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DOING BETTER THAN ‘ADEQUATELY’: CHARTING A POST-MCDV COURSE FOR THE ROYAL CANADIAN NAVY

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JCSP 45

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DOING BETTER THAN ‘ADEQUATELY’: CHARTING A POST-MCDV COURSE FOR THE ROYAL CANADIAN NAVY

While the National Shipbuilding Strategy (NSS) charts a course for the Royal Canadian Navy (RCN) that includes enhanced ability to operate in the arctic and maintains, or even upgrades, expeditionary capabilities, the lack of serious discussion of a replacement of the *Kingston* class will lead to capability gaps that are best addressed through the acquisition of a medium sized offshore patrol vessel.

As currently structured the NSS includes six *Harry DeWolf* class Arctic – Offshore Patrol Ships (AOPS), two Joint Support Ships and fifteen Canadian Surface Combatants. With the decision in 2006 to forgo a mid-life refit of the *Kingston* class Maritime Coastal Defence Vessels, the NSS does not however, address the issue of what it is to be done once the MCDVs reach the end of their service life¹. Given the existing and likely future maritime security environment, lack of a replacement of the MCDVs will mean the RCN will be unable to maintain existing capabilities.

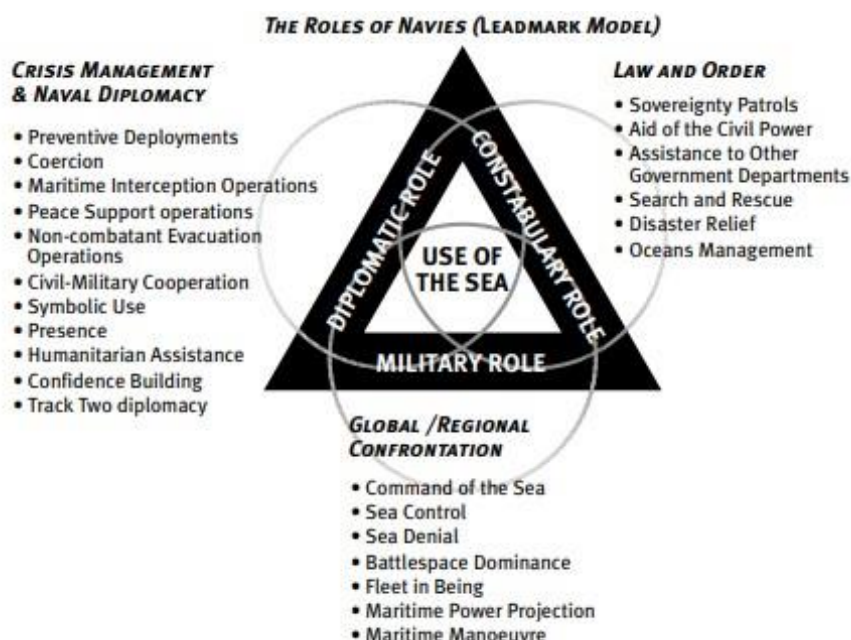
Through examination of the current, and likely future, roles and operating environment of the RCN it will be argued that the decision to cancel the mid-life refit of the *Kingston* class, in light of the fleet structure outlined in the NSS, will lead to diminished capabilities. With the current roles of the MCDV as the basis of discussion, potential solutions will be examined and a way ahead proposed.

Strategic Environment

To understand the capability needs of the RCN, we must first examine the role(s) of a navy using the Booth model. As can be seen in Figure 1 (on the following page) naval roles can be grouped into three broad categories: military, diplomatic and constabulary, all contributing to maintenance of ‘use of the sea’.

¹ Michael Byers and Stewart Webb, *Titanic Blunder: Arctic Offshore Patrol Ships on Course for Disaster*, Canadian Centre for Policy Alternatives, April 2013: 10

Figure 1 – Leadmark Interpretation of Booth's Model²



Within this framework, the RCN's long-term planning guidance, currently contained in Leadmark 2050, categorizes the above noted roles into three broad categories of employment of Canada's maritime forces:

1. Protect Canada by exercising Canadian sovereignty in our home waters, securing the maritime approaches to North America and contributing to maritime peace and good order abroad;
2. Prevent conflict by strengthening partnerships and deploying forward to promote global stability and deter conflict; and
3. Project Canadian power to shape, and when necessary, restore order to the global system³.

To do this, the RCN has articulated a need for “a blue water navy that possesses a balanced mix of platforms, including submarines, surface combatants, support ships and **patrol vessels**”⁴. (emphasis added). Currently, the patrol vessel for the RCN is the Kingston Class Maritime Coastal Defence Vessel (MCDV) which entered service between 1995 and 1998⁵. The MCDVs are considered “modestly but adequately equipped and armed” and have been employed in domestic surveillance, sovereignty

² Canada. Department of National Defence. *Leadmark: The Navy's Strategy for 2020*. Ottawa: Chief of the Maritime Staff, 2001: Figure 5, 34

³ Canada. Department of National Defence. *Leadmark 2050: Canada in a New Maritime World*, Ottawa: Directorate of Maritime Strategy, 2016: iv.

⁴ Canada: Department of National Defence. *Royal Canadian Navy Strategic Plan 2017-2022*, Ottawa: Royal Canadian Navy, 2017: 9.

⁵ Byers, 9

patrol and continental defence and security assignments along with, more recently, expeditionary deployments in support of capacity building⁶.

Capability Needs

The capability requirements of the RCN are often articulated in terms of “home waters” and expeditionary operations, with “home waters” essentially encompassing the Economic Exclusion Zone (EEZ) and expeditionary operations involving sustained deployment of ships for extended periods of time.

Home Waters

Within home waters RCN operations generally involve the constabulary side of the Booth ‘triangle’ along with those aspects of the diplomatic and military sides that involve domestic operations such as presence, maritime interception operations (MIO) and sea control⁷. While ‘presence’ falls under the diplomatic role, which is normally considered to relate to foreign policy, it has a significant domestic component. Presence, MIO and sea control in home waters are equally relevant to foreign policy and the diplomatic side of the triangle as those tasks in an expeditionary operation – because being seen to contribute to the collective defence of North America is in the national strategic interest vis-à-vis relations with our southern neighbour⁸.

While ‘maritime blindness’ is more prevalent inland, even many residents of coastal communities have little knowledge of the RCN, and/or have never seen an RCN vessel visit their community⁹. To adequately address this issue, you need sufficient numbers of vessels¹⁰. With the second largest continental shelf and 5th largest EEZ in the world, effective home water operations require awareness, presence and the ability to exercise control at sea in order to secure the maritime approaches to North America¹¹. To do that, the RCN needs ships able to – in addition to the potential need to engage in combat – conduct interdiction operations against vessels engaged in illegal fishing, dumping of pollutants, immigration or smuggling¹². More often than not, major surface combatants are often overqualified or unsuited for many of these roles¹³.

⁶ *Leadmark 2050*: 42-43

⁷ While ‘presence’ is considered a diplomatic/foreign policy role, it has a significant domestic component – formerly considered part of ‘connecting with Canadians’ in the domestic sphere, it is now considered ‘strategic outreach’.

⁸ Ben Lombardi and Bill Ansell. “Military Planning, Canada’s Strategic Interests and the Maritime Domain”, *Canadian Military Journal* Vo.18, No. 4 (Autumn 2018): 8.

⁹ Lieutenant-Commander S.A. Kelemen, “RCN Littoral Capability Replacements: Good Enough is not Good Enough” (Joint Command and Staff Course Paper, Canadian Forces College, 2015): 3.

¹⁰ *Ibid.*

¹¹ *Leadmark 2050*: iv, 15

¹² Byers, 32

¹³ Kelemen, 4

Expeditionary Operations

Given Canada's status as a maritime trading nation, it should not be surprising that the RCN conducted over 110 'expeditionary deployments' between 2001 and 2017, including 64 OP CARIBE deployments, 34 anti-terror and anti-piracy deployments and three deployments in support of humanitarian assistance or disaster relief (HADR)¹⁴. Since 2017, the expeditionary tempo has increased with the addition of annual deployments to OP PROJECTION for capability building and further HADR deployments. With an articulated need to maintain a naval task group at high readiness, a role that can only be filled by frigates (or in future, the Canadian Surface Combatant), commitments of major surface combatants to multilateral organizations such as NATO, and taking the operational cycle into account, there will be a continued need for the RCN's smaller vessels to contribute to expeditionary operations where appropriate¹⁵.

While piracy off Somalia is no longer front-page news it is still a \$2 billion problem annually¹⁶. Piracy is also a problem off West Africa, in the area of the Strait of Malacca and in areas of the Caribbean, particularly off of Venezuela¹⁷. Along with counter-narcotic operations (OP CARIBE), use of smaller vessels makes more sense than using an extremely expensive warship to chase pirates in skiffs¹⁸. Smaller vessels are also usually more appropriate for capability building deployments than major surface combatants as those classes of ships are generally not operated by developing nations¹⁹.

Fleet Structure

The bare minimum fleet structure in order to carry out the missions assigned to the RCN has been determined as more than 24 surface combatants, 3 support ships and submarines²⁰. However, this modest fleet size still leaves potential gaps during refit periods as demonstrated during the refit process of the frigates which meant that "with fewer ships at its disposal in recent years, the RCN's engagements in the Asia-Pacific region have fallen well short of need"²¹. This means that, should the MCDV's leave service without a replacement, the future fleet will be at least 3 ships short of the already determined minimum number of surface combatants²². The end result will be the return to

¹⁴ Canada. Standing Committee on National Defence. *The Readiness of Canada's Naval Forces, Report of the Standing Committee on National Defence* Ottawa: House of Commons, June 2017: 4

¹⁵ *Leadmark 2050*: 42

¹⁶ *Leadmark 2050*: 17

¹⁷ Francesca Guetchev, "Pirates of Venezuela and Worrying Parallels with Somalia" *Canadian Naval Review* Volume 15, Number 1 (2019): 37

¹⁸ Kyle Mizokami, New Pentagon Study Spells Doom for Two Aircraft Carriers . . . and Maybe More, *Popular Mechanics*, www.popularmechanics.com/military/navy-ships/a32239137/pentagon-study-aircraft-carriers/, last accessed 11 May 2020.

¹⁹ Gaelle Rivard Piche and Lieutenant-Commander James Brun, "The Strategic Contribution of the Harry DeWolf Class to Canadian Defence and Security", *Canadian Naval Review* Volume 15, Number 1 (2019): 21

²⁰ *Leadmark 2050*: 42

²¹ *Leadmark 2050*: 20

²² Currently the 24 surface combatants are comprised of 12 *Halifax* class frigates and 12 *Kingston* class MCDVs. The future fleet as currently outlined under the NSS will comprise 15 Canadian Surface Combatants and 6 *Harry DeWolf* class AOPS, for a total of only 21 surface combatants.

the situation during the *Halifax* class refit, where the fleet was one major crisis away from being unable to complete all its assigned missions.

Charting a Course

There has been much discussion in naval planning around modular mission capable vessels – and this was the original operating concept for the MCDVs. Conceived of in the wake of the 1989 Defence White Paper, the original planning document called for up to 18 MCDVs and six patrol corvettes²³. With the end of the Cold War, the drive for cost savings led to a design compromise, resulting the current design and the concept of mission modules²⁴. In reality there have been few instances of this ‘mission module’ capability being put into successful practice on smaller vessels. Even larger vessels such as the US Navy’s Littoral Combat Ships, designed ‘from the keel up’ to enable rapid mission swap through change of modules still measure the time in port to change modules in weeks, resulting in a doctrinal shift to single mission groupings²⁵.

Stand On?

With a mid-life refit, the MCDVs would be serviceable until approximately 2045 – 2055, so one could ask why not simply stay the course and refit the MCDVs?²⁶ Given that the class was the test bed for the Naval Remote Weapons System, the current lack of meaningful armament could be easily addressed²⁷. However, even with a refit, the age of the vessels and the major systems would present issues. Maintenance on older ships carries greater expense and difficulty, resulting in an increased load on maintenance facilities to address broken equipment, or in many cases with obsolete systems, manufacture parts²⁸. Given that in 2016 only 10 of the 12 MCDVs were available at any given time due to maintenance, any refit would have to include a replacement of major systems to prevent continued age related issues²⁹. Given that the original refit plan was only for \$100 million for the class as a whole, major system refreshment was clearly not in the cards, so age-related equipment issues remain a factor³⁰.

The original hull and propulsion design were to allow the class to act as mine counter measures vessels – features that no refit is able to address. The problem is that the rounded hull design of such vessels – designed to minimize shock damage from

²³ Stephen Preistley. “The Kingston Class: ‘Mid-Life’ or Move Over for the MCDV?” *Canadian American Strategic Review* (June 2006); retrieved from Internet Archive.

<https://web.archive.org/web/20070807040649/http://www.sfu.ca/casr/id-mcdv-midlife1.htm> (last accessed 20 April, 2020).

²⁴ Byers, 9-10

²⁵ Robert Beckhusen, “The U.S. Navy Gives Up on Its Lousy Future Warship’s Main Feature”, medium.com <https://medium.com/war-is-boring/the-us-navy-gives-up-on-its-lousy-future-warships-main-feature-9493f2ab5d7>, last accessed 14 May 2020.

²⁶ Preistley.

²⁷ *Ibid.*

²⁸ Canada. Department of National Defence, Chief Review Services, 1258-201, *Evaluation of Naval Forces*. Ottawa: DND Canada, 2013: 14

²⁹ *The Readiness of Canada’s Naval Forces, Report of the Standing Committee on National Defence*, 23

³⁰ Byers, 10.

exploding mines – and the slow speed at which they are designed to operate result in vessels that have poor seakeeping and patrol capabilities³¹.

Built as a compromise design, even if refitted the MCDVs are too small, too slow and not equipped for the missions they have to fill³².

The RCN has acknowledged that there is a need to reinvest in Mine Counter Measures (MCM) capabilities that the MCDVs theoretically brings to the fleet. However, with no MCM module in use, it is not something that operators of the vessels ever consider³³. Rather than retain the entire class to retain possible capabilities, better to retain one or two hulls to use as a test-bed to evaluate current and future MCM technology such as the German *seehund* remotely operated mine-hunting drones and the troika system³⁴.

AOPS: Square Peg – Round Hole?

Some may argue that the needs of the RCN could be met by simply increasing the number of AOPS constructed to retain the appropriate numbers of ships to make the ‘fleet math’ work. Such an argument does not take into account that the AOPS are not meant to replace the MCDVs but are an addition to the RCN’s capabilities, with the MCDVs or their replacement meant as a complement to the AOPS³⁵.

As already noted, effective coastal patrol requires a vessel with speed and the ability to interdict vessels of interest. Given that the AOPS has a maximum speed of only 17 knots, it suffers from the same need for speed as the MCDVs³⁶. Displacing over 6600 tonnes, with a length of 103m AOPS are significantly larger than the MCDVs and, notwithstanding the manoeuvrability provided by the fitted bow thrusters, they will have a much smaller range of possible domestic port visit destinations, limiting their domestic presence utility³⁷.

Given their intended roles in Arctic waters, the AOPS has command and control facilities, ample storage space, landing craft, a 20 tonne crane and helicopter landing capability; all of which make them ideally suited to maintaining sustained emergency response operations without negatively impacting the population and/or strained resources ashore³⁸. Given that discussion around a dedicated large support ship with significant HADR capabilities has resulted in general agreement that it would be the most used asset in the CAF, it is not unreasonable to assume the HADR capabilities of the

³¹ Masimo Annati and Thomas P. Johansson, “MCMVs Revisited: Technologies, Markets and Programmes” *Military Technology* 7/2005: 79

³² Byers, 10

³³ Former Chief Boatswain’s Mate, HMCS BRANDON, conversation with author, 18 February 2020

³⁴ Annati, 81

³⁵ *Leadmark 2050*: 45

³⁶ Byers, 19

³⁷ *Harry DeWolf*-class offshore patrol vessel, https://en.wikipedia.org/wiki/Harry_DeWolf-class_offshore_patrol_vessel, last accessed 16 May 2020

³⁸ Piche, 21

AOPS would be heavily used³⁹. It is not hard to imagine a scenario with 2 AOPS deployed to the Arctic, 1 in an extended work period and 2 deployed as part of relief efforts during the annual hurricane season in the Caribbean, leaving the RCN with only 1 AOPS to augment the major surface combatants.

Assessing the Choices

With the AOPS ill-suited, and more than likely given their particular capabilities, too busy to take on the roles currently filled by the MCDVs, we must turn our attention to what to replace it with. A relatively new designation which essentially replaces the corvette designation, the Offshore Patrol Vessel (OPV) definition has only really been settled on in the last decade as part of a re-emerging requirement by many nations for a lower-end maritime security (the constabulary role from Booth's triangle) capability⁴⁰. Ranging in size from under 800 tons (large patrol craft) to well over 2500 tons (the lower end of the frigate class), OPVs are seen as a viable, less-expensive alternative to frigates or destroyers with an ability to perform a wide spectrum of operations⁴¹.

Given the need for increased capability to operate in the arctic the AOPS is being built to address, the question of whether or not a new Canadian patrol vessel should also be ice capable must be considered. Such a decision was made by the Royal New Zealand Navy during the acquisition of the offshore patrol vessel portion of their Project Protector fleet recapitalization⁴². With six AOPS ordered for the RCN (and 2 for the Coast Guard) in addition to dedicated Coast Guard ice breakers, there is sufficient operational capacity for the foreseeable future and as such, the cost premium of approximately 18% for AOPS level ice capability would be an unnecessary expense⁴³. This allows consideration of existing ship designs, continuing the trend of "off the shelf" ship designs as the preferred method for the RCN.

Evaluation Criteria

Having determined that any replacement for the MCDVs should fall within the OPV category, consideration can be given on criteria against which potential choices can be assessed. The following are general criteria which can be used to narrow the selection:

Size – the size of OPVs is somewhat dictated by the need for a well balanced weapons loadout along with electronic warfare, command and control and data link systems, and manned or unmanned aviation⁴⁴. Given that the refit of the MCDVs would have added 12m to their length, a vessel of approximately 70m would seem to be a

³⁹ *The Readiness of Canada's Naval Forces, Report of the Standing Committee on National Defence*, 13, 64.

⁴⁰ Dr. Lee Willet, "Patrol Punch: Oceanic OPVs" *Armada International* (April/May 2019): 14.

⁴¹ Stefan Nitschke, "Being Flexible and Mission Oriented: The Growing Task and Market for Offshore Patrol Vessels." *Naval Forces III* (2006): 87-88

⁴² Protector class offshore patrol vessel, Wikipedia. https://en.wikipedia.org/wiki/Protector-class_offshore_patrol_vessel#Ice_strengthening, last accessed 15 May 2020.

⁴³ R.C Braithwaite and D. Khan, "Implications of ice class for an offshore patrol vessel". *Journal of Marine Engineering & Technology* 13:3 (2015): 26-27

⁴⁴ Nitschke, 87

minimum requirement for a future OPV⁴⁵. Most naval vessels of similar length to the MCDVs (55m) are fast patrol craft. Tonnage is somewhat a function of size, with longer ships tending to have greater displacement, but will not form part of the assessed criteria.

Endurance – as with tonnage, somewhat a function of size, given the expeditionary roles currently carried out by the MCDVs, a range within 25% of the current MCDV endurance would be the minimum appropriate for independent deployments.

Speed – The commonly accepted speed necessary for effective Maritime Interdiction Operations (MIO) is at least 25 knots, but the ability to rapidly deploy high speed small boats can somewhat compensate for a slightly slower speed.

Crew – as with other modern warship designs, OPVs utilize automation to reduce needed crew sizes. Given the current crew level of the MCDV of about 35, a similar crew size would allow a one for one replacement without placing undue strain on RCN manning levels.

Aviation – a wide variety of unmanned aircraft systems (UAS) are increasingly being operated from OPVs⁴⁶. Their smaller size makes them well suited to augment the capabilities of vessels that would be too small to operate a helicopter. For example, the US Navy's Cyclone class patrol boats can operate the Puma UAS, providing additional situational awareness for their crews and through data links, operational commanders ashore⁴⁷.

Weapons – the difference between an OPV and a small frigate is often simply the weapons loadout, with OPV intended for lower intensity roles typically only armed with a smaller calibre gun. Dependent on the roles envisaged for a Canadian OPV, a similar weapons loadout to the AOPS would be most appropriate, but as this is typically determined during the final design phase, it need not be considered as part of this discussion.

Using the above criteria, a selection of currently operated or building OPV and patrol craft can be examined for suitability. For the purposes of evaluation, the following scale will be used in the table on the following page:

Red	Well below current or desired capability
Yellow	Reasonably close to current or desired capability
Green	Meets or exceeds current or desired capability

⁴⁵ Byers, 10.

⁴⁶ Nitschke, 96

⁴⁷ Edward Lundquist, “ ‘Cyclone’ Class Coastal Patrol Boat: Small Size is Smart Solution” *Naval Forces* III (2015): 71.

Table 1 – Sample Patrol Vessel Assessment

Class (operator)	Length (meters)	Range (nm)	Speed (knots)	Crew	Size (tonnes)	Note
Kingston (RCN)	55.3	5000	15	35	970	
Hero Class (CCG)	42.8	2000	25	14	253	1
Sentinel FRC (USCG)	46.8	2500	28	24	359	2
Cyclone PC (USN)	54.6	2500	35	28	380	
Protector (New Zealand)	85	6000	22	35	1900	3
Arafura (Australia)	80	4000	20+	40	1640	4
Comandanti (Italy)	88.6	3500	25	70	1520	
Avante 1400 (Venezuela)	79.9	4000	22	30	1700	5
Bir Anzaran (Morocco)	70	4200	22	64	800	
River Batch II (Royal Navy)	90.5	5500	25	58	2200	
OPV 80 (Chile)	80	8600	22	30	1850	6
Notes: 1. The Hero class operated by the Canadian Coast Guard is representative of the Damen group 42m patrol craft operated by many navies and coast guards. 2. The USCG Sentinel Fast Response Cutter includes stern ramp for launching a high speed boat 3. The Protector class is ice-strengthened for operations near Antarctica and is based on a Vard Marine design. 4. The Arafura class, based on the Royal Brunei Navy's Darussalam class it replaces the Armidale patrol boats and includes a stern ramp for boat launch. A Lurssen design. 5. The Avante 1400, produced by Navantia is currently in operation with the Venezuelan Navy but is new enough to be actively marketed by the builder. 6. A Fassmer design, it is also in service with the Colombian navy and being considered by Argentina.						

Source: Adapted from respective Wikipedia pages for above noted ship classes.
www.wikipedia.org, last accessed 17 May 2020

Examining the above table, it becomes clear that the best fit for the roles that the MCDVs currently fill is an OPV in the 80-meter size range, displacing in excess of 1600 tonnes – particularly given the number of offerings in the market⁴⁸. While existing vessels of this size are not able to accommodate a CH148, they do have the flight deck space to operate (and house in modular container) the Skeldar V-200 UAS being acquired for the RCN⁴⁹. Of additional note is that most patrol vessels of similar length to the *Kingston* class are fast patrol craft with more limited endurance. Given the expeditionary roles that the MCDVs are tasked with – and more suitable for than a major surface combatant – such patrol craft would only be suited for home waters and limited hemispheric operations and, as such, are not a suitable replacement given current RCN doctrine.

Conclusion

The RCN has articulated a need to retain the domestic and expeditionary capabilities that are currently provided ‘adequately’ by the *Kingston* class MCDVs⁵⁰. While some of these functions can be carried out by the AOPS, that class’s optimization for JIMP oriented co-operative missions and their HADR suitability means that additional ships will be needed to retain the current capabilities of the RCN⁵¹. This pending capability gap is best addressed through the acquisition of 10 – 12 OPVs of approximately 80m in length. Given the increasing number of expeditionary operations for which the RCN has been tasked, research into the doctrinal suitability of smaller, faster patrol craft for use in domestic and hemispheric operations should also be undertaken.

⁴⁸ All major maritime vessel design firms have at least one complete design for an OPV in the 70 to 80m length, including BAE, Damen, Lurssen, Fassmer, DNSC, Navatia, Fincantieri and Vard Marine.

⁴⁹ Hemanth Kumar and Talal Hussein “Qinetiq to supply unmanned aircraft systems to Canadian Armed Forces” Naval Technology <https://www.naval-technology.com/news/canadian-navy-drones-qinetiq/>, last accessed 20 May 2020.

⁵⁰ *Leadmark 2050*: 42-43, 45

⁵¹ Kelemen, 15

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