

Canadian  
Forces  
College

Collège  
des  
Forces  
Canadiennes



## DOES THE RCN NEED SUBMARINES AND IF SO, TO FULFILL WHAT NEED?

Lieutenant-Commander James Brun

### JCSP 47

#### Service Paper

##### Disclaimer

Opinions expressed remain those of the author and do not represent Department of National Defence or Canadian Forces policy. This paper may not be used without written permission.

© Her Majesty the Queen in Right of Canada, as represented by the Minister of National Defence, 2021.

### PCEMI 47

#### Étude militaire

##### Avertissement

Les opinions exprimées n'engagent que leurs auteurs et ne reflètent aucunement des politiques du Ministère de la Défense nationale ou des Forces canadiennes. Ce papier ne peut être reproduit sans autorisation écrite.

© Sa Majesté la Reine du Chef du Canada, représentée par le ministre de la Défense nationale, 2021.



CANADIAN FORCES COLLEGE – COLLÈGE DES FORCES CANADIENNES  
JCSP 47 – PCEMI 47  
8 FEBRUARY 2021

DS545 COMPONENT CAPABILITIES

**DOES THE RCN NEED SUBMARINES AND IF SO, TO FULFILL WHAT NEED?**

By Lieutenant-Commander James Brun

*“This paper was written by a candidate attending the Canadian Forces College in fulfilment of one of the requirements of the Course of Studies. The paper is a scholastic document, and thus contains facts and opinions which the author alone considered appropriate and correct for the subject. It does not necessarily reflect the policy or the opinion of any agency, including the Government of Canada and the Canadian Department of National Defence. This paper may not be released, quoted or copied, except with the express permission of the Canadian Department of National Defence.”*

Word Count: 2,637

*« La présente étude a été rédigée par un stagiaire du Collège des Forces canadiennes pour satisfaire à l'une des exigences du cours. L'étude est un document qui se rapporte au cours et contient donc des faits et des opinions que seul l'auteur considère appropriés et convenables au sujet. Elle ne reflète pas nécessairement la politique ou l'opinion d'un organisme quelconque, y compris le gouvernement du Canada et le ministère de la Défense nationale du Canada. Il est défendu de diffuser, de citer ou de reproduire cette étude sans la permission expresse du ministère de la Défense nationale. »*

Nombre de mots : 2.637

## AIM

1. The Royal Canadian Navy (RCN) has been operating submarines, albeit intermittently, since the First World War. Despite their enduring role in the RCN's force structure, debate remains concerning the necessity of submarines within the RCN's order of battle. While some would contend that Canada does not need submarines, a look at their impact throughout history and the maritime reality of Canada will show that submarines are not only required, but that our current fleet size is inadequate. This service paper argues that the RCN's submarine force is vital to maintain "combat-effective naval forces that support Canadian interests at home and abroad," and fulfill strategic requirements directed by *Strong, Secure, Engaged: Canada's Defence Policy* (SSE).<sup>1</sup> This service paper will introduce SSE and the two primary RCN documents that support its objectives: *Royal Canadian Navy Strategic Plan: 2017-2022* and *Canada in a New Maritime World: Leadmark 2050*. Subsequently, an analysis of submarine capabilities will outline their strategic, operational, and tactical importance to the RCN's mandate.

## INTRODUCTION

2. There are three strategic documents that articulate the need for a modern and capable Canadian submarine force. SSE is the overarching policy framework, published by the Government of Canada in 2017, which defines the role of the Canadian Armed Forces (CAF) and guides how the Department of National Defence (DND) will enable it. SSE envisions a Canada that is strong at home, secure in North America, and engaged in

---

<sup>1</sup> Department of National Defence, *Royal Canadian Navy Strategic Plan: 2017-2022*, (Ottawa, DND Canada, 2015), 13.

the world. To achieve this vision, the CAF requires an “agile, multi-purpose, combat-ready military, operated by highly trained, well-equipped women and men.”<sup>2</sup> SSE further expands on this, stating explicitly that “Canada requires a Navy that is organized and sized to project power responsively and effectively far from Canada’s shores.”<sup>3</sup> This force will contribute to “joint action ashore and support the sustainment of joint operations from sea, while preserving the ability to defend its own freedom of action through naval combat operations” independently or as part of a naval task group.<sup>4</sup> Operationalizing SSE, the RCN published two documents to amplify and support SSE’s vision for maritime effectiveness. *Royal Canadian Navy Strategic Plan: 2017-2022*, articulates SSE’s direction to the RCN, specifically noting that the maritime force requires:

... a balanced mix of platforms, including submarines, surface combatants, support ships and patrol vessels. It is a Navy structured around the ability to deploy and sustain a Naval Task Group, highly interoperable with allies, contributing meaningfully to joint action ashore, and the sustainment of joint operations from sea.<sup>5</sup>

Maintenance of a submarine force is a significant strategic asset that is essential to the Canadian Naval Task Group, capable of providing meaningful contributions to alliance and partner operations. In lockstep with the direction outlined in the strategic plan, the RCN’s *Canada in a New Maritime World: Leadmark 2050* anticipates future maritime trends, threats, and naval requirements. *Leadmark 2050* petitions for a globally

---

<sup>2</sup> Department of National Defence, *Strong, Secure, Engaged: Canada’s Defence Policy*, (Ottawa, DND Canada, 2017), 14.

<sup>3</sup> Department of National Defence, *Strong, Secure, Engaged: Canada’s Defence Policy*, (Ottawa, DND Canada, 2017), 34.

<sup>4</sup> Department of National Defence, *Strong, Secure, Engaged: Canada’s Defence Policy*, (Ottawa, DND Canada, 2017), 35.

<sup>5</sup> Department of National Defence, *Royal Canadian Navy Strategic Plan: 2017-2022*, (Ottawa, DND Canada, 2015), 9.

deployable and forward postured submarine force to deter conflict, control vital sea-lanes, and deny adversarial access to Canadian seas.<sup>6</sup> An over-arching theme in these documents is that submarines are vital to a balanced, distributed, and lethal naval force.

3. The Canadian submarine force is a unique strategic asset, and provides platforms capable of:

...unrivalled stealth, persistence and lethality [that] can place an adversary's maritime forces at risk in a given theatre of operations through offensive action. They can also amplify the defence in depth of the surface forces they are assigned to protect. They remain the most effective means to counter an adversary's submarine force and can operate where surface combatants would be placed at great risk.<sup>7</sup>

These capabilities support the intent of SSE, which envisions a Canadian maritime force that can enforce sovereignty at home, while capably projecting combat power abroad. Significant time, money, commitment and expertise is required to maintain such a submarine force. Although the capability is vital to Canada's maritime defence, it can be quickly lost with a single government decision. Reestablishment of a lost submarine capability would take years. For instance, in 1953, after decades of considering the restoration of a Canadian submarine capability, the RCN began to seriously contemplate a new submarine fleet with the establishment of the Submarine Committee of the Naval Staff.<sup>8</sup> Over the next five years, the naval staff considered a fleet of nuclear submarines – which it determined Canada could build - then settled on a combined fleet of six conventional and six nuclear submarines, with the government finally settling on

---

<sup>6</sup> Department of National Defence, *Canada in a New Maritime World: Leadmark 2050*, (Ottawa, DND Canada, 2015), vi, 28.

<sup>7</sup> Department of National Defence, *Canada in a New Maritime World: Leadmark 2050*, (Ottawa, DND Canada, 2015), 39.

<sup>8</sup> Marc Milner, *Canada's Navy: The First Century* (Toronto: University of Toronto Press, 1999), 226.

three conventional British submarines, which Canada received between 1965 and 1968.<sup>9</sup> All told, it took Canada about fifteen years to generate the first three submarine crews for these boats, with the training of Perisher qualified commanders being the longest single component.<sup>10</sup> Given the lead time to build, and the complexity of modern submarines, if Canada found itself without a submarine force in a time of war, it is unlikely that such capability could be restored in a timely enough manner to be effective. This would put Canadian lives and surface vessels at risk – vulnerable to a subsurface threat, or reliant on allies for defence. This discussion will outline reasons Canada needs a submarine force, including its ability to: control and deny the enemy access to the seas, counter enemy sub-surface and surface forces, conduct intelligence, surveillance and reconnaissance (ISR), train allied anti-submarine (ASW) forces, and importantly, provide Canadian maritime forces with *strategic weight*.

## DISCUSSION

4. Submarines are the “RCN’s ultimate warfighting capability”, and a crucial asset for controlling the seas.<sup>11</sup> A submarine can detect and destroy enemy ships and submarines, blockade harbours, attack seagoing commerce, and lay mines. The presence, or potential presence, of a submarine “can alter an adversary’s decision-making across an entire maritime theatre of operations” and “control a substantial ocean space or deny it to

---

<sup>9</sup> Marc Milner, *Canada’s Navy: The First Century* (Toronto: University of Toronto Press, 1999), 226-231.

<sup>10</sup> Commodore Chris Robinson (Commander of Canadian Submarine Force 2017-2019) in discussion with the author, February 2021.

<sup>11</sup> Department of National Defence, *Canada in a New Maritime World: Leadmark 2050*, (Ottawa, DND Canada, 2015), 39.

others.”<sup>12</sup> During the 1982 Falklands conflict, for instance, the Argentine cruiser ARA *General Belgrano* was sunk by the Royal Navy’s (RN) nuclear attack submarine, HMS *Conqueror*. Following this attack, the remaining Argentine surface fleet returned to the relative safety of their harbour for the remainder of the war. The single action allowed the RN to control the surface of the South Atlantic without having to engage in any single surface action with its own warships.<sup>13</sup> Notwithstanding, the RN relentlessly searched for two Argentine diesel submarines throughout the remainder of the Falklands campaign, fearing that these enemy submarines could have been operating in their vicinity. Although no Argentine submarines successfully attacked RN vessels, the mere threat of their presence occupied British anti-submarine forces, influencing mission planning and execution throughout the remainder of the war.<sup>14</sup> Evidenced by the British fleet’s expenditure of 200 torpedoes fired at false contacts throughout the Falklands campaign, the presence, or perception, of an enemy submarine adds a significant element of prudence to any surface fleet’s operations. The RN’s success in submarine operations, and frustrations with ASW capabilities, demonstrates the inherent value of a well-trained and modern submarine force. Peter Haydon, a retired submariner and defence analyst, argues that modern submarines “provide strategic and operational superiority at sea in both close and distant defence against attack”, characteristics that “give submarines the edge in sea control and power projection operations”.<sup>15</sup>

---

<sup>12</sup> Department of National Defence, *Canada in a New Maritime World: Leadmark 2050*, (Ottawa, DND Canada, 2015), 39.

<sup>13</sup> Scot Macdonald, "The Falklands Campaign: The British Reconquest and the Argentine Defense." *Marine Corps Gazette* 84, no. 3, 2000, 72.

<sup>14</sup> Scot Macdonald, "The Falklands Campaign: The British Reconquest and the Argentine Defense." *Marine Corps Gazette* 84, no. 3, 2000, 73.

<sup>15</sup> Peter Haydon, "Canada and Modern Submarines." *Canadian Naval Review* 12, no. 1 (2016): 35.



5. From a defensive standpoint, a submarine is the “most effective means to counter an adversary’s submarine force.”<sup>16</sup> Submarines are a navy’s best platform to detect, identify, track, and threaten enemy submarines across vast expanses of ocean, all while remaining undetected. This capability is increasingly important due to the wide proliferation and operation of friendly, neutral, and adversarial submarines throughout the modern world. While the number of active submarines has fallen since the end of the Cold War, the number of countries operating submarines has increased, and the boats they operate are more sophisticated.<sup>17</sup> Further, while traditional submarine operating nations continue to operate modern submarine fleets, the export market for new submarines largely falls in Asia, the Middle East, and Latin America – parts of the world that are strategically important to Canada.<sup>18</sup> China, for example, has concluded that the submarine will be the most important naval ship of the 21<sup>st</sup> century, due to its stealth and lethality.<sup>19</sup> Likewise, Russia is rebuilding their submarine fleet.<sup>20</sup> In this strategic context, Canada’s submarines are vital assets for the CAF to fulfill its NORAD obligations. The Canadian area of responsibility includes the great-circle route between Asia and North America, which increases the likelihood of a foreign sub-surface presence off our

---

<sup>16</sup> Department of National Defence, *Canada in a New Maritime World: Leadmark 2050*, (Ottawa, DND Canada, 2015), 39.

<sup>17</sup> Jan Joel Andersson, “The Race to the Bottom: Submarine Proliferation and International Security,” *Naval War College Review*, Vol. 68, No. 1 (2015), 3.

<sup>18</sup> Jan Joel Andersson, “The Race to the Bottom: Submarine Proliferation and International Security,” *Naval War College Review*, Vol. 68, No. 1 (2015), 2.

<sup>19</sup> Lieutenant Commander Jamie A. Clarke, “China’s Naval Modernization in the Mahanian Mirror: Reconsidering Real Force Capacity in the Medium and Longer-Term Perspective”, Canadian Forces College, April 2008, 31.

<sup>20</sup> David Axe, “The Russian Navy’s Growing Submarine Fleet Is Ready To Contest NATO Waters.” *The National Interest*. The Center for the National Interest, October 1, 2020. <https://nationalinterest.org/blog/reboot/russian-navys-growing-submarine-fleet-ready-contest-nato-waters-169923>. Accessed 4 February 2021.

shores.<sup>21</sup> In a complex geopolitical environment, maintaining a modern and capable submarine force is essential to countering threats posed by enemy submarines.

6. A submarine is a lethal anti-surface warfare (ASuW) platform. In his book *The Sea Power of the State*, former Admiral of the Soviet Fleet Sergei Gorshkov argues that a submarine force increases “the strike possibilities of our fleet, to form a considerable counter-balance to the main forces of the fleet of our enemy.”<sup>22</sup> The *Victoria* class submarine, for example, is equipped with “highly sensitive acoustic, electro-optic and electromagnetic sensors, as well as the world’s most advanced bow sonar” allowing them to “detect and track surface vessels at great distance” while remaining undetected.<sup>23</sup> In such circumstances, a submarine remains poised to engage a surface vessel on its own terms, maintaining the initiative of offensive action. The example of *Conqueror* during the Falklands campaign is instructive. *Conqueror* detected, identified, and tracked *Belgrano* on May 1, 1982. She shadowed her target, undetected, for 27 hours until receiving orders to attack the Argentine cruiser.<sup>24</sup> The nuclear submarine was able to stalk her prey for over a day before firing the torpedoes that would send the Argentine ship to the bottom. *Conqueror* enjoyed freedom to manoeuvre, while simultaneously tracking an enemy capital ship, all while remaining undetected and still communicating with higher headquarters. This advantage allowed the RN to maintain the initiative, retain

---

<sup>21</sup> Commodore Chris Robinson (Commander of Canadian Submarine Force 2017-2019) in discussion with the author, February 2021.

<sup>22</sup> Sergei G. Gorshkov, *The Sea Power of the State*, (Malabar, Florida: Robert E. Krieger Publishing Company Inc., 1979), 190.

<sup>23</sup> Department of National Defence, *Canada in a New Maritime World: Leadmark 2050*, (Ottawa, DND Canada, 2015), 40.

<sup>24</sup> Lawrence Freedman, *The Official History of the Falklands Campaign*, Volume 2: *War and Diplomacy* (London: Routledge, Taylor & Francis Group, 2005), 289.

the element of surprise, and strike when appropriate – earning a measure of sea control with a single action.

7. A modern submarine provides exceptional ISR capability. Its unique combination of stealth, mobility, and endurance allows it to operate where ships and aircraft are vulnerable and detectable. A submarine can affect a full spectrum of intelligence collection within the maritime environment, as well as near the shore. Combined with other intelligence gathering methods, a submarine can work with surface, air, and space surveillance capabilities to contribute to establishing a complete intelligence picture as “a key element of the system-of-systems approach to maritime domain awareness”.<sup>25</sup> A modest modern diesel-electric submarine, under fair conditions and with decent sensors, can surveil a larger area than a modern surface ship, all the while remaining undetected.<sup>26</sup> In the modern anti-access area-denial (A2/AD) environment, a submarine’s ability to freely operate in an adversary’s littorals makes it “a proven and invaluable tool in collecting ISR data” and able to “detect high frequency, very high frequency and ultra - high frequency signals and cellphone transmissions.”<sup>27</sup> Although the exact nature of submarine deployments are secret, Canada’s *Victoria* class submarines have recently deployed to the Caribbean, Mediterranean, Arctic, and Indo-Pacific regions on maritime security patrols, likely conducting ISR tasks in addition to other assigned duties.

8. Operating a submarine fleet gives Canada access to valuable underwater intelligence. As a member of NATO, and a close ally of the United States, Canada is

---

<sup>25</sup> Commodore Chris Robinson (Commander of Canadian Submarine Force 2017-2019) in discussion with the author, February 2021.

<sup>26</sup> Jeffrey Collins, “Towards a Renewed Canadian Submarine Capability” *Niobe Papers*, No. 4 (July 2019), 4.

<sup>27</sup> Jeffrey Collins, “Towards a Renewed Canadian Submarine Capability” *Niobe Papers*, No. 4 (July 2019), 4.

privity to information concerning water space and subsurface sensors that would be inaccessible without submarines.<sup>28</sup> Specifically, Canada benefits from the global water-space management program, which prevents mutual interference amongst allied submarines, preventing blue on blue interactions. These agreements afford Canada access to vast underwater intelligence, which would not be available to decision makers if the RCN no longer operated submarines.

9. Canadian submarines are in high demand to support allied ASW training. The United States Navy does not operate diesel-electric submarines, but is required to defend against them as many are operated by adversarial nations.<sup>29</sup> As such, the *Victoria* class remains a preferred platform for training serials with American partners, and other allies.<sup>30</sup> Through complex ASW exercises, Canadian submarine expertise provides outstanding benefits for partner nations, while simultaneously enhancing the warfighting prowess of RCN operators who gain tactical and strategic experience during simulated engagements against modern, technologically advanced, surface and subsurface forces.

10. Unlike a surface combatant, a submarine is a strategic national asset. Maintaining and operating a modern submarine force affords Canada “a strategic capability that ensures Canada can exercise sovereignty in our own waters and can contribute to collective defence around the world.”<sup>31</sup> Vice Admiral (Retired) Ray Griggs, former Chief

---

<sup>28</sup> Jeffrey Collins, “Towards a Renewed Canadian Submarine Capability” *Niobe Papers*, No. 4 (July 2019), 4.

<sup>29</sup> Jeffrey Collins, “Towards a Renewed Canadian Submarine Capability” *Niobe Papers*, No. 4 (July 2019), 4.

<sup>30</sup> Editor, “Canadian Submarines Conduct Successful Deployments.” *Lookout Newspaper*, December 5, 2018. <https://www.lookoutnewspaper.com/canadian-submarines-conduct-successful-deployments/>. Accessed 27 January 21.

<sup>31</sup> Rear Admiral Brian Santarpia, Twitter post, 24 January 2021, 7:08 pm, <https://twitter.com/BrianSantarpia>

of the Royal Australian Navy, framed the strategic benefits of a submarine force as follows:

...a capable submarine force gives us strategic weight. For Australia, our submarines provide us with strategic weight in a way that no other ADF [Australian Defence Force] asset, or combination of ADF assets does. By strategic weight, I mean submarines are a capability which shapes or changes the behaviour of other nations and the calculus of their leaders.<sup>32</sup>

A submarine's ability to shape the behaviour of an adversary was evident in 1995, during Canada's confrontation with Spain over the turbot fishery. During the standoff, Canada issued a "Notice of Intention" for an *Oberon* class submarine to operate in the vicinity of the Spanish fishing fleet.<sup>33</sup> The possibility that a Canadian submarine would be operating in the area caused Spain to reconsider its plan to send a surface task group to the Grand Banks, which eased tensions between Canada and Spain.

11. In a 2013 study for the Rideau Institute, political scientists Michael Byers and Stewart Webb argued that Canada's submarine fleet was of little relevance to Canadian defence.<sup>34</sup> The RCN has operated with limited, or no, submarine capacity before, they argued, and could do so again. Further, Byers and Webb use the example of Denmark, a NATO ally, having divested its submarine force, inferring a model that Canada could follow. This reasoning is specious. The RCN could eliminate its submarine fleet, but it would become more reliant on allies to defend maritime approaches, consequently abdicating a measure of Canadian sovereignty. Further, while Canada persisted through

---

<sup>32</sup> Vice Admiral Ray Griggs, "The Role of Submarines in a Maritime Strategy," Chief of Navy Speeches, 9 April 2014, 7-8. <http://www.navy.gov.au/media-room/publications/chief-navyspeeches-april-2014>. Accessed 25 January 21.

<sup>33</sup> Paul T. Mitchell, "The Deal of the Century: Canada's Problematic Submarines in Historical Perspective," Laurier Centre for Military Strategic and Disarmament Studies, 28 June 2013.

<sup>34</sup> Michael Byers and Stewart Webb, "That Sinking Feeling: Canada's Submarine Program Springs a Leak," Canadian Centre for Policy Alternatives, June 2013, 27.

periods of history without a submarine capability, the world has evolved. Today, submarines are operated by more nations than ever, in waters of strategic importance to Canada. If Canada wants to remain a valued maritime partner and ally, submarines are an important component of a balanced and capable naval force.

12. There is little doubt that Canada's current fleet of four *Victoria* class submarines is inadequate. Three oceans and the world's longest coastline present a significant area of Canadian maritime responsibility. The *Victoria* class modernization project is currently upgrading "platform and combat systems with targeted enhancements in order to maximize availability, improve operational effectiveness, manage obsolescence, and above all improve habitability".<sup>35</sup> However, four incrementally modernized but aging submarines are insufficient to effectively patrol Canadian waters, contribute to alliance initiatives, and support Canadian interests abroad. The current submarine fleet is only able to achieve key requirements in limited respects. The fleet size of four submarines is suboptimal, as the maintenance routines for the *Victoria* class denotes that one of the four platforms is always unavailable. Of the remaining three deployable submarines, the operational demands on the submarine force can be difficult to manage if more than one boat is deployed.<sup>36</sup> Lastly, unlike nuclear submarines, the *Victoria* class have no sustainable under-ice capability, limiting its utility in Canada's Arctic.<sup>37</sup> A submarine replacement program is required to enable Canada's sovereignty enforcement initiatives in the Arctic, including the accessible water beneath the ice.

---

<sup>35</sup> Commodore Chris Robinson, "RCN Undersea Warfare Future Capability and Challenges" Keynote Address, Deep Blue Forum, October 2020.

<sup>36</sup> Commander Mike Mangin (RCN submariner) in discussion with the author, February 2021.

<sup>37</sup> Senate of Canada, *Reinvesting in the Canadian Armed Forces: A Plan for the Future*, (Canada, Standing Senate Committee on National Security and Defence, 2017), 37.

## CONCLUSION

13. Canada requires an effective, professional and modern submarine force.

Submarines are deadly and versatile; a unique platform that affords unparalleled advantages in a maritime conflict. They are difficult to detect and supremely lethal. Often, a single torpedo fired from their weapon system is capable of sinking most ships. For this reason, navies are extremely cautious about deploying maritime assets into a theatre where enemy submarines may be operating. The stealth offered by modern diesel-electric submarines reinforces this danger. *Leadmark 2050* states that “Submarines are likely to remain the dominant naval platform for the foreseeable future, and hence are an essential component of a balanced combat-effective navy.”<sup>38</sup> Finally, a submarine provides a state with an unrivalled strategic asset capable of controlling or denying access to the seas, containing and defeating enemy maritime forces, conducting unique ISR tasks, and providing access to vital undersea intelligence while enhancing the ASW capabilities of friendly surface forces.

---

<sup>38</sup> Department of National Defence, *Canada in a New Maritime World: Leadmark 2050*, (Ottawa, DND Canada, 2015), 50.

## RECOMMENDATIONS

14. Canada must continue to maintain and operate a modern, professional and lethal submarine force to meet strategic, operational and tactical goals of the RCN's mandate.

To achieve this aim:

- a. Canada must immediately initiate a program to replace the aging *Victoria* class submarine fleet; and
- b. In so doing, the RCN should undertake a study to determine what capabilities are vital to a modern Canadian submarine force. It would be a missed opportunity if Canada failed to improve its submarine force and instead, simply replaced the capabilities resident within its current fleet.



## BIBLIOGRAPHY

- Axe, David, "The Russian Navy's Growing Submarine Fleet Is Ready To Contest NATO Waters." *The National Interest*. The Center for the National Interest, October 1, 2020. <https://nationalinterest.org/blog/reboot/russian-navys-growing-submarine-fleet-ready-contest-nato-waters-169923>. Accessed 4 February 2021.
- Byers, Michael and Stewart Webb, "That Sinking Feeling: Canada's Submarine Program Springs a Leak," *Canadian Centre for Policy Alternatives*, June 2013, 27.
- Clarke, Lieutenant Commander Jamie A., "China's Naval Modernization in the Mahanian Mirror: Reconsidering Real Force Capacity in the Medium and Longer-Term Perspective", *Canadian Forces College*, April 2008.
- Collins, Jeffrey F. "Towards a Renewed Canadian Submarine Capability" *Niobe Papers*, No. 4 (July 2019).
- Department of National Defence, *Canada in a New Maritime World: Leadmark 2050*, (Ottawa, DND Canada, 2015).
- Department of National Defence, *Royal Canadian Navy Strategic Plan: 2017-2022*, (Ottawa, DND Canada, 2015).
- Department of National Defence, *Strong, Secure, Engaged: Canada's Defence Policy*, (Ottawa, DND Canada, 2017).
- Editor, "Canadian Submarines Conduct Successful Deployments." *Lookout Newspaper*, December 5, 2018. <https://www.lookoutnewspaper.com/canadian-submarines-conduct-successful-deployments/>. Accessed 27 January 21.
- Freedman, Lawrence, *The Official History of the Falklands Campaign*, Volume 2: *War and Diplomacy* (London: Routledge, Taylor & Francis Group, 2005).
- Gorshkov, Sergei G., *The Sea Power and the State*, (Malabar, Florida: Robert E. Krieger Publishing Company Inc, 1979).
- Griggs, Vice Admiral Ray, "The Role of Submarines in a Maritime Strategy," *Chief of Navy Speeches*, 9 April 2014, 7-8. <http://www.navy.gov.au/media-room/publications/chief-navyspeeches-april-2014>. Accessed 25 January 21.
- Haydon, Peter, "Canada and Modern Submarines." *Canadian Naval Review* 12, no. 1 (2016), 35-37.
- Macdonald, Scot, "The Falklands Campaign: The British Reconquest and the Argentine Defense." *Marine Corps Gazette* 84, no. 3, 2000, 72-80.

Mangin, Commander Mike (RCN submariner) in discussion with the author, February 2021.

Milner, Marc, *Canada's Navy: The First Century* (Toronto: University of Toronto Press, 1999).

Mitchell, Paul T. "The Deal of the Century: Canada's Problematic Submarines in Historical Perspective," Laurier Centre for Military Strategic and Disarmament Studies, 28 June 2013.

Robinson, Commodore Chris (Commander Canadian Submarine Force, 2017-2019) in discussion with the author, February 2021.

Robinson, Commodore Chris, "RCN Undersea Warfare Future Capability and Challenges" Keynote Address, Deep Blue Forum, October 2020.

Santarpia, Rear Admiral Brian, Twitter post, 24 January 2021, 7:08 pm, <https://twitter.com/BrianSantarpia>

Senate of Canada, *Reinvesting in the Canadian Armed Forces: A Plan for the Future*, (Canada, Standing Senate Committee on National Security and Defence, 2017).