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THE CURRENT AND FUTURE NEED FOR SUBMARINES IN THE ROYAL CANADIAN NAVY

Major William A.C. Brake

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By Major William A.C. Brake

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THE CURRENT AND FUTURE NEED FOR SUBMARINES IN THE ROYAL CANADIAN NAVY

AIM

1. This paper provides an overview of some factors affecting the current and future need for Canada's submarine fleet of *Victoria*-class submarines. These factors, taken from the public discourse, will be discussed against the background of the current Government of Canada defence policy and statements and the Royal Canadian Navy's (RCN) self-assessed¹ vision and ambition.

INTRODUCTION

2. The RCN released *Leadmark 2050* in 2016 as its "vision for the future."² It stated that the *Victoria*-class would have to be replaced because submarines were "likely to remain the dominant naval platform for the foreseeable future, and hence are an essential component of a balanced combat-effective navy."³ The Standing Senate Committee on National Security and Defence explicitly agreed with that statement⁴ in a May 2017 report, recommending that the Government "commence the procurement process before the end of 2018 to acquire 12 new submarines equipped with air independent propulsion systems,"⁵ citing the economic benefits of having them built in Canada⁶ and similar programs that had been launched in Norway and Australia.⁷

¹ Royal Canadian Navy, *Leadmark 2050: Canada in a New Maritime World* (Ottawa: DND, 2016), ii.
² *Ibid*, iii.
³ *Ibid*, 50.
⁴ Senate of Canada, Standing Senate Committee on National Security and Defence, *Reinvesting in the Canadian Armed Forces: A Plan for the Future*, Report, May 2017, 35. Last accessed 8 February 2021, http://publications.gc.ca/collections/collection_2017/sen/yc33-0/YC33-0-421-11-eng.pdf
⁵ *Ibid*, 38.
⁶ *Ibid*, 38.
⁷ *Ibid*, 37.

3. Canada's defence policy, *Strong, Secure, Engaged* (SSE), was released in late 2017 without any commitment to such submarine replacement. Instead, it expressed the government's intention to "modernize the four *Victoria*-class submarines"⁸ starting "in the mid-2020s, which [would] ensure their continued effectiveness out to the mid-2030s."⁹ The Commons Standing Committee on National Defence made a similar recommendation to increase the size of the fleet and begin the replacement process for ice-capable submarines in a June 2018 report,¹⁰ but this recommendation was also not accepted.¹¹ The new in-service support contract to accomplish this extension is expected to be awarded by mid-2022, but COVID-19 may affect this timeline.¹² Director Maritime Equipment Program Management (DMEPM) – Submarines reported in October 2020 that this new contract was a top priority for the RCN and that consultation with industry and related studies were ongoing.¹³ The *Victoria*-class modernization was listed first in the Top 5 Priorities presented to the Best Defence Conference by the Director Naval Requirements on 17 Nov 2020.¹⁴

DISCUSSION

⁸ Canada, *Strong, Secure, Engaged: Canada's Defence Policy* (Ottawa: Government of Canada, 2017), 35.

⁹ *Ibid.*, 65.

¹⁰ House of Commons of Canada, Standing Committee on National Defence, *Canada and NATO: An Alliance Forged in Strength and Reliability*, Report, June 2018, 105. Last accessed 8 February 2021, <https://www.ourcommons.ca/Content/Committee/421/NDDN/Reports/RP9972815/nddnrp10/nddnrp10-e.pdf>

¹¹ David Pugliese, "Liberals reject committee recommendation to replace *Victoria*-class subs – no desire for subs with under-ice capability," *Ottawa Citizen*, 17 November 2018, last accessed 8 February 2021, <https://ottawacitizen.com/news/national/defence-watch/liberals-reject-committee-recommendation-to-replace-victoria-class-subs-no-desire-for-subs-with-under-ice-capability>

¹² David Pugliese, "RCN Strategic Capability: *Victoria*-Class Submarine Sustainment Top Priority for Royal Canadian Navy," *Esprit de Corps*, 5 October 2020, last accessed 8 February 2021, <http://espritdecorps.ca/feature/rcn-strategic-capability-victoria-class-submarine-sustainment-top-priority-for-royal-canadian-navy>

¹³ *Ibid.*

¹⁴ Director Naval Requirements, *The RCN's Capital Procurement Priorities and Projects*, (presentation), Best Defence Conference, 17 November 2020, last accessed 8 February 2021, <https://bestdefenceconference.com/wp-content/uploads/Capt-Gillis-DNR-Best-Defence-2021-final.pdf>

4. Since the history of Canada's naval strategy is clearly, and "correctly, politically driven and achieved by a careful balancing of desired capabilities and available funds,"¹⁵ the most important validation of the RCN's need for submarines is arguably the political and financial commitment by the Government. SSE recognized submarines as a requirement for the "balanced mix of platforms"¹⁶ which is needed for the domestic and international tasks of the RCN. It listed the four *Victoria*-class submarines as integral to the "Joint Intelligence, Surveillance, and Reconnaissance (ISR) concept,"¹⁷ describing their role in "sub-surface surveillance [as a] key element of the system-of-systems approach to maritime domain awareness."¹⁸ That year, the Minister of National Defence praised the submarines' abilities, saying that "no other platform ... can do what a submarine can do,"¹⁹ referring to their unrivaled stealth, ISR, and "deterrence to potential adversaries."²⁰

5. While the level of political commitment is evident, similar validation can be seen by way of financial commitment. Expenditures for sustaining the submarines are averaging between \$300 million and \$350 million annually.²¹ This includes ongoing costs under the 2008 support arrangement - a contract which would be valued at \$2.9 billion if all the options are exercised to extend it to the 15-year maximum.²² Given that the public and political debate around whether Canada needs submarines has mostly been about

¹⁵ Peter T. Haydon, "Submarines, Love Them or Hate Them," *Canadian Naval Review* 11, no 1 (2015): 31.

¹⁶ Canada, *Strong, Secure, Engaged...*, 34.

¹⁷ *Ibid*, 64.

¹⁸ *Ibid*, 65.

¹⁹ Pugliese, *Liberals reject committee recommendation...*

²⁰ Pugliese, *Liberals reject committee recommendation...*

²¹ Pugliese, *RCN Strategic Capability: Victoria-class...*

²² Pugliese, *RCN Strategic Capability: Victoria-class...*

whether Canada could afford them,²³ this current multi-billion dollar level of financial commitment to the *Victoria*-class further points to clear recognition of the current need. The level of financial investment in contracts expected to be awarded in the next few years²⁴ to extend the “operational relevance of the *Victoria* class [*sic*] through to the mid-2030s”²⁵ shows the Government’s recognition of the near-future need as well.

6. Submarines’ characteristics, among which stealth is the most important, has made them among the most important factors in warfare since U-boats conducted unrestricted submarine warfare against ships in British waters during the First World War – the practice regarded as being partially responsible for drawing the United States into that conflict.²⁶ Modern submarines can often move freely where surface vessels and aircraft cannot as a result of their inherent stealth, operational endurance, and persistence advantages over other platforms. A submarine’s unrivalled lethality and deterrence from the tactical to strategic level comes when these advantages are combined with advanced weaponry, exemplified in the Mark 48 Mod 7AT torpedo that the *Victoria*-class uses as its primary weapon.²⁷ According to Professor James Goldrick, a former Royal Australian Navy (RAN) Admiral, this makes submarines the enduring “apex predators of maritime conflict.”²⁸ Besides their decisive posture against surface and sub-surface threats while operating alone or as part of a Naval Task Group, their freedom of movement makes

²³ Haydon, *Submarines, Love Them...*, 32.

²⁴ Pugliese, *RCN Strategic Capability: Victoria-class...*

²⁵ Canada, “*Victoria*-class Maintenance & Modernization,” last accessed 8 February 2021, <http://www.navy-marine.forces.gc.ca/en/fleet-units/submarines-maintenance.page>

²⁶ Canadian War Museum, “Canada and the First World War, U-Boat Threat,” last accessed 8 February 2021, <https://www.warmuseum.ca/firstworldwar/history/battles-and-fighting/sea-war/u-boat-threat/>

²⁷ Tim Dunne, “*Victoria*-class submarines Canada’s Maritime Predators,” *FrontLine Defence* 13, no 4 (2016): 26.

²⁸ James Goldrick, “What, exactly, do submarines do?” in *Special Report: Submarines: Your questions answered* (Barton, ACT, Australia: Australian Strategic Policy Institute, 2020), 5.

them important enablers in Joint and Special Forces operations, and allows for intelligence gathering from a vantage points which are otherwise unreachable by other platforms. Submarines are therefore operationally indispensable as part of the “responsive and agile means” which Canada’s defence policy says is required to protect Canada’s maritime approaches and “project power responsively and effectively far from Canada’s shores.”²⁹

7. The need for the *Victoria*-class is evidenced by the activities it performs to defend Canada and support Government of Canada policy objectives and priorities. Canada’s submarine fleet’s peacetime roles include “fisheries patrols and surveillance of all three Canadian coastlines, supporting maritime law enforcement and other government departments,”³⁰ as well as important international engagements and training events. Though, as the former Commander of the Canadian Submarine Force noted in 2018, “almost everything [they] do is classified,”³¹ successful deployments publically attest to the continued relevance of the submarine capability. *Victoria*-class boats have deployed internationally in counter-narcotics roles on OP CARIBBE³² and HMCS VICTORIA “joined NATO allies for DYNAMIC MANTA in the Mediterranean Sea for anti-submarine warfare and anti-surface warfare training,”³³ among other activities, in 2018. HMCS CHICOUTIMI’s deployment while “helping to monitor sanctions enforcement

²⁹ Canada, *Strong, Secure, Engaged...*, 34.

³⁰ Canada, “*Victoria*-class Capabilty,” last accessed 8 February 2021, <http://www.navy-marine.forces.gc.ca/en/fleet-units/submarines-capability.page>

³¹ Guy Toremans, “Canadian submarine force demonstrates global reach,” *The Maple Leaf*, 7 June 2018, last accessed 8 February 2021, <https://ml-fd.caf-fac.ca/en/2018/05/13938>

³² Canada, “Her Majesty’s Canadian Submarine *Victoria* (SSK 876),” last accessed 8 February 2021, <https://www.navy-marine.forces.gc.ca/en/fleet-units/submarines-victoria.page>

³³ Canada, “Her Majesty’s Canadian Submarine *Windsor* (SSK 877),” last accessed 8 February 2021, <http://www.navy-marine.forces.gc.ca/en/fleet-units/submarines-windsor.page>

off North Korea and [visit] Japan as part of a wider engagement in the western Pacific”³⁴ was the clearest possible signal of the “the strategic importance of the Asia-Pacific region”³⁵ to Canada. It is also important to note that “as a submarine-operating NATO nation, Canada has privileged access to intelligence that it would not otherwise have,”³⁶ which is an important requirement for maritime domain situational awareness.

8. An increasingly recognized feature of the future of maritime warfare is the importance of the littoral zone compared to the open-ocean naval competition which characterized the Cold War environment. The RCN’s closest partner, the United States Navy (USN), has focused research and development related to submarines and anti-submarine warfare (ASW) on “blue water” capabilities for decades.³⁷ The USN has also not invested in diesel-electric submarines³⁸ like those of the RCN, making the participation of Canadian subs a welcome addition to training exercises.³⁹ Canada’s submarines are especially advantageous in the littoral environment, “making them valuable strategic asset Canada and our international partners”⁴⁰ like the USN. For example, in addition to their advantageous size compared to larger nuclear-powered submarines, diesel-electric submarines like the *Victoria*-class can shut off their engines

³⁴ Murray Brewster, “Canada's submarine fleet spent 'zero days' at sea last year: government documents,” *CBC News*, 11 February 2020, last accessed 8 February 2021, <https://www.cbc.ca/news/politics/submarines-canada-fleet-repairs-canadian-navy-1.5458632>

³⁵ Toremans, *Canadian submarine force...*, 7.

³⁶ Canada, “Victoria-class Submarines,” last accessed 8 February 2021, <http://www.navy-marine.forces.gc.ca/en/fleet-units/submarines-home.page>

³⁷ Robert E. Beauchamp, *Blue Water Navy - Littoral Threat* (Newport, RI: Naval War College, 13 February 2006), 8.

³⁸ James Goldrick, “What’s the rest of the Indo-Pacific doing with submarines?” in *Special Report: Submarines: Your questions answered* (Barton, ACT, Australia: Australian Strategic Policy Institute, 2020), 12.

³⁹ David Pugliese, “HMCS Chicoutimi, HMCS Vancouver and HMCS Calgary taking part in U.S. exercise,” *Ottawa Citizen*, 24 October 2015, last accessed 8 February 2021, <https://ottawacitizen.com/news/national/defence-watch/hmcs-chicoutimi-hmcs-vancouver-and-hmcs-calgary-taking-part-in-u-s-exercise>

⁴⁰ Canada, *Victoria-class Capability*.

and operate on battery power to offer additional quietness (stealth) advantages for limited time periods. Compared with nuclear submarines, which have clear advantages in terms of power, speed, and endurance, these smaller, potentially stealthier *Victoria*-class submarines can be called upon where its attributes could offer tactical advantages alongside Canada's allies.

9. Retired United States Air Force General Terrence J. O'Shaughnessy, shortly after finishing his command of North American Aerospace Defence Command (NORAD) in August 2020, wrote of the requirement for increased preparedness for a "peer threat"⁴¹ to North America. The former Commander responsible for continental maritime warning described worrying investments by Russia to more capably strike targets in Canada and the United States,⁴² and of China's investments to target at range, even if their strategy was described as more related to denying the US military and allies from accessing the Western Pacific in the event of a crisis.⁴³ An important aspect of this steadily increasing great-power competition lies under the maritime approaches to North America, where the USN Chief of Naval Operations reported in 2018 that there was more Russian submarine activity than had been "seen in 25 years"⁴⁴ and that "China's military movements from the North Atlantic into the Mediterranean Sea"⁴⁵ had created a "new dynamic."⁴⁶ The

⁴¹ Terrence J. O'Shaughnessy and Peter M. Fesler, "Hardening the Shield: A Credible Deterrent & Capable Defense [*sic*] for North America," *The Wilson Center*, September 2020, last accessed 8 February 2021, https://www.wilsoncenter.org/sites/default/files/media/uploads/documents/Hardening%20the%20Shield_A%20Credible%20Deterrent%20%26%20Capable%20Defense%20for%20North%20America_EN.pdf

⁴² *Ibid.*, 3.

⁴³ *Ibid.*, 4.

⁴⁴ Carla Babb, "US Navy's Top Admiral Cites Increased Threat in Ocean Nearest Washington," *Voice of America News*, 6 August 2018, last accessed 8 February 2021, <https://www.voanews.com/usa/us-navys-top-admiral-cites-increased-threat-ocean-nearest-washington>

⁴⁵ *Ibid.*

⁴⁶ *Ibid.*

former US Secretary of State noted in the 2019 that the Arctic had become “an arena for power and for competition”⁴⁷ when referring to a US Department of Defence report that “Chinese submarines might soon extend their reach into Arctic waters.”⁴⁸ Great power competition is notably fueling increased proliferation of diesel-electric submarines among regional competitors in the Indo-Pacific region,⁴⁹ while countries such as South Korea and Brazil vie to be the first countries to join the exclusive, 6-member nuclear-sub club since the late 1980s.⁵⁰ Increased submarine activity along Canada’s three coastlines and overseas points to an increasing need for Canadian submarine capabilities as important tools for tracking and deterring potential threats and protecting Canada’s interests.

10. Despite all of the reasons noted above, some aspects of the future security environment threaten to erode the stealth advantage of submarines. These techniques include using “big data” and computing power advances to significantly exploit theoretical⁵¹ ASW techniques like running detailed oceanographic models in real time. Increased computer power could also locate submarines by “comparing expected ambient noise from marine life, waves, and seismic events to measured noise fields.”⁵² Canada is participating in “Maritime Unmanned Systems [Science and Technology] Pre-Feasibility

⁴⁷ Timothy Choi and Adam Lajeunesse, *Some Design Considerations for Arctic-Capable Submarines* (Peterborough, ON: North American and Arctic Defence and Security Network (Trent University School for the Study of Canada), 16 November 2020), 1. Last Accessed 8 February 2021, https://www.naadsn.ca/wp-content/uploads/2020/11/Policy-Primer_Some-Design-Considerations-for-Arctic-Capable-Submarines_Choi-and-Lajeunesse.pdf

⁴⁸ *Ibid.*

⁴⁹ James Goldrick, *What’s the rest of the Indo-Pacific doing with submarines...*, 12.

⁵⁰ H. I. Sutton, “Nuclear Submarine Game Changer: New Countries To Go Atomic,” *Forbes*, 3 November 2019, last accessed 8 February 2021, <https://www.forbes.com/sites/hisutton/2019/11/03/nuclear-submarine-game-changer-new-countries-to-go-atomic/?sh=6d4969e81d74>

⁵¹ Bryan Clark, *The Emerging Era in Undersea Warfare* (Washington, DC: Center for Strategic and Budgetary Assessments (CBSA), 22 January 2015), 9.

⁵² *Ibid.*, 8.

studies that focus on ASW and naval mine warfare capabilities” with NATO allies which have similar targets for future military platforms.⁵³ While a 2019 study by RAND Corporation regarding autonomy in unmanned maritime vehicles found that assumptions regarding “the capability for autonomous systems to [operate] in a dynamic environment”⁵⁴ were unrealistic for the near future, it recommended acceptance of “the reality that autonomous systems will need to make engagement decisions”⁵⁵ for them to be effective, as “modern weapons system timelines ... preclude human intervention.”⁵⁶ The employment of such systems may eventually offer more cost-efficient methods for some aspects of surface and sub-surface warfare in which submarines currently excel, thus lowering the relative need for submarines in the future.

CONCLUSION

12. The current and near-future need for submarines stated by the RCN has recently been validated by committees in both houses of Parliament, and the Government’s commitment by way of policy and financial expenditure shows support for that need accordingly. Successful deployments since the *Victoria*-class has been fully operational further support these conclusions, while increased activity by strategic competitors along Canada’s shores and in areas of strategic interest such as the Western Pacific further reinforce the requirement. While the timeline remains uncertain, disruptive technologies will eventually erode the advantages of submarines to some degree and may affect the relative importance of submarines for the RCN in the more distant future.

⁵³ Pugliese, *Liberals reject committee recommendation...*

⁵⁴ Bradley Martin *et al*, *Advancing Autonomous Systems: An Analysis of Current and Future Technology for Unmanned Maritime Vehicles* (Santa Monica: RAND Corporation, 2019), 53.

⁵⁵ *Ibid*, 54.

⁵⁶ *Ibid*, xi.

RECOMMENDATION

13. Based on the demonstrated need for submarines in the RCN:
 - a. DGMEPM should prioritize activities related to the second *Victoria*-class In-Service Support Contract (VISSC) to ensure it is awarded before the maximum extension of the current VISSC expires in 2023; and,
 - b. Director General Maritime Force Development should revisit the requirement for a submarine capability replacement by 2025 to avoid a capability gap after the planned mid-2030s retirement of the *Victoria*-class.⁵⁷

⁵⁷ The estimated timeline for a decision regarding a replacement submarine fleet is based on average procurement timelines for similar capital investments in Canada historically, as well as comparison with a likely very similar program which has recently been undertaken in Australia. For a summary of the factors requiring study for such a project, such as propulsion, procurement methodology, and capability considerations for under-ice and littoral operations, see: Jeffrey F. Collins, “Towards a Renewed Canadian Submarine Capability,” *Naval Association of Canada*, Niobe Papers, no 4 (2019), last accessed 8 February 2021, <https://www.navalassoc.ca/wp-content/uploads/2020/09/Collins-Submarine-Capabilities.pdf>

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