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## Does the RCN need Submarines? A Surface Naval Warfare Officer's Wave-Top Perspective

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In July 2021 the Royal Canadian Navy (RCN) launched the long-anticipated process to replace its aging *Victoria*-class submarine fleet, standing up a team to define Canada's requirements and inform government decision making. A submarine replacement program will be a challenge, both politically and financially, as the expensive Canadian Surface Combatant program gears up and other shipbuilding efforts see significant cost inflation.<sup>1</sup> Indeed, the strategic and operational value of submarines has been a point of perpetual debate within government, the media, and even military circles.<sup>2</sup> Yet, even in the face of budgetary constraints and political opposition, the Navy is advancing the program, on the understanding that a submarine capability is essential to meeting Canada's needs. That assessment is certainly correct as the security and defence challenges that Canada will likely face in the 21<sup>st</sup> century will call for the strategic capabilities only offered by submarines. Speed is also of the essence. *Strong, Secure, Engaged* states that the *Victoria*-class will be kept operational "through the mid-2030s."<sup>3</sup> Building submarines takes years and the Canadian Armed Forces (CAF) must soon decide on a replacement to meet that 2035 timeline.<sup>4</sup> Meeting that challenge and hitting that 2035 deadline means long-term investments and a realistic but thoughtful approach to the selection of a future diesel-electric boat for the RCN. It also means experimenting with new technology that can augment crewed platforms and add a degree of flexibility in an increasingly uncertain and dangerous marine environment.

### A Strategic Capability

Submarines provide Canada with an important strategic capability, one baked into Canadian defence policy. Both the Government of Canada's defence policy, *Strong Secure Engaged*, and the RCN's *Leadmark 2050* make specific reference to the value of robust submarine capabilities. In the former, submarines are said to "play an important role in sovereignty operations and continental defence."<sup>5</sup> In the latter, submarines are described as representing "the RCN's ultimate warfighting capability."<sup>6</sup> Indeed, submarines bring a unique strategic capability, being able to control a battle space by virtue of their real or perceived presence alone, while deterring adversaries and altering opponents' decision making across an entire maritime theatre. In times of

conflict, submarines are the Navy's best anti-submarine warfare assets and the best platforms for operating in contested environments.<sup>7</sup> During peace, they offer ideal intelligence gathering systems, which can be used in either a constabulary or security role.

The need for this kind of versatile platform is based on Canada's interpretation of the future security environment, laid out in *Strong, Secure, Engaged*, which is anticipated to be "a more diffuse environment in which an increasing number of state and non-state actors exercise influence."<sup>8</sup> Within this setting, the defence element of the security spectrum has become even more pressing and the most relevant actors in the maritime security space are now, once again, the great powers. That is clearly the American interpretation, given the focus of the 2017 National Security Strategy, itself catalysed by recent Chinese and Russian military expansion and diplomatic posturing.<sup>9</sup>

From a Canadian perspective, Russia is the most threatening maritime threat. In recent years, Moscow has threatened its neighbours, expanded its naval activity, and presents an ever present threat to Ukraine and NATO's eastern front. Russia considers the Arctic a national security bastion and is increasingly active in the North Atlantic.<sup>10</sup> The second clear and emerging (and more novel) threat is China. China has built the world's largest navy with new power projection capabilities, which includes nuclear submarines and a "growing fleet of conventional and air independent propulsion-equipped diesel attack submarines [providing] additional potent capabilities."<sup>11</sup> China's "grey zone" coercive activities also highlights the utility of covert intelligence, surveillance and reconnaissance (ISR). Indeed, the growth of Anti-Access/Area-Denial (A2/AD) in China's near-abroad has shown how important stealth is, conferring as it does a significant advantage in developing an ISR picture.<sup>12</sup> At the same time as great power competition expands, non-state actors – acting either on their own accord or as proxy for great powers – could also exert localized influence in crucial locations. The expansion of law enforcement surveillance and enforcement, such as that undertaken in Operation *Caribbe* (a drug interdiction operation in the Caribbean) or *Artemis* (an anti-terrorism and weapons smuggling operation in the Middle East) – demonstrate the need for that. This is the geopolitical environment facing the RCN, and one which is likely to become even more dangerous in the years ahead.

### **Diesel Electric Attack Submarine (SSK): Capabilities in the 21<sup>st</sup> Century**

Canada's submarine fleet has always been made up of SSKs and this platform is likely in the future fleet as well. Diesel electric attack submarines provide non-nuclear navies the least expensive opportunity to generate significant, and often disproportionate, effects within the underwater maritime domain. These effects can be achieved alongside other surface assets, such as anti-submarine warfare (ASW) influence within a Task Group, or individually on a single task or operation. Underwriting these capacities is the stealth advantage. The submarine offers a covert means to achieve national operational and strategic goals in ways that air and surface assets cannot.<sup>13</sup> A single submarine, particularly an SSK, can be positioned at strategic points to exercise sea denial to an adversary, or support friendly sea control. As "grey zone" operations increase in the marine security environment, maritime insertion of Special Operations Forces (SOF) elements will become an increasingly useful tool in the national or allied strategic toolbox.<sup>14</sup>

Likewise, the ability to discretely and persistently conduct maritime ISR, including signals intelligence (SIGINT), is unique to the submarine. This is especially so in an environment

congested with air and surface A2/AD factors.<sup>15</sup> Improvements to submarine-launched weapons systems will permit surprise joint land attack options. While there are other capabilities an SSK bring to a middle power navy, these are key elements that advisers and decision makers should keep in mind when discussing middle power naval capabilities.

The future appears bright for the relevance of SSKs. They will retain these core capabilities and with improvements in stealth and under water endurance will remain “a key underwater sensor for the near to medium future.”<sup>16</sup> As pointed out by Abenheim and his coauthors, “[t]he ideal warship is the least expensive one that can carry out its strategic role while maintaining a degree of tactical independence in modest threat environments.”<sup>17</sup>

### International Benefits to Maintaining a Submarine Capability

One of the key benefits of possessing a submarine capability within the NATO and partner community is that of access. Being part of the “sub club” grants “decision-makers the access to information on allied submarine operations necessary to avoid mutual interference.”<sup>18</sup> Losing this critical intelligence link would jeopardize an important node by which the CAF shapes operations and provides military advice to the government.

By possessing an SSK capability, Canada is also in a unique position to reinforce its maritime defence partnership with its most important ally: the United States. Indeed, this defence relationship is essential. As Canada relies heavily on the international rules-based order, it finds its own maritime security underwritten by the US Navy, which Abenheim calls “the glue for this vast and unprecedented system of global maritime security.”<sup>19</sup> The US does not itself possess SSKs, but finds itself facing adversaries with growing fleets of them. In the past, the US has sought to leverage RCN skill and geographic proximity for its own training purposes and is likely to continue to do so in the future.<sup>20</sup> Canada should embrace opportunities to be that sparring partner given the benefits which Canada derives from the strength and capability of the US Navy.

Although submarines tend not to be viewed as platforms for defence diplomacy due to their inherently covert nature, being able to field an SSK abroad furthers the defence engagement goals laid out in Canada's defence policy. As a member of NATO, deploying SSKs to key regions abroad demonstrates an ability and willingness to contribute to the alliance's strategic goals, such as HMCS *Windsor*'s participation in Operation *Sea Guardian* in the Mediterranean.<sup>21</sup> In a separate theatre, HMCS *Chicoutimi* completed a lengthy deployment to the Asia Pacific region, demonstrating the reach the RCN is capable of projecting with its SSK force.<sup>22</sup> This also demonstrates to allies in the increasingly vital Indo-Asia Pacific region that Canada is poised to complement local allied SSK capabilities to ensure stability and a rules-based international order in the region.

### Operational Readiness Benefits to the CAF

Less widely discussed are the significant operational readiness benefits the CAF enjoys by having a submarine force. RCN and Royal Canadian Air Force (RCAF) assets are the prime beneficiaries of this symbiotic relationship. Surface ships' ASW teams have multiple underwater sensors to manage, both active and passive. Live training against a submarine yields results that

extant autonomous drones, such as the expendable mobile ASW training target (EMATT), cannot. RCAF assets, both maritime helicopter and long-range patrol aircraft, similarly benefit. The effect is enhanced when air and surface assets operate together, providing training within the command-and-control domain as well. At the same time, submariners hone their track, attack, and evasion skills against a variety of adaptive and reactive above water assets.<sup>23</sup> Somewhat less frequently, RCN submarines provide operational readiness opportunities to other domain operators such as the Canadian Army Patrol Pathfinders and Canadian SOF Command. The operational readiness value is truly pan-domain.

Regardless of the participants involved, CAF control of all these assets provides independence from allied availability and schedules, allowing service branches to directly control the level of training and target specific skill sets. Having such a robust domestic force generation ability cannot be overstated given the resurgence of Russia in the Atlantic, China's increasingly assertive posture in the Pacific, and Special Operations Force relevance in grey zone operations.

### **Evolving the RCNs Underwater Domain Capability**

Uncrewed underwater vehicles (UUV) represent an option to achieve similar effects to a crewed platform, though at much less cost and risk. These systems have matured quickly and some commentators have called for the UUV to take the place of conventional submarines. Others argue that technological advances will render the crewed submarine obsolete by negating its stealth advantage.<sup>24</sup> While these platforms offer real potential, the technology is still in nascent form and it will be years, if not decades, before its potential is realized. Crewed submarines, including SSKs, will remain the option of choice to achieve these strategic effects.

Despite the need to focus Canada's efforts on crewed platforms, a concerted effort must also be placed on developing UUVs as a force multiplier. UUVs represent an opportunity for the CAF to enhance its undersea presence by complementing, rather than replacing, the crewed submarine. As noted in *Forbes* magazine, UUVs “could complement manned warships in conducting tactical reconnaissance, mine countermeasures, anti-submarine warfare, strike missions and a variety of other critical activities.”<sup>25</sup> Other observers note UUVs could “extend sensor coverage and abilities, decoy, generate clutter to confuse adversaries, and push into the littorals on behalf of the expensive submarine.”<sup>26</sup> This sentiment is shared by the US Director of Unmanned Vessels who, in early 2020, laid out the USN's goal, which “isn't to replace manned warships but to augment them so that the fleet has more firepower, more awareness, and more flexibility to disrupt enemy war plans.”<sup>27</sup> However, she also notes that “none of the unmanned vessels currently under development is ready to join the fleet. A lot more research and prototyping lie ahead.”<sup>28</sup> Indeed, significant challenges exist in the areas of battery capacity, control algorithms, and communications with the “mothership.”

Despite this, Canada is making strides to incorporate UUVs into achieving maritime effects. Recently, Commander Mark O'Donohue outlined significant steps the RCN has made in initiating UUV projects within Force Development and specific projects in the seafloor mapping domain.<sup>29</sup> In November 2020, Canada joined the NATO Maritime Unmanned Systems Initiative, which promotes collaboration on “operational experimentations, exchanges with the private sector on innovation and initial efforts to develop specific capabilities.”<sup>30</sup> Canada should continue

seeking similar opportunities to work with defence partners to smartly invest in a technology area that will inevitably impact the conduct of undersea military operations.

### Other Middle Power Approaches to Submarines

There is value in considering how other middle power navies, which share similar geopolitical outlooks and challenges, are approaching the role of submarines within the context of great power competition and the evolving maritime security environment. A brief examination of Norway, Spain, Australia, and Denmark provides context in framing how Canada should value an SSK capability.

Norway, a NATO member, possesses a coastline that borders a strategic route for Russian naval access to the Atlantic Ocean. Indeed, Russia is highlighted as a strategic threat in the latest Norwegian defence policy.<sup>31</sup> The 2014 Russian incursion into Norwegian territorial waters is a reminder that this threat is not simply theoretical.<sup>32</sup> At present, Norway intends to keep their six *Ula*-class SSK submarines in service until they can be replaced by four German-designed 1800-ton Type 212 SSKs, which feature air-independent propulsion (AIP).<sup>33</sup>

Spain, another NATO member, remains committed to an SSK fleet. At present, it possesses two *Galerna*-class SSKs, having retired two already. These are due to be replaced by four *Isaac Peral* (S-80) class SSKs through 2024, which also feature AIP. At 3,400 tons, these boats are notably larger than the Type 212s and are designed for long range oceanic missions.<sup>34</sup> Such is the potential of this platform that it has drawn the attention of India.<sup>35</sup> The production delays experienced by Spain pursuing a domestic build policy are worthy to note should Canada consider a similar plan.<sup>36</sup>

Australia, a close US and Canadian security partner, shares maritime defence concerns similar to Canada, with the exception of their relationship with China. That country possesses a vast coastline, much of it remote from population centers, while Australia also has an economy facing similar fiscal constraints amid an ambitious military recapitalization plan.<sup>37</sup> Keeping their six *Collins*-class SSK submarines active has remained a priority for the Australian military, which has gone so far as to attract RCN officers to mitigate crewing shortfalls.<sup>38</sup> Before the fundamental shift in its shipbuilding plan – ushered in by the AUKUS agreement and the decision to procure nuclear attack submarines – Australia had intended to purchase twelve French designed *Barracuda*-class SSKs to double extant capacity. That this plan failed in the face of cost increases and changing strategic considerations, shows some of the pitfalls that Canada will have to navigate. This is particularly the case given the size of submarine that the Australians had intended to purchase. Nearly 4,000 tons and capable of long ocean deployments, the French SSKs are larger and more capable than many boats procured for coastal defence by Canada's European allies. Like the Australians, Canada will need larger platforms to move its littorals.<sup>39</sup>

NATO member Denmark is also included in this review because its divestment of submarine capability in 2004 helps shape a holistic international view. After the Cold War, Denmark assessed a reduction in submarine activity in its near-abroad justified divestment of its SSK submarines.<sup>40</sup> However a resurgent Russia has now become a national security priority.<sup>41</sup> In a clear shift to an ASW footing, Denmark has updated and reclassified “its *Absalon*-class ships from command and support vessels to the Anti-Submarine Warfare (ASW) role, a move that is a clear reflection of the changing priorities of many NATO navies.”<sup>42</sup> However, Denmark finds itself

beholden to international partners for maintaining ASW proficiency, and the capability “deficit negatively affects Denmark’s ability to enforce the sovereignty of its territorial waters and its ability to support NATO in ASW operations.”<sup>43</sup> Clearly, the decision to divest has had serious repercussions for Denmark.

## Conclusion

The debate about whether Canada should maintain a submarine capability seems as rote as tax season. It is indeed a significant expense to maintain, but the level of maritime effect that a submarine can bring to bear more than justifies the cost for a middle power navy such as the RCN. Largely out of sight and out of mind when operating effectively, it is easy to forget the ways in which a submarine capability enables the RCN to project military power on behalf of Canada. The platform’s core tasks: sea denial, sea control, special operations, and ISR (including SIGINT) are vital and cannot be allowed to disappear.

Beyond those effects normally associated with the application of maritime power, allied SSK users reap additional benefits by maintaining a credible submarine force. Access to water space management intelligence and mutual training opportunities provide significant information and reinforce defence relationships. Domestic control of submarine training opportunities grants independence to the CAF pan-domain in achieving readiness goals. These additional benefits rarely receive attention, but they are significant and not easily available by other means.

The future of Canada’s submarine capability could be positive, if given sufficient long-term investment. Noting that the CAF is fiscally constrained and suffers from a dearth of human resources, Canada must be realistic but thoughtful in selection of submarine fleet size and capabilities. Comparable navies are investing in modern SSK designs, including emergent AIP options, normally between four and twelve hulls. In contrast, those that divested SSKs are increasingly challenged in the evolving and increasingly challenging maritime security environment. Canada must sustain this capability, while also investing in complementary technologies that can augment the traditional capabilities of crewed platforms. Crewed submarines, augmented by UUVs, represent a potent combination for long-term strategic RCN undersea awareness and control and the time to invest is now.

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## Notes

- <sup>1</sup> For instance: the Canadian Coast Guard Science Vessels, Icebreakers, and the CSC
- <sup>2</sup> For a summary of some of these arguments see: Michael Byers, “Does Canada need Submarines,” *Canadian Naval Review* 14:3 (Summer, 2014).
- <sup>3</sup> Department of National Defence, “Victoria-class Modernization (VCM),” <http://dgpapp.forces.gc.ca/en/defence-capabilities-blueprint/project-details.asp?id=943>.
- <sup>4</sup> Jeffrey F. Collins, “Towards a Renewed Canadian Submarine Capability,” *Niobe Papers* 4 (2019), 9.
- <sup>5</sup> Department of National Defence, *Strong Secure Engaged: Canada’s Defence Policy* (Ottawa: Minister of National Defence, 2017), 65.
- <sup>6</sup> Department of National Defence, *Canada in a New Maritime World: Leadmark 2050* (Ottawa: Commander, Royal Canadian Navy, 2016), 39.
- <sup>7</sup> Naval Association of Canada, “Canada’s Submarine Assets,” NAC Briefing Note.
- <sup>8</sup> Department of National Defence, *Strong Secure Engaged*, 50.
- <sup>9</sup> United States, White House, “National Security Strategy of the United States of America” (December 2017).
- <sup>10</sup> Rebecca Pincus, “Three-Way Power Dynamics in the Arctic,” *Strategic Studies Quarterly* 14:1 (Spring 2020).
- <sup>11</sup> D. Abenheim et al., “American Sea Power in the Contemporary Security Environment,” *Comparative Strategy* 37:5 (2018).
- <sup>12</sup> *Ibid.*
- <sup>13</sup> Geoffrey Till, *Seapower: A Guide for the Twenty-First Century* (New York: Routledge, 2018), 158.
- <sup>14</sup> *Ibid.*
- <sup>15</sup> Jeffrey F. Collins, “Towards a Renewed Canadian Submarine Capability,” *Niobe Papers* 4 (2019), 4.
- <sup>16</sup> Till, 162.
- <sup>17</sup> Abenheim et al.
- <sup>18</sup> Collins, 4.
- <sup>19</sup> Abenheim et al.
- <sup>20</sup> Collins, 4.
- <sup>21</sup> “Canadian Submarine HMCS Windsor Returns from Mediterranean Deployment” *Naval Today* (June 21, 2018).
- <sup>22</sup> CBC, “Sub culture: Aboard a Canadian Submarine Prowling the Pacific” (February 6, 2018).
- <sup>23</sup> To fully realize the benefits of these valuable interactions, ASW exercise planners are recommended to implement formalized, yet simple, after-action feedback mechanisms. Operations teams should generate detailed post-exercise messages to be shared among all participants, containing timestamps of assessments and/or actions taken, to aid evaluation of ASW effectiveness.
- <sup>24</sup> Andrew Davis, “The Strategic Role of Submarines in the 21st Century,” *Real Clear Defense* (October 26, 2017).
- <sup>25</sup> Loren Thompson, “Biden Defense Team Inherits Navy Robotic Warship Research Aimed At Deterring And Defeating China,” *Forbes* (December 23, 2020).
- <sup>26</sup> Davis.
- <sup>27</sup> Loren Thompson, “U.S. Navy Mounts Campaign to Convince Congress That Unmanned Vessels Are Critical To Winning Future Wars,” *Forbes* (August 17, 2020).
- <sup>28</sup> Loren Thompson, “Biden Defense Team.”
- <sup>29</sup> Mark O’Donohue, “Autonomous Underwater Vehicles: Future Capability for the RCN,” *Niobe Papers* 11 (March 2020).
- <sup>30</sup> NATO, “Two Allies and one partner join the Maritime Unmanned Systems (MUS) Initiative” (November 20, 2020)
- <sup>31</sup> Norwegian Ministry of Defence, *The Defence of Norway: Capability and Readiness* (Oslo: Ministry of Defence, 2020), 8.
- <sup>32</sup> Nina Græger, “Illiberalism, Geopolitics, and Middle Power Security: Lessons from the Norwegian Case,” *International Journal* 74:1 (2019).
- <sup>33</sup> “Norway Starts Formal Negotiations with Thyssenkrupp Marine Systems for New Submarines,” *Defpost* (undated).
- <sup>34</sup> “Navantia: Development of S-80 Submarine’s AIP System Completed,” *Naval News* (March 9, 2020).

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<sup>35</sup> “Navantia S-80 Plus Submarine one of the Candidates for the Indian MoD P75I Program,” *Navy Recognition* (November 9, 2020).

<sup>36</sup> Naval News, “Navantia: Development of S-80 . . .”

<sup>37</sup> Hamish McDonald, “Australian Naval Program Sums up Dilemmas for 'Middle Power' Nations” *NikkeiAsia* (June 2, 2017).

<sup>38</sup> Amanda Connolly, “Canadian Submariners Leaving Fleet for Down Under,” *iPolitics* (August 7, 2017).

<sup>39</sup> Norm Jolin, “A Canadian Patrol Submarine: What are the Options,” Naval Association of Canada (October 2021).

<sup>40</sup> Johannes F. Sender and Edward R. Lucas, “Danish-German Submarine Cooperation: Opportunities and Challenges” (Briefing Paper, Royal Danish Defence College, 2017), 7.

<sup>41</sup> Ministry of Foreign Affairs of Denmark, “New Danish Foreign and Security Policy Strategy” (2018).

<sup>42</sup> Systematic, “Changing Tack: the Danish Navy’s Return to High-End Warfighting Presents an Opportunity to Benefit from Advanced C2” (October 30, 2020).

<sup>43</sup> Sender and Lucas, 11.