The Naval Association of Canada | Corvette Series

The Corvette Question
Defining Canada's Next Surface Combatant

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This Naval Association of Canada series is devoted to examining options for Canada's Multi-Mission Corvette Project. Support for this work is provided by the Canadian Maritime Security Network.

Executive Summary

As Canada replaces its Kingston-class MCDVs, a new fleet of light warships will be needed to both assume the MCDVs' existing roles and provide the RCN with the capabilities needed to manage great power competition. This paper offers an overview of the kinds of capabilities that the RCN should prioritize in its search for a multi-mission corvette.

In December 2023, while speaking at a Naval Association of Canada event, then-Commander of the Royal Canadian Navy (RCN) Vice-Admiral Angus Topshee was asked what he thought should replace the Navy's ageing Kingston-class maritime coastal defence vessels. The answer was a sharp diversion from the broader conversation then taking place within the Navy and the larger defence community. Rather than pitching a new constabulary-focused offshore patrol vessel (OPV), the Admiral suggested a "high-end corvette" to function as an "adjunct in battle to the Canadian Surface Combatant [now River-class destroyer]."[1] The following summer, the RCN made this approach official by announcing a Canadian Multi-Mission Corvette (CMC) project [later renamed the Continental Defence Corvette (CDC)].[2] The initiative remains at a preliminary 'Options Analysis' stage, having not yet received either policy authority or the funding required to procure the ships.[3]

Nevertheless, the establishment of the project reflects a broader reassessment of Canada's security needs in an increasingly dangerous international security environment. Threats from Russia and China, along with a myriad of rogue state and non-state actors, are intensifying. Meanwhile, the scale and nature of continental defence demands are changing rapidly. The early 2020s have also found the RCN in an awkward position. The Navy has embarked on a near-total recapitalization

of its fleet, pledging to build 15 high-end River-class destroyers, up to 12 submarines, and two Protecteur-class replenishment vessels.[4] Yet, this future fleet mix is lopsided, weighted heavily towards frontline warfighters and a handful of lightly armed Arctic and Offshore Patrol Vessels (AOPV) and support ships. This plan leaves a missing middle in the fleet structure. The CDC project is intended to fill that gap by providing the RCN with a relatively large number of inexpensive vessels that can provide a deterrence and response capability in Canadian waters, allowing the future destroyers to focus on warfighting and expeditionary operations.[5] Unlike a constabulary OPV, the envisioned corvettes are designed as tier-2 combatants, offering enough capability to meaningfully support the Navy across the spectrum of conflict, but are not expected to be as combat-capable as the RCN's primary warfighters, the River-class destroyers.[6]

While the RCN's need for a warship like a corvette is largely accepted in expert circles, the class's capabilities and mission sets remain ambiguous and government buy-in has yet to fully materialize. What these ships will look like and how they will be equipped depends on the threats the RCN prioritizes. Competing threat perceptions will therefore produce competing visions for the ship, all of which must account for the global security context the Navy finds itself in. Compounding this design challenge, the RCN must navigate the CDC project amidst a revolution in drone and weapons technology, persistent personnel shortages, and ever-present industrial politics.

Responding to this complex dynamic quickly and affordably requires force-level thinking: a disciplined approach to assessing and distributing effects across the Navy and broader Canadian Armed Forces (CAF). The RCN's objective should be to generate operational capability across the force as a whole, rather than maximizing the capability of individual platforms. Understanding where the corvettes fit into the Navy's broader naval strategy should therefore precede design decisions. This is necessary not only to secure needed capabilities, but to maintain discipline in determining requirements for the new class and avoid gold-plating it.

This chapter analyzes competing visions for the CDC, the missions these vessels are likely to perform, and the capabilities they will require to meet the Navy's evolving responsibilities. Drawing on an assessment of operational requirements, personnel constraints, procurement realities, and the growing importance of autonomous and networked systems, the chapter recommends the procurement of a class of light warship that also functions as a hybrid autonomous-systems mothership, capable of generating fleet mass, supporting continental defence while also complementing the future River-class destroyers on global deployments. With growing recognition that the RCN must fill the 'missing middle' between its future River-class destroyers and constabulary Arctic vessels quickly, understanding and accepting the trade-offs involved in defining procurement requirements is increasingly important.

The Context

The RCN's decision to advance a corvette project reflects the sharp deterioration of the strategic environment. Russia's invasion of Ukraine has changed Western perceptions of Moscow's risk tolerance and created a very real threat of war between North Atlantic Treaty Organization (NATO) allies and a peer adversary. Although badly damaged on land, Russia's military retains much of its naval and aerospace power and is rebuilding its forces at a pace that has led European governments to warn that it could be capable of testing NATO within the next several years.[7] In Asia, meanwhile,

China has built the world's largest navy and is using its coast guard and maritime militia to advance an aggressive maritime policy of expansion and coercion, while frequently rehearsing an invasion of Taiwan.

Against such great-power adversaries, Canada has recognized the need for its ships to possess more advanced warfighting capabilities as well as for its fleet to have greater mass. High-intensity warfighting against either China or Russia would invariably result in losses of assets and personnel on a scale the RCN has not planned for since the Cold War. Mass, understood as a greater number of capable combatants, has therefore become critical to allowing the Navy to absorb potential combat losses while preserving operational effectiveness.

The need for mass extends across the defence spectrum, with the RCN requiring a greater footprint than ever to monitor and respond to a wide array of hybrid and grey zone threats. From Russian sabotage of undersea infrastructure in European waters to China's growing marine scientific research program, grey zone activity is proliferating around the world with clear implications for Canada's own waters. In this environment, Canada must be able to monitor, deter, and defend against potential incursions. There is also a new recognition that the Navy may be pulled in multiple directions during future crises, requiring it maintain presence across Canada's maritime approaches while potentially deploying to Europe or Asia.

To enable the RCN to fulfill both these defensive and expeditionary roles, the Navy needs a greater number of smaller, combat-capable vessels. By adding hulls that can be deployed independently or integrated into the larger force, the RCN can distribute its naval power more widely, extending its reach and sustaining a presence across multiple locations while improving fleet-level survivability by reducing the consequences of losing any individual platform. A larger number of capable vessels would also allow the Navy to meet routine commitments without consuming the limited availability of its most capable warships.

Corvette Design Philosophies

While the need for the corvettes is clear, the Navy has yet to articulate what kind of vessel would best meet the challenges at hand. Statements by the Navy and Public Services and Procurement Canada (PSPC) indicate that they are intended to be minor (or tier-2) combatants. Admiral Topshee has suggested that the vessels should be in the 2,500 to 4,000-tonne range, with "the fight of the Halifax class."[8] That implies that the class would have anti-surface, -air, and -submarine warfare capabilities,[9] with an emphasis on anti-submarine warfare (ASW).[10] RCN documents underline the need for the corvettes to support a wide range of mission sets from "persistent presence, ASW, maritime surveillance, interdiction, protection of sea lines and critical subsea infrastructure, naval mine countermeasures, and contribution to joint and allied awareness."[11]

Their primary area of operation is intended to be Canadian waters in the North Atlantic and Pacific, where they would contribute to the defence of Canadian ports and local shipping, as well as the maritime approaches to North America, ranging from the Caribbean to the Arctic. Despite this focus, they are nevertheless envisioned as blue-water warships, with the endurance and range required for extended operations.[12] An Arctic capability is also embedded into their design philosophy, with Vice-Admiral Topshee frequently citing a need to operate "right up to the ice-

edge,"[13] a capability that has been incorporated, albeit ambiguously, into PSPC's initial requirements.[14]

These ships are meant to be quick to build and inexpensive to acquire. With an initial (very theoretical) budget of $5 billion for up to 20 vessels, the implied unit cost could be as low as $250 million per ship.[15] Even if this figure represents 'sail-away' pricing, rather than the Treasury Board of Canada's standard life-cycle costing methodology, it will still make the corvette one of the least expensive minor combatants in service anywhere in the world. Yet the government's vision remains both ambiguous, and in some respects, contradictory. Full-spectrum combat capabilities are unlikely to be low-cost, while a globally deployable warship cannot also be an efficient Arctic platform.

The proposed size of the vessel, reportedly under 105 metres, raises further questions about whether sufficient space and displacement would exist to accommodate the range, endurance, and systems being discussed.[16] More fundamentally, the corvette project's very *raison d'etre* seems unclear. A platform optimized for continental defence and maritime surveillance demands a larger fleet size, persistent presence, and low operating costs. By contrast, combat missions place a premium on survivability, advanced sensors, and substantial armament. This conceptual ambiguity is understandable given that the RCN is still defining its needs. Nevertheless, greater clarity is needed regarding the vessel's intended role and the trade-offs that will inevitably shape its final design.

There are several design philosophies that the RCN may choose to pursue when procuring the corvettes, each based on different priorities and budgets. The following sub-sections describe three competing visions for the class of ships and assess whether the capabilities associated with each meet the RCN's needs.

Vision 1: Coastal Patrol Platform

The first vision is essentially a return to the original concept of replacing the Kingston-class with a lightly armed OPV: a vessel designed for continental defence and combatting grey zone threats. This type of ship could fit within the Government of Canada's initial $5 billion budget for 20 hulls and be built relatively quickly. As an example, this concept was proposed by Vard Marine in 2023 with its original Vigilance OPV.[17] Similar vessels are already in service with navies around the world. Spain's Meteoro-class is a good example: a modular OPV equipped with a main gun and helicopter hangar, but no heavy weapons. Such vessels are primarily designed for constabulary and surveillance missions rather than combat operations and would be able to perform many of the RCN's key continental-defence tasks during peace time, including critical infrastructure protection and maritime surveillance.

A class of such vessels, however, is unlikely to satisfy many of the Navy's stated combat requirements. While adept at countering grey zone threats, OPV lack the capabilities required for ASW or operations in contested environments. This concept is therefore difficult to reconcile with the RCN's recent statements. That said, it is included here since such a design may ultimately

emerge as a compromise solution if financial pressures force the Government of Canada to reconsider its defence spending ambitions.

Vision 2: Blue Water Minor Combatant

More in line with the Navy's stated requirements – but well outside of its (admittedly extremely tentative) proposed budget – is a minor combatant able to operate independently in Canadian waters and deploy across the Atlantic or Pacific. Beyond constabulary and grey zone duties, this ship would be able to defend Canada's maritime approaches against conventional threats and reinforce task groups built around River-class destroyers and other allied assets.

Such a ship would require substantially more capability than a patrol-focused corvette. To participate in expeditionary operations, it would require endurance broadly comparable to the RCN's Halifax-class, which have a range of up to 9,500 nautical miles, as well as the capacity to remain deployed for extended periods and replenish at sea.[18] Its combat suite would need to be sufficient to engage peer-adversaries and operate in contested waters, with anti-surface, anti-submarine, and anti-air warfare capabilities. A ship with these capabilities would be considerably more expensive than the government's initial $250-million-per-ship aspiration, but it would most closely match the Navy's stated ambition for a smaller ship with much of the "fight" of the Halifax-class.

A useful international comparator is the Japanese Mogami-class frigate, a blue-water combatant designed to provide distributed capability alongside larger surface combatants. At roughly 4,800 tonnes, it combines substantial combat power with a relatively small crew.[19] This class offers a useful example of the kind of minor combatant the RCN might pursue. However, a vessel like this would risk duplicating certain combat capabilities intended for the River-class destroyers and, while this would be a useful contribution to the RCN's combat capabilities, it would also introduce inefficiencies into the broader fleet structure.

Vision 2a: Ice-Capable Minor Combatant

In addition to its blue-water tasks, the RCN has identified ice capability as an important feature for the new ships. Admiral Topshee stipulated that the Navy would like the ships to have a Polar Class 6 rating.[20] This variant would allow the ship to operate in light first-year ice, giving it the ability to work independently in the Gulf of St. Lawrence during winter, approach the Arctic ice-edge, and safely maintain sustained naval presence in Northern waters beyond the limits of a conventional frigate.

Despite the utility, this feature would entail additional costs, as such vessels would require ice-strengthened hulls and structural modifications. These changes could increase the ship's mass by over ten percent, reducing fuel efficiency and therefore range.[21] That added weight could also limit maneuverability and constrain weapons capacity if the trade-offs reduce the number of vertical launch cells (VLS) or require additional heating systems. An ice-capable hull would also be less efficient in open water. Ice-strengthened ships typically have a rounded bow, designed to ride up

on ice rather than cutting cleanly through water, making them less hydrodynamically efficient than hulls designed for open-water operations.[22] An ice-capable hull form may also present acoustic trade-offs, as the flow of water can contribute to the ship's acoustic signature and radiated noise, making it easier for potential adversaries detect.

Ice-strengthening a blue-water combatant would result in a more versatile warship and fill policy requirements surrounding Arctic defence laid out in Canada's defence policy.[23] There are also international comparables that show that it can be achieved. The Finnish Pohjanmaa-class, for instance, is a corvette boasting an eight-cell VLS, anti-shipping missiles, and torpedoes. Ice-strengthened to Finnish-Swedish ice class 1A (roughly equivalent to Polar Class 6 to 7), it would meet the Navy's Arctic and winter operations requirements.[24] While Canada could pursue such a design optimized for operations in ice, the additional cost and trade-offs would likely constrain combat capability and add costs to a project that has little room for growth. For a ship that will spend most of its life in the Atlantic and Pacific, the trade-offs may be too steep to accept.

Vision 3: Autonomous Systems Mothership

A less conventional option would be to procure a hybrid warship that functions as an autonomous systems mothership. This type of vessel would serve as a command-and-control node, deploying and coordinating uncrewed aerial, surface, and underwater systems as distributed sensors across a wide geographic area. Rather than concentrating sensor and warfighting capabilities within the ship itself, the mothership would distribute these functions across its autonomous systems and contribute to a broader network of CAF and allied assets. Networked to the River-class destroyers, submarines, maritime patrol aircraft, fighter aircraft, and NORAD sensors, these minor combatants would push detection and tracking out further, while still providing the combat capability needed to engage threats independently.

Larger than a patrol vessel but smaller than a frigate, this model would feature a modular design with containerized mission payloads, a dedicated mission bay for autonomous systems, and a flight deck capable of supporting uncrewed aviation as well as receiving helicopters when required. Extensive automation and integration of autonomous systems would allow the vessel to operate with a comparatively small crew. Surveillance, sensing, and some ASW functions would be provided by networked autonomous systems, enabling the mothership to generate effects traditionally associated with larger combatants while reducing the required hull size, crew requirements, and acquisition costs.

This concept would be well suited to continental defence, where a platform is needed to detect threats and coordinate a response, while also supporting task force operations by complementing traditional platforms with a variety of autonomous systems. There is precedent for such a design; the Royal Navy, for example, has recently commissioned HMS *Stirling Castle* as a specialist platform supporting autonomous maritime systems. This repurposed offshore supply ship is a leading effort, soon to be followed by more autonomous-systems motherships, being built with Norway to host uncrewed surface vessels, uncrewed undersea vehicles, and associated command-and-control equipment.[25] These developments reflect a broader global shift toward distributed sensing and surveillance networks and, given Canada's vast geography and diverse requirements,

would offer a valuable degree of flexibility and adaptability. For a corvette, the key would be to mix the autonomous capability of such a ship, with a self-defence capacity and versatility that allows it to perform the numerous roles that Canada requires.

The risks of this vision must be acknowledged, and these are that it presupposed the development and integration of autonomous technology over the coming years that can be integrated into RCN ships and effectively managed by the Navy. Relying on future developments is always a risk, however it is one that the authors suggest is worth taking. Drone developments are advancing at such a rapid pace that it is likely safe to assume that Canada can develop or procure the kinds of systems that this vision is based upon.

Defining Requirements

Once an overall vision has been selected for the CDC, capability requirements will depend on mission sets. Regardless of capabilities, these vessels will monitor activity across Canada's maritime estate while denying adversaries the ability to operate there. As continental defence vessels, they would need to operate across Canada's 2.6 million square kilometers of Atlantic and Pacific exclusive economic zone and potentially into Arctic waters during the summer months. Despite that domestic focus, the RCN has made it clear that these ships will also be employed beyond Canadian waters, giving them a far broader set of responsibilities than the continental defence branding would suggest. The remainder of the chapter assesses the capabilities the corvette will require and how those requirements can be balanced against the Navy's broader force structure and procurement constraints

Peacetime Mission Sets and Requirements

In peacetime, corvettes are likely to be employed for surveillance and patrol tasks aimed at deterring and responding to hybrid and grey-zone threats in Canadian waters, as well as for naval diplomacy and sanctions enforcement. Most of these activities do not demand particularly sophisticated capabilities. Instead, they require a persistent and affordable naval presence with the sensors, communications systems, and endurance necessary to maintain maritime awareness across large areas and respond effectively to emerging incidents.

Hybrid and grey-zone threats have become prominent features of modern conflict. These dangers have proliferated around the world and are now a central element of Russia's strategy in its conflict with the West. These threats straddle the line between traditional safety and security threats posed by civilian actors (pollution, trespassing, regulatory violations, etc.) and the attributable state-based threats of rival navies and coast guards. Hybrid threats are opaque and complex, often combining both conventional and unconventional threats, emerging when state actors or civilian or quasi-state actors act on behalf of a state in a manner that provides that state with plausible deniability. The best examples come from Europe, where Russia has aggressively pushed a (deniable) campaign of sabotage.

Following a series of cable cuttings in late 2024, NATO launched Baltic Sentry, deploying warships into the region to monitor important infrastructure and shadow suspicious vessels.

Secretary General Mark Rutte pushed a more aggressive tone, emphasizing that suspicious conduct could result in "boarding, impounding, and arrest."[26] Along with other coordinating and air surveillance, the mission was a success and, by November 2025, NATO's regional task force reported that there had been no further suspicious undersea incidents.[27] The underlying strategy of Baltic Sentry – and most defences against hybrid attacks – was to make sabotage more difficult, detectable, and costly for the perpetrator.

While this form of conflict has not become an acute threat in Canadian waters, the country should be prepared to respond as NATO did in the Baltic; first and foremost, this means persistent situational awareness. Corvettes facilitate this but also provide the Navy with armed craft capable of rapidly investigating, documenting, deterring, and responding to suspicious activity. Grey zone threats proliferate in a vacuum, where attribution is hazy and escalation is limited by uncertainty. As NATO actions in the Baltic have proven, presence and prevention are critical.

During peacetime, the Navy is also likely to use corvettes as its key asset for naval diplomacy. Cheaper to deploy than a destroyer, but more imposing than an AOPV, a corvette would fit nicely into that diplomatic niche. For years, Canada has sent Halifax- and Kingson-class vessels around the world on capacity building and goodwill missions. Recently, the AOPV have taken over many deployments to the Caribbean, even conducting a controversial stopover in Cuba in 2024. As the Halifax- and Kingson-classes are decommissioned in the coming decades, the corvettes will almost certainly take over this role. A lighter warship, they will be cheaper to send and maintain abroad, while freeing the River-class from non-combat engagement missions.

In a similar vein, the RCN also has a long history of enforcing international sanctions and embargoes across the globe. These include deployments to support the UN-authorized economic embargo against Iraq, Haiti, and the former Yugoslavia. A frigate was also sent into potentially hostile waters off Libya to monitor shipping and conduct boardings in support of an arms embargo. Canadian warships have also taken part in multi-national campaigns against pirates off Somalia and deployed regularly to the western Pacific to detect illicit ship-to-ship transfers intended to evade sanctions against North Korea.

Tasks such as these require higher-end combat capabilities than what a standard OPV could bring to bear – both in terms of sensors and weapons systems if a target resists a boarding. Like naval diplomacy, however, these tasks would be overkill for a large combatant designed for modern warfare and carrying a crew of 210.[28] The overseas nature of such missions does break from the ships' "continental" mission, though it seems to explain why the Navy sees a need for a larger vessel with a range of 7,000 nautical miles – enough to take it all the way to Asia without refueling.

Apart from its operational responsibilities, the fleet of corvettes will be very useful training platforms.[29] This requirement has come up repeatedly and is substantiated by PSPC's 2026 Procurement Outlook brief, which highlights the need for "extra accommodations to facilitate at sea experience in support of RCN training priorities."[30] As the Navy seeks to build its numbers to crew a growing fleet, the availability of training berths has emerged as a bottleneck. DND's 2025 *Evaluation of Naval Forces*, showed that reduced platform availability was constraining complex warfare training, a situation created by the retirement of most of the Kingston-class and the fact that 40 percent of the fleet was in refit or modernization in recent years.[31] Training crew requires

platforms and sea days and the Navy is increasingly short of both. While the corvettes will expand the Navy's crew requirements, they will also offer a combat platform to conduct vital training – including warfare exercises that the remaining Kingson-class and AOPV cannot offer.

Wartime Mission Sets and Requirements

In wartime, corvettes would complement the River-class rather than duplicate their roles. While the destroyers are designed to command task groups and defend other vessels in area denied environments, the corvettes would have a more limited mission set, centered on controlling and protecting Canada's maritime approaches. Along the Atlantic, Pacific, and Arctic coasts, corvettes would contribute to sea denial by maintaining maritime domain awareness, detecting threats, and working with naval and air assets to prosecute enemy surface vessels and submarines. They would also be well-suited to ASW and barrier operations in critical chokepoints acting as "a goalie" for Canadian waters.[32]

Wartime operations would also place renewed emphasis on harbour defence. As recent conflicts in the Black and Red Seas have demonstrated, mines, uncrewed systems, and other asymmetric capabilities remain effective tools for disrupting maritime activity and threatening critical infrastructure. Given the concentration of Canada's naval power in Halifax and Esquimalt, adversaries would have strong incentives to target these facilities. Corvettes could provide a persistent local defence capability, conducting anti-submarine patrols, deploying and monitoring uncrewed systems, policing maritime traffic, and responding to threats directed against ports and naval bases. They could also support mine-countermeasure operations through the deployment of autonomous mine-clearance systems, reducing the need to expose larger combatants to littoral threats.[33]

While this class of vessel is primarily geared towards continental defence, the pressures of war would likely demand that it be globally deployable as well. While not likely to deploy into highly contested areas, corvettes would support the River-class and submarine fleets in maintaining situational awareness in the Atlantic and Pacific sea lines of communication, guarding convoys, and protecting replenishment vessels positioned just outside of the principal combat areas.

These wartime requirements would place a premium on sensors, networking, endurance, and autonomous-system integration. While ASW should be a central design consideration, the corvette's contribution would be made primarily through the deployment of autonomous systems, rather than replicating the high-end ASW capabilities of the River-class destroyers. Capable of deploying and sustaining uncrewed aerial, surface, and subsurface systems, as well as towed arrays, corvettes could extend the sensor coverage of the wider fleet, providing surveillance and targeting beyond the ship's own onboard suite, while maintaining more persistent contact with hostile assets. In this role, the corvette would function as a networked sensor and weapons node within a broader maritime defence system. Given the likelihood of operating in contested environments, the class will also require a degree of survivability and self-defence absent from most OPVs.

Capability Through Restraint

The challenge facing the RCN will be exercising discipline when defining requirements. Nearly every capability absent from the corvette can be justified as useful, but each additional system increases cost, crewing requirements, technical complexity, and construction timelines. The central purpose of the class is to generate fleet mass and persistent presence, not to replicate the capabilities already provided by the River-class. Accordingly, the corvette should not be expected to provide area air defence, ballistic missile defence, task-group command facilities, carrier escort capabilities, or independent high-end ASW comparable to those of the River-class. Attempting to replicate them on the corvette would undermine the focus on affordability and mass that justify the class in the first place.

One of the most significant savings that a corvette can realize is in air defence. The ship would need the ability to protect itself in contested environments, however this defence should be a local rather than area capability.[34] These vessels would not form the heart of a task force and, therefore, would not need to provide a protective umbrella for a group of forces. With air defence limited to local-area capabilities the corvettes could also find significant savings in sensors. Unlike the River-class, which boasts a $130 million SPY-7 radar,[35] the corvette, could carry a trimmed down but modern sensor suite scaled to building the local maritime picture able detect and engage nearby air and surface threats.

Land attack capabilities are also an easy ability to dismiss for the new ships. If the vessels' principal task revolves around continental defence, maritime surveillance, and the support of larger RCN and allied formations, there will be no need for independent strike operations against targets ashore. Adding land-attack missiles would consume scarce magazine space and increase acquisition costs while merely duplicating a capability of the River-class.

As one of the corvettes' core missions would be ASW, the ship should have a modest hull-mounted sonar and provision for a lightweight towed or variable-depth sonar, rather than the full high-end ASW suite of the River-class. While ASW is best prosecuted by embarked aircraft, the Navy could also forgo the capability. In its continental defence role, the corvette would be able to rely on the shore-based P8 maritime patrol aircraft as well as helicopters. When operating with task forces, this capability will be maintained by destroyers. If operating alone and out of range of shore-based aircraft, a corvette may be able to achieve the same effects with uncrewed systems for wide-area surveillance. While current drone technology delivers less effective ASW capabilities than an embarked helicopter, the omission of a helicopter hangar and its associated maintenance spaces aboard the corvette would offer significant savings, in terms of purchase price, fuel, space, specialized personnel, and weight.[36]

While ASW will be an important role, a low-cost minor combatant cannot be built to the same acoustic specifications as a modern destroyer. The River-class, for instance, has been carefully designed to minimize its acoustic signature with what BAE Systems describes as a "world-class self-noise monitoring system."[37] This matters because ship-generated noise can both disclose a vessel's position and degrade the performance of its own sensitive hull-mounted and towed-array sonars. Reducing a ship's radiated noise signature is certainly important in contested waters, but also very expensive. This expenditure is justified for a high-end destroyer designed for sustained

ASW operations; it would be difficult to justify in a corvette focused on surveillance, presence, and local sea denial. Overbuilding the hull would therefore be a failure to align the class's capabilities to mission requirements.

Savings on hulls can also be achieved by pushing back on the notion of an ice-strengthened warship. From the beginning of the project, Admiral Topshee has stipulated that the corvettes will need some form of Arctic capability to allow the ships "to take the fight to the ice edge."[38] This idea of procuring an Arctic-capable combatant flows logically from Canada's defence policy, focused on Arctic defence, and also makes sense from a continental defence perspective, as the Gulf of St. Lawrence is frozen during the winter and, if the Second World War is a guide, could be a future target for enemy submarines.[39] Despite these benefits, the costs of ice-strengthening – in both capability and ship price – make this low hanging fruit for savings.

From an operational perspective, the prospects for surface engagement in the Arctic ice are low.[40] Combat at the ice edge is far less likely to materialize than in the critical sea routes of the Atlantic and Pacific. If kinetic force is needed at the ice edge or in a frozen Gulf, a submarine or aircraft would prosecute threats more efficiently than a surface vessel. RCN presentations posit that corvettes could deploy into the Beaufort Sea and Baffin Bay during the summer season yet, such deployments would likely have minimal wartime significance, given the limited strategic value of surface ship operations in those regions. Meanwhile, peacetime deployments to counter grey zone threats would be more effectively and affordably accomplished by an AOPV.[41]

While removing the ship's ice-strengthening and select combat systems limits its effectiveness and versatility, this trimming is an essential exercise. In a world of constrained budgets, such efficiencies may mean the difference between ships built or an over-budgeted project cancelled by a future government. The question, therefore, is not what capabilities could be added to the corvette, but what capabilities can be omitted because they already exist on other platforms. In an era of networked warfare, the effectiveness of the corvettes will be derived from combining complementary capabilities across ships, aircraft, submarines, autonomous systems, and command networks, rather than from maximizing the combat capability of the platform itself. These deliberate limitations represent more than operational choices – they constitute a strategic design philosophy that should enable the Navy to procure a larger number of hulls and distribute capability across the fleet rather than concentrating it in fewer, more expensive platforms.

Recommended Design: A Hybrid Autonomous Systems Mothership

When considering what type of ship to procure, the RCN should resist the temptation to pursue a traditional OPV or light frigate. Instead, the future Canadian corvette should be conceived primarily as a hybrid autonomous-systems mothership – a platform optimized for deploying, supporting, and coordinating uncrewed systems while still being able to operate independently in contested environments. This design approach aligns closely with the missions for which Canada is most likely to employ the class, from peacetime surveillance and sovereignty patrols to wartime sea denial, sensing, and harbour defence. Across this mission spectrum, the vessel's greatest contribution lies not in serving as a heavily armed surface combatant, but in its ability to detect, track, and coordinate the prosecution of threats across a wide area through networked integration.

Accordingly, the corvette should generate operational effect not through organic firepower, but through its autonomous systems and integration with the broader joint force.

To perform this role, the size of the corvette should occupy the middle ground between an OPV and a frigate. On several occasions, the RCN has indicated that a 105-metre vessel would be ideal, allowing the class to fit in existing berths in Halifax and Esquimalt without modification.[42] However, Admiral Topshee has also suggested that that length would not be prioritized over capability.[43] Given that the new corvettes are intended to have similar combat power to the Halifax-class frigates – which are 143 metres in length and displace 4,770 tonnes, it can be assumed that the future corvette has 105 meters as its floor. Its tonnage will also be at the high end of NATO corvette comparables. The 117 metres, ice-strengthened Pohjanmaa-class, for example, will be 4,300 tons.[44]

Canada's need for a big corvette, closer in size to small frigates, stems from the combat effects that it hopes to achieve as well as the environment where these ships will operate. Unlike many European and Asian corvette classes, these vessels will not be confined to operations in enclosed seas or the littorals. The North Atlantic, in particular, is a rough environment that makes small craft operations uncomfortable. There, the average winter sea state ranges from five to six, with wave heights averaging three to five metres.[45] In conditions such as these, size matters. Greater displacement gives a ship more inertia and usually a steadier motion in heavy seas, helping it retain speed while providing greater comfort for crew. Length is equally important as a longer hull bridges waves more effectively, generally reducing pitching and vertical acceleration. A smaller warship of between 2,000 to 3,000 tons can safely transit these conditions, but crew fatigue, speed loss, and boat operations become greater challenges. In addition to seakeeping, a larger ship will also future-proof the class for new power and cooling demands, which will only increase. It is not inconceivable, for instance, that within the next decade, High Energy Laser Weapons Systems (HEL) will be ready for deployment – and will need space and power.

Size also matters because a Canadian corvette will likely have missions that go beyond what most minor European combatants would be expected to perform. The size of the Canadian exclusive economic zone and maritime domain will require longer patrols, hence Admiral Topshee's insistence that the ship be capable of remaining on station for 30 days or longer, while being able to replenish at sea.[46]

Since the defining feature of the design should be its ability to deploy and control a mix of uncrewed systems, a dedicated mission bay and launch-and-recovery facilities should be core requirements for the class, rather than optional additions. The vessels' combat management system should also be capable of controlling these assets and integrating their data into the ship's overall operational picture, enabling the crew to detect, track, and respond to threats across a much wider geographical area than would otherwise be possible. The class should be designed around common NATO standards and interoperable combat systems wherever practical, ensuring seamless integration with Canadian and allied naval, air, and command-and-control networks.

Modularity should also remain an important design feature. Like the Kingston-class, the corvette should be capable of embarking containerized mission packages that can be exchanged as operational needs evolve. This approach would support missions such as mine warfare, towed-

array operations, and seabed surveillance while allowing future capabilities to be incorporated without extensive redesign.

While autonomous systems and modular mission kits should provide much of the vessel's core capability, the ship must still possess sufficient combat power to survive in contested waters. The ideal balance would include, air defence and anti-ship missiles, lightweight torpedoes, electronic attack capabilities including jamming and decoy support, passive electronic support measures, a hull-mounted sonar, and a capable medium range surveillance radar. From a practical perspective this suite would entail interoperable tactical data links, including Link 16 and Link 22. It would also include a 57 millimetre or 76 millimetre main gun, though there may be economies of scale to deploying the same 127 millimetre gun as the River-class. The ship should have a close-in weapons system (CIWS), like the one found on the Halifax-class.

Beyond guns, the ships' missile complement is a critical question, since this is where a balance must be achieved between cost and capability. The combat requirements outlined by the Navy will almost certainly require deck-mounted launchers for anti-surface weapons, likely the Naval Strike Missile being deployed aboard the River-class.[47] Point air defence should, likewise, mirror the River-class systems to achieve economies of scale through common magazines, namely Evolved SeaSparrow Missiles.

One of the limitations suffered by the Halifax-class was its magazine depth. If the Navy expects a corvette to operate in a modern contested environment, it will likely require a VLS. Not all NATO corvettes carry VLS, with patrol-focused corvettes typically relying on deck-mounted weapons. Still, larger combat vessels in the 2,000 to 4,000 tonne range often carry between an eight and 32-cell VLS.[48]

To meet the Navy's requirements, and to get maximum value from the platform, the RCN would likely look for a ship with either an eight or 16-cell tactical-length VLS, with a theoretical magazine of 64 air defence missiles for the 16-cell option. These cells could also carry ASROC ASW weapons, if deemed necessary. Along with the main gun and CIWS, this level of armament would give the ship a layered local air defence at a lower cost than the larger strike-length Mark 41 VLS, designed for area air defence weapons and land-attack missiles carried by the River-class. However, this combat capability would come with added expense. A 16-cell tactical-length Mark 41 VLS would cost an additional $35 to $45 million per ship, excluding the missiles themselves.[49]

Besides the financial cost, a VLS system also has space costs. A 16-cell Mark 41 VLS installation (two eight-cell modules) has a deck footprint of roughly 37 square metres.[50] That is the launcher-module footprint only; allowing for surrounding access, cabling, and gas-management arrangements, the ship would have to reserve even more space. These are large systems, taking up space that could also be used for mission bays or other facilities. A VLS is therefore as much a choice of design philosophy as of cost. Achieving both the self-defence requirements outlined by the Navy and the mothership duties advanced by this chapter, would therefore require a ship larger than what the Navy has deemed optimal.

While a larger ship costs naturally costs more than a smaller vessel, that size difference may not be prohibitive given that a warship hull is a small portion of its total cost. A 2017 United Kingdom

government-commissioned study showed that the typical ratio of combat-system to platform costs is roughly 2:1, meaning roughly two-thirds of the ship cost is combat systems and one-third is the platform itself.[51] The latter includes not only the hull, but propulsion, power generation, auxiliaries, outfitting, and shipyard labour, and steel. The Canadian Parliamentary Budget Officer likewise found that the combat systems on the Halifax-class averaged 35 percent of total ship cost, with the cost of those systems on the River-class growing to 41 percent of the total.[52] While these are rough estimates of how the cost of a corvette would be broken down, they provide some substantiation to the notion that the steel needed for a large ship is the cheap part of any warship.

While headline ship costs often capture the most attention, the long-term operating costs revolve more on crewing requirements. This, plus the fact that the RCN is still struggling to rebuild its force of sailors means that it is critically important that the crew size remains as small as possible. Any corvette design must be shaped by the fact that sailors, rather than hulls, are likely to be the Navy's most constrained resource. In April 2025, the CAF remained roughly 6,334 Regular Force personnel below its authorized strength.[53] Minimizing crew requirements and maximizing automation through integrated machinery control, automated diagnostics, AI-assisted navigation, maintenance monitoring, sensor management, remote weapons, and a compact combat-management system should be central design objectives. The aim would be to maintain a level of crewing needed for safe operations, damage control, maintenance, and combat resilience, while ensuring that a larger fleet can be sustained from the personnel the RCN can realistically recruit and retain.

Contemporary warship design demonstrates that substantial reductions in crew size are achievable through automation. The Mogami-class frigate, displacing approximately 5,000 tonnes, operates with a crew of around 90 personnel – roughly half that of comparable frigates due to its high degree of automation.[54] For the kind of vessel envisioned by the RCN, a crew of roughly 60 to 70 personnel could therefore represent a reasonable design target, provided that the ship's machinery and systems are heavily automated.

This crew target, however, captures only the ship's company and not the class's overall personnel requirements. A force of up to twenty vessels, each crewed by 60 to 70 sailors, implies 1,200 to 1,400 shipboard positions before accounting for things such as training, leave, and courses, not to mention the shore establishments required to keep these ships deployable. Automation will minimize but not eliminate these demands. Some tasks can be shifted ashore – but this creates requirements for software support, systems integration, data management, and specialized maintenance. This burden will be especially acute because the corvettes will enter service while the RCN is still taking possession of the River-class destroyers and submarines, which will compete for the same limited pools of engineers, technicians, and project-management expertise.

The proposed autonomous-systems mothership would also introduce a new and technically complex capability for the RCN. Personnel will be required years before the first ship is commissioned to develop doctrine and operational concepts and deliver supporting infrastructure. These demands will extend across the RCN, DND, PSPC, and industry, and cannot be treated as secondary to platform acquisition. The one advantage of this, however, is that training on drone systems can begin in earnest well before ships are in the water.

In short, the future Canadian corvette should be a lean, hybrid autonomous-systems mothership with teeth: affordable enough to procure in meaningful numbers, automated enough to address personnel shortages, and capable of extending the reach of the RCN through a distributed network of autonomous systems. Most importantly, it should be designed to defend Canada's maritime approaches, while allowing the River-class destroyers to focus on expeditionary warfare, rather than serving as a scaled-down destroyer itself.

Procurement Considerations

Given the rapidly deteriorating global security situation. procurement speed has become a critical factor. In April 2026, Vice-Admiral Topshee declared that the Navy requires "a construction-ready design in under two years." For Topshee, corvettes are not a capability needed in a decade, they are one needed "yesterday."[55] PSPC's initial schedule anticipates that the Government of Canada will issue a request for information from industry in 2026, formally initiating communications with potential shipbuilders. From there, the government intends to define its requirements in 2027 and 2028 and begin operating the ships in 2039 to 2040.[56] In September 2025, then-CDC-project lead, Commander Dean Lang offered a slightly more optimistic projection at the Canadian Seapower conference, where he said he envisions the first vessel built and in the water: "delivered, tested, trialed, and operational" by 2037.[57] This timeline is ambitious, but possible.

The River-class went from a Solicitation of Interest and Qualification in 2010 to first delivery in (optimistically) 2031: a 21-year process. Meanwhile, the less complex AOPS program went from announcement to first delivery in 13 years. That kind of design and build schedule would be fast, by shipbuilding standards, but may be insufficient for a Navy facing mounting global pressures. Indeed, those pressures are now so great that lengthy design and build-times are not only frustrating but could jeopardize Canada's national security.

One of the central procurement questions in moving the project to construction is therefore whether to pursue a clean-sheet Canadian design or adapt an existing foreign platform. Given Admiral Topshee's emphasis on rapidly delivering new capability, beginning with a mature design has an appeal. These designs can be licensed and built domestically, combining the schedule advantages of a proven platform with the industrial benefits associated with Canadian shipbuilding. Such an approach may also create broader strategic and industrial opportunities. The MEKO family illustrates this possibility. Following TKMS's selection as Canada's preferred submarine supplier, company officials indicated their willingness to license a MEKO corvette design for construction in Canada, potentially allowing the RCN to leverage an emerging industrial relationship across multiple naval procurement programs.[58]

This approach works, however, only if the RCN can identify a ship that genuinely meets its needs and will not require more than superficial redesign. Often a ship that appears suitable will suffer from some serious limitation. The Finnish Pohjanmaa-class, for instance, meets many of Canada's top-level requirements but has a range of only 3500 nm. When a navy underestimates the need for changes the time and cost savings can quickly evaporate as over-modification leads to a cascading sequence of alterations. Experience with programs such as the River-class destroyers and the United States Navy's Constellation-class illustrate that risk, with Canada's future destroyers

having grown in displacement enormously from their Type-26 parent design and the United States Navy's Constellation-class changing so much that the project collapsed.

The second possibility for Canada is a clean sheet design, which would be slower than building from a reference design, though perhaps not much slower if that design were heavily modified. This approach would also serve Admiral Topshee's requirement that the ship be overwhelmingly Canadian in design and construction. For the first time since the late Cold War, such an approach might be possible. The National Shipbuilding Strategy has significantly expanded Canada's shipbuilding expertise and industrial capacity. This approach would allows the RCN to develop a vessel tailored specifically to Canadian requirements, avoiding the compromises often associated with modifying an existing design and aligning with the Navy's desire for a platform that is "Canadian from the core."[59] Given the Navy's stated desire for a ship that combines long range, meaningful combat power, and even some degree of Arctic capability, Admiral Topshee has argued that no existing design fully satisfies Canadian requirements.[60]

Design decisions will almost certainly hinge on the Navy's statement of requirements. If there exists a ship in production that would suit all – or most – of the RCN's requirements without more than superficial modifications, then a foreign design would likely be the faster and easier approach. The critical feature in this equation is the degree of change needed and the suitability of foreign platforms, since it is far from certain that what the RCN needs is currently in service.

More politically charged than the question of design is deciding where to build the ships, something that will have significant implications for cost and schedule. Historically, Canada's shipbuilding decisions have been strongly influenced by political criteria, with successive governments seeking to spread shipyard jobs within Canada to favored constituencies or to create the impression of regional fairness. From the political drama of the Halifax-class construction to the split of the Coast Guard's heavy icebreakers, Canada has accepted delays and inefficiencies in the name of political expediency.[61] In the context of current great power tensions – and the Navy's need to have these ships "yesterday" – political considerations in procurement are a luxury that the government should abandon.

If shipbuilding choices are to be ruthlessly driven by cost and delivery considerations, procurement should be concentrated with one shipbuilder. While spreading a build over multiple yards could speed up the construction of ships, in that it adds capacity and labour, there are serious risks of fragmenting a production run and losing the kinds of efficiencies that the National Shipbuilding Strategy was designed to create. The Halifax-class build in the 1990s showed the costs of this kind of split. There, the distribution of industrial and regional benefits imposed a construction premium as shipbuilders in New Brunswick and Quebec duplicated the learning process on a new class. Management complexity was increased by introducing additional subcontractors and production sites while lessons learned at one yard had to be repeated at the second.[62]

More recent experience has shown the value of concentrating a build. Halifax Shipyard's production of the AOPV fleet is the first large scale domestic ship procurement since the Kingston-class in the 1990s and offers a lesson in economies of scale. The yard has shown enormous efficiency gains over the eight-ship build, with each AOPV delivered more quickly than the last. Data from Irving Shipbuilding (Figure 1) shows the steep decline in work hours for each ship, with

AOPV 5 and 6 built in nearly half the time of the lead vessel. AOPV 7 and 8 – the custom variant for the Canadian Coast Guard – will also be delivered in one million fewer hours than contracted, with an estimated cost savings of $100 million.[63]

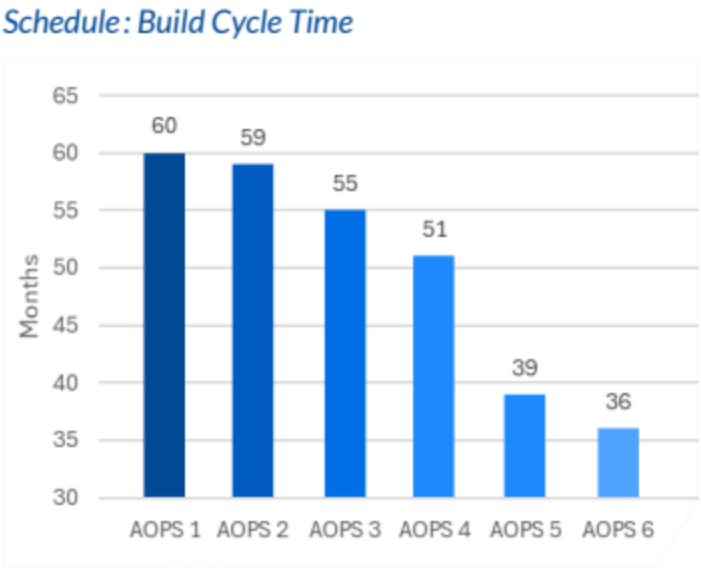

Figure 1: AOPV build times improvements (from ISI, 2026)

This industrial efficiency is not surprising. As with any product, a workforce becomes faster and more efficient the more it builds. In its 2017 study on the subject, Canada's Parliamentary Budget Officer assessed a labour learning curve of between 80 and 85 percent.[64] This stands to reason; as ships are built, problems and inefficiencies in process and supply chains are resolved and lessons are learned and applied. As with the AOPV, a major shipbuilding program of up to 20 vessels provides an opportunity to build these cost and time efficiencies.

While concentration of the corvette build makes industrial sense, Canada's shipyards may not have the capacity to construct the corvettes. Halifax Shipyards is currently Canada's most experienced facility, having built eight AOPVs and initial hull components for the River-class. It also possesses the workforce, supplier relationships, production infrastructure, and military-shipbuilding experience that would reduce the corvette program's industrial start-up risk. Yet fifteen River-class destroyers will occupy the yard for many years. Adding as many as twenty corvettes to that workload could create precisely the bottleneck that a supposedly rapid acquisition is intended to avoid. This concern was raised publicly by Commander Lang in 2025 and creates a genuine possibility that Canada will have to establish some form of parallel production.[65]

If a single experienced yard is not available, the government may achieve the same effect by dividing the contract up while seeking to minimize the negative consequences. One alternative identified in Canada's historical experience is to separate design authority more clearly from production. Government, or a competitively selected naval design agent, could mature a common construction-ready design and then contract multiple yards to build that design under tightly controlled arrangements. Such an approach would resemble elements of successful Cold War programs, in which centralized design permitted production across numerous shipyards. For the St. Laurent-class, the government – with private support – undertook the design work and then parcelled out finished blueprints to seven different yards across the country, which facilitated the class's rapid construction.[66] South Korea's current frigate programs is a contemporary example of this approach, where one company holds the design contract while more than one shipbuilder subsequently receives production contracts. This procurement model could preserve competition at the production stage while avoiding some of the inefficiencies associated with multiple yards independently interpreting or modifying an immature design.[67] Such an approach would require

considerably greater naval architecture, engineering, contracting, and quality-assurance capacity within government than has been customary under the National Shipbuilding Strategy, but rebuilding precisely this capacity could be one of the most valuable long-term outcomes of the corvette program.

Conclusions

The central challenge facing the CDC project is not ship design, but strategic clarity. Before determining what capabilities the vessel should possess, the RCN must first determine the role it is intended to perform. As this chapter has demonstrated, competing visions of the threat environment generate competing visions of the corvette itself, from a simple coastal patrol vessel to a blue-water combatant or autonomous-systems mothership. Each option offers advantages but also trade-offs in cost, capability, crewing, and fleet size.

The temptation to pursue every desirable capability will be strong. Yet the cumulative effect of requirement growth is to increase cost, delay delivery, and reduce the number of vessels that can ultimately be procured. Successful acquisition will therefore depend upon disciplined requirements management and the willingness to accept trade-offs and freeze requirements once a design philosophy has been selected.

Fundamentally, the corvette should be evaluated in the context of the wider force rather than as an isolated platform. The objective of procurement should be to generate operational capability across the CAF rather than maximize the capability of every individual ship. In an increasingly networked force, effectiveness derives from the integration of ships, submarines, aircraft, autonomous systems, and command networks rather than from any single platform acting independently. The key question is therefore not what capabilities can be added to the corvette, but which capabilities it must possess to complement the assets Canada already fields.

For these reasons, this chapter has recommended that the future corvettes be designed as hybrid autonomous-systems motherships with modest combat capability, sufficient Arctic utility, and the endurance required to conduct continental-defence and coalition operations. Such a vessel would provide the fleet mass, persistence, and flexibility increasingly demanded by Canada's strategic environment while avoiding unnecessary duplication of the capabilities already provided by the River-class destroyers. More broadly, the CDC project illustrates the challenges facing Canadian defence procurement in an era of rapid technological change and renewed great-power competition, where requirements, timelines, and industrial policy objectives must be balanced simultaneously.

How the corvettes are designed and built will be nearly as important as the capabilities they carry. Given the urgency of the requirement, Canada should favour the approach that delivers a design to production fastest, whether through limited adaptation of a suitable foreign platform or a clean-sheet Canadian design. In either case, changes should be minimized once construction begins and production should, where possible, be concentrated to preserve learning-curve efficiencies. At all times, Admiral Topshee's call to have these ships "yesterday" should be the guiding design and build principle. Ultimately, the success of the CDC project will depend not on building the perfect

ship, but on acquiring the right ship in sufficient numbers, on an appropriate timeline, and with the discipline necessary to keep the project on track.

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