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## LETHAL AND DEADLY: SUBMARINE REQUIREMENTS AND THE ROYAL CANADIAN NAVY

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# LETHAL AND SILENT: SUBMARINE REQUIREMENTS AND THE ROYAL CANADIAN NAVY

## AIM

1. “Canada requires a Navy that is organized and sized to project power responsively and effectively far from Canada’s shore” and to do so Canada must have submarines<sup>1</sup>. The aim of this paper is to add a contemporary perspective to the ongoing professional and academic discussion on the importance submarines within the Royal Canadian Navy (RCN). This paper will discuss the roles which submarines can be employed in and the capabilities that submarines bring to the RCN as it seeks to protect Canada at home and abroad, prevent conflict throughout the world, and being employed in key roles as Canada seeks to ensure a peaceful global order.<sup>2</sup>

## INTRODUCTION

2. *Strong, Secure, Engaged* articulates a defence policy vision that sees the Canadian Armed Forces (CAF) ensuring Canada’s sovereignty goes unchallenged and that Canada remains “...well-defended”, that the continent of North-America is secure, and that the “Canadian Armed Forces do(es) its part in Canada’s contributions to a more stable, peaceful world, including through peace support operations and peacekeeping.”<sup>3</sup> Simply put, “Strong at home, secure in North America, and engaged in the world.”<sup>4</sup> This defense vision is translated into core missions which the CAF must be prepared to accomplish or are already accomplishing; the relevant missions in which submarines play a role in are: “Detect, deter and defend against threats to or attacks on Canada; Detect, deter and defend against threats to or attacks on North America in partnership with the United States, including through NORAD; and lead and/or contribute forces to NATO and coalition efforts to deter and defeat adversaries, including terrorists, to support global stability.”<sup>5</sup>

3. Within that framework, the RCN, will provide maritime forces that must be able to meet adversaries, operate in “...the wide spectrum of maritime situations”...and must be prepared to be an instrument used by Canada as it demonstrates its “...national power on the international stage”.<sup>6</sup> As the element charged with the responsibility of conducting operations and achieving specific results within the sea-domain, this work argues that the RCN must retain submarines in order to provide the CAF and the Government of Canada (GoC) with a lethal and stealthy deterrent within Canadian waters and abroad, a key component in anti-submarine and naval warfare, a key element of the maritime intelligence, surveillance, and reconnaissance (ISR) network, and an enabler for the future technological trends of unmanned undersea vehicles (UUV), remotely operated vehicles (ROV), and unmanned air vehicles (UAV). These arguments will be supported by CAF, RCN, GoC doctrine and policies, peer-reviewed journal articles,

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<sup>1</sup> Department of National Defence. “Strong, Secure, and Engaged: Canada’s Defence Policy.” (Public Works Canada, April, 2017), 39.

<sup>2</sup> *Ibid*, iv.

<sup>3</sup> *Ibid*, 14

<sup>4</sup> *Ibid*, 14.

<sup>5</sup> *Ibid*, 17.

<sup>6</sup> *Ibid*, 34.

media articles, and in some instances, the doctrine and policies of allied governments and their respective naval armed forces.

## DISCUSSION

### Submarines as a deterrent.

4. *Strong, Secure, Engaged* describes deterrence in two complementary aspects, within its pages. Firstly, "...deterrence is about discouraging a potential adversary from doing something harmful before they do it" and the GoC's ability to "deter" is directly proportional to the strength of the CAF and its ability to conduct operations effectively.<sup>7</sup> Secondly, "...accompanied with dialogue...", deterrence will "...help prevent conflict."<sup>8</sup> From a RCN perspective, it contributes in the creation or amplification of deterrence, by ensuring that the CAF have and are prepared to deploy ships, fleets, submarines, and taking part in naval task groups so as to "...create[s] a strong signal of Canada's interest."<sup>9</sup>

5. The RCN itself has identified the importance of having a sub-surface fleet. The RCN clearly articulates that submarines are the "...ultimate warfighting capability, a platform through which Canada can control a substantial ocean space or deny it to others".<sup>10</sup> While, the tactical capabilities will be discussed in paragraphs 9 through 12 of this paper, the argument here lies in that it is the knowledge of the threat towards other navies and sea-going vessels due to its lethality and the submarine's ability to patrol anywhere, in such a covert fashion that supports the deterrence aspect of submarine employment.<sup>11</sup>

6. Supporting this argument is the contemporary procurement and use of submarines in nations in Southeast Asia who cannot sustain large conventional fleets in order to ensure sovereignty of their own waters.<sup>12</sup> Small nations can increase their ability to deter by being assessed by adversaries as capable operators of submarines.<sup>13</sup> This is not to say that those submarines will be required to engage and destroy adversaries forces, but by conducting national joint exercises, participating in multi-national manoeuvres, overtly training new crews, and simply taking the vessel out to sea in a televised or media covered event will increase deterrence.<sup>14</sup> However, the inverse is also true, if submarines are left at their mooring and training stops on that capability, deterrence levels will drop.<sup>15</sup>

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<sup>7</sup> Department of National Defence. "Strong, Secure, and Engaged: Canada's Defence Policy." (Public Works Canada, April, 2017), 60.

<sup>8</sup> *Ibid*, 50.

<sup>9</sup> Department of National Defence. "Leadmark 2050: Canada in a New Maritime World." (Ottawa: National Defence, 2017), 23.

<sup>10</sup> *Ibid*, 39.

<sup>11</sup> *Ibid*, 39.

<sup>12</sup> Andersson, Jan Joel. "Submarine Capabilities and Conventional Deterrence in Southeast Asia" *Contemporary Security Policy* (Routledge: 2015), 473-474.

<sup>13</sup> *Ibid*, 475.

<sup>14</sup> *Ibid*, 475.

<sup>15</sup> *Ibid*, 475.

7. Furthermore, the Royal Australian Navy, one of Canada's historic allies, envision submarines as key enablers in a "...future Australian Defence Force (ADF) optimized to deter and defeat attacks."<sup>16</sup> The RAN has recently faced challenges within the submarine service and Australian leaders look to fix retention and recruiting issues as well as increasing both the number of submarines within the Australian arsenal, and the technological level of those to precured.<sup>17</sup> Again, from an Australian perspective "[f]or submarine deterrence to work effectively, potential adversaries must have a real sense that having to deal with them will require a disproportionate attacking force."<sup>18</sup> However, and like mentioned above, the Australian perspective also includes that for deterrence to work, submarines belonging to a nation must be crewed by trained personnel, must be operated consistently on exercises at home and abroad, and most importantly must be contemporary and be in sufficient amount to meet a nation's requirements.<sup>19</sup>

8. Canada and CAF require sufficient contemporary submarines that will ensure that adversaries are not prepared to conduct operations that include, but not limited to, breaching Canadian waters, engaging Canadian or allied naval forces, or participating in actions which are in conflict with Canadian international interests.

#### **Submarines in anti-submarine warfare (ASW) and conventional naval warfare.**

9. The importance anti-submarine warfare was brought to the forefront of military thinking during World War II (WWII), where German submarines attacked strategic lines of supply with great success. A key characteristic of WWII submarine operations was the technological battle between submarine warfare operators and anti-submarine warfare operators, this "hider-finder" competition led to a cycle of moves and countermoves; as ASW forces developed new ways to detect submarines, submarines attempted to counter by employing new methods to evade detection."<sup>20</sup>

10. Throughout the decades since WWII this competitive cycle has continued between nations, but is best exemplified by the United States and the Soviet Union during the Cold War.<sup>21</sup> It is during this time that five important technological advances would shape ASW: 1. The implementation of the detailed approach in silencing United States Navy's nuclear submarine fleet and the establishment of a network of sensors in key areas surround the Soviet Union and the United States – Sound Surveillance System (SOSUS), 2. Soviet Union nuclear submarines developed technology to run more silently, 3. The advent of air-independent propulsion (AIP) which enable diesel powered submarines to run more silently and remained submersed for longer

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<sup>16</sup> McCaffrie, Jack and Chris Rahman. "Australia's 2009 Defense White Paper: A Maritime Focus for Uncertain Times." *Naval War College Review* 63, no. 1 (Winter, 2010), 63.

<sup>17</sup> *Ibid*, 64-65

<sup>18</sup> Rex, Patrick. "Roles and Requirements for Australia's Future Submarines." *Asia-Pacific Defence Reporter* (2002) 37, no. 3 (2011), 24.

<sup>19</sup> *Ibid*, 24.

<sup>20</sup> Clark, Bryan. "The Emerging Era in Undersea Warfare." *Center for Strategic and Budgetary Assessments* (January 22, 2015), 2 – 3.

<sup>21</sup> *Ibid* 2 - 6

periods, 4. The arming of submarines (both nuclear and diesel propelled) with “... supersonic anti-ship cruise missiles (ASCM) able to defeat many common shipboard air defense systems,” 5. Repeated improvements in acoustics and their application in locating submarines.<sup>22</sup>

11. While subsequent paragraphs will discuss future trends that will be enabled by submarines, it is the tactical capabilities that submarines, and their partnered systems bring to the RCN that is straightforward. Submarines fill an extremely important part of ASW, anti-access and area denial (A2/AD), and anti-surface warfare. The RCN must continue to deploy submarines within and external to its Canadian fleets or multinational task groups due to their inherent capabilities of “... unrivalled stealth, persistence and lethality...” in key tasks that enable the application of sea power: strategic nuclear deterrence, interdiction of enemy maritime forces, sealift and commercial shipping, blockade operations, containment by distraction, area sea control operations (previously mentioned), establishment and maintenance of exclusion zones, advance sea control operations, and layered defence (close and distant screening).<sup>23</sup>

12. Having been deployed on operations submarines become spectres whose effects on the enemy cannot be underestimated, to counter submarines an enemy make use of numerous amount of resources in order to ensure that they have freedom of movement; resources that could be utilized elsewhere.<sup>24</sup> These challenges in anti-submarine warfare and conventional naval warfare will continue to be important and submarines will be required in these operational and tactical roles.

### **Submarines within the maritime ISR network.**

13. Having discussed the capabilities that submarines play in anti-submarine and sub-surface warfare, it is not difficult to template those capabilities and leverage them with the purpose of collecting information to be processed into intelligence, in conducting both covert and overt surveillance, and being an important instrument in which to conduct reconnaissance.<sup>25</sup> In fact, submarines will prove to be crucial, especially smaller diesel powered submarines, very much like Canada’s *Victoria*-class submarines, which are able to manoeuvre more in the littorals and in proximity to shores and can be used to “...insert, support, and extract special forces in a highly covert manner.”<sup>26</sup>

14. Coupled with sensors, C4SIR packages, and the ability for future amelioration within platforms, submarines provide the RCN an extremely flexible and versatile instrument that will

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<sup>22</sup> Clark, Bryan. "The Emerging Era in Undersea Warfare." *Center for Strategic and Budgetary Assessments* (January 22, 2015), 5 – 9.

<sup>23</sup> Canadian Forces College. *MCP I, Naval Doctrine Manual*. (Toronto: Canadian Forces College, 2006), C-5/12 to C-11/12

<sup>24</sup> Cocking, Janis, Chirs Davis, and Christopher Norwood. *Australia’s requirement for submarines*. Department of Defence: Science and Technology. 2016), 3.

<sup>25</sup> Department of National Defence. “Leadmark 2050: Canada in a New Maritime World.” (Ottawa: National Defence, 2017),, 39

<sup>26</sup>*Ibid*, 39-40

be required to enable or conduct the following sea power tasks from a surveillance perspective: defended lanes, layered defense, combat operations against the land (to include all amphibious operations, sea-manoeuvre operations, etc.), naval control of shipping, distant and close escort, anti-piracy operations, and peace support operations.<sup>27</sup>

15. Furthermore, submarines can be tasked in mapping the physical environment; the ocean floor topography, deep currents, temperatures, etc.<sup>28</sup> Utilizing the military maxim of time spent on reconnaissance is seldom wasted, developing charts and detailed maps of ocean floors will define domestically, key areas of observation and vital areas for navigation within Canada's water.<sup>29</sup> This includes the Arctic Ocean.<sup>30</sup> Additionally, developing key navigational tools, covertly, in potential areas of competition will help increase situation awareness in deployed fleets or task groups operating in unknown or less travelled waters.

16. Finally, from a coalition and joint perspective, submarines will fill the role as an ISR platform collecting data, which in turn will provide credibility to the Joint Intelligence, Surveillance, and Reconnaissance (JISR) framework that will enable Canada to be a contributing member of the "Five-Eyes" network and North Atlantic Treaty Organization (NATO).<sup>31</sup>

**Submarines, unmanned undersea vehicles (UUV), remotely operated vehicles (ROV), and unmanned air vehicles (UAV).**

17. Forecasting the future is always difficult and focusing too quickly and too readily on one specific trend may lead to a waste in resources and the development of projects that do not yield effects required by a navy. However, envisioning a role that Canadian submarines could be employed within a fleet comprising UUVs, ROV, and UAVs, is a realistic endeavor. This is due to allied nations and potential adversaries continued research and development in UUV, ROV, and UAV field.<sup>32</sup>

18. It is not unlikely that current and future submarines will be fitted with ports and riggings in which to transport and then command and control UUV and ROV as they conduct extremely high risk operations.<sup>33</sup> In a more kinetic environment, Common Very Lightweight Torpedoes (CVLWT) whose ranges are limited, could be transported by larger UUVs towards an adversaries ships and coupled with torpedoes being launched by conventional submarine (diesel or nuclear) would ensure a layered fire plan and greatly add to the fog of war.<sup>34</sup>

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<sup>27</sup> Canadian Forces College. *MCP 1, Naval Doctrine Manual*. (Toronto: Canadian Forces College, 2006) C-5/12 to C-11/12

<sup>28</sup> Andersson, Jan Joel. "Submarine Capabilities and Conventional Deterrence in Southeast Asia" *Contemporary Security Policy* (Routledge: 2015), 490

<sup>29</sup> Department of National Defence. "Strong, Secure, and Engaged: Canada's Defence Policy." (Public Works Canada, April, 2017), 34-35

<sup>30</sup> *Ibid*, 64.

<sup>31</sup> *Ibid*, 64.

<sup>32</sup> Clark, Bryan. "The Emerging Era in Undersea Warfare." *Center for Strategic and Budgetary Assessments* (January 22, 2015), 7-12.

<sup>33</sup> *Ibid*, 19.

<sup>34</sup> *Ibid*, 13.



19. Finally, it is very much within the realm of reality to see UAVs launched from submaes and with the use of "...ongoing miniaturization in electro-optical, infrared, and radar sensors....conduct surveillance or electronic warfare missions, providing targeting information directly via line-of-sight to a submarine...".<sup>35</sup>

## CONCLUSION

20. By utilizing doctrine, academic papers, polices, both Canadian and allied, this work has argued that the Royal Canadian Navy must retained the capabilities that submarines bring to naval warfare. Specifically, submarines provide the CAF and the Government of Canada with a lethal and stealthy deterrent within Canadian waters and abroad, a key component in anti-submarine and naval warfare, a key element of the maritime intelligence, surveillance, and reconnaissance network, and an enabler with future trends of unmanned undersea vehicles, remotely operated vehicles, and unmanned air vehicles. Armed with this instrument of war, the RCN will be able to meet it mission of protecting Canada, securing North America, and defending Canadian interests internationally well into the future.

## RECOMMENDATION

21. This document recommends four courses of action which will add to research, stimulate the consolidation of lessons learned and their application, and reinvigorate discussion and debate in the requirements for submarines into the future.

22. *Liaison Team to the Royal Australian Navy.* Search out and establish a liaison team(s) with key personnel at the strategic, operational, and tactical level as the RAN continue to address the requirements of their sub-surface fleet. Matters of discussion should include the differences in governmental procurement of naval vessel and infrastructure, submarine life management, employment of submarines, resource management, and crew recruitment and training in order to provide persistent submarine capabilities for the RAN.

23. *Exchange officers and crews to "Five-Eyes" community and integration of those personnel into submarine crews for short and long duration.* Short durations being defined a major exercises (e.g. RIMPAC) and a long duration defined as being part of boats crew throughout the full extent of a pre-deployment and deployment cycle. With information gathered, an after-action review model, with appropriate security classification, would be developed in order to consolidate, assess, and prioritize key lessons gathered as well as capabilities that would require further investigation through official channels.

24. *Leveraging the Mobilizing Insights in Defence and Security program (MINDS).* With the use of the MINDS program academia and subject matter experts can enable the development of estimate of needs and roles which submarines will play in the UUV, ROV, and UAV trend. Six

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<sup>35</sup> Clark, Bryan. "The Emerging Era in Undersea Warfare." *Center for Strategic and Budgetary Assessments* (January 22, 2015), 13.

initial questions should be posed by the CAF and the RCN: Which future trends will become operational soonest? Who are the subject matters experts within Canada? What realistic effects will be achieved? Where should Canada focus its research and investigation in these future trends? Which domestic and international corporations or business are at the forefront of this research and how can the GoC, CAF, RCN enable them? How could these future trends be leveraged by other agencies and government departments?

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