are two major military bases in the province, CFB Comox and CFB Esquimalt, which are staffed with some 5,000 regular force military personnel and have a vast array of heavy equipment and material. The province is also home to naval and army reserve units. The naval reserve consists of two divisions, HMCS *Discovery* in Vancouver and HMCS *Malahat* in Victoria. The army reserve consists of the 39 Canadian Brigade Group which is composed of a headquarter group and 11 army reserve units. The reserves in BC total some 2,000 military personnel. So, the question is: how can this system be changed to make it more effective?

Provincial and territorial authorities are required to respond first when a major natural disaster occurs in Canada. According to the Department of National Defence, "[i]f they become overwhelmed, they may ask the Canadian Forces for help." *Operation Lentus* is the Canadian Armed Forces' (CAF) "response to natural disasters in Canada, and it follows an established plan of action to support communities in crisis," including forest fires, floods, ice storms, or hurricanes.[1]

Credit: Corporal [illegible], IMAGARPAC Imaging Services

Sailors and soldiers from Canadian Fleet Pacific assist the WSÁNEĆ First Nations in Saanich, British Columbia, with sandbagging efforts to protect against flooding from during ***Operation Lentus*** *21-06 on 30 November 2021.*

However, the provinces and territories have no control of what resources will be provided and their end-use, even though they are the most knowledgeable as to their own needs. With the dire need of resources in the aftermath of a major disaster, there must be a better system for provinces to be able to react quickly and have access to emergency aid.

The provinces should have the authority to call on Canada's support resources to come to the rescue in situations of sudden damage or suffering. In fact, there are much better organizations in other countries. For example, in Great Britain during World War II the militia principle was followed in the establishment of the Home Guard. Today militia forces constitute the bulk of the armed forces available for emergency service in Switzerland, Israel, Sweden and several other countries. China maintains large standing forces and conscript reserves to support militia forces as territorial reserves for local defence and disaster relief.

The examples closest to home are the organizations that exist in the United States – the US National Guard and the US Naval Militia. The National Guard is a militia, a reserve military group organized by the US Army and Air Force. Every US state and territory (including Guam, the Virgin Islands, Puerto Rico and the District of Columbia) has a National Guard, for a total of 54 organizations. The National Guard is organized, trained and equipped

to handle any emergency that may arise in its territory, in support of local police, firefighters, medical personnel and other first responders. In general, the same types of uniforms, arms and equipment as are issued to the US Army are issued to the National Guard.

Guard units are funded by the federal government, but command and control remain with the state Governor, and can be called on by Governors during emergencies. Guard units may also be ordered into active duty for up to two years by the President in the event of a national emergency. National Guard troops can also be folded into the US Army and serve in military operations overseas. In fact, some 40 per cent of the US Army's current combat capacity is National Guard members.[2]

In addition to the National Guard, there is the US Naval Militia, a reserve military organization also administered under the authority of the state governments. Naval militias are funded by the federal government, and can use US Navy facilities. Like members of the National Guard, the navy reservists serve in both federal and state capacities – i.e., they can be asked to deploy as part of the federal military force and can be deployed by the Governor of their states during emergencies.

Canada could have a similar organization of its reserve military forces. There are at present naval, army and air force reserve units that could be re-organized in similar fashion and would be available in a timely manner in the event of any catastrophic situation that arises, such as the flooding in BC. The Canadian reserve forces could become the Canadian equivalent of the US National Guard or militia.

The Primary Reserve is comprised of part-time soldiers, sailors, airmen/women who work in military establishments. They are members who have other full-time civilian employment or who attend school, and who dedicate themselves to the military on a part-time basis. The Primary Reserve has approximately 28,500 members, including:

- the Naval Reserve (approximately 4,000 reservists in 24 Naval Reserve Divisions). At least one naval reserve establishment in each province;
- the Canadian Army Reserve (approximately 19,000 part and full-time reservists in 185 units located in 86 cities). At least one unit in each province and the Northwest Territory;
- the Royal Canadian Air Force Reserve (approximately 2,000 personnel employed in various establishments throughout Canada);
- Military Personnel Command, which includes the Canadian Forces Health Services Reserve (16 Reserve Field Ambulances across Canada and the 1 Canadian Field Hospital Ottawa) and the National Defence Headquarters Primary Reserve List (PRL) (approximately 1,500 members);
- the Canadian Special Operations Forces Command Reserve; and
- the Judge Advocate General Reserve (approximately 60 legal officers employed in various supporting legal roles).[3]

The Canadian reserve force should be a unique branch of the Canadian Armed Forces (CAF) that would have both provincial and federal responsibilities. The force would respond to domestic emergencies such as natural disasters and unrest, and it would also support military operations overseas. It would serve both community and country.

The reserve force should be under the control of the CAF and administered and funded as for any other military units. But its callout should be the responsibility of the Governor-General or the Lieutenant-Governors of the provinces. The Governor-General of Canada executes most of the duties of the sovereign, including being the Commander-in-Chief of the CAF. The Lieutenant-Governors are the de facto representatives of the sovereign and the Governor-General in the provinces.

Once a Premier of a province or the Prime Minister perceives the need for assistance, the request for assistance

Credit: Timothy Koster, Connecticut National Guard Public Affairs Office

Soldiers assigned to the Connecticut National Guard organize and prepare a shipment of at-home COVID-19 testing kits to be distributed at a regional distribution point in North Haven, Connecticut, 3 January 2022.

Royal Canadian Navy sailors from the Naval Reserve assist Immediate Response Unit soldiers from 2 Canadian Mechanized Brigade Group as they conduct a shoreline reconnaissance of flood afflicted areas in Ottawa, Ontario, during ***Operation Lentus****.*

would be submitted to the applicable governors. For each situation, and depending on the emergency, a Crisis Action Team would be created which would include representatives from the Governor-General, Lieutenant-Governor, the federal, provincial, municipal government and the military, as applicable. The team would oversee a coordinated use of available resources. Once the needs are established, decisions would be made to deploy troops and equipment according to the situation. Today, reserve army units have vehicles and equipment and reserve navy units have small boats, but all units would need to be better equipped with material that would be useful in any disaster. As well, there should be plans now for the procurement of equipment that would be required in an emergency. There should also be training of reserve personnel on how to respond to catastrophic situations,

There have been deployments of military personnel during floods on numerous occasions in Canada. In one such situation, in April 2019, some 800 Canadian military personnel fanned out across Quebec, filling sandbags and aiding evacuations. In Rigaud, naval reserves were called in to carry out rescue and assistance activities along the Rigaud River. This work was seen as very rewarding by reservists, and positively received by local residents.

As noted, every province has established reserve units which could be called out to provide relief during emergencies. The units are composed of local members who would be familiar with the area, live in the vicinity of the scene and could be deployed instantly. But if the local situation prevents this, external personnel would obviously have to be called out. Once a Crisis Action Team agreement is reached, then the deployment of personnel and equipment would occur immediately. The units would be readily available to serve in a timely manner since they are in each of the provinces. There would be no longer be the need to wait for an out-of-area mustering of personnel and equipment. Reserve units could also be ordered into active duty by the Prime Minister through the Governor-General in the event of a national emergency.

The reserve force should receive the requisite training in line with its mission and be equipped to react to any event that would require its services. Reserve units should be organized, trained and equipped to handle any emergency that may arise in their territory, in support of local first responders.

Notes

1. See Canada, Department of National Defence, "Current Operations: Operation Lentus," December 2021.
2. See, for example, Mark Cancian, "U.S. Military Forces in FY 2020: Army," Center for Strategic and International Studies, 15 October 2019.
3. See Canada, Department of National Defence, "Canada's Reserve Force."

COP26, Arctic Climate Change and the RCN

Bill Featherstone

Canada has always been a proponent of addressing climate change at home and globally. For decades, the Arctic has been a major part of the research into climate change. As the proverbial 'canary in the coal mine,' this area is the harbinger of what is now occurring or will be soon in the rest of the world. Unfortunately, the Conference of Parties (COP) climate conferences over the last almost three decades have not shown much appreciable success at slowing down Arctic or global climate change. We are at the point where we must start developing ongoing strategies to mitigate the outcomes.

Arctic sea ice continues to deteriorate beyond reasonable recovery. With the increasing open period of Arctic waters, the maritime traffic throughout the area also increases. Much of the traffic is simply shippers looking for a shorter, more accessible route, east to west or west to east, which has its own environmental concerns. However, a more nefarious concern includes other states attempting to exploit the vast natural resources in the Arctic. The concerns for Canada are not just security and sovereignty in the north, but environmental concerns throughout the Canadian archipelago as global warming continues to increase unabated.

The COP is the decision-making body of the United Nations Framework Convention on Climate Change (UNFCCC) that came into force by a multinational treaty in 1994. COP21, better known as the Paris Accords, took place in 2015. It was significant because for the first time each country represented there agreed to work towards a

Credit: Adam Scotti, Prime Minister's Office

Prime Minister Justin Trudeau takes part in the Canadian Leadership Event on Carbon Pricing during COP26 in Glasgow, 2 November 2021.

limit to global warming of something less than 2 degrees Celsius but aim for 1.5 degrees. They all agreed to present updated plans every five years to illustrate their progress. To date, none of the Paris Accord participants has gotten anywhere near those goals. In 2017, newly elected American President Donald Trump pulled the United States out of the Paris Accords and UNFCCC, and the wind promptly went out of the sails of many good intentions.

This year's conference (COP26) came to a close on 12 November in Glasgow, Scotland. It was the pivotal moment for participating countries to bring their updated plans from five years ago to the table, although there is little to report or be proud of. The election in 2020 of US President Joe Biden returned the United States to COP with renewed vigor, beginning with reversing the Trump administration actions against climate change. Interestingly, during the COP26 talks, agreement was reached between the United States and China to work together on common strategies to reduce the release of methane gas into the atmosphere. Unfortunately, they have no such agreement regarding coal production, which is troubling. Time will tell if any of these postures amount to anything substantive.

Regardless of the muted optimism of the meeting in Glasgow, if the politics holds fast, a goal to reach less than 2 degrees by the end of the decade (2030) will be problematic judging from past performance. The United States, as a major producer of greenhouse gases, is a critical lynchpin here. Much depends on domestic politics – in particular whether Republicans or Democrats govern the House and/or the Senate after the mid-term elections in 2022. The final part of this political minefield will be who resides in the White House after the presidential election in 2024. Quite frankly from a climate change perspective, a Republican majority in any of these branches of the US government will likely scuttle any hopes of reaching anything acceptable by 2030. Significant proportions of the American electorate do not appear to be sold on climate change. The economy is very closely associated with fossil fuels, and the country is divided on which direction to go.

This is not to say that other countries, including Canada, do not have similar political issues to deal with when it comes to addressing climate change. There has been reluctance in the fossil fuel-producing provinces to address climate change because of their individual economies and because they feel that other fossil fuel-producing states are not doing their fair share. That is problematic, but hardly an excuse to do nothing. The effects of climate change in this country, particularly in the Arctic are very difficult to ignore.

As alluded to earlier, issues of security, sovereignty and environmental concerns of Arctic climate change are ever-present and increasing. This writer is not optimistic that COP26 will lead to reductions that limit the change to the 2-degree goal, let alone 1.5 degrees, by 2030. There are far too many political impediments ahead and some very difficult decisions to be made and, quite frankly, not many states appear willing to commit fully to what is

required. We will have to wait on the final outcomes from COP26 before passing complete judgement, but it does not look promising.

Nonetheless, there are practical things that can be initiated to help mitigate some Arctic concerns. Canada and notably, the Royal Canadian Navy (RCN) is taking pragmatic steps towards addressing the critical concerns in the Arctic. The six new Arctic Offshore Patrol Ships (AOPS) are an example, and are well in progress with three vessels already launched. These ships will bring a much-needed Canadian presence to the east and west Arctic open sea approaches and for a more extended period than before. Admittedly, the presence of the AOPS has little, if anything to do with slowing down climate change. But, from an environmental perspective, with a greatly extended operational capability in the Arctic, the AOPS will have an immediate role assisting in the mitigation of increased maritime traffic through the Arctic waters, and possibly helping to monitor compliance with environmental regulations.

For many reasons, the Canadian Arctic will be an increasing challenge and concern for the RCN in the future, as maritime traffic increases and Arctic climate change continues unabated.

An October 2021 graphic shows a top-down view of the future Canadian Surface Combatant.

Royal Canadian Navy: On Track to Net-Zero Carbon Emissions

Lieutenant-Commander Linda Hodgkins[1]

The outcome of the United Nations Climate Change Conference of the Parties (COP26) held in Glasgow this past fall reaffirmed that the world at large is serious about climate change and about taking the actions required to limit global temperature rise to 1.5 degrees Celsius, as was previously agreed to by the Paris Agreement adopted at COP21 in 2015.

Leading up to COP26, the government of Canada took actions to enhance its climate change plan commitments, including a refresh of the Greening Government Strategy. The strategy outlines how the government plans to transition to net-zero carbon – reducing emissions as much as possible, then balancing what remains through an equivalent amount of carbon removal. It also outlines a plan to increase climate-resilient operations while reducing their overall environmental impacts.

Under the updated Greening Government Strategy, greenhouse gas (GHG) emissions from national safety and security operations, such as those conducted by the Royal Canadian Navy (RCN), are now within the scope of the government's 2050 net-zero carbon emissions target. It is with this in mind that the RCN has developed its own Green Strategy, aligned with the larger Greening Government and Department of National Defence (DND) Energy and Environment Strategies. The RCN's Green Strategy sets out the vision, goals and objectives for an embedded green culture across all bases, activities and businesses, which will result in reducing the navy's environmental footprint.

Attaining a net-zero carbon emissions target will require the RCN to develop a decarbonization plan by 2023 to outline how it will reduce emissions from operations in line with the net-zero target. Decarbonization of the RCN's fleet operations will be challenging based on several constraints, including the fact that at present, technological solutions to achieve zero carbon emissions do not exist for warships. Additionally, the RCN is in the middle of a major fleet renewal program that has already begun to deliver new ships and will continue to do so over the next 30 years.

These new ships are being built using existing propulsion technologies which are more efficient than those used in the RCN's older ships but still operate by burning fossil fuels. For example, the design requirements for the new Canadian Surface Combatants (CSC) are for ships that allow the RCN to meet or exceed all current Canadian and international environmental regulations and laws, and DND continues to explore opportunities to improve the environmental footprint of these ships. Additionally, the CSC will have optimized hybrid propulsion systems that will more efficiently transfer the power produced in the engines to the ships' propellers as compared to the engine configuration in the existing fleet, resulting in improved fuel efficiency.

The RCN continues to explore options to reduce emissions, and work has already begun on initiatives that will inform and contribute to a fleet decarbonization plan. The RCN envisions optimizing the energy performance of its fleets through data analysis and the introduction of more energy-efficient technologies and processes. A fundamental prerequisite to improving fleet energy performance and thus reducing GHG emissions is to understand the current fuel and energy use requirements. To do this, baseline studies are being conducted on the in-service fleet. Data from these studies can then be analyzed and used to identify opportunities for improvement and quantify the impact of newer energy-efficient technologies on overall performance and energy efficiency.

Complementary to the baseline studies being conducted on the in-service fleet, Defence Research and Development Canada's (DRDC) Ship Platform Exploitation of Energy Data (SPEED) project, funded by the Greening Government Fund program, is aiming to optimize energy efficiency and reduce GHG emissions for naval ships. It will accomplish this by collecting ship energy data on the RCN's *Halifax*-class frigates to gain insights into onboard energy use as well as develop physics-based ship energy models so that machine learning methods will be able to predict energy use under various operational profiles. The SPEED project will enable decision-making with respect to ship energy efficiency through fuel optimization, the identification of energy-saving measures and the assessment of new technologies, to name a few possibilities.

Having the ability to quantify and analyze fuel and energy consumption accurately, and GHG emissions, across the RCN's fleet is a fundamental requirement to any future decarbonization plan. The 'Less GHGs on the Seas: Practical Solutions to Measure and Record Energy Consumption' challenge was recently launched through the Innovation for Defence Excellence and Security (IDEaS) program. The challenge is designed to find innovative solutions to measure fuel consumption, load energy consumption and GHG emissions data across the RCN fleet, and to provide an energy management infrastructure that can be leveraged to organize and analyze the data. Proposals for this challenge are currently being reviewed.

Credit: Maritime Forces Atlantic

*HMCS **Fredericton** is shown out of the water on the synchrolift in Halifax on 28 February 2021. Its hull was being cleaned in preparation for deployment.*

Credit: Sailor First Class Bryan Underwood, Royal Canadian Navy

*HMCS **Halifax** receives a refuelling probe from the German navy tanker FGS **Spessart** on 3 March 2021 off Norway during **Operation Reassurance**.*

A shipboard energy efficiency management plan is used to monitor and improve a ship's energy efficiency over its operational lifespan. These plans have been mandatory in the commercial shipping industry since 2013 but are not a requirement for naval vessels. Nonetheless, the RCN is implementing a shipboard energy efficiency management plan for its new Arctic and Offshore Patrol Ships.

Another consideration for reducing GHG emissions is that a fouled ship's hull not only transfers and introduces aquatic invasive species, it also significantly decreases fuel efficiency. In addition to managing shipboard energy efficiency, the RCN is incorporating operationally focused changes such as the introduction of plans to manage biofouling. Short for biological fouling, biofouling is the accumulation of micro-organisms, plants, algae and animals on the underwater surfaces of vessels, and is known to be a primary vector for the transfer of aquatic invasive species around the world.

Although the primary focus of biofouling management plans is to avoid transferring invasive species, as noted, a fouled ship's hull can decrease fuel efficiency and thus increase GHG emissions. The RCN is implementing plans that will introduce the requirement for hull inspections and in-water cleanings before certain deployments, especially in environmentally sensitive areas of the world such as the Arctic. At the same time, Public Services and Procurement Canada is setting up a supply arrangement for in-water vessel cleanings that will enable the RCN's biofouling management plans in a manner that complies with environmental legislation.

Another viable track that is being considered by the RCN to reduce GHG emissions from its operations is the use of drop-in, low-carbon-intensity fuels. These fuels are functionally equivalent to petroleum fuels and do not require any changes to engine fuel systems or the fuel distribution network. These drop-in fuels are synthetic hydrocarbons that are derived from renewable sources and have lower carbon emissions over their life-cycles, which includes emissions related to obtaining the feedstock, the production and the combustion of the fuel.[2]

Currently, the RCN uses naval distillate fuel with an ultra-low sulfur content that is compliant with Canadian General Standards Board – 3.11 (CAN/CGSB-3.11). This fuel standard is undergoing updates that will allow for the use of up to 50 per cent synthesized paraffinic diesel, a new generation of cleaner fuel with near zero sulphur and aromatics, made from natural gas, biomass or coal, and up to 20 per cent synthesized iso-paraffins, a specially processed fuel made from the fermentation of sugars. Once blended, these fuels meet all current fuel property limits. The revised specification will assist the RCN in reducing fleet-generated emissions by enabling the purchase of compliant fuel blends.

Decarbonization of Canada's national safety and security operations also affects other federal departments with maritime fleets, including the Canadian Coast Guard and the Royal Canadian Mounted Police. The RCN has established a Green Fleet Working Group that serves a vital coordination function among the affected federal departments, enabling them to share information and to undertake joint work towards a decarbonized future.

The examples provided here are not an exhaustive list of all the greening initiatives being undertaken by the RCN but are representative of current efforts that will help reduce emissions from the operational fleet and contribute towards reaching the government of Canada's climate change goals. The RCN's journey to net-zero operations is just beginning and there is considerable work to be done. The current initiatives are providing an important foundation for future work.

Notes

1. Lieutenant-Commander Hodgkins is Environmental Officer, Royal Canadian Navy.
2. Sometimes you can have a fuel that is made from renewable resources but because of the processing required to make the fuel usable, you are actually producing more emissions than the fuel upon which you are trying to improve. Therefore you need to consider the entire life-cycle of the fuel when comparing emissions, which includes the feedstock (what are the emissions associated with extracting the oil or harvesting the crop), the emissions from processing, and the emissions from burning the fuel.

A View from the West: Europe's Navies in the Indo-Pacific Region

Brett Witthoeft

The Indo-Pacific region got much busier this past year as several European navies conducted significant deployments to the region. The UK's *Queen Elizabeth* Carrier Strike Group 21 (CSG21), the Royal Navy's first carrier deployment in a decade, was the headline-grabbing mission as it conducted port visits and exercises from the Mediterranean to the East China Sea, visiting over 40 countries to proclaim the global reach of post-Brexit Britain. CSG21 was notably a multinational effort, as the Dutch frigate *Evertsen* sailed with the group, along with the American destroyer *The Sullivans* and a squadron of US Marine F-35B fighters aboard *Queen Elizabeth*.

The German navy dispatched the frigate *Bayern* for its own seven-month sail to the Indo-Pacific region, visiting a dozen ports along the way and upholding UN sanctions against North Korea. Finally, the French were also active. The *Marine nationale*'s deployments to the Indo-Pacific region in 2021 included the nuclear attack submarine *Émeraude* and the amphibious helicopter ship *Tonnere* leading the Jeanne d'Arc 2021 training mission sail to Japan and back.

These European missions follow the recent release of major national Indo-Pacific strategies. France was first out of the gate with the publication of its regional policy in May 2018. This was followed up with the appointment of France's first Ambassador to the region in October 2020 and consistent ministerial-level participation in major regional fora such as the Shangri-La Dialogue and the Western Pacific Naval Symposium. Berlin followed with its Indo-Pacific foreign policy guidelines in August 2020, and the Netherlands joined the trend with its strategy in November 2020. The UK's March 2021 Integrated Security Review included a section on the Indo-Pacific region, including London's goal that the UK become "the European partner with the broadest, most integrated presence [in the Indo-Pacific]" by 2030.[1] Most recently, the European Union promulgated its own Indo-Pacific cooperative strategy in September 2021, signaling that the bloc had sufficiently grappled with other issues and was now ready to increase its participation in the Indo-Pacific region.

While each national strategy occupies a point on a spectrum of interests in the region, they share several common themes, including acknowledging the economic, investment and demographic heft of the region. The region contributes two-thirds of global growth and is projected to have 2.4 billion new members of the middle class by 2030.[2] This makes Asia a source of important imports (such as medical equipment and pharmaceutical precursors, a lesson learned from the early days of the pandemic) as well as key export markets for Europe as it grapples with the effects of Brexit and "America First"[3] policies.

However, the strategies also emphasize the Indo-Pacific region as being at the centre of significant evolving security challenges that affect European prosperity. The EU strategy notes that 40 per cent of Europe's foreign trade passes through the South China Sea (SCS), the site of competition between the United States and China, and Chinese coercion of its neighbours. This makes "stability in the region a shared concern."[4] The German, Dutch and French also acknowledge the importance of seaborne trade to and from Europe.

The strategies also note the importance of the rule of law, not just for business stability, but also fair and peaceful conduct between states. The UN Convention on the Law of the Sea (UNCLOS) gets special mention in the documents as essential for guaranteeing regional maritime security and guiding the resolution of maritime disputes. Given this maritime emphasis, and that naval vessels provide flexible platforms for promoting both security and diplomacy, it makes sense that there was a surge in European navies sailing in Asian waters in 2021.

Credit: Mass Communication Specialist 2nd Class Russell Lindsey, US Navy

*Ships and aircraft from the Japan Maritime Self-Defense Force, Royal Australian Navy, UK Royal Navy and US Navy, led by HMS **Queen Elizabeth** (left), **Nimitz**-class aircraft carrier USS **Carl Vinson** (centre) and JMSDF **Izumo**-class helicopter destroyer **JS Kaga**, transit in formation as part of Maritime Partnership Exercise 2021, 17 October 2021.*

Credit: Mass Communication Specialist Seaman Henry X. Liu, US Navy

*The French navy **Loire**-class tender and support vessel FS **Seine** and **Rubis**-class nuclear attack submarine FS **Émeraude** arrive at Guam, 30 November 2020.*

So what did the European naval deployments accomplish? While it's too early to determine the medium and long-term implications, we can reach some initial conclusions. First, the European deployments signaled substantive interest in the region beyond the usual economic focus, and the national contributions largely aligned with relative national naval capabilities and regional ambitions: the smaller navies of the Netherlands and Germany each dispatched one warship, in keeping with their smaller fleets, while the British and French navies both sent major task groups. Given the resurgence of Russian naval activity around Europe, the deployments represented a major commitment to such a distant region, even as arguments were made to keep the ships closer to home.

Second, the European missions invigorated and expanded naval cooperation in the Indo-Pacific region and reinforced norms and standards there. The headline example was the exercise including CSG21, the American flattops *Carl Vinson* and *Ronald Reagan*, and a Japanese flotilla led by the helicopter carrier *Ise*, as well as Canada's HMCS *Winnipeg* and New Zealand's HMNZS *Te Kaha*, southeast of Okinawa in early October. The rare six-navy, four-aircraft carrier drill was not only a dramatic display of allied naval power in the western Pacific, but also a key opportunity to practice anti-submarine, air-defence and other critical warfighting skills. In smaller examples, CSG21 also engaged twice with the Indian Navy while sailing to and from east Asia,[5] and *Bayern* became the first German warship to visit Japan in two decades.

The European transits also helped reinforce the rules and norms of free transit through contested features. CSG21 in particular upheld the UNCLOS-based right to sail through international waters – claimed by China – in the SCS, despite Chinese warnings to avoid them.[6] The lone British frigate HMS *Richmond* also supported free transit through the Taiwan Strait (and reportedly revealed London's "evil intentions" in the process[7]).

A final lesson is that it does not pay to chart a middle course on China's SCS claims. Germany announced *Bayern*'s sailing in support of the rule of law, including a transit of the SCS, but attempted to avoid angering Beijing and jeopardizing German access to Chinese markets by signaling in advance that the warship would not sail through the Taiwan Strait or within 12 nautical miles of any Chinese-claimed SCS land feature. Despite these contortions, *Bayern* was denied a port visit at Shanghai for unspecified reasons, and the Chinese Foreign Ministry suggested that the onus is on Germany to create "favourable condition[s]" by adhering to China's claims.[8]

These deployments were not without their challenges. For example, Covid-19 curtailed not only port visits and shore leave, but also tested the ability of the European navies to stretch their logistical chains to new lengths.[9] The question, however, is whether Europe has the capacity to maintain consistent naval deployments to the region. That question has already been partly answered, as the Royal Navy (RN) has forward deployed two Batch 2 *River*-class Offshore Patrol Vessels (OPVs), HMS *Tamar* and *Spey*, to the region for a five-year mission to exercise with partners and counter non-traditional security threats such as drug smuggling. *Tamar* and *Spey* will largely avoid the problems that come with a permanent regional base by using local ports as needed (such as Singapore and Guam), and half the ships' crews will swap out every few weeks to avoid fatigue and spread regional experience in the fleet.

For Germany's part, while visiting *Bayern* in Tokyo, German Vice-Admiral Kay-Achim Schönbach told Japanese media that he is looking to dispatch German warships to Asia every two years,[10] and Germany is considering deploying them for up to two years at a time, possibly following the RN OPV model. In all, it looks like the Indo-Pacific region is becoming a region of interest, with opportunities for both cooperation and competition.

Notes

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3. Richard Haass, "The Age of America First: Washington's Flawed New Foreign Policy Consensus," *Foreign Affairs*, 29 September 2021, p. 2.
4. EU, *EU Strategy for Cooperation in the Indo-Pacific*, Factsheet, p. 2.
5. Alex Walters, "Namaste! UK Carrier Strike Group Arrives in India for Second Round of Engagements," Forces.net, 22 October 2021.
6. See Frank Gardner, "China Warns UK as Carrier Strike Group Approaches," BBC, 30 July 2021; George Allison, "British Aircraft Carrier Ignores Chinese Warnings for Second Time," *UK Defence Journal*, 4 October 2021.
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9. This includes HMS *Queen Elizabeth* visiting Guam twice for maintenance. Alex Wilson, "HMS Queen Elizabeth Stops in Guam for a Second Time during Maiden Deployment," *Stars and Stripes*, 17 September 2021.
10. "German Navy Looks to Send Vessels to Indo-Pacific Every Two Years," *The Japan Times*, 7 November 2021.

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Dollars and Sense: Defence and Economic Recovery

Dave Perry

Following a 2021 election that changed very little in the standing of the federal parties, Justin Trudeau's Liberal government is back in office, and slowly getting staff up and running. Two months post-election, and pending whatever the Omicron Covid-19 variant may bring, the themes emphasized during the campaign continue to resonate: climate change; diversity and inclusion; reconciliation; and importantly, a full economic recovery from the pandemic. Indeed, the title of the Throne Speech that launched the current session and laid out the government's agenda, was "Building a Resilient Economy."[1]

Further evidence of the government's priorities is found in the composition of Cabinet and its committee structure. In what would seem to be a first for a Canadian government, the ministry features two Cabinet committees with the exact same mandate, the Committee on Economy, Inclusion and Climate 'A' and Cabinet Committee on Economy, Inclusion and Climate 'B' respectively.[2] Collectively, those two committees comprise 28 ministers, in a Cabinet of 39. As well, eight different ministers have 'economic development' as part of their portfolios, when the regional development ministers, such as the minister responsible for the Atlantic Canada Opportunities Agency, are included.

A government with such a keen eye on economic recovery is doubtless considering the economic impact of all of its activities. This is likely an even more relevant factor given Canada's fiscal situation which features high levels of national debt as a result of various federal Covid support programs, and inflation running at a level not seen since the 1990s. In that context, all activities of government are likely to be viewed through an economic lens. Historically, defence has come under heavy scrutiny when this was the case, so the impact of defence on the Canadian economy is worth considering in some detail.

The data compiled in the National Shipbuilding Strategy Annual Report highlight $17.5 billion in contracts awarded under all pillars of the strategy between 2012 and 2020, creating almost 17,000 jobs.[3] So, clearly, major procurement initiatives create substantial economic returns. But beyond the types of commitments companies make when fulfilling their economic offset obligations for Canadian procurement purposes, what economic impact is created by spending money on defence in Canada, generally? To answer that question, in a recent study by the Canadian Global Affairs Institute, author Craig Stone engaged Statistics Canada to run two simulations using its Input-Output Model to assess the economic impact of defence

Credit: Justin Tang, The Canadian Press

Prime Minister Justin Trudeau is flanked by Deputy Minister and Minister of Finance Chrystia Freeland and Governor-General Mary Simon after the 26 October 2021 swearing in ceremony at Rideau Hall following the fall 2021 federal election.

spending in Canada.[4] In essence, the Statistics Canada model is a sophisticated means of assessing the impact of a specific type of investment (in this case defence), broken out into detailed spending categories, and the resulting impact on Canadian Gross Domestic Product (GDP) and jobs. Using detailed spending breakdowns obtained from the Department of National Defence (DND), the report ran one simulation on the impact of Operational spending (including personnel and operations and maintenance) and a second on Capital expenditures (encompassing spending on equipment and infrastructure).

The results of the simulation show that every dollar invested in Operational expenditures creates a multiplier of 2.0 and spending on Capital a multiplier of 2.17. Stated otherwise, every dollar spent on defence creates at least two dollars of future economic activity, and 2.17 dollars if the spending is on Capital expenses. Furthermore, the Statistics Canada data show that each defence dollar spent on Operational or Capital spending creates 1.71 and 1.99 jobs, respectively. For the sake of comparison, the 2016 federal budget indicated that investments in housing or infrastructure produced multipliers of 1.4 and 1.5, respectively, suggesting that the economic impact of defence spending compares favourably to that in other areas of potential government investment.[5]

In addition to the sizeable overall economic impact of defence on Canada's GDP and job creation, defence activities are also dispersed broadly across Canada. DND has buildings in 161 federal ridings across the country, slightly less than half of the total. That footprint is

asymmetrical, with some having many structures – eg., the ridings of Fredericton and New Brunswick Southwest in New Brunswick have nearly 1,700 different structures – while others have as few as one, but this does indicate the breadth of the defence footprint across the country.[6] The majority of the department's activity can be found in 25 bases and support units in eight provinces and one territory. Of those, a socioeconomic study conducted for DND indicates a significant economic contribution by several bases and wings on their local economies. Eleven of them contribute 10% or more to the GDP of their host communities and five of them contribute over 20%. The most significant impact is provided by the 4th Canadian Division Support Base Petawawa, which accounts for three-quarters of the GDP of its host community.[7]

Of course, the real point of defence spending is to provide for the defence of the country. But if fiscal pressures and the strong focus on economic recovery force some tough choices about overall federal spending, the government should factor into those considerations that defence spending has a consequential impact on the national economy, spread widely across the country, with particularly substantial impacts on the host communities of some bases. With defence spending nearing $26 billion annually as the implementation of *Strong, Secure, Engaged* continues, the economic potential of a twofold, or better, impact on the economy of each of those dollars spent in Canada, as well as up to two jobs created with each dollar spent, should weigh into any consideration of future defence spending.

Similarly, the discussions about modernizing continental defence and the Canadian Patrol Submarine Project offer the prospect of additional investment over and above the existing National Shipbuilding Strategy program. Given the parameters of the Industrial Technological Benefits Program, companies are now heavily incentivized to make significant investments in Canada's economy to win that work. For that reason, defence should be considered an economic asset as the government of Canada focuses on the recovery of the economy from the impacts of Covid-19.

Credit: Petawawa Garrison Imaging

An undated aerial view shows CFB Petawawa.

Credit: Irving Shipbuilding

*The future HMCS **Max Bernays** is prepared to be launched at Irving Shipbuilding, 22 October 2021.*

Notes

1. Canada, Privy Council Office, "Building a Resilient Economy: A Cleaner and Healthier Future for Our Kids," Speech from the Throne to open the First Session of the Forty-Fourth Parliament of Canada, 23 November 2021.
2. Prime Minister of Canada, "Cabinet Committee Mandate and Membership," 3 December 2021.
3. Canada, "Canada's National Shipbuilding Strategy: 2020 Annual Report," 3 June 2021.
4. Of note, this examined only expenditures which occurred in Canada. Spending on a procurement project that went to, say, a foreign-based supplier, did not factor into the simulation, although under the terms of Canada's Industrial Technological Benefits Policy, firms are required to commit at least 100% of the value of a procurement in the Canadian economy.
5. Craig Stone, "Defence and Economic Recovery Post Covid-19," Calgary: Canadian Global Affairs Institute, 2021.
6. Treasury Board of Canada Secretariat, Directory of Federal Real Property, Department of National Defence, September 2020.
7. Prism Economics and Analysis, "Socio-Economic Impact of Canadian Armed Forces Installations on Host Communities Study," 28 April 2017.

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Warship Developments: News and Views

Doug Thomas

The Royal Navy (RN) is moving along smartly with its new frigate-building programs. The first three of eight planned Type 26 frigates are in various stages of construction. The first frigate, HMS *Glasgow*, is progressing well with all the main building blocks joined and fitting out of this large and complex vessel underway.

The Royal Navy needs more than eight frigates to meet fleet requirements, so construction of a second class of frigates, the five-ship Type 31 *Inspiration*-class, has also started. Steel has been cut for the first of class, the future HMS *Venturer*. The RN would like to acquire another five – primarily for general-purpose duties – and it is hoped in Britain that this flexible and cost-effective ship design may keep shipyards busy with export orders from many countries needing to upgrade their maritime forces.

Forward Basing

Countries with gobal national interests and defence commitments find it is more efficient to base warships in the geographic area of intended operations. The United States, for example, has maintained the 6th Fleet in the Mediterranean for many years, and USS *Ronald Reagan*, flagship of Carrier Strike Group 5, is based in Japan.

The Royal Navy has not had a permanent presence in Pacific waters since the UK pulled out of Hong Kong in 1997, however two new *River*-class Offshore Patrol Vessels (OPV), HM Ships *Spey* and *Tamar*, left the UK in September 2021 for an anticipated five-year deployment to the Indo-Pacific area. These 2,000-ton, 25-knot OPVs have a ship's company of 45, with additional messing available for up to 52 Royal Marines or soldiers. Their large flight decks are capable of handling a Merlin or comparable helicopter, and they should be very useful ships for a broad range of operations.

They will not have a specific home port during their deployment, but instead will depend on port facilities in allied ports such as the United States, Australia, New Zealand, India and Japan to name a few. They will represent UK interests in the Pacific, and no doubt participate in exercises to maintain the skills of their ships' companies. The current plan is to exchange crews frequently – perhaps as frequently as every two or three weeks half the crew will be replaced – in order not to 'burn-out' their crews and also to maximize opportunities for training. Nevertheless, managing this frequent rotation could prove to be difficult.

The purposes of the OPVs in the Pacific will be multiple. According to a UK Defense Ministry statement, "they will act as the eyes and ears of the Navy – and nation – in the region, working alongside Britain's allies, carrying out security patrols to deal with drug-running, smuggling, terrorism and other illegal activities, joining in exercises with other navies and armed forces, and flying the flag for Global Britain."[1] It is anticipated that in the future two of the new Type 31 *Inspiration*-class general-purpose frigates, with much greater capability, will replace the OPVs in this important role.

Credit: Royal Navy

A computer-generated image shows the Type 31 ***Inspiration****-class frigate at sea.*

Credit: Royal Navy

*HMS **Tamar** shows off its new 'dazzle' camouflage paint pattern in Falmouth on 27 April 2021 prior to a joint deployment with HMS **Spey** to the Pacific.*

AUKUS

The Royal Australian Navy (RAN) has six large *Collins*-class diesel-electric submarines, which are due to be replaced after 2025. A project has been in the works since 2007 for new submarines and a contract had been signed for 12 submarines from France, based on a conventionally-powered version of the French *Barracuda*-class nuclear-powered general-purpose attack submarine (SSN). It was to have an American Combat Control System and American weapons – not French. However, on 16 September 2021, an official statement by the Australian Prime Minister announced that the deal with France (worth about 90 billion Euros) had been cancelled and that an agreement had been reached with the United Kingdom and United States to build nuclear-powered submarines for the RAN – what has been called the AUKUS agreement.[2]

Credit: LSIS Richard Cordell, Royal Australian Navy

*Left to Right - Head of Office British Consulate Perth, Kirsty Packer, Member for Victoria Park, Hannah Mary Beazley, Principal Strategy and Engagement Consultant Ben Halton and Governor of Western Australia, the Honourable Kim Beazley, onboard HMS **Astute** while the British nuclear submarine is alongside at Fleet Base West, Rockingham in Western Australia, 3 November 2021.*

This is a major procurement for Australia. In an effort to keep costs down, I assume that the deal will be for units of the British *Astute*-class SSN or the American *Virginia*-class, and apparently it will consist of eight units rather than the 12 non-nuclear vessels previously planned. The *Virginia*-class submarines cost about $2.5 (US) billion each; the US Navy's next generation, SSN(X), would likely be double that.

Questions remain about the details of the AUKUS deal. Given that Australia has no experience building nuclear-powered submarines, would the propulsion system, and perhaps the whole after-end of these new submarines, be built in the UK or United States? Would it then be mated to the forward portions built in Australia? It is not yet clear what is in the agreement that has been signed with the UK and United States.

On 22 November 2021 the Australian Defense Minister, met with his US and UK counterparts in Canberra and they all signed a document that specified that eight state-of-the-art SSNs would be built for Australia.[3] Some portion of these SSNs will be built in Australia, but probably not the nuclear reactor and associated propulsion system since building complex SSNs like the *Astute*- and *Virginia*-class in Australia would be much more expensive than simply buying them from the US or UK shipbuilder. The die is apparently cast!

Notes

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Book Reviews

American Sea Power in the Old World, by William N. Still Jr., Annapolis, Maryland: Naval Institute Press, 1980/2018, 304 pages, illustrations, notes, bibliography, ISBN 978-1-59114-618-6

Reviewed by Robert Dienesch

The history of the US Navy (USN) is long and fascinating. Most people tend to think of the USN in terms of the modern nuclear-powered super carriers and ballistic missile submarines or even the Second World War era fleets of battleships and carriers leapfrogging across the Pacific. This would be a story of dramatic carrier actions and marines storming beaches, but the history of the USN spans much more.

It starts with sailing vessels at the time of the American revolution and spans a huge swath of time. One of the most interesting periods of this history runs from the end of the American Civil War (1865) through to the American entry into the First World War (1917). In this period there was first a decline of the navy due to neglect and financial restrictions after the Civil War and then its eventual rise again as a modern steam and steel navy by 1917. An excellent addition to our understanding of this period is William Still Jr.'s *America Sea Power in the Old World*.

William Still is an accomplished American maritime historian who brings years of experience to this work. First director of the maritime history program of East Carolina University, he has published extensively in naval history from the Civil War through to the First World War. He is also the recipient of several awards including the Theodore and Franklin D. Roosevelt Prize in Naval History (2007) and the Commodore Dudley W. Knox Naval History Lifetime Achievement Award (2013). In *American Sea Power in the Old World*, Still traces the role of the USN in European and Mediterranean waters.

The European station, the name given to ships on duty in European waters, was a station that the United States had been filling since its creation. Neglected during the Civil War, its re-establishment put an American presence back in European waters. Covering an area from the Baltic Sea through the eastern Mediterranean, the US Navy played a variety of roles for the United States. It represented the United States so it was a political tool, but it also protected American citizens and American interests. This was a varied set of tasks as business interests, missionaries, political issues and international relations often produced challenges to the fleet and its commanders. These challenges were only intensified by the state of the USN, its decline and neglect. The author does an incredible job of laying out the intricacies of the issues relating to the USN. Spanning 11 chapters, he explains the complicated relationship of personalities, political requirements and the practical realities of sustaining a squadron of ships so far from home. In the process he discusses the logistical challenges this produced and how they evolved especially as the fleet changed to coal-fired armoured ships. Depending on local suppliers and repair facilities, the generally antiquated ships of the USN did their best to represent their country and satisfy the necessities of their station.

Of particular interest is the interaction of the personalities involved. Commanders at sea were expected to fulfill their duties but also had latitude due to the lack of timely communications with Washington. That meant that the commanding officers helped to shape policy and had a far greater impact on situations than we realize. The various consuls and state department representatives, naval officers and, of course, Secretaries of the Navy and State play a huge part in this history. The book provides a colourful and insightful discussion of this truly complex period.

Also fascinating is the role of the European squadron in the Turkish crisis. The eastern Mediterranean was probably the most dangerous powder keg of the world at the time and helped ignite the First World War. The importance of the Dardenelles and the political tensions among Imperial Russia, England and France over the area are an essential part of the story as the USN had to navigate the troubled waters of the region. But at the same time American humanitarian interests and missionary pursuits in the area made the situation even more complicated and often pulled the United States into these waters despite the desire to remain an outsider.

Still's work provides a well balanced and detailed discussion of these many issues and does so in a readable format. The inclusion of correspondence and personal information of those involved adds an extra dynamic to the discussion. Issues like pending retirements, the inclusion of family on ships and wintering stations demonstrates why the period is so fascinating. For example, the assessment of Alfred Thayer Mahan as an officer who didn't like going to sea and the role of Teddy Roosevelt in the lead up to the Spanish-American War produce interesting insight into the people involved.

This book provides an incredible view of the USN in the period between the Civil War and the First World War. As such it is an essential read for anyone interested in this period of American naval history. But it also provides some interesting insights into the political situations in Europe and the eastern Mediterranean and the tensions that led up to war. Still's work is highly recommended for all audiences. Undergraduate and graduate students will

find the book insightful and useful. General audiences will find it engaging and enlightening. It is thus highly recommended.

Red Star Over the Pacific: China's Rise and the Challenge to U.S. Maritime Strategy, by Toshi Yoshihara and James R. Holmes, Revised 2nd Ed.; Annapolis, Maryland: Naval Institute Press, 2018, index, references, ISBN (hard cover) 978-1-682-47218-7

Reviewed by Brian K. Wentzell

In *Red Star Over the Pacific*, the authors have used their naval experiences, combined with their knowledge of Asia and access to Chinese-language resources, to produce a lengthy and detailed analysis of the rise of the sea power of the People's Republic of China and its impact on the maritime strategy of the United States in the region. Their thorough analysis presents a compelling argument that the current and previous American maritime strategies have missed the intent to counter the political, military and naval strategies of China.

The authors have accessed a treasure trove of open source Chinese language documents and publications to produce a well-considered and provoking argument. The Chinese have followed the principles of maritime strategy developed by Alfred Thayer Mahan and created a competent modern naval force that has the necessary capabilities and national political support to influence, control and limit the activities of other states in the East China and South China Seas. These capabilities have potential for use throughout the Pacific Ocean and beyond.

The overall Chinese maritime strategy has been successful to date. The Chinese Navy, Coast Guard, Maritime Militia and police forces have employed traditional and novel concepts, including aggressive gray zone initiatives, to thwart the legitimate activities of citizens from adjacent countries in what are ostensibly international waters. The fact that many countries bordering the East and South China Seas lack the resources to resist or challenge the actions is not lost on Chinese political and military leaders. Even the 2016 decision of the Permanent Court of Arbitration at The Hague which ruled the Chinese claims to jurisdiction over a broad expanse of South China Sea waters to be without foundation was ignored by the Chinese government. The governments of Japan, South Korea, the Philippines and Taiwan are cautious and timid in responding to the Chinese occupation of rock outcroppings and their development of permanent airfields, military bases and surveillance facilities thereon.

According to the authors, the United States, Canada and Australia can be numbered amongst the timid states as well. Despite several freedom of navigation deployments by warships of these states and measured condemnations by political leaders, there has been little effort to chastise or penalize China economically or otherwise. It is of little wonder that China continues to enhance its military and security presence and activities.

In conclusion, *Red Star Over the Pacific* is an informative read and should be read by anyone involved in the development and implementation of diplomatic, military and political strategy at the international level. The major Western states have, through excessive caution, empowered China to pursue its relations with other states with little or no regard for international law. As a result, the international system, which is based on a degree of mutual respect and trust among states, has been placed in serious jeopardy.

Credit: Timothy Choi

Dr. Erin Gibbs Van Brunschot, Director of the Centre for Military, Security and Strategic Studies (CMSS) at the University of Calgary, presents CMSS Master's student Christopher Verklan with a cheque on behalf of the Canadian Naval Memorial Trust for his winning essay.

2022 Canadian Naval Memorial Trust Essay Competition

Canadian Naval Review will be holding its annual essay competition again in 2022. There will be a prize of $1,000 for the best essay, provided by the **Canadian Naval Memorial Trust**. The winning essay will be published in *CNR*. (Other non-winning essays will also be considered for publication, subject to editorial review.)

Essays submitted to the contest should relate to the following topics:

- Canadian maritime security;
- Canadian naval policy;
- Canadian naval issues;
- Canadian naval operations;
- History/historical operations of the Canadian Navy;
- Global maritime issues (such as piracy, smuggling, fishing, environment);
- Canadian oceans policy and issues;
- Arctic maritime issues;
- Maritime transport and shipping.

If you have any questions about a particular topic, contact **cnrcoord@icloud.com**

Contest Guidelines and Judging

- Submissions for the 2022 *CNR* essay competition must be received at cnrcoord@icloud.com by Friday, **30 September 2022**.
- Submissions are not to exceed 3,000 words (excluding references). Longer submissions will be penalized in the adjudication process.
- Submissions cannot have been published elsewhere.
- All submissions must be in electronic format and any accompanying photographs, images, or other graphics and tables must also be included as a separate file.

The essays will be assessed by a panel of judges on the basis of a number of criteria including readability, breadth, importance, accessibility and relevance. The decision of the judges is final. All authors will be notified of the judges' decision within two months of the submission deadline.

HMCS *Fredericton* passes under the Grand Belt Bridge in Denmark as it enters the Baltic Sea during *Operation Reassurance*, 11 August 2021.

Credit: Cpl Laura Landry, Canadian Armed Forces