



ARE SUBMARINES REQUIRED TO MEET CANADA'S UNDERSEA WARFARE NEEDS?

By Michael W. Jones, Jim Hughes, John Holmander, and Andrew Miller

As the Canadian Patrol Submarine Project considers the undersea warfare capabilities that Canada needs in the future, it is likely considering whether those capabilities require a submarine – could these capabilities be achieved in some other manner, either based on current or future technologies? This paper, the third in a series (see *6 Questions to Consider When Planning for Canada's Next Submarine*, March 2022, and *Canada's Undersea Warfare Capabilities and the Victoria-Class Replacement*, April 2022), provides a perspective on the importance of replacing submarines with submarines.

Alternatives to a robust replacement of the *Victoria* class (blue-water, any-temperature submarine with under-ice capability)

A full-capability *Victoria*-class replacement would be able to operate in any ocean or sea (blue-water), any temperature, and under-ice. Potential alternatives to a full-capability replacement of the *Victoria* class run the gamut from a network of underwater sensors to blue-water, cold-temperature, under-ice submarines. A representative – but not exhaustive – list could be:

- Canadian underwater sensors that are fixed in place to detect surface and undersea vessels
- Submarines operated by Canada's allies (e.g., U.K., U.S.), which may provide many of Canada's required capabilities but may not always be available when Canada requires support
- Canadian surface ships and aircraft that can detect, monitor, and, as appropriate, deter maritime activity
- Canadian autonomous undersea vessels that can detect and monitor maritime activity and, over time, could expand capabilities to include deterrence
- Canadian coastal submarines (cold temperature) that can provide for continental defense but are not able to travel large distances and possibly cannot go under ice
- Canadian blue-water, cold temperature submarines that have long ranges but are unable to operate under ice or in warm waters
- Canadian blue-water, cold temperature, under-ice submarines that have long ranges and can operate under ice, but not in warm waters

Each potential alternative has its own implication for which of Canada's possibly needed undersea warfare capabilities can be met.

Canada's possible needs for undersea warfare capabilities

The best solution to replace the *Victoria* class is grounded in the undersea warfare capabilities that Canada needs. An earlier brief (*Canada's Undersea Warfare Capabilities and the Victoria-Class Replacement*, April 2022) suggested that Canada may possibly have an enduring need to:

- Deny access to adversary vessels (anti-access / area denial (A2/AD))
- Operate covertly in contested environments (domestic, international, or foreign waters)
- Insert special operations units
- Perform anti-submarine warfare (ASW) missions
- Gather intelligence
- Provide ASW training to other vessels (Canadian and allied)
- Exercise sovereign control over all of Canada's territorial waters - including those under ice

A blue-water, any-temperature, under-ice submarine could provide all these capabilities; potential alternatives should be assessed against which of these capabilities they can - and cannot - provide.

Potential alternatives to a Canadian Blue-water, any-temperature, under-ice submarine could create capability gaps that Canada might find unacceptable

To understand the potential attractiveness of alternatives to a blue-water, under-ice submarine, we assessed the extent to which each could possibly provide the capabilities that Canada might need (Figure 1). Each alternative has potential capability gaps that Canada might find unacceptable, to the extent that they compromise Canada's strategic national security objectives, and there does not appear to be a low-cost combination of alternatives that avoids capability gaps. Additionally, the alternative with the fewest gaps - submarines operated by Canada's allies - is subject to the operational needs of its own navies and thus may not always be available to meet Canada's needs.

DEGREE OF FIT:

- Equivalent to or better than a Canadian-operated, blue-water, any-temp, under-ice submarine
- Some gaps compared with a Canadian-operated, blue-water, any-temp, under-ice submarine
- Many gaps compared with a Canadian-operated, blue-water, any-temp, under-ice submarine
- Not able to provide this capability

Capability	Canadian underwater sensors	Allied submarines (when available)	Canadian surface ships and aircraft	Canadian autonomous undersea vessels	Canadian coastal submarines (cold-temp)	Canadian blue-water, cold-temp submarines	Canadian blue-water, cold-temp, under-ice submarines	Full capability (blue-water, any-temp, under-ice) Canadian submarines
A2/AD	Many gaps	Equivalent	Some gaps	Some gaps	Some gaps	Some gaps	Some gaps	Full capability
Covert operations in contested areas	Not able	Equivalent	Not able	Some gaps	Some gaps	Some gaps	Some gaps	Full capability
Insert special operations units	Not able	Equivalent	Equivalent	Some gaps	Some gaps	Some gaps	Some gaps	Full capability
ASW missions	Some gaps	Equivalent	Some gaps	Many gaps	Many gaps	Some gaps	Some gaps	Full capability
Gather intelligence	Many gaps	Equivalent	Some gaps	Many gaps	Many gaps	Some gaps	Some gaps	Full capability
ASW training support / targets	Not able	Equivalent	Many gaps	Some gaps	Equivalent	Equivalent	Equivalent	Full capability
Sovereign control of Canada's territorial waters (no ice)	Not able	Not able	Equivalent	Equivalent	Some gaps	Equivalent	Equivalent	Full capability
Sovereign control of Canada's under-ice territorial waters	Not able	Not able	Not able	Equivalent	Many gaps	Many gaps	Equivalent	Full capability

Figure 1. Potential fit of alternatives to a Canadian-operated, blue-water, under-ice submarine with capabilities that Canada might need.

Undersea warfare capabilities are not the only consideration – but they should be considered first

In developing initial requirements, Canada may wish to consider elements that are beyond undersea warfare capabilities – such as affordability, expected useful life, and maintenance requirements. These are all important factors to consider in selecting a platform, which can involve trading-off capability, cost, and schedule considerations, among others. Starting that trade-off process by considering undersea warfare capabilities – the capabilities that Canada is trying to maintain as the *Victoria* class retires – could help keep the decision grounded in which capabilities Canada would like to maintain, and which capabilities it is comfortable relinquishing.

Conclusion

Blue-water, any-temperature, under-ice submarines deliver a set of capabilities that cannot be easily and reliably matched by alternatives, or even combinations of alternatives. As policymakers consider how to best replace the *Victoria* class, staying grounded in the capabilities that Canada requires – and how potential alternatives might meet those capabilities – could help ensure Canada's investment meets the test of time, especially in the face of the budgetary, schedule, or geopolitical pressures that will manifest throughout the acquisition process.

Photo credit: The Canadian Press

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About the Authors



Mr. Jones is the Managing Director of MW JONES & COMPANY. He has over 24 years of consulting experience specializing in strategy, growth initiatives and business transformation. He has worked with global Aerospace and Defense companies, as well as U.S. and international governments, to improve performance for air, sea, and space-based systems. Mr. Jones designs and leads multi-year projects for cost repositioning, market growth and post-merger integration strategies. As a leading expert in cost repositioning and value migration strategies, Mr. Jones works with CEOs and executive teams faced with volume disruptions or competitive pricing. Mr. Jones created the highly recognized “Design for Affordability” framework to dramatically improve affordability and bound total ownership costs for highly engineered products.



Mr. Holmander is an Industry Advisor for MW JONES & COMPANY, bringing over 40 years of experience in ship construction. John was previously Vice President of Operations at Electric Boat, responsible for Groton operations, nuclear and sub-base operations, test, ship’s management, facilities, and Quonset Point. Prior to Operations, John was the VIRGINIA-class Program Manager from November 2005 – May 2012, during which he led the successful Design-for-Affordability cost reduction program to drive down construction costs of Block III submarines, which resulted in increasing the VCS build rate to two boats per year. During his tenure as VIRGINIA-class Program Manager, John was responsible for the design and unique construction process involving teamed production between two major shipyards – Huntington Ingalls Industries Newport News Shipbuilding and General Dynamics Electric Boat.



Mr. Hughes is an Industry Advisor for MW JONES & COMPANY and the retired vice president of Submarines and Fleet Support at Newport News Shipbuilding, a division of Huntington Ingalls Industries in Newport News, VA. In that position, Hughes was responsible for all aspects of the Virginia-class submarine construction program, Columbia Class support program, as well as submarine and surface ship fleet maintenance in Newport News and world-wide.

Prior to his last position, Hughes served as vice president for In-Service Aircraft Carriers and was responsible for planning and executing aircraft carrier refueling and overhaul programs at Newport News as well as carrier fleet support work around the globe. He began his career at Newport News Shipbuilding as a Combat Systems engineer in Aircraft Carrier and Nuclear Cruiser Engineering.



Mr. Miller is a Senior Associate at MW JONES & COMPANY. He has over 15 years of experience in aerospace and defense, including over 5 years as a management consultant. His project experiences span many industries, with a focus on highly engineered products in space, defense, and industrials. He started McKinsey & Company's Capture Excellence service line and has supported leading aerospace and defense firms across the business development lifecycle, from project formulation through execution. He has led government sales strategy, operations improvement, due diligence, and business cost restructuring projects. Prior to consulting, he led business development strategy for a veteran-owned engineering services firm.

MW JONES & COMPANY

1818 Library Street Suite 500
Reston, Virginia 20190

o +1 703 956 3035

f +1 703 956 3009

e jones_michael@mwjones.com

w mwjones.com