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How the Victoria Class Offers Lessons for the Canadian Patrol Submarine Project

AIM

1. After acquiring four used diesel electric submarines from the British in 1998, the Canadian Submarine Force received a new lease on life, however the transition was not an easy one. 24 years later and after over a decade of uncertainty on the future of submarines in Canada, in July 2021 the Royal Canadian Navy (RCN) officially stood up the Canadian Patrol Submarine Project (CPSP)¹, signalling the intent to provide a new submarine replacement for the existing *Victoria-class* submarines (VCS), and ensuring the continuance of the submarine force in Canada past its current forecasted end date in the late 2030s².
2. Submarine capability within Canada and the RCN remains a much discussed but not well understood concept, with discussion around maintenance issues often obscuring the excellent capability the force provides. This paper will look at the clear advantages provided by a submarine force both in terms of asymmetric warfare as well as great power competition, the historical context to submarine procurement in Canada and will provide some recommendations to the Commander RCN for the CPSP going forward.

INTRODUCTION

Meanwhile, beyond our myopic national horizon, and despite significant advancements in technology designed to defeat it, the modern submarine continues to evolve as the dominant global naval platform. The unprecedented international proliferation of submarines, by friends and potential foes alike, is a clear indicator

¹ Lee Berthiaume, “Canada launches program to replace its ageing submarine fleet”, *CP24 News* (July 14th 2021), [Canadian Navy launches program to replace its beleaguered submarine fleet | CP24.com](https://www.cp24.com/news/canada-launches-program-to-replace-its-beleaguered-submarine-fleet-1.5048484)

² Canadian Press, “Troubled submarines to be used until 2030s”, *CBC News*, (Feb 27th, 2012), <http://www.cbc.ca/news/canada/story/2012/02/27/submarines-2030.html>

*of the importance maritime nations place on the ability to control their maritime estates and project credible seapower. The submarine is now, and is likely to remain, the preeminent naval platform for the remainder of this century.*³

– VAdm Mark Norman, (Ret'd)

3. A capable and deployable submarine force is one of the primary distinguishers between a true “blue water” Navy, and a “green water” littoral or coastal force. The capabilities offered by a modern submarine in terms of its covert intelligence, surveillance, and reconnaissance (ISR) abilities and in the domain of sea control are unmatched. Submarines are a classic “force multiplier”, in that the presence of even a single submarine in theatre will completely change an adversary’s posture in the area and cause a disproportionate response to try and localize the submarine. Although nuclear submarines remain unmatched in endurance and repositioning speed, many modern conventional submarines classes now operate with Air-Independent Propulsion (AIP) systems fitted. This closes the gap on dived endurance and provide greater flexibility in operations and the ability to operate for weeks submerged including under ice at a fraction of the cost of a nuclear sub⁴.

4. Examples of the type of response that can be engendered by the presence of a submarine in theatre can be found in instances during the Falklands war, both in the Argentinian Navy’s withdraw in response to the sinking of the *ARA General Belgrano* by *HMS Conqueror*⁵ and in the Royal Navy’s (RN) frantic attempts to find and destroy the one active Argentinian

³ Jeffery Collins, “Deadline 2036: Assessing the requirements and options for Canada’s future submarine force”, *Macdonald-Laurier Institute* (September 2021), 5

⁴ Sebastien Roblin, “Nuclear or Not? Why the U.S Navy doesn’t want AIP Submarines”, *The National Interest* (May 28th, 2021), <https://nationalinterest.org/blog/reboot/nuclear-or-not-why-us-navy-doesn%E2%80%99t-want-aip-submarines-186311>

⁵ Scot Macdonald, “The Falklands Campaign: the British reconquest and the Argentine defense”, *Marine Corps Gazette* 84 (March 2000), 72-80

conventional submarine during the conflict, where at one point they “had ten frigates or destroyers and a helicopter carrier assigned at least in part to antisubmarine duties” and they “expended hundreds of expensive antisubmarine munitions and dispatched 2,253 helicopter sorties chasing false contacts.”⁶

5. The RCN has long understood the challenges and benefits of submarine capabilities. As then Minister of Defence Harjiit Sajjan said in 2018 “no other platform in the Canadian Armed Forces can do what a submarine can do. No other platform has the stealth, the intelligence-gathering, surveillance and reconnaissance capability and the deterrence to potential adversaries that a sub does”⁷. However, despite the advanced capabilities provided by the submarine force, the discourse in Canada has long been dominated by the negative press that has accumulated around the VCS. The fire on HMCS Chicoutimi⁸, the grounding of HMCS Corner Brook⁹, the numerous cost overruns and maintenance delays have all combined to form a toxic narrative around the class that obscures and obstructs any attempts to “re-habilitate” the current submarine force within the eyes of the public. Without public support it is difficult to find the political capital to replace the current submarine fleet. Other than a nebulous plan of modernization of the current Victoria-class, submarine replacement was left completely out the current Government’s defence policy, Strong Secure Engaged (SSE)¹⁰ released in 2017, and a recent standing senate defence committee recommendation that Canada replace the Victoria class submarine with 12

⁶ Sebastien Roblin, “How one Argentine Submarine Kept the Royal Navy At Bay During The Falklands War”, *The National Interest* (April 18th 2020) How One Argentine Submarine Kept The Royal Navy At Bay During The Falklands War | The National Interest

⁷ David Pugliese, “Liberals reject committee recommendation to replace Victoria-class subs – no desire for subs with under-ice capability” *Ottawa Citizen* (November 17th 2018), Liberals reject committee recommendation to replace Victoria-class subs – no desire for subs with under-ice capability | Ottawa Citizen

⁸ Dan Dubreuil “Chicoutimi Submarine Fire”, *The Canadian Encyclopedia* (August 17th 2015), Chicoutimi Submarine Fire | The Canadian Encyclopedia

⁹ Rob Gordon, “Navy submarine damage severe, internal report says”, *CBC News* (Jul 16th 2013), <http://www.cbc.ca/news/canada/nova-scotia/navy-submarine-damage-severe-internal-report-says-1.1353463>

¹⁰ Department of National Defence, “Strong, Secure, Engaged - Canada’s Defence Policy”, (Ottawa: DND, 2017)

new submarines was the only recommendation outright rejected by the Government in 2018¹¹. Given this context it is perhaps unsurprising then that the CPSP was stood up with relatively little amount of fanfare.

DISCUSSION

Historical Context

6. The history of the submarine service in the RCN is one of almost continuous stopgap and ad-hoc platforms. In the late 60s, Canada acquired her only new submarine class to date – the three boats of the *Oberon*-class, themselves only a “temporary” solution as the RCN intended to purchase a fleet of US nuclear boats. When costs and political fears ended the nuclear solution, the once temporary Oberon’s were Canada’s only submarine class for the next 30 years.

7. In the late 1980s, the prospect of nuclear submarines was raised again in Canada – this time the leading option was to buy 12 new French *Rubis*-class submarines, as the Americans had now come down firmly against Canada having nuclear submarines, considering the proposal “unnecessary and even unwelcome”¹². This deal, like the one before it, collapsed due to cost (estimated at 10-billion dollars in the mid 1980s) and political pressures, as well as the collapse of the Soviet Union, which undermined the strategic case for the submarines themselves. Importantly when looking at our current replacement project, the budget pressure for the nuclear submarine project in the late 1980s required the RCN to cancel the 3rd batch of Halifax Patrol Frigates (hulls 13 through 18)¹³, which were not restored when the nuclear program itself was

¹¹ Pugliese, “Liberals reject committee recommendation to replace Victoria-class subs – no desire for subs with under-ice capability”

¹² Adam Lajeunesse, “Sovereignty, security and the Canadian Nuclear Submarine Program”, *Canadian Military Journal* 8 (Winter 2008). Military History (forces.gc.ca)

¹³ Richard Gimblett, “The Naval Service of Canada 1910-2010: The Centennial Story” (Toronto: Dundurn Press, 2009), 181

cancelled. The presence of the nuclear option was enough to deprive the RCN of 6 ships, and should be seen a lesson for the future, as the RCN moves forward with the CPSP simultaneously with the Canadian Surface Combatant (CSC) project.

8. By the mid 1990s the Oberon class submarines, despite significant combat systems modernization in the 1980s, were showing their age. At the time the RCN was deeply mired in the “decade of darkness” which saw large budget cuts and a reduced force size. It seemed that the class would be retired without replacement, and Canada would be left without a submarine force. The decision by the RN in 1994 to transition to an all-nuclear submarine fleet, leaving the four already constructed *Upholder*-class submarines surplus to requirements, was seen as just the lifeline that the Canadian submarine force needed. Nonetheless, it still took four years of negotiations by Chretien-era Liberal Government, before the purchase of the *Upholder*-class, now renamed *Victoria*-class, was announced in 1998.¹⁴

9. At the time, the 897-million-dollar lease-to-purchase agreement for the newly named VCS was seen as “the deal of the century”¹⁵. The submarine force had a future and given that the replacement cost for four new conventional submarine was estimated at the time to be 3 to 5-Billion dollars¹⁶, it was seen as very cheap solution. Yet even from the beginning there was some red flags. The *Upholder*-class were purpose built for shorter range patrol¹⁷ and had a much more limited range that the *Oberon*-class they replaced. Furthermore, the crew accommodations were worse, and the fitted sonar system was older and less capable than the upgraded units onboard

¹⁴ Michael Byers, “That Sinking Feeling”, Canadian Center for Policy alternatives (June 2013), <https://rideauinstitute.ca/wp-content/uploads/2019/08/Publications-2013.06-That-Sinking-Feeling.pdf>

¹⁵ Paul Mitchell, “Deal of the Century”, *Naval Association of Canada* (Nov 2014), http://navalassoc.ca/wp-content/uploads/2014/11/Deal-of-the-Century-by-Paul_Mitchell.pdf

¹⁶ Chief Review Services, “Review of the Submarine Acquisition/Capability Life-Extension Program,” (May 2003), <http://www.crs-csex.forces.gc.ca/reports-rapports/pdf/2003/P0432-eng.pdf>

¹⁷ Mitchell, “Deal of the Century”

the Oberon. After being laid up for years many systems had deteriorated, and re-activation in the UK took far longer and was much more difficult than anticipated, largely due to the delay between the submarines being laid-up by Britain and the Canadian lease. Most critically from the RCN personnel point of view, the delays in reactivation lead to a multi year gap between the decommissioning of the Oberon's (between 1998 and 2000) and the activation of the VCS (between 2002-2006), which resulted in a massive loss of experience within the personnel of the submarine force.

A Ticking Clock

10. Once the VCS arrived in Canada the RCN was faced with the reality that it had never been the sole operator of an orphan class of submarines. It soon became apparent that operating the VCS would be a greater challenge than the previous class. In the 'Oberon days', the RCN could rely on the technical expertise of the design authority in the UK, as well as build upon the experience with the half-dozen other navies that operated the 27-unit fleet of Oberon's worldwide. Building the technological and industrial base to support the VCS domestically was an expensive, lengthy process and the result was a 15 year, 2.9-billion-dollar service contract with industry.¹⁸

11. As a result of the technological challenges and exacerbated by the program delays caused by the accidents onboard *HMCS Chicoutimi* and *HMCS Corner Brook* the VCS did not achieve weapons certification until 2012¹⁹ and only briefly achieved the submarine force's goal of steady

¹⁸ David Pugliese, "RCN Strategic Capability: Victoria-Class submarine sustainment top priority for Royal Canadian Navy", *Esprit de Corps* (Oct 5th 2020), <http://espritdecorps.ca/feature/rcn-strategic-capability-victoria-class-submarine-sustainment-top-priority-for-royal-canadian-navy>

¹⁹ CBC News, "Sub HMCS Victoria fires 1st torpedoes in test" (March 16th, 2012), <https://www.cbc.ca/news/canada/nova-scotia/sub-hmcs-victoria-fires-1st-torpedoes-in-test-1.1170626>

state operations in 2014²⁰ (16 years after purchase) before weld issues on the west coast sidelined two submarines for years²¹.

12. As the platform struggled to get to sea and was savaged by the press, the ticking clock that is the slowly diminishing material condition of the fleet continued unabated. Although initially planned to be retired in the mid 2020s it became clear that doing so would leave the RCN without any submarine force, and the class was materially extended out to the mid 2030s²². Although the 2030s might seem like a long time, the average length of a procurement project within the CAF is over 15 years, the CPSP having only been announced in 2020¹ is not included in SSE, nor is it costed or approved by Treasury Board, and this is a huge risk to project delay. Even if the VCS can be further materially extended until the early 2040s, that still doesn't give the RCN much time to choose and move forward with submarine procurement to allow for a smooth transition between classes, and if anything, the CPSP is already several years late and must make up that deficit through prudent use of the resources allocated to the project.

A Small Navy

13. The situation that the RCN finds itself has some differences from the situation in the mid to late 1990s. The decision to acquire the VCS was not so much favored as it was the only option. The RCN budget had been cut quite severely in the 1990s and there was not any political will for a new submarine option. What has not changed is that the RCN remains the smallest service within the Canadian Armed Forces (CAF) and has very little excess capacity in project

²⁰ Department of National Defence, "Victoria Class submarines reach operational steady state", *Defence Talk* (March 3rd 2015), <https://www.defencetalk.com/victoria-class-submarines-reach-operational-steady-state-63335/>

²¹ Dean Beeby, "Wonky welds keep West Coast submarines stuck in port", *CBC News* (May 17th 2016), <https://www.cbc.ca/news/politics/submarine-welding-repairs-hmcs-chicoutimi-victoria-1.3584592>

²² Canadian Press, "Troubled submarines to be used until 2030s", *CBC News*, (Feb 27th 2012), <http://www.cbc.ca/news/canada/story/2012/02/27/submarines-2030.html>

staff. The bulk of the RCN's money, personnel, and focus remains on the acquisition and in-Canada build of the CSC. To be successful the CPSP must learn to work within this framework, having to be smaller, more agile, and more reliant on industry support to quietly get to work in the shadow of the much larger and better resourced CSC project.

14. Industry support is not unlimited either – with all of Canada's major shipyards already tasked with procurements under the Canadian Shipbuilding Strategy, there isn't any excess capacity in the yards to take on the monumental task of new submarine construction. Even if there was a spare yard Canada does not have the submarine technical experience in-house, having never built submarines domestically. When the Australians built the Collins class, it required massive amounts of capitol to build that expertise locally and ended up over double the initial estimates in cost, spending more per boat than the entire VCS project cost.²³ If Canada does not tread carefully, and plan properly, it could face a similar fate.

A Changing World

15. The global strategic picture onto which the CPSP is emerging is vastly different from the situation in the late 90s when the Victoria class was purchased. Submarines are proliferating globally, particularly in the Indo-Pacific region, where a rising China has embarked on an ambitious naval procurement strategy²⁴ and countries like Australian and India are investing in submarines to counter the growing threat²⁵. As Sam Bateman writes in the journal of Asian Security:

²³ Derek Woolner, "Getting in Early: Lessons of the Collins Submarine Program for Improved Oversight of Defence Procurement" *Parliament of Australia* (Sept 18th 2001)
https://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/pubs/rp/rp0102/02RP03#unresolved

²⁴ Collins, "Deadline 2036: Assessing the requirements and options for Canada's future submarine force"

²⁵ Collins, "Deadline 2036: Assessing the requirements and options for Canada's future submarine force"

Many Asia-Pacific countries are placing greater emphasis on submarines. Notably, Australia, China, Japan, India, Indonesia, Singapore, and South Korea are committed to increasing the size and capabilities of their existing submarine fleets, whereas Malaysia and Vietnam, which had not previously possessed ocean-going submarines, are acquiring them. Meanwhile, the United States is increasing the number of submarines it has deployed in the region, with 60 percent of US submarines to be home-ported in the Pacific by the end of 2010²⁶

16. In addition to the naval arms race going on in the Pacific region, competition remains fierce for the Arctic region, an area that Canada considers “home territory”. While Russia remains the most active adversary in the region, recently China has expressed interest in becoming a player in the Arctic, as a “self declared near-Arctic-state, China has ramped up its activities in the north”²⁷. While climate change will allow for more surface operations in the region, a nuclear or AIP enabled submarine is still the best way to project power in the high Arctic and remains an area where Canada has not been able to operate. Our failure to be able to patrol our claimed territory has caused the UK to offer to ‘step-in’ and help patrol with their own nuclear submarines²⁸. However benevolent this action may seem it will only lead to an increased degradation of Canada’s sovereignty claim over the Arctic. The CAF budget doesn’t have room for the massive expenditure that comes with a nuclear submarine (for example, single *Virginia-class* submarine costs 3.45 billion per boat²⁹) without massively disrupting the current

²⁶ Sam Bateman, “Perils of the Deep: The Dangers of Submarine Proliferation in the Seas of East Asia”, *Asian Security*, 7:1, (2011) 61-84, DOI: 10.1080/14799855.2011.548213

²⁷ Adam Lajeunesse & Timothy Choi, “Here there be dragons? Chinese submarine options in the Arctic”, *Journal of Strategic Studies* (2021), DOI: 10.1080/01402390.2021.194014

²⁸ Murray Brewster, “Britain offers Canadian military help to defend the Arctic”, *CBC News* (Sept 24th 2021), Britain offers Canadian military help to defend the Arctic | CBC News

²⁹ Congressional Research Service, “Navy Virginia (SSN-774) Class Attack Submarine Procurement: Background and Issues for Congress” (United States Government: Washington DC, 2022), 7

shipbuilding plan in SSE. In order to maximize the benefits of a conventional submarine, Canada must look to AIP as a key technology in the new class of submarines, to ensure that any new class can operate in the arctic.

17. While the RCN had no flexibility with numbers of submarines with the VCS procurement, the advantage of a new build is that the number of boats required for the CPSP is not fixed. Given the increased demand for submarines in the pacific and artic operating regions, as well as traditional sub operations in the Atlantic and training missions, a hull for hull replacement strategy will not be sufficient to meet strategic demands. As it is today, splitting 4 submarines across two coasts has resulted in an inability to meet the desired 2+1 steady state operational level for subs (with two boats in high-readiness and one “swing” boat in standard readiness) and given technical issues, 4 boats is not enough to ensure that even one is available at all times, with certain years such as 2019, there were no boats operationally available³⁰.

CONCLUSION

18. Submarines remain challenging to support and require a great deal of technical and operational expertise to operate, yet they provide a massive tactical and strategic advantage to any country that operates them. Canada can ill-afford to give up this edge in maritime operations as global competition heats up and our allies see a return to great power competition. It is a capability that the RCN can ill-afford to lose, and one that must be protected through an aggressive but carefully managed submarine procurement process – one that will allow a seamless transfer of knowledge from one class to the other and provide strategic overseas as well as in all three of Canada’s oceans.

³⁰ Murray Brewster, “Canada’s submarine fleet spent ‘zero days’ at sea last year: government documents”, *CBC News* (Feb 11th, 2020), <https://www.cbc.ca/news/politics/submarines-canada-fleet-repairs-canadian-navy-1.5458632>

RECOMMENDATION

Recommendation #1: The RCN pursues a lean project management office that runs in parallel with the CSC project rather than waiting until one starts to ramp down. As seen, the RCN cannot afford to wait any longer to move forward with a new submarine procurement and the submarine force must work with what we have, using industry support where applicable to make up for government personnel shortfalls.

Recommendation #2: The RCN should highly prioritize an overseas build rather than trying to bring that capacity in country. Canada has no technological or industrial base with any expertise in submarine construction and the attempt to do so will add billions of dollars and years to the project timeline.

Recommendation #3: The RCN should focus on six to eight AIP conventional boat platforms by proven submarine manufacturers. Given the proliferation of submarines and the increase importance placed on the Arctic by both Russian and China, 4 boats split between two coasts is not sufficient to meet Canada's strategic demand. Furthermore, safe operation in the Arctic will only be possible with a boat designed around an AIP plant with sufficient excess margins of safety to operate under ice. These should be the primary design goals of any selected new class.

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