CANADIAN NAVAL REVIEW

VOLUME 17, NUMBER 2 (2021)

Suez Canal Blockage

NORAD's Maritime Warning Role: Origins and Future

Towards Multilateral Arrangements Regarding Incidents at Sea in Europe

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Today's Policy Questions, Tomorrow's Policy Leaders

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*A Halifax Transit ferry crosses between two **Halifax**-class frigates, as three frigates and three **Kingston**-class Maritime Coastal Defence Vessels depart Halifax Harbour for Exercise Cutlass Fury 21 on 7 September 2021.*

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Editorial

Training in the Spotlight

As I write this Editorial, the United States has just left Afghanistan in a chaotic and embarrassing scramble. The Taliban took the country quickly – in many places without opposition – as Afghan security forces melted away. Twenty years, many lives lost and billions of dollars spent training and equipping Afghan forces were not enough to stop the Taliban march to victory.

The causes of the failure in Afghanistan are many, beginning perhaps with partnering with the warlords of the Northern Alliance to remove the Taliban in the first place, and conflating the Taliban (the host) with Al Qaeda (the perpetrators) of 9/11. But this is not the focus of the Editorial. Since the US withdrawal from Afghanistan, President Joe Biden has said that there would be no more nation-building missions. Does this mean the end of training missions abroad? *Should* it mean the end?

Canada participates in training missions of foreign forces, and has done so for many years. The Canadian Army in particular has been involved in these programs. For example, it was involved in Bosnia in the 1990s and Afghanistan until 2014. The army is currently involved in *Operation Unifier* in Ukraine to help build security force capability and capacity. The Canadian Armed Forces (CAF) are also participating in *Operation Reassurance*, based mainly out of Latvia, which includes training and exercises employing army, navy and air force assets.

Because of Afghanistan the attention right now is on the efficacy of training missions undertaken on land. But this is a journal about the navy, so what about naval training and exercises? In peace-time navies train in order to be prepared for war. The work that the Royal Canadian Navy (RCN) does with allies (eg., NATO) and like-minded friends (eg., Australia, New Zealand, Japan, South Korea) is focused on improving the ability to work together seamlessly – i.e., interoperability. Interacting with peer-navies is important to enhance war-fighting abilities ranging from layered defence and communication to standardized operating procedures, equipment compatibility, logistics and support, such as re-fuelling warships at sea. To assess this, navies engage in exercises that simulate war-like scenarios in a controlled environment. During an exercise personnel are supposed to accomplish certain tasks to defined standards in accordance with their training. This, of course, raises all sorts of questions about how success is measured. We cannot know – as trainers did not know in Afghanistan – how effective training is until troops are engaged in an actual combat. Training improves readiness, but does not guarantee victory.

Credit: 621st Contingency Response Wing Public Affairs

The last USAF personnel assigned to the 621st Contingency Response Wing head to a Boeing C-17 Globemaster III to leave Hamid Karzai International Airport, August 2021.

There are many naval exercises and training programs. For example, there was the recent Exercise Sea Breeze, co-hosted by the US and Ukrainian Navies, a two-week program undertaken in the Black Sea. There were no RCN ships present but an RCN dive team participated. The exercise focused on amphibious warfare, diving operations, maritime interdiction, anti-submarine warfare, and search and rescue operations.[1] Following Sea Breeze, NATO forces participated in another exercise in the Black Sea, Breeze 2021 a Bulgarian-led maritime exercise.[2] These engagements involved both exercising and training. Perhaps more importantly, they sent a clear message to Russia, and this statement of unity and resolve may have been their biggest value.

Regular exercises between Canada and its key allies can be seen as different from missions in which RCN personnel act as advisors and trainers of the nascent forces of other states. In these cases, the RCN training is in some ways similar to the training of Afghan forces. Indeed it may involve introducing basic concepts of naval processes to

states that are just creating their navies (and coast guards). For example, there have been interactions with African states that have started to build up their navies to enhance security off their coasts (including deterring piracy and terrorism), and protect fisheries and offshore energy facilities. In 2007, the US Navy (US Africa Command) and other NATO navies created Africa Partnership Station (APS). The program is to help African navies enhance security off their coasts. The RCN has not been a major participant in this, but the USN and European navies have been active.

RCN ships regularly participate in Obangame Express, the largest multinational maritime training exercise sponsored by US Africa Command (AFRICOM). The program is designed to improve regional cooperation off the West Coast of Africa. It is also designed to enhance maritime domain awareness, interoperability, information-sharing practices, and the capabilities of regional states to increase maritime security in the region.[3]

Lessons from Afghanistan will (hopefully) be learned in coming years. Some of them will apply to training missions elsewhere, including naval ones. We already know that, at the big-picture level, there are problems with a focus on training military forces in other states. In Afghanistan there were many dedicated personnel, both trainers and trainees. But, even in the presence of smart and committed trainers and students, building up one element of a society – the security forces – is unlikely to succeed without addressing other elements. In the Afghan case, it was short-sighted to train security forces without at minimum tackling corruption and establishing rule of law. Societies are made up of interconnected systems and without addressing foundational systems, building single sectors will likely fail. As well, bureaucracies, including militaries, are resistant to change. You can train as many low-level personnel as you want but if leaders resist changes to a system that suits their purposes, that's a problem. No matter how dedicated and eager Afghan recruits might have been, if their leaders were siphoning off money through ghost recruits, not paying personnel, selling weapons to the enemy, and/or smiling politely at trainers and then ignoring their advice, the training would not be effective. Afghan military personnel were understandably reluctant to fight for an organization that seemed rotten at its core.

There are other questions that should be asked about military training missions in general. First, who picks the training program? Is it something that the locals want, or is it whatever is convenient to the trainers, regardless of relevance to the trainees? Second, is the training just a photo op? According to media releases, all Canadian missions are tremendously successful, but how is success measured? Third, are the correct people involved? Can the people being trained make the decisions that incorporate the training into local forces? Fourth, does the training reek of arrogance or does it encourage learning in both directions? It's a significant responsibility to provide training to other states' military forces. We owe it to them to consider these questions before taking on the mission.

A training instructor observes Canadian Armed Forces members dressing in full chemical, biological, radioactive and nuclear equipment while practicing for Exercise Silver Arrow at Adazi Military Training Area in Kadaga, Latvia, in 2015 during ***Operation Reassurance****.*

The spotlight on training missions may be painful right now as the dust settles in Afghanistan but there is no doubt that exercising and training with other navies is useful. With peer navies, it hones the RCN ability to work with allies to enhance readiness and interoperability. With non-peer navies, the RCN can provide at a minimum some skills that are universal – eg., safe weapon handling, combat first aid and casualty evacuation, mine/improvised explosive device (IED) countermeasures, navigation, etc. – and these skills can be building blocks for nascent forces. And the RCN can learn from their experiences, and gather valuable intelligence such as knowledge about enemy capabilities and war-fighting tactics, techniques and procedures. In addition to honing skills and finetuning procedures, training and exercises allow the RCN to practice naval diplomacy, a key role of naval forces in peace-time.⚓

Dr. Ann Griffiths

Notes

* **The opinions expressed in this Editorial are those of the author.**

1. See "Sea Breeze 2021: An Exercise in the Black Sea," SOF News, 8 July 2021.
2. Michael Manaranche, "NATO Navies Conduct Breeze 2021 Exercise in the Black Sea," *Naval News*, 20 July 2021.
3. See US Naval Forces Africa, "Obangame Express," available at https://www.africom.mil/what-we-do/exercises/obangame-express.

Suez Canal Blockage

Heinz Gohlish and Michael Moon

On 23 March 2021, the ultra-large container ship (UCC) *Ever Given*,[1] on a voyage from Tanjung Pelepas, Malaysia, to Rotterdam, was transiting the Suez Canal northbound, running fifth in a convoy of 20 ships. Shortly after entering, the ship experienced significant crosswinds due to a desert storm and became diagonally wedged across the canal. She grounded both at the bow and the stern. The canal was immediately blocked in both directions and over 200 ships transiting or about to enter the canal were stopped until the blockage was cleared. The queue grew by about 50 ships per day.

The Suez Canal Authority (SCA) immediately dispatched tugs and dredgers to the scene to push the ship back into the central channel. This proved more difficult than anticipated. The tide was of some assistance but the range is small, about half a metre (18 inches). Combined efforts in dredging the canal banks where the ship was lodged and tugs pulling/pushing at both ends at high tide finally freed the ship on 29 March after six days of blockage. *Ever Given* was then escorted to the Great Bitter Lakes where she was anchored until the SCA finally allowed the vessel to leave on 7 July, 108 days after entering.

With further hull checks off Suez, *Ever Given* finally continued with her voyage but would not complete the original planned rotation of discharge ports. Factors included the convenience of those still waiting to receive their cargo, and concerns that some of them, or their insurers, would seek to initiate legal proceedings aimed at detaining the vessel in order to obtain security for their late delivery claims. However, that did not happen. The ship proceeded directly to Rotterdam to discharge some cargo, then to Felixstowe, UK, where all remaining containers were discharged or transhipped. *Ever Given* then continued to Quingdao, China (via the Suez Canal, this time accompanied by two tugs) for drydocking, thus completing the round voyage.[2]

Future developments are now in the hands of insurers and their lawyers, negotiating in accordance with the applicable maritime conventions and laws, the outcome of which will cost the affected parties millions of dollars. In addition, this incident put the spotlight on three key maritime issues: (1) world-wide commercial trade choke points; (2) ship design; and (3) the fragility of the global supply chain.

As maritime incidents go, this one was not particularly unusual. What made it noteworthy is twofold: (1) the immediate impact the blockage had on the global supply chain; and (2) the scale of this impact. Indeed, a single ship involved in a single incident set into motion a series of events that will take months – more likely years – to play out, and involve costs possibly running into hundreds of millions of dollars before the books can finally be closed. This should concern policy-makers and strategic planners on several levels. This article will outline how this scenario came about and identify the ramifications that may affect future maritime policy issues.

An image taken from the International Space Station on 27 March 2021 shows the container ship ***Ever Given*** *stuck in the Suez Canal.*

The Main Actors

The Suez Canal Authority (SCA): The Suez Canal, between the Mediterranean and Red Seas,[3] was opened in 1869 and became the crucial maritime link between the Far East and Europe. Since the Suez Crisis in 1957, the

canal is sovereign property of Egypt which discharges its management responsibilities through the SCA, a "public and an independent authority of juristic personality."[4] The canal is 193 kilometres (120 miles) long with two passing areas – the Great Bitter Lakes and El Ballah. The maximum allowed ship's beam is 77.5 metres (252 feet) and the maximum depth is 24 metres (78 ft) with a maximum allowed draught of 20.1 metres (66 ft).[5] Ships transit in convoy in one direction at a time. In 2019 about 12-15% of the world's seaborne trade and 30% of the world's shipping containers passed through the canal. It is compulsory for all transiting ships to embark an SCA pilot. However, the pilot acts in an advisory capacity only and the responsibility for safe navigation in the canal remains with the Master of the ship.

The canal has been closed before and there have been earlier groundings. The most serious impediment was following the Six Day War when the waterway was closed from 1967-75. The effects of this lengthy closure were disruptive, most seriously for tankers, but the shipping industry adjusted without too many problems. The container industry was then still in its early stages and the supply chain as we know it today barely existed.

The ship operators: There are three principal ship operators involved in this incident and their interlocking relationship is standard for the shipping industry. The ultimate owner of *Ever Given* is Shoei Kisen KK (SKK) of Imabari-shi, Japan. It exercises its ownership though a subsidiary company Luster Maritime SA/Higaki Sangyo Kaisha Ltd. SKK owns over 150 ships of varying types and is itself a wholly owned subsidiary of Imabari Zosen KK, a major shipbuilder. The day-to-day management of the ship – crew and technical – is subcontracted to Bernhard Schulte HKG LP of Hong Kong, which is a subsidiary of The Bernhard Schulte Group of Hamburg. Their relation with the owners is governed by a management contract.[6]

The final key participant is the ship charterer – in this case Evergreen Marine Corp. Ltd of Taiwan, which operates hundreds of owned and chartered ships. The charterer's contract with the ship owner is found in the charter party. In this case, it was a time charter and therefore the responsibility for the operation and navigation of the ship remains with the owner. The time charterer's primary responsibility is the employment of the ship. That is, the charterer arranges the cargo, loads the ship, directs the ship to its destination(s) and delivers the cargo to the receiver(s).

The time charterers do not own the cargo but transports it under their care, custody and control. The governing document for this is the Bill of Lading (B/L) which contains the terms of the contract between the shipper and the carrier. Evergreen, which is likely to have procured much of the cargo for the vessel, will have issued each of its shipper customers with a B/L identifying itself as the carrier of the cargo. Evergreen is likely also to have chartered space out on the vessel to the pool partners with whom it is engaged in providing the joint service. Those partners will issue their own Bs/L to their shipper customers. A space charter agreed among the pool partners will address who between them will pick up the liabilities following an incident, once they have each paid their customer claims.

Credit: Kees Tom, Port of Rotterdam

Ever Given *arrives in Rotterdam in the early morning of 29 July 2021 after its grounding in the Suez Canal.*

Following an incident, it becomes the responsibility of the relevant liability insurers to disentangle this web of contractual and legal obligations and ultimately to pay for it. This is conducted in accordance with the local jurisdiction (Egypt), the jurisdiction of the relevant B/L contracts and in accordance with applicable international conventions which are most likely incorporated into the contracts or through accession to the relevant conventions by Egypt or the flag state (Panama).

The liability insurers: There are four key parties whose liability insurers will determine who is to be compensated, the level of compensation and who ultimately pays: the SCA; Shoei KK; Evergreen; and the various cargo interests. The SCA will likely escape liability unless it can be proven that the incident was caused, at least in part, by the authority's negligence (eg., failure to maintain advertised depth).

SKK and Evergreen, for their part, will rely on their respective P&I Club – third party insurers for ship owners/charterers, who indemnify their members for contractual and legal liabilities in the operation of their ships. For SKK this is the UK Club based in London, and for Evergreen this is the Gard Club based in Arendal, Norway. The UK Club has already appointed a leading maritime law firm to work with its in-house legal team. The various cargo interests are less concerned about liabilities (they have none), but are very concerned about cargo damage and delay. Their insurers will be scattered world-wide.

Claims

The owners of cargo who have suffered loss because of the physical deterioration of their cargo while detained in *Ever Given* will look to be compensated by their cargo insurers. So, too, will those cargo owners who have suffered financial loss by, for example, being unable to meet their contractual commitments in a supply chain. Provided the losses fall within the terms of the relevant policies, these claims should proceed routinely.

Having paid the claim, the law permits the insurer to step into the shoes of the cargo owner and submit a claim for reimbursement against the relevant carrier identified in the B/L.[7] This is a complicated procedure requiring a forensic examination by maritime lawyers and nautical experts of all the circumstances giving rise to the grounding, aimed at determining its exact cause. The contractual undertakings the carrier has assumed under the B/L will then need to be determined, and a view formed whether or not the carrier is in breach of those obligations. In the circumstances of the grounding of *Ever Given* it can be anticipated that these enquiries will focus on the vessel's seaworthiness, suitability and preparedness for transiting the canal, the operation and actions of the pilots and crew leading up to the grounding, and the possible intervention by outside forces such as wind. These investigations will take months if not years to complete. While many claims are likely to be settled amicably, it is possible that some could rumble on for years in the courts.

The owners of cargo carried on the many vessels prevented from proceeding through the canal have also been severely affected. Insofar as they have suffered physical or financial loss, their first port of call for recompense will again be their cargo insurers. However, for these insurers, the prospects of any recovery from a ship interest look fraught with difficulty. These cargo interests have no contract with any of the interests engaged in the *Ever Given* enterprise upon which to found a claim, and there would seem little point in claiming against their own carrying vessel in each instance, as no fault can attach to those ship owners simply because of their inability to proceed brought about by matters beyond their control. The unfortunate grounding of another vessel ahead of them in the queue was not something they could reasonably have anticipated.

To these complex issues should be added the possibility that SKK may wish to recover its costs incurred in refloating the vessel by requiring the various cargo interests to contribute to these in general average. This centuries-old principle of maritime law permits ship owners, who have assumed the financial burden of refloating the vessel, to recover the costs they have incurred from the other parties to the venture, usually the cargo interests, in proportion to the common interest they have in the vessel. To succeed the owners will have to show that no fault attached to them for the grounding. The legal hurdles to be surmounted are considerable, and it remains to be seen whether the ship owner will actively pursue claims against those owning the cargo.

Credit: Suez Canal Authority

A convoy of merchant vessels transit the Suez Canal in an undated photo.

Lessons

The proximate cause of the incident is yet to be formally determined (or released). At present the most likely cause is high winds due to a sandstorm. This scenario raises two immediate points:

1. The canal is not fully dredged side to side. This means that bigger ships, such as *Ever Given*, can navigate safely only in or near the centre of the canal.
2. If the ship was helpless against high crosswinds, and barring crew error, there must be a defect in either the manoeuvrability of the ship or in the design of the ship.

It is at present SCA policy not to attach tugs to a ship while transiting the canal. Since the ship cannot simply drop anchor in the middle of the canal during poor conditions and wait, it is expected that the ship must be capable of dealing with all reasonably expected conditions. Sandstorms across the Suez Canal are not unusual, given that the canal is bordered on both sides by desert. This leads to the question whether ships such as *Ever Given* are inherently unfit for such navigation. This of course is not a reflection of the ship itself which no doubt is soundly built and in accordance with standards, but rather with recent developments in building container ships as a generic class. There are two relevant issues that affect this incident: superstructure; and engines.

Since the beginning of commercial containerization at sea in the mid-1960s,[8] container ship owners have followed the simple economic principle of reducing marginal cost, i.e., each additional container should cost less to carry than the previous one. Therefore each new generation of container ships became significantly larger than the previous. Container numbers were soon in the thousands and are still increasing.[9] The ships have been getting wider, deeper and higher.

It has been suggested, and reinforced by *Ever Given*, that the level of 'peak container ship' is now being reached. The first limitation is water depth and, with a ship's draught approaching 16 metres (52 feet), even the major deep water ports are struggling (Halifax being an example). Yet the ships are still getting bigger and, because they are not able to increase the draught without reducing the available ports, the tendency is to increase the beam and stack higher. Ships are now stacked 24 containers wide, eight containers deep in the hull, and nine containers high on the superstructure bow to stern. The consequence is that wind on the beam will strike a floating steel wall some 400 metres wide and 40 metres high (known as the 'sail area'). That may be acceptable on the high seas but can be disastrous in restricted water. Powerful engines are required to compensate.

Yet container ships are now being built with *less* total power. The standard for UCCs until recently has been two main engines, two shafts, two propellers and two rudders. *Ever Given* (and other recent builds) has only one of each.[10] These single engines are more reliable, have redundancy components and generate more power per engine. However, it is not just a matter of power and reliability but of the ship's manoeuvrability. In open waters there is likely no issue, but when operating in restricted waters at slow speeds or while stopped and without tugs' assistance, there may be problems under conditions as met by *Ever Given*.

There is also the possibility of a speed and control dilemma in this particular situation. It should be noted that in a Suez convoy the speed is set by the SCA. A reasonable speed will give the Master better control to maintain course against adverse winds. However, this may lead to the 'shallow water effect' in the canal.[11] *Ever Given* had as little as 4.5 metres (15 ft) of water under the keel and that, at even moderate speeds, could cause the stern to settle, which in turn could lead to loss of control in steering. The solution is to slow down but there then comes a point where the single engine cannot sufficiently counteract against a strong crosswind pushing against a massive sail area. Two engines, even each with less power, might have been more effective in holding the ship's course.

Conclusions

The task now is to evaluate the consequences of the Suez Canal blockage and then to outline the remedies necessary to mitigate the damages and prevent future occurrences. On the face of it, no serious physical damage was caused by the incident: no pollution, no crew injury, no infrastructure damage and likely only minor ship damage.[12] Since the crew had to remain in the vessel for an extended period of about four months, there may be crew compensation issues. This will depend on the crew contracts negotiated between SKK and Schulte. The principal damage therefore is the consequence of delay for the blocked ships which is mainly for the late delivery of the

Credit: Suez Canal Authority

The container ship ***Maersk Sheerness*** *transits the Suez Canal in this undated photo.*

cargo in accordance with contracts – and there will be thousands.

The Suez Canal itself has become a claimant with an estimated loss of revenue of $60 million (US), although a good part of that will have been recovered when the congestion cleared, as well as considerable salvage and dredging expenses. SCA prevented the ship from leaving the canal by reportedly[13] seeking compensation of $916 million from the ship owner. It was reported that this was later reduced to $550m. An agreement was reached 4 July although the total compensation is not known as the SCA signed a non-disclosure agreement with the owners.

There are two further important issues: cargo on board *Ever Given*; and cargo on board all the other ships which were denied a timely passage. A rough estimate of the value of the cargo within the 18,000 containers on board *Ever Given* is $775 million (US).[14] The latter group could be as many as 400 ships. This includes those ship owners who attempted to cut their losses and diverted around Africa, involving both additional fuel costs and adding about 10 days (at 20 knots) to the voyage time. Thousands of cargo owners now face contractual issues with hundreds of thousand of customers. The value of all this cargo could top out at $60 billion.[15] Of course, most of this cargo will eventually be delivered without consequence, but a significant proportion will be time sensitive – mainly refrigerated cargo, seasonal products and just-in-time industrial inputs. The modern supply chain is unforgiving.

Finally, there is the matter of ship design and available sea room. These huge ships regularly pass through three congested and shallow shipping choke points: the Strait of Malacca (average depth 25m); the Panama Canal (15.5m); and the Suez Canal (20.1m). Such shortcuts suit the ship operators and save time and fuel costs. They also suit environmentalists and those invested in the global supply chain. However, there is a cost.

Credit: Petty Officer 1st Class Sabrina Clarke, US Coast Guard

*CMA CGM **Theodore Roosevelt**, a 1,200-foot long container ship, passes under the recently elevated Bayonne Bridge connecting New Jersey and New York on its maiden voyage to the United States in September 2017. **Theodore Roosevelt** was the first large capacity container ship to transit under the bridge after the project to raise the bridge was complete.*

Credit: CMA CGM

Two LNG-powered container ships of the French shipping line CMA CGM are pictured here during trials in China in July 2021. Note the single propeller arrangement, which may reduce manoeuvrability at low speeds, increasing the risk of situations like that experienced by ***Ever Given****.*

There are some key issues which will likely feature in the formal investigations and in the legal proceedings among the various affected parties:

1. Suez Canal: The point may have been reached where this canal is no longer adequate for the size of ships now being built. A second, parallel channel extending end to end is becoming a necessity, complete with cross-over channels to avoid future blockage. The SCA should also review its policy of routing the deep draught mega-carriers in convoys. Perhaps they should travel independently with tugs attached forward and aft. Such ships need the ability to proceed dead slow in shallow water.
2. Ship design: If, however, the mega-carriers are designed to navigate through narrow and shallow passages, they should be built for greater independent manoeuvrability. Ideally, this means at least two engines and two propellers.
3. Maritime choke points: If the above come with an unacceptable cost, consideration should be given to reducing the maximum size of future UCCs or, for large UCCs, increasing the length of the global supply chain.

It is difficult to underestimate the financial fallout of an incident of this magnitude. The insurance and legal ramifications will take years to resolve as the interested parties, their insurers and lawyers tussle over who should bear the consequential losses. What is clear is that the shipping and insurance industry have been taught a salutary lesson, and will be pondering long and hard the wisdom of operating and insuring ships of such magnitude, particularly when proceeding in confined and congested waters.

Notes

1. *Ever Given* was built 2018; 219,079 gt, 199,489 dwt, 400m long, 59m beam, 16.5m max. draught, capacity 20,388 teu; Flag Panama; Class ABS. Sources: equasis.org, marinetraffic.com, vesseltracker.com.
2. ETA is 17 September. See www.vesseltracker.com.
3. The difference in water level between the two seas is measured in centimetres, with a slight flow in both directions depending on the season. There are no locks in this canal.
4. Suez Canal Authority, available at www.suezcanal.gov.eg.
5. *Ibid*.
6. Electronic Quality Shipping Information System, available at www.equasis.org.
7. Known as 'Rights of Subrogation.'
8. The purpose-built container ships of this era had a capacity of just over 1,000 teu.
9. The next batch, due for delivery 2022-23, will be in excess of 24,000 teu – i.e., 12,000 boxes measuring 40' x 8' x 8'.
10. For propulsion, the ship has a single diesel engine coupled to a single fixed-pitch propeller.
11. 'Shallow water effect,' called 'squat effect' in the UK, is explained by Bernoulli's principle and is particularly pronounced in a canal. It is reported that *Ever Given*'s draught during the canal transit was 15.6 metres (source: marine traffic.com). SWE could start at a depth/draught ratio of about 4. The ratio here was about 1.5 at best (24/15.6).
12. The ship itself is insured for $140 million by Hull & Machinery insurers, likely in the Japanese market, which does not involve the liability insurers.
13. As reported on BBC2, 6 July 2021.
14. *Ibid*.
15. Lloyd's List estimated the daily build up of delayed ships collectively involves $9.5 billion of cargo. For an explanation of how P&I Clubs deal with such enormous compensation figures, see Heinz Gohlish, "Strategic Maritime Planning and the Role of P&I Clubs," *Canadian Naval Review*, Vol. 13, No. 4 (2018), pp 18-19.

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NORAD's Maritime Warning Role: Origins and Future

Andrea Charron and James Fergusson

Credit: MC2 Kaleb Sarten, US Navy

*US Air Force General Glen VanHerck, commander of North American Aerospace Defense Command and US Northern Command, visits the sonar control room aboard the **Arleigh Burke**-class guided-missile destroyer USS **Mitscher** (DDG 57) in the Atlantic Ocean on 6 February 2021.*

In 2006, the binational North American Aerospace Defence Command (NORAD), a then exclusively aerospace domain command, acquired a new mission in a new domain – maritime warning. The new mission had little, if anything, to do with traditional military threats to North America. With the Cold War long over, a globally dominant United States, and the absence of any existential military threat to North America, the new mission was simply part of the fallout from 9/11, and one response to the American-led 'war on terror.'

Roughly a decade later, however, the transformed geopolitical and geostrategic environment placed traditional military threats back on the defence agenda. This did not mean that the terrorist threat to North America had simply disappeared. On the contrary, the two combined in some ways to merge homeland defence and security together, especially within the maritime domain. The nexus of this merger of threat environments was largely the function of a common technology, which cut across the traditional state and non-state divide. For example, an otherwise peaceful merchant ship becomes a platform from which to carry or launch weapons of mass destruction. In keeping with new thinking about homeland defence, focus turned from the 'arrows' (the weapons) to the 'archers' (the launch platforms).

New, long-range submarine-launched cruise missile (SLCM) capabilities, Russia's in particular, raised doubts that naval forces could intercept the archers before they reached their launch points. In other words, the maritime threat environment could morph into an air-breathing one[1] if missiles, drones or other air-breathing threats are launched from a ship or submarine. The problem is that while NORAD may warn of a maritime threat, it cannot defeat it if it is not an air-breathing threat. The same functional logic that called for NORAD to have an aerospace warning *and* air defence role should also apply in the maritime domain. This, in turn, suggests that a binational solution in a different or 'new' maritime threat environment

Credit: Cpl Vic Lefrancois, DAPAir

CF-18 Hornet and Russian Su-27 fighters practice procedures to transfer a simulated hijacked airplane from Russian to American airspace during the North American Aerospace Defense Command Exercise Vigilant Eagle on 28 August 2013.

would be logical; one that goes beyond the longstanding bilateral nature of naval cooperation between Canada and the United States (CANUS). In practice, however, there is great political resistance on both sides of the border to integrating new missions into the NORAD agreement. For now, attention should be on maximizing the potential of this warning mission.

In order to understand this new maritime environment and NORAD's potential future role, it is useful to examine the origins and evolution of the maritime warning mission. This examination exposes the obstacles faced by NORAD in engaging the existing North American maritime organizations. This naturally leads to a review of the defence challenges confronting North America and CANUS defence cooperation.

Beyond its experience in the aerospace domain, NORAD's maritime warning mission was based upon significant developments that quickly occurred both at the national and bilateral level after 9/11.[2] The first pressing requirement was to encourage intelligence sharing to counter the 'stove-piped,' multiple actor maritime world. Both countries took steps to promote intelligence sharing across their respective maritime communities. For example, Canada established three Marine Security Operations Centres (MSOCs) in 2004 located on the East Coast (also responsible for the Arctic), West Coast and the Great Lakes. The former two are led by the Department of National Defence (DND)/Royal Canadian Navy (RCN) and the latter by the RCMP. In addition to the RCN and the RCMP, the Canadian Coast Guard (CCG), Transport Canada, the Canadian Border Services Agency (CBSA) and Fisheries and Oceans are present. The MSOCs enable partner government departments to work together and share intelligence, surveillance and reconnaissance information (within the legal mandate of the agencies/departments) about vessels of interest.

The United States created the National Maritime Intelligence-Integration Office (NMIO) to facilitate and coordinate maritime intelligence sharing, but not until January 2009. NMIO is led by a Rear Admiral and partners with 17 US military and civilian agencies. NMIO's focus is global as opposed to the national focus of the MSOCs. NMIO tracks three persistent challenges: bad actors; polar issues; and managing the overwhelming amount of data. It also has three foci: threats to maritime critical infrastructure; advanced technologies; and threats to sea lines of communication.[3]

NORAD, however, is not formally engaged with these actors in their processes. Instead, NORAD resides at the end of the maritime intelligence 'food chain.' In particular, the navies are responsible for generating a national maritime common operational picture (COP), which includes intelligence from the military and civilian sectors. The integrated North American maritime COP is generated by US Naval Forces Northern Command (USNAVNORTH to the USNORTHCOM Commander[4]) located in Norfolk, Virginia, which receives the Canadian COP from the RCN's operational support and intelligence centre (TRINITY) in Halifax (which will include information from the MSOCs).[5] NAVNORTH will also incorporate information from allies and from NMIO.

The subsequent North American maritime COP is transmitted, in various forms, after filters have been applied to scrub out nationally sensitive information. NORAD became one of the recipients of this maritime COP. NORAD's maritime personnel, who receive the maritime COP, provide no input into the process, and have no direct involvement in its creation. If necessary, the NORAD/USNORTHCOM Command Center (N2C2) maritime desk can reach out directly to CANUS security and defence offices for clarification, but NORAD's main function is as an intelligence fuser. At the end of the chain, NORAD sees much of what others have seen and assessed. NORAD provides a final set of assessment eyes on the maritime COP and may choose to issue a maritime advisory (to warn of an emerging threat) or warning (a confirmed threat) through formal mechanisms to the respective maritime communities and actors, and the respective National Command Authorities (NCAs).

Not surprisingly, NORAD's entrance into the maritime defence and security domain was not an easy one, and the maritime community was not welcoming of the perceived usurpation of a navy-only activity. While some, such as US Admiral Vern Clark, the Chief of Naval Operations in 2002, recognized the need to track inbound vessels, the idea was to have a separate "maritime NORAD" and not for NORAD to have a maritime role.[6] Besides the fact that the decision to assign a maritime warning mission to NORAD was top-down, with apparently little, if any, input from the maritime security community, what role was there for maritime actors in an aerospace-dominant NORAD? The lack of a strategic communication plan to communicate with the multi-faceted maritime community, and especially with the respective navies, was also not helpful.

The aerospace and maritime domains were distinctly different. For example, speed is vital in the process from threat identification to response in the aerospace domain, but it is not in the maritime domain, simply because ships move more slowly – or so was the common refrain heard amongst critics of the new role for NORAD. NORAD assessors, critics continued, would simply see what others in the community had also seen and assessed, and thus NORAD appeared as not only redundant, but also as a veiled critique or attack on the analytical work of the maritime community. Finally, NORAD's entrance into the maritime world raised fears that a new maritime warning mission was the first step to NORAD assuming maritime control from the navies, highlighting environmental jealousies.

These critiques and fears, however, were misplaced. First of all, the NORAD of the past had significantly transformed. It was no longer an exclusively aerospace military organization, reflecting the blending of the heretofore separate defence and security domains. After 9/11 US Federal Aviation Administration (FAA) personnel were brought into the command, and the establishment of the Binational Planning Cell and Binational Planning Group brought naval personnel and US Coast Guard personnel into the fold. Second, the creation of USNORTHCOM was instrumental in getting military and civilian personnel in many domains in contact with each other and, by extension, with NORAD personnel. USNORTHCOM's co-location with NORAD headquarters, with a dual-hatted common commander, an integrated N2C2 and its maritime control mandate that extended over the coastline and out to 500 miles in the Atlantic, all helped to transform the NORAD environment and mindset.[7] USNORTHCOM, with its responsibility in the maritime and land domains, brought

Credit: MCpl Angela Abbey

*HMCS **Whitehorse** (shown here) assists HMCS **Winnipeg** in escorting MV **Sun Sea** to a port on Vancouver Island, 12 August 2010.*

US Navy, US Coast Guard and other civilian security personnel into the headquarters. Personnel from roughly 60 other US government departments were represented in USNORTHCOM, and thus accessible to NORAD.[8]

The first test for NORAD's maritime warning role, however, didn't come until three years after the mission was acquired. This happened when MV *Ocean Lady,* a derelict freighter that left from Pangkal Pinang, a port city on Indonesia's east coast, popped up off the coast of British Columbia in June 2009. This voyage exposed the lack of intelligence/information sharing among all of the organizations involved (among other issues), creating lessons learned for future, improved cooperation.[9] The arrival in August 2010 of MV *Sun Sea* carrying 492 Sri Lankans to British Columbia demonstrated improved information sharing and NORAD's value added, such that all of the relevant security and defence actors were aware of the threat. Most importantly, NORAD issued its first maritime notice with the *Sun Sea* arrival. Issuing a warning, however, did not quite fit the circumstance and so NORAD created a new category of 'advisories.'

But while NORAD was now issuing these notices, there was no feedback loop to NORAD as to what national actions had been taken vis-à-vis the notices. This meant that it was difficult for NORAD to gauge the relevance, timeliness and usefulness of its products. This lack of feedback, however, was somewhat hidden given that national representatives within NORAD could access this information informally and 'everyone knew everyone' in the maritime community, especially on the Canadian side. This informality was widely accepted, but it meant that the few key naval personnel within NORAD became vital as the go-to-source for information. On the one hand, this made for quick answers when needed because the key source phoned his/her key source for the relevant information. On the other hand, this meant that there was no redundancy in the system and the potential for single points of failure when *the* go-to-person changed positions.

The number of warnings and advisories to date has been few as shown in Table 1. We have no way of knowing (other than the fact that there has been no attack on North America that has emanated from the maritime approaches) if these few advisories and the one warning are a true reflection of the dataset of possible events. In theory, the RCN and USN will have responded to all possible threats in advance of NORAD needing to issue advisories or warnings. Given, however, that all-domain awareness (especially in the form of data, information dominance and 'decision superiority') is the new focus of NORAD,[10] more data and information should be made available for future analyses.

Table 1: Number of Warnings and Advisories issued by NORAD Since its First in 2010.

YEAR	#	YEAR	#
2010	1	2016	11
2011	0	2017	6
2012	4*	2018	5
2013	9	2019	14
2014	14	2020	7
2015	3		

** The only warning (a confirmed threat) was in 2012. The rest have all been advisories (to warn of a possible/emerging threat).*

Particulars of the advisories and warning are classified. It would be fascinating to know why there was a spike in 2014 and 2019 and quite a dramatic drop in 2015 and 2020. Was it a function of more or fewer vessels? Or new processes including filters at NAVNORTH? Or even new personnel, the pandemic or perhaps a change within a civilian organization? For example, are the advisories in 2014 associated with Russian activities in the Black Sea? And perhaps the reconstitution of the USN 2nd Fleet in 2018 might have resulted in more advisories in 2019? Or are the numbers a function of where the maritime analysts 'sit' in NORAD? They were once in the J-32 (the operations intelligence cell) but now are incorporated in the N2C2, the command centre. Which is optimal for the intelligence fusion function? These questions suggest that a dedicated review of NORAD's maritime warning mission is overdue.

What the maritime warning role has done is forced NORAD (and hence especially Canadian and American air force personnel) to think beyond the aerospace domain. Consider, for example, the importance of a maritime warning role during a pandemic. Similar to the tracking of ships that may be suspected of carrying the Ebola virus (especially between 2014-16 during the large outbreak in West Africa), the NORAD maritime warning mission can warn of vessels that may be approaching North America with suspected cases of COVID-19 to provide advanced warning to public health officials to prepare for their arrival, especially in the future as travel begins to resume in a world of uneven vaccination rates and new variants. Closely related, there are also the various 'support' initiatives that have appeared over the last decade or so as maritime domain awareness/warning deepened and broadened. It is clear that the NORAD-initiated annual CANUS Maritime Stakeholder Conferences (which were last held in 2019),[11] as well as other education/joint exercise efforts, have raised NORAD's profile within the maritime defence and security community, and facilitated information sharing. An evaluation of their continued

Credit: Staff Sgt. Thomas J. Doscher, US Air Force

Master Corporal John Bowden, an Airborne Electronic Sensor Operator from 407 Long Range Patrol Squadron, demonstrates a CP-140 Aurora's electro-optical infrared sensor to Major Brian Martin from NORAD Public Affairs on 18 January 2013. The Aurora and its crew were at Peterson Air Force Base, Colorado, as part of pilot upgrade training and to learn about their role in NORAD maritime warning.

utility and relevance may prove a useful exercise today.

Now that the focus of the US and Canadian militaries is to achieve all-domain awareness[12] – i.e., connect sensors from all of the military services so that there is simultaneous awareness of the sub-maritime, maritime, land, air, space and the cyber domains – NORAD's maritime warning role looks less out of place. It is still, however, not used to its full advantage. Black swan (an unknown unknown), gray swan (anticipated but highly unlikely) and pink flamingo (predictable but ignored) events need to be considered and at the end of an intelligence fusion cycle seems an opportune time.[13] What is more, given NORAD's global area of operations, the warning role is a force multiplier for both countries. While we hold out hope for an eventual binational North American Defence Command that encompasses warning and control missions for all domains, understanding and making full use of NORAD's maritime warning role, far from threatening the USN and RCN, will strengthen continental defence.

The political resistance to opening the binational agreement, not least of all because one never knows what could be added or deleted, is longstanding. Given that NORAD modernization is the key issue for CANUS defence and Canada is viewed as the resource allocation laggard, it is not the time to open the agreement. More attention, however, is needed on the bilateral maritime control side of the relationship. The USN, for example, since 2015 must report to the Commander of USNORTHCOM when action is taken with respect to a NORAD warning or advisory but there is no requirement on the Canadian side. Now with the re-institution of the US 2nd Fleet and NATO's new Joint Force Command Norfolk (the new Supreme Allied Commander Atlantic (SACLANT) 'replacement') – both in Norfolk, Virginia, and both with similar areas of responsibility, including areas within the RCN's area of responsibility – more coordination and information sharing is recommended. NORAD's maritime warning could be a boon for the newly operational fleet/forces as well as for all-domain awareness but only if information from NORAD, a key command protecting North America, is valued.

Notes

1. Air-breathing threats include any vehicle that has an engine requiring the intake of air for combustion of its fuel. This contrasts with a rocket missile which carries its own oxidizer and can operate beyond the atmosphere.
2. For full details of the intelligence-sharing process, see Andrea Charron, James Fergusson and Nicolas Allarie, *Left of Bang: NORAD's Maritime Warning Mission and North American Domain Awareness* (Winnipeg: Centre for Defence and Security Studies. 2015).
3. National Maritime Intelligence-Integration Office (NMIO), "Our Strategies, Priorities and Alignment."
4. The Commander of NAVNORTH is also the Commander of US Fleet Forces Command.
5. For a detailed analysis, see Charron, Fergusson and Allarie, *Left of Bang*, pp. 23-24.
6. Guy Thomas, "A Maritime Traffic-Tracking System Cornerstone of Maritime Homeland Defense," *Naval War College Review*, Vol. LVI, No. 4 (2003), p. 138.
7. The N2C2 is fully integrated, except for J-3 (Operations). There is N/J3 = NORAD Joint Operations Directorate and NC/J3 = USNORTHCOM Operations Directorate.
8. Canada, however, did not follow suit, except in the provision of RCN personnel. There are no NAVCANADA personnel present at NORAD Headquarters. As CANUS cooperation in the maritime and land domains, notwithstanding MW, is strictly bilateral in nature, the image of other Canadian government department representation as liaisons to USNORTHCOM remains politically problematic.
9. Individual agencies and departments were aware of the ship but they were not able to share the information effectively. Note, all intelligence is information but not all information is intelligence. Intelligence is information that informs (government) policy. See Mark M. Lowenthal, *Intelligence: From Secrets to Policy* (6th ed.; Washington: CQ Press, 2014), p. 2.
10. NORAD and USNORTHCOM, "Strategy: Executive Summary," March 2021, p. 7.
11. NORAD no longer serves as a tri-chair principal in the CANUS Maritime Domain Awareness Partnership with Transport Canada and NMIO.
12. All-domain awareness is US parlance; in Canada, it is referred to as pan-domain awareness.
13. See Frank Hoffman, "Black Swans and Pink Flamingos: Five Principles for Force Design," *War on the Rocks*, 19 August 2015.

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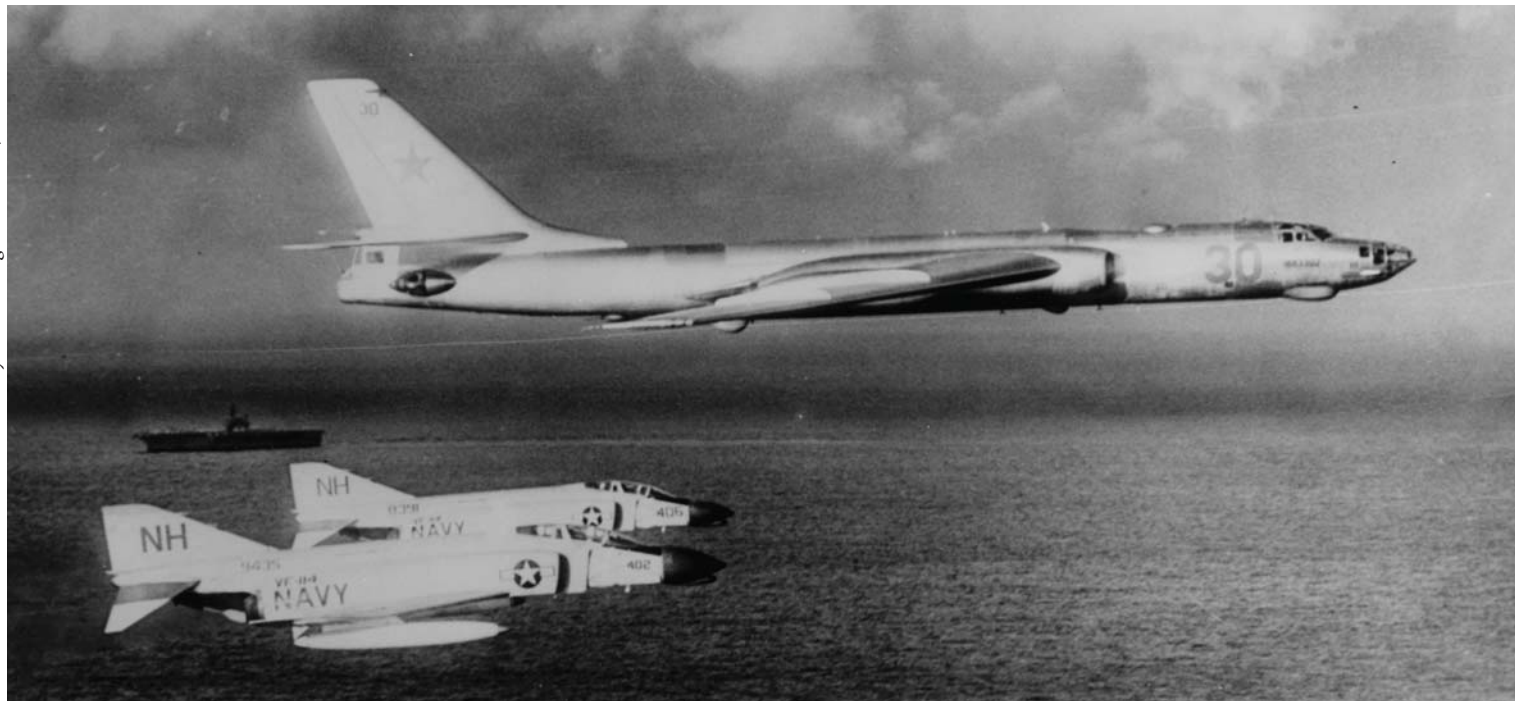
Towards Multilateral Arrangements Regarding Incidents at Sea in Europe[1]

David F. Winkler



Credit: National Archives and Records Administration, via Naval History and Heritage Command, #USN 1068600

A Tu-16 Badger of the Soviet Naval Air Force overflies the aircraft carrier USS ***Kitty Hawk*** *whilst being escorted by a pair of F-4B Phantom II fighters, January 1963.*

As relations between NATO and Russia remain cool, a review is necessary of established regimens designed to ensure that unplanned incidents between military forces do not escalate into conflict. In recent years, the waters in the East and South China Seas have become somewhat contentious, yet there may be lessons learned from the regimens established by Western Pacific maritime states that have applications to the relationship between NATO and Russia.

To place the current situation in historical context, during the Cold War, militarized borders separated the ground forces of the two opposing blocs and generally limited confrontation. Not so on the ocean commons where beyond the 12-mile limits of national territorial waters, the navies of NATO would regularly engage with the maritime forces of the Warsaw Pact. This often led to some unfortunate encounters.

For example, on 25 May 1968, the American aircraft carrier USS *Essex* and her escorts were on a submarine-hunting mission off the coast of Norway. On this day, *Essex* lookouts spotted a Soviet Badger bomber on patrol. On the flight deck a US Navy S-2 Tracker aircraft piloted by Commander Russ Dickens moved into position over the catapult. He looked up to see the tail section of a Badger pass in front of the bow. Dickens then observed the low-flying plane turn about two miles from the ship and cartwheel into the water.[2]

The Commanding Officer of *Essex* had two immediate concerns: (1) rescue any survivors; and (2) alert authorities so this was not misconstrued by the Soviets as a hostile act, an opening shot leading to World War III. *Essex*'s rescue helicopter found no survivors, but boats did recover human remains. Messages were sent to Washington about the situation. As the Soviet Embassy received news, USS *Warrington* also passed a message to a Soviet destroyer patrolling some 100 miles away from the crash site. That destroyer immediately proceeded to the vicinity of *Essex*. After the Soviet warship joined up with *Essex*, arrangements were made for the transfer of remains. Commander Edward Day, the operations officer, had the task of escorting the remains to the Soviet ship. As Commander Day's boat was placed in the water, the Soviet destroyer took station astern of the American carrier. As a tribute to the fallen naval aviators, the Americans flew the 'missing man' formation in S-2 Trackers. The Soviets also rendered honours in the form of a gun salute.

Nearly three years later, in the wake of a collision between a British aircraft carrier and a Soviet destroyer off Crete that killed two Soviet sailors, a team of mostly American naval officers traveled to Moscow to discuss safety at sea

Credit: Mass Communication Specialist 3rd Class Emily Johnston

Retired US Senator and former Secretary of the Navy John Warner speaks with Russian and US Navy delegations during the annual INCSEA consultations in Washington, DC, 18 July 2019. Warner signed the original 1972 INCSEA agreement with Soviet Fleet Admiral Sergey Gorshkov.

measures. Day, who was now Captain, headed the American working group discussing aviation safety. He made little headway with Deputy Chief of Staff for Naval Aviation, General Major Nikolay I. Vishensky. One proposal tabled by Vishensky obligated each side to fly no closer than 1,500 metres from the other's warships. The Americans found this distance unacceptable due to the limitations it would place on aircraft performing reconnaissance missions on Soviet surface warships, and such a distance limitation could have given Soviet surface ships the capability to provide sanctuaries for Soviet submarines from low-flying American anti-submarine warfare (ASW) aircraft. Another Soviet proposal called for a 12-hour warning before any mass launching of aircraft from aircraft carriers. Day quickly dismissed this overture.[3]

With little headway being made, Day decided to try a different tack. He opened a session by telling the story of how in 1968, he had the solemn task of returning the body of a dead Soviet naval aviator to an awaiting Soviet destroyer. He concluded with a statement on the necessity of preventing such tragedies in the future. Becoming emotional, Vishensky informed Day that the body he had returned was that of his son.[4] From that point on, the two men achieved progress as the air working group focused on obligations of aircraft operating in the vicinity of opposing warships, and establishing navigational and identification signals between opposing aircraft and ships operating in proximity.[5]

These provisions were eventually incorporated into the "Agreement between the Government of the United States of America and the Government of the Union of Soviet Socialist Republics on the Prevention of Incidents on and over the High Seas" (INCSEA) signed by Fleet Admiral Sergei Gorshkov and Navy Secretary John W. Warner. INCSEA contained 10 articles. Article I spelled out definitions for warship, aircraft and formation. Article II directed both sides to remind their ship captains to abide by the established international regulations for preventing collisions at sea, commonly called the COLREGS or Rules of the Road. Article III instructed both sides to refrain from evading the COLREGS, especially against ships engaged in underway replenishment or aviation operations. Article III also ruled out other provocative behaviours, such as aiming weapons, launching objects, or pointing searchlights in the direction of the other party.

While Article III satisfied many American concerns about surface ships, Article IV addressed Soviet concerns about 'buzzings' by forbidding aircraft from performing simulated attacks or dropping objects in the vicinity of a surface ship. Article V discussed use of navigation lights, and Article VI directed each side to forewarn the other of danger by using flag, sound, or light signals. Eventually, the two sides developed a set of military-unique signals to augment the existing international code of signals. Article VII set up the navy-to-navy communication channel, Article VIII established the agreement renewal and termination mechanisms, Article IX instituted an annual implementation review meeting, and Article X established a committee to meet in six months to revisit Soviet recommendations to establish 'come no closer' fixed distance zones.[6]

In his book *Oceans Ventured: Winning the Cold War at Sea*, former US Navy Secretary John F. Lehman wrote about a lieutenant in charge of a communications detachment aboard USNS *Navasota* during 1984 American exercises involving three aircraft carriers conducting flight operations near Vladivostok.[7] What impressed that lieutenant during these exercises (which were a part of USN strategy against the Soviet Union) was the use of the signals that had been developed by the two superpowers. Despite the confrontational nature of the exercises in waters contiguous to the Soviet Union, shipboard officers

and naval aviators on both sides acted with utmost respect and professionalism as intents were transmitted via flag hoist signals and bridge-to-bridge radio. At the time of these exercises, the INCSEA represented the only bilateral forum for direct discussions between the Soviet and American militaries.

That changed on 12 June 1989 with the signing in Moscow of the "Prevention of Dangerous Military Activities Agreement" (PDMA). Although the PDMA was a military-to-military versus navy-to-navy agreement, the agreement had substantial applications to the maritime environment when it went into effect on 1 January 1990. It had four major provisions. First, it laid out procedures for forces operating near the territory of the other country when unforeseen circumstances caused an inadvertent penetration of the other's territory. The two parties worked out radio frequencies and signals and phrases to establish direct communications in such circumstances.

Second, the Americans had become concerned about the Soviet use of lasers. In 1988, the issue was addressed at the annual INCSEA review after a series of incidents in which flashes of 'directed energy' emanating from Soviet vessels had momentarily blinded American pilots. Both sides agreed that laser use was a violation of the INCSEA provision that deterred weapon pointing. PDMA formalized this understanding in writing and expanded the concept to cover land border regions.

The third major provision "envisions measures necessary for the facilitation of the action of personnel of armed forces of the other party in special jointly determined 'regions of special attention.'" With negotiations conducted during US peacekeeping and convoy escort duties in the Persian Gulf, the United States asked for this provision to ensure that in future crises involving the forces of one party or both, 'Special Caution Areas' could be mutually agreed on where both sides could utilize the established communications channels to prevent dangerous misunderstandings.

Finally, both sides agreed to work to prevent interference with each other's command and control networks. As in INCSEA, the two sides would use a military-to-military channel, with the defence attachés serving as the envoys. The accord established a joint military commission to review implementation of the agreement. The first meeting took place in Tampa, Florida, in March 1990. None have occurred since.

American and Soviet navies did not have a monopoly on the high seas competition. Starting in 1986, American allies negotiated their own INCSEA accords with the Soviets that essentially replicated the US-USSR accord. By 1991, with the signing of a Canadian-Soviet accord, 10 such agreements existed, plus one between Germany and Poland.[8]

With the signing of a number of bilateral accords, there was a question if INCSEA and perhaps PDMA could be pursued on a multilateral level. Indeed, the incident that directly led to bilateral US-USSR safety at sea talks was a Soviet destroyer collision with a *British* aircraft carrier. So there was strong European interest in the negotiations from the beginning. At a May 1972 negotiating session, the subject of making the accord multilateral was broached. The Soviet representative noted that if NATO was to be added, then all of the Warsaw Pact countries should be added too. However, this presented problems for the Americans for it would allow the German Democratic Republic to participate in the process – a state the United States did not recognize. The proposal was dropped.[9]

Keeping the agreement bilateral may have been a good idea. Bilateral forums allow for frank discussions. However, the Soviet (and now Russian) Naval Ministry may regret signing so many agreements requiring annual meetings to discuss incidents. From the perspective of the US-Soviet/Russia accord that has existed for a half century, there is something to be said for the saying 'if ain't broke, don't fix it.' However, does it make sense to maintain all of the other bilateral accords?

An Alternative Model in the Western Pacific

Until the 1990s, China's People's Liberation Army Navy (PLAN) was a coastal defence force with few encounters with foreign naval vessels. However, in October 1994, a PLAN *Han*-class submarine drew attention when it attempted to shadow USS *Kitty Hawk* operating in the

*A Russian **Udaloy I**-class destroyer (left) manoeuvres close to the **Ticonderoga**-class cruiser USS **Chancellorsville** (right) in the Philippine Sea on 7 June 2019.*

Credit: MC2 (SW) Kevin V. Cunningham, US Navy

*The Chinese Type 054A frigate **Xuzhou** steams alongside USS **Stethem** during a Code for Unplanned Encounters at Sea (CUES) exercise in the East China Sea, 20 November 2015.*

Yellow Sea. In February 1995 the United States stated that it intended to open dialogue with the Chinese on an accord modeled on INCSEA.[10] It took nearly three years to reach an accord. The Americans and Chinese looked at safety at sea through different prisms. From the US perspective, the most important issue is providing for the physical safety of sailors and aviators operating in international waters. However, in addition to the safety of its forces, China also values a homeland free of 'foreign interlopers.'

One development that occurred since the original INCSEA accord was the revised United Nations Convention on the Law of the Sea (UNCLOS) that went into force in November 1994. By March 2016, 167 states had signed on to UNCLOS with a notable exception – the United States. Nonetheless, the United States indicated that it supports provisions of the convention regarding navigation and overflight. It also concurred with the allowance for an exclusive economic zone (EEZ) and sovereign rights in living and non-living resources within 200 miles of a state's coast. Perhaps the most substantive outcome of the convention, the 200-mile EEZ, was quickly declared by nearly all littoral states, instantly creating territorial disputes where zones overlapped – such as in the South China Sea.[11]

Unfortunately, UNCLOS has blurred the definition of 'high seas.' When the INCSEA accord was negotiated in 1972, waters beyond 12 miles (three miles in the case of the United States at that time) were considered international waters. The allowance for EEZs now enables littoral states to claim a degree of sovereignty over some 30.4% of the world's oceans and seas.[12] This has created tensions between states that have overlapping EEZs as well as with states that argue the zone implies sovereign rights beyond the economic. China is one of those states.

On 19 January 1998, "Agreement between the Department of Defense of the United States of America and the Ministry of National Defense of the People's Republic of China on Establishing a Consultation Mechanism to Strengthen Military Maritime Safety" was signed. Known as the "Military Maritime Consultative Agreement" (MMCA), the title reflects the desires of the American delegation not to incorporate the phrase 'Incidents at Sea' because of Cold War connotations inappropriate for the relationship it sought with China. In addition, the term 'High Seas' is nowhere to be found in the title. The agreement represented the first permanent military-to-military relationship between the two countries.[13]

The MMCA's nine articles illustrate that many of the lessons learned from INCSEA were incorporated. As with INCSEA, MMCA provides for annual consultations and for the details of the consultations to be kept between the parties to encourage a free exchange of views. In the case of INCSEA, the annual review features working group and plenary sessions. At the working group level, mid-grade officers and civilian subject matter experts examine specific issues, share positions and draft statements. Disagreements are put in writing. At the plenary sessions, senior officers of flag or general rank review the efforts of the working group and sign a summary of the proceedings. MMCA instituted a similar regimen, except that the working group meetings are not only conducted during the annual consultative meeting but also independently, usually every four to six months.

Unfortunately, the existence of the MMCA has not eliminated incidents between the United States and China. One common denominator is that these incidents have occurred in waters China claims as part of its EEZ and where the United States continues to support the principle of the freedom of the seas and opposes claims that would impinge on those rights.

Beyond government-to-government efforts to mitigate tensions, the contribution of scholars and forums, such as the International Seapower Symposium hosted by the US Naval War College, to foster discussions should be noted. Starting in 1969, the biennial gathering initially involved representatives of about three dozen navies that were

allied with the United States. In recent years the number of states attending has grown to over 130. With the size of the symposium growing, regional offshoots were created to improve dialogue. The Western Pacific Seapower Symposium, for example, was first held in 1988 following discussions indicating a need.

At the 1994 Western Pacific Seapower Symposium, the concept of a multilateral INCSEA was proposed. While some delegates were receptive, many of the potential drawbacks that had been pointed out previously in European forums became apparent. One aspect of the INCSEA accord that was deemed worth pursuing was the ship-to-ship signaling system. Borrowing from the NATO tactical and signal manual with which many of the navies in the region were acquainted, a working group rolled out the "Code for Unalerted Encounters at Sea" (CUES) at the 2000 gathering. At the April 2014 gathering of the symposium, hosted by the PLAN, the representatives of 21 Pacific region navies reconfirmed their commitment to use the signals.[14]

Given the ongoing discussions by the MMCA working group, the Chinese and American leadership drafted a more structured safety at sea memorandum. Signed on 14 November 2014, the memorandum "Regarding Rules of Behavior for the Safety of Air and Marine Encounters" reaffirmed international conventions to which both states were parties and pledged to work towards rules of behaviour using the MMCA framework and the signaling system developed through the Western Pacific Naval Symposium. The memorandum contained two annexes. The first annex defined terms of reference for the safety of air and maritime encounters and the second addressed rules of behaviour for safety of surface-to-surface encounters. A section titled "Rules for Establishing Mutual Trust at Sea" incorporates language regarding the avoidance of "simulation of attacks by aiming guns, fire-control radars, torpedo tubes, or other weapons" that was negotiated for the INCSEA accord. Ten months later, the United States and China signed the third annex on rules of behaviour for safety in air-to-air encounters.

Conclusions

This article has addressed three constructs that have been created to deter incidents and build confidence at sea: the multiple bilateral Incidents at Sea accords; the "Prevention of Dangerous Military Activities" accord; and a series of understandings beginning with the 1998 US-China MMCA, the multilateral CUES developed through the Western Pacific Naval Symposium, and the 2014 US-PRC "Rules of Behaviour" accord.

Perhaps the states of the western Pacific have created a template that could be expanded to other areas of the globe such as NATO/Russia. Other regional academic naval gatherings have been initiated; for example, the Venice Regional Seapower Symposium, formed in the mid-1990s, draws naval representatives of the Mediterranean, Black Sea and Middle East regions. By using the regional bodies as forums to discuss incidents and the use of CUES, perhaps many of these replicative INCSEA accords can be eliminated.

With the end of the Cold War, the close proximity of thousands of American and Soviet troops in Europe no longer existed. The Joint Military Commission established under the "Prevention of Dangerous Military Activities Agreement" met only once in 1990. Unfortunately, in the ensuing decades, Russian military aggressiveness toward Georgia, Ukraine and the Baltic states has again led to close proximity of ground forces along the frontiers of Eastern Europe. A case could be made that the Organization for Security and Cooperation in Europe (OSCE) establish a multinational commission, similar to the US-Soviet framework established in 1989, to review the provisions of the accord to reflect the current situation. A discussion of the implications of social media and disinformation would be a useful addition to the agenda.

Sidebar: A Threat to Maritime Agreements: Social Media

INCSEA has endured and served as a model for similar accords. One of the reasons for its success is the lack of publicity of its discussions. INCSEA instituted practices designed to mitigate chances for miscommunication that could inadvertently lead to armed confrontation. Rather than make accusations in the media, a naval attaché from

Credit: Chief Mass Communication Specialist Peter D. Lawlor

US Chief of Naval Operations Admiral Jonathan Greenert addresses conference delegates at the 14th Western Pacific Naval Symposium, 22 April 2014.

Credit: US Navy

A Russian Su-24 aircraft makes a very low altitude pass by USS ***Donald Cook*** *on 12 April 2016 in the Baltic Sea.*

one state would notify the naval leadership of the other of the intent to discuss a potential violation at the annual meeting. This enabled both sides to gather information to flesh out an accurate narrative of the event. During a review in the 1980s a State Department official was "utterly amazed at the frankness, professionalism, and objectivity of the exchanges during the sessions, in contrast to the normal diplomatic intercourse between the two countries."[15]

During the Cold War both navies worked to prevent incidents and, when an incident occurred, to keep it out of the public eye. This quiet navy-to-navy diplomacy worked. Unfortunately, two things have occurred in the ensuing years that seem to make every meeting between Russian and NATO forces an international crisis. First, with the collapse of the Soviet Union, there were negligible opportunities to have incidents, given that Russian naval units were not venturing far from home and NATO naval forces were supporting operations in the Middle East. This meant that the institutional memory of how both sides approached the implementation of the accord faded. The second factor undermining the effective implementation of INCSEA is more uncontrollable – social media.

There was a situation circa 1983 when crew of the ammunition ship USS *Suribachi* in the Mediterranean observed a Soviet frigate pull along its starboard beam. It had its forward gun aimed at the American ship – a violation of the behavioural norms established by the 1972 accord. The Americans chose to ignore the violation seeing no reason why the Soviets would initiate World War III on this day by firing on a clearly identified ammo ship.

However, if that were to occur today, there is no doubt that someone would be recording the incident on his/her cellphone and would share it on Facebook or Twitter. Suddenly the cable news shows are talking about what counter actions need to be taken.

Unfortunately, this is exactly what is occurring today. Following the release of footage in April 2016 by US Naval Forces Europe (NavEur) depicting a Russian Su-24 Fencer zipping past USS *Donald Cook* while it was operating in the Baltic, the footage appeared on news networks. Then some newscasters were asking why the commanding officer did not shoot down the aircraft while others wondered why the United States was provoking the Russians by sending *Donald Cook* to the Baltic in the first place.[16]

Why did NavEur release the footage? In NavEur's defence, Russian media/social media were circulating videos of these overflights and making claims about new electronic warfare devices to disable American radars and destroy crew morale. The bottom line: thanks to the use of social media as a tool for information warfare, the effectiveness of the INCSEA accord is being undermined. Given the potentially dangerous consequences of social media influencing naval interactions at sea, this issue should be discussed at bilateral meetings and at the various international sea power symposia.

Notes

1. This article is an adaption of a talk given at the 2018 Annual Security Review Meeting of the Organization for Security and Cooperation in Europe (OSCE) held 27 June 2018.
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4. Captain William C. Lynch, JAGC, USN (Ret.), Interview by author, 3 March 1992, 8 April 1992, Washington. DC. Tape Recording.
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6. David F. Winkler, *Incidents at Sea: American Confrontation and Cooperation with Russia and China, 1945-2016* (Annapolis, MD: Naval Institute Press, 2017), pp. 122-123.
7. John Lehman, *Oceans Ventured: Winning the Cold War at Sea* (New York, NY: W.W. Norton, 2018), pp. 158, 160. The lieutenant is, of course, the author of this article.
8. For more information see European Leadership Network, "Bilateral Military Agreements between NATO member States and the Soviet Union on the Prevention of Incidents." An accord was signed between Turkey and the Russian Federation in 2004.
9. SECSTATE WASHDC message to USMISSION NATO 231500Z May 72, FOIA, State.
10. Charles A. Meconis, "US-China Confidence Building, More Important than Detargeting," *Global Beat Issue Brief*, No. 39 (14 July 1998), Center for War, Peace and the News Media.
11. Statement by the President, "United States Ocean Policy," 10 March 1983, available at http:www.state.gov/documents/organization/143224.pdf.
12. This is a National Oceanic and Atmospheric Administration calculation. See http://www.gc.noaa.gov/geil_maritime.html.
13. The author served as a consultant to the US delegation.
14. Report of "Twenty-First International Seapower Symposium, US Naval War College, Newport Rhode Island, September 16-19, 2014," p. 40.
15. Robert P. Hilton, Sr., "The U.S.-Soviet-Incidents at Sea Treaty," *Naval Forces*, Vol. 6, No. 1 (1985), p. 37.
16. "US Navy Ship Encounters Aggressive Russian Aircraft in Baltic Sea," Headquarters, US European Command, Story No. NNS16041320, released 13 April 2016; and White House Press Briefing by Josh Earnest, 14 April 2016.

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Why Canada Needs Submarines

James Brun

Credit: Mona Ghiz, MARLANT Public Affairs

*The **Victoria**-class submarine HMCS **Windsor** leads the **Halifax**-class frigate HMCS **Toronto** and other participants of Cutlass Fury 2021 as they sail out of Halifax Harbour on 7 September 2021.*

A submarine force is a necessary component of a fighting navy. While surface ships offer valuable contributions to warfighting, naval diplomacy and support to other governmental departments, submarines are mission-oriented platforms. In wartime, a submarine sits in a defined box and kills any adversary who enters. Even the potential presence of a submarine creates a tactical and operational challenge for an opponent.

Canada needs a submarine force to control access to its maritime approaches, counter enemy maritime forces, gather intelligence and provide Canadian maritime forces with strategic weight. This article will discuss these factors.

Denying Access to the Seas

Submarines are specialized warfighting platforms that deny an adversary access to the seas. Julian Corbett, the great British sea power theorist, argued that the "object of naval warfare must always be directly or indirectly either to secure the command of the sea or to prevent the enemy from securing it."[1] Contested command of the sea is its natural state, according to Corbett. Command must be asserted and defended. Through control of the sea, a state ensures rights of passage on the global commons. If a sea power truly retains command of the seas, it also maintains unhindered maritime communications across the seas and can deny those same advantages to an enemy. By denying an enemy safe passage on the seas, a sea power state may "check the movement of his national life at sea in the same kind of way we check it on land by occupying its territory."[2]

By winning and maintaining command of the sea, a sea power removes restrictions on its own maritime movement. Further, a sea power may exert "military pressure upon the national life of our enemy ashore" while preventing an enemy from "exerting direct military pressure upon [itself]."[3] The simplified objective of naval warfare is to control maritime communications for commercial or naval purposes.[4]

Bordering three oceans, the Royal Canadian Navy's (RCN) preferred weapon to deny an adversary access to Canada's vast amount of water is the submarine, or torpedo-carrying maritime patrol aircraft.[5] Submarines can deny enemy access to chokepoints in sea approaches to Canada, or support allied or coalition forces overseas. A submarine does not need to be everywhere. A submarine at an unknown location at sea within a geographic region

is enough to have significant effect on an adversary's operations.

Submarines are critical platforms for controlling the seas.[6] A submarine can detect and sink enemy submarines, surface combatants and shipping, all while remaining undetected. The presence, or suspected presence, of a submarine will influence an enemy's planning process in an operational theatre, and is vital in controlling or denying an adversary's access to the sea.[7] For example, when the British nuclear-attack submarine HMS *Conqueror* sank the Argentine cruiser ARA *General Belgrano* during the 1982 Falklands War, the remaining Argentine surface fleet returned alongside until the war was over out of fear that the undetected Royal Navy (RN) submarine would continue to attack and sink assets. With a single action, the RN established limited control of the South Atlantic theatre.[8] Interestingly, two Argentine diesel submarines, present in the same conflict, preoccupied British anti-submarine forces through the remainder of the campaign.[9] The RN fired over 200 torpedoes at suspected submarine contacts during the war, demonstrating how the perception of an enemy submarine adds prudence to any surface fleet's operations.

For a relatively small force like the RCN, the ability to employ submarines in a theatre of operations, as part of a coalition or alliance, projects a formidable threat with an outsized tactical and strategic effect.

As an Arctic state, Canada must remain vigilant about activity in the high North. Submarines and autonomous underwater vehicles (AUVs) offer Canada platforms to assert sovereignty over the region. Canada's *Victoria*-class submarines safely navigate near Arctic ice and patrol chokepoints of entry to the Arctic, but due to their size and design are unable to operate safely under the ice cap. In the North, AUV technology presents an opportunity to obtain superior results under the ice, with significantly less risk to life. The ability to utilize cutting edge AUV platforms, with a Canadian submarine operating near the edge of the ice as a mothership, presents a future opportunity.

Countering Enemy Submarines

The most effective anti-submarine weapon is another submarine. Submarines are the premier means to detect, track, classify and attack adversarial submarines, while simultaneously remaining undetected. Countries are making considerable investments in submarines and today, more countries operate sophisticated and modern submarines than ever before.[10] Due to proliferation of submarines throughout the world, a serious submarine capability is increasingly vital as a means to counter these threats. Further, while traditional submarine-operating states continue to maintain sub-surface fleets, they also continue to export submarines to regions of strategic Canadian importance, particularly in Asia.[11]

Like other states, China has determined that submarines are significant maritime assets due to their lethality and inherent stealth.[12] The People's Liberation Army Navy (PLAN) operates a formidable fleet of both nuclear-powered and diesel-electric submarines. Today the PLAN includes 60 submarines in its order of battle, and its fleet is still growing.[13] As well, Russia continues to rebuild its submarine fleet with modern, capable vessels.[14]

Great-circle maritime transit routes between Asia and the key ports on the West Coast of North America travel through Canada's North American Aerospace Defence Command (NORAD) area of responsibility. The use of northern transit routes increases the likelihood of a Chinese or Russian submarine presence off Canada's West

Credit: Chief Mass Communication Specialist Sam Shavers

*US Secretary of the Navy Ray Mabus departs a Chinese **Yuan**-class submarine in Ningbo, China, during a visit on 29 November 2012.*

Coast.[15] In this geopolitical environment, a capable Canadian submarine force is crucial to countering threats posed by an adversary's submarines. Without submarines, the Canadian Armed Forces (CAF) must rely primarily on maritime patrol aircraft as the key contributor to anti-submarine operations in Canada's maritime approaches.

Countering Enemy Surface Combatants

Submarines are deadly anti-surface warfare (ASuW) weapons. In Admiral Sergei Gorshkov's book, *The Sea Power of the State*, the former Soviet Admiral argues that submarines "form a considerable counter-balance to the main forces of the fleet of our enemy."[16] The RCN's *Victoria*-class submarines are outfitted with "highly sensitive acoustic, electro-optic and electromagnetic sensors, as well as the world's most advanced bow sonar," which "detect and track surface vessels at great distance" while remaining concealed.[17] In these conditions, a submarine maintains the initiative by choosing the time and place of a hostile engagement. For example, during the 1982 Falklands campaign, HMS *Conqueror* detected, identified and commenced tracking *General Belgrano* on 1 May. *Conqueror* tracked *Belgrano*, undetected, for over a day before receiving orders from London to sink the Argentine warship.[18] The advantage afforded to *Conqueror* allowed the RN to maintain the initiative, retain freedom to manoeuvre and attack on its own terms.

Capable and modern submarines influence the actions of enemy combatants, and provide friendly surface forces in-depth defence by ensuring that the seas are clear of enemy forces beneath the surface and available for allied use. Without the support of their own submarines or anti-submarine aircraft, surface combatants are mere targets for an enemy submarine. The presence, or possible presence, of a Canadian submarine that operates in associated or direct support of the surface fleet deters the approach of an adversary's submarines and thereby increases the safety of all friendly maritime forces in the area.

Conducting Intelligence, Surveillance and Reconnaissance

Modern submarines are exceptional intelligence, surveillance and reconnaissance (ISR) assets, and this represents their actual day-to-day employment in most navies. A superb combination of endurance and stealth allows submarines to operate where other maritime assets are exposed. A submarine can execute a wide array of intelligence collection techniques throughout the maritime theatres, including the littoral regions. This combined with land, air, space and cyber surveillance assets establishes a complete understanding of the operational environment as a "key element of the system-of-systems approach to maritime domain awareness."[19]

A conventional submarine with decent sensors under reasonable environmental conditions can search large areas of water while remaining unobserved.[20] In an anti-access area-denial (A2/AD) environment, a submarine's ability to operate in an enemy's littoral regions makes it "a proven and invaluable tool in collecting ISR data," including the ability to "detect high frequency, very high frequency and ultra-high frequency signals and cellphone transmissions."[21]

*The decommissioned frigate USS **Curtis** is seen through the periscope of the **Los Angeles**-class submarine USS **Chicago** after being fired upon by American forces during Exercise Valiant Shield 2020 on 19 September 2020 in the Pacific Ocean.*

Credit: Petty Officer 1st Class Ryan Litzenberger, US Navy

Submarines are not solely valuable from an intelligence collection standpoint. Operating submarines also permits Canada access to underwater information collected by allies. As a submarine-operating state, Canada maintains access to useful underwater intelligence. As a NATO member and close American ally, Canada gains access to water-space information and is privy to intelligence gleaned from underwater arrays and sensors. Canada participates in the global water-space management program, which de-conflicts the movements of allied submarines in an effort to avoid unexpected encounters with the submarines of partners states beneath the surface, and is a key underpinning of Canadian maritime sovereignty. If the RCN divested itself of its submarine force, there would be little reason for Canadian allies to share the details of their submarine operations in and around Canadian waters.[22] Agreements with other allied states provide Canada with access to extensive underwater information, which would otherwise be unattainable if Canada did not maintain a submarine capability.

Providing Canadian Maritime Forces with Strategic Weight

A submarine is a strategic national asset ensuring that Canada can exercise sovereignty in its Exclusive Economic Zone (EEZ), while supporting the rules-based international order at sea throughout the world. Former Chief of the Royal Australian Navy, Vice-Admiral (Retired) Ray Griggs, argued that a capable submarine force gives the state that wields it "strategic weight."[23] A modern submarine force "shapes or changes the behaviour of other nations and the calculus of their leaders" in a way no other CAF asset does.[24]

Credit: Mass Communication Specialist 1st Class Peter Burghart

***Victoria*-class submarine HMCS *Chicoutimi* enters Yokosuka, Japan, as part of its trans-Pacific deployment on 18 October, 2017. In the background is the new Japanese helicopter-carrying destroyer, JS *Izumo*, which is slated for conversion for F-35B operations.**

A submarine's capacity to influence an adversary's behaviour was apparent during Canada's dispute over the turbot fishing industry with Spain in 1995. Canada issued a Notice of Intention for a submarine to operate off the Grand Banks on the East Coast of Canada during the diplomatic impasse. The threat that a Canadian submarine might operate near the disputed area undoubtedly caused Spain to reassess its position and led to eased tensions between the two countries.

Further, lethal and multi-role submarines are unique platforms that offer benefits in maritime disputes. Submarines are covert and deadly. A single torpedo fired from a submarine will sink most vessels below a certain size. Consequently, navies are wary of deploying ships into a maritime theatre where the submarines of an adversarial state could operate. The stealth offered by capably operated submarines strengthens this hazard.

Conclusion

A modern and capable submarine force is an essential strategic capability, and submarines are the main element of the strategic deterrent for every major nuclear state. Submarines deny access to the seas, contain and defeat opposing naval forces and conduct other vital tasks such as intelligence collection. The ability to insert and extract special operations forces or vital individuals in remote locations during times of disaster or localised tension, increases a submarine's utility and relevance.

For Canada's navy, a submarine is a vital force-multiplier warfighting platform. Submarines are a critical element of the RCN's force structure, essential to defending the world's longest coastline, supporting alliance commitments and projecting power across the world's oceans. A lethal submarine force complements the RCN's highly effective general-purpose surface combatants and patrol ships, providing a well-balanced, blue-water capability for its modest fleet. According to the RCN's vision statement, *Canada in a New Maritime World: Leadmark 2050*, "[s]ubmarines are likely to remain the dominant naval platform for the foreseeable future, and hence are an essential component of a balanced combat-effective navy."[25]

However, the RCN's *Victoria*-class fleet of four incrementally modernized but aging submarines is only able to achieve these key requirements in limited respects. Canada's next fleet of submarines must be more capable and sufficiently numerous to operate persistently in all three of Canada's oceans, while supporting Canadian strategic interests throughout the maritime domain.

Notes

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Exploring the Impact of Loitering Munitions in the Maritime Environment

Christopher Verklan

Credit: Swadim, Wikimedia Commons

Loitering munitions made by the Israeli company UVision Air Ltd are pictured here on display at the DSEI 2019 conference/trade show in London.

Loitering munitions, alternatively known as kamikaze or suicide drones, have become an increasingly common feature of modern conflicts. Unlike previous efforts such as the kamikaze attacks in the Second World War, these weapons systems are designed as optionally recoverable unmanned aerial vehicles, capable of self-propelled and self-controlled flight, with a built-in reconnaissance and explosive payload that can be detonated on target. The success of this platform was illustrated in the 2020 Armenia-Azerbaijan war. During this conflict, Azerbaijan employed a variety of these munitions, in addition to other unmanned aircraft systems, to disable and destroy Armenian land-based weapons systems and troop formations in Nagorno-Karabakh. While this success was aided by a lack of modern air defences to counter such threats, the ability for loitering munitions to undertake these missions helped Azerbaijan gain and utilize air superiority in its campaign. This weapons system has also been adopted by non-state actors with varying effects. For example, the 2019 attack against Saudi oil facilities by Houthi forces utilized 18 of them in combination with other weapons systems.

Despite the attention given to the application of this weapons system in the land domain, the topic of loitering munitions in the maritime environment has been overlooked. This is due, in part, to their relative novelty in the maritime environment, with the first public sale of a system designed for this environment to a state announced in February 2021.[1] However, current development efforts indicate that more states will follow. As such, a brief analysis of the role and impact that these munitions will have on the maritime environment is timely, if not overdue.

Loitering Munitions: Current Capabilities and Shortfalls

Since the public reveal of the first loitering munition by Israel in the 1990s, these systems were slowly adopted by militaries before gaining momentum over the past decade. The result has been that several major powers (including China, Russia and the United States) as well as minor or regional powers (such as Iran, Poland and Turkey) have all manufactured indigenous versions of this weapons system. While space precludes the in-depth examination of each system developed by these countries,

some generalized attributes are worth noting here. First, the typical range of current market offerings varies between 5-50km, with larger versions having ranges of 50-150km. Several loitering munitions have ranges of roughly 1,000km, although these are outliers compared to most current offerings. Second, while the payload of the system varies by the size and expected use, the explosive payload is typically under 50kg; with a handful having a warhead of over 100kg.[2] Third, the vast majority of current market offerings are designed to be 'man-in-the-loop' systems – meaning that they are remotely piloted with varying degrees of automation, leading them to be reliant on datalinks to enable full function.

The main benefits of this weapons system are threefold, with the first and most important its low cost per unit. Although there is insufficient public data to provide an accurate cost range, one estimate placed the minimum cost of a AeroVironment Switchblade at $70,200 USD in the early 2010s. Recent efforts have been made to lower the cost per unit – for example, Raytheon's Coyote has a cost of $15,000 USD per unit, with plans to reduce this to $5,000-7,000 USD per unit.[3] Unfortunately, no costing information is available on larger loitering munition platforms, but they would likely have a higher cost per unit. The second benefit of this weapons system is its small radar cross section which makes the weapon difficult to track at range, leading to a more constrained timeframe for defenders to react to the threat, if they are able to detect it at all. Lastly, this weapons system is capable of aborting attacks should it be required, thereby providing additional options to the user.

Despite the apparent advantages of this weapons system, it also has several drawbacks. Foremost among these is the limited range and endurance of many current offerings that were initially designed for tactical use by ground forces, which restricts the potential role of this system in the maritime environment. Although this is a design feature that can and has been overcome, loitering munitions with greater range are also larger in size, leading to a negative correlation between the size and range of the weapons and the number of weapons carried on a launch platform. Naturally, as ships only have limited space, this is a more concerning issue for sea-based systems than land-based ones.

The recovery process is also more challenging at sea than on land. In the case of the latter, one can simply land the loitering munition (relatively) undamaged in a friendly area where it can be recovered. In contrast, the recovery of loitering munitions at sea is complicated by the limited space available on ships for recovery, the sea state during recovery, and the general lack of vertical landing capabilities of loitering munitions, among other issues. While research has been done to find better and more efficient recovery platforms for small unmanned aircraft systems (sUAS), such as modern loitering munitions, currently there is no widely-adopted means to enable the rapid recovery of multiple sUAS with minimal damage. The final drawback of this weapons system is their reliance on datalinks to control the aircraft, leading them to be susceptible to electromagnetic warfare measures such as jamming.

Significant efforts have been made to overcome these limitations. Beginning with the limited range and endurance, efforts have focused on developing aerial or surface

Credit: Master Sgt. Barry Loo, US Air Force

A tactical loitering munition, with propellers collapsed, is displayed during the ThunderDrone Tech Expo in Tampa, Florida, 5 September 2017.

Credit: Julian Herzog, Wikimedia Commons

The Israel Aerospace Industries Harop loitering munition is seen here during a demonstration at the Paris Air Show in 2013. The Harop was employed by Azerbaijan during its recent conflict with Armenia over Nagorno-Karabakh.

systems that can enable the forward deployment of loitering munitions. This can be seen in the development efforts of the US Navy which has contracted Raytheon to support the development of unmanned surface and underwater vehicles to launch swarms of loitering munitions.[4] Efforts are also taking place to mitigate the vulnerabilities posed by electromagnetic warfare by increasing the automated and autonomous capability of these weapons. While it is unclear how new versions might handle decoys and/or spoofed electromagnetic signatures, this capability has already been utilized in combat, as noted in a recent report to the United Nations Security Council.[5] Finally, there has been increasing effort to equip loitering munitions with electromagnetic warfare capabilities – as opposed to an explosive payload – thereby creating an sUAS platform that can be used to degrade enemy sensors.

Loitering Munitions in the Maritime Environment

Defining the case for using loitering munitions in the maritime environment is difficult, especially as they have yet to be fully integrated and utilized by a navy on operations. However, looking at the general operations performed at sea by navies, it is possible to outline – albeit in general terms – if and where this weapons system might be employed. The following four 'typical' operations outlined by Geoffrey Till will serve as the basis for this discussion: sortie control/blockade; chokepoint control; open ocean operations; and local engagements.[6]

'Local engagements' refer to a broad range of actions that exercise sea control, including amphibious operations, the protection of sea lines of communication and strike operations. Loitering munitions can be of benefit to both the attacker and the defender in each of these missions. In the case of amphibious operations, for example, they can be used to supplement other weapons systems to provide an intelligence, surveillance, target acquisition, reconnaissance (ISTAR) and strike capability. In doing so, loitering munitions can help to target or prosecute targets in difficult to reach areas and provide an inexpensive means to damage, disable, or destroy troop masses, armoured vehicles and troop-carrying ships on or transiting to the shore. Likewise, the attacking forces could also use these to a similar effect.

The potential benefits brought by loitering munitions can also be seen in local engagements that aim to protect sea lines of communication. For example, one threat that has emerged in recent years to sea lines of communication has been naval swarming tactics and unmanned surface vehicles, notably in the Persian Gulf and Red Sea. The combination of surveillance and strike capability provided by loitering munitions could better enable the tracking of multiple targets or provide a low-cost means to strike the hostile forces. Moreover, this weapons system could provide a means to deter further escalation without the use of force through its abort attack capability which could enable it to dive on or harass hostile forces – in essence escalating the encounter without resorting to force. Alternatively, this weapons system could also be utilized to aggravate these existing threats. Notably, loitering munitions could help to create complex swarming operations involving sea and air elements or be used in harassing attacks to degrade or impose costs on commercial vessels or warships operating in the area.

Loitering munitions are not, however, well-suited for Till's remaining missions due to the limited range of most of them. For example, in open ocean operations, where the objective is to seek out and destroy enemy forces on the high seas, the distances are immense and dwarf the range and endurance capabilities of many modern loitering munitions. This makes them less effective in an ISTAR role as most do not have the range to use their ISTAR capability to search and destroy hostile forces without being directed to the target (area) by other platforms; especially should the user wish to recover the munition for future use. This reduces the flexibility of the platform's strike capacity as it is less able to act independently of other systems. However, should the munition have the requisite range to reach the target, it could play a significant role in providing ISTAR and/or degrading, damaging, or destroying weapons systems on warships, land-based missile systems and coastal defences such that they become inoperable or vulnerable to an attack. Moreover, even without inflicting physical damage to a given target, a large number of

Credit: Cpl. Aaron Henson, US Marine Corps

US Marines stand with their Light Marine Air Defense Integrated System aboard the amphibious assault ship USS ***Kearsarge*** *during a transit of the Suez Canal, 12 January 2019. The system is designed to detect small aerial vehicles.*

loitering munitions could help to overwhelm sensor coverage in the target area, complicating defensive efforts.

For this reason, loitering munition systems are increasingly being teamed with unmanned sub-surface, surface and aerial vehicles to aid them in overcoming their limited range and enable numerous munitions to be forward deployed to the target area. A lesser number of systems, such as Israel Aerospace Industry's Harop, are instead made larger to enable greater endurance and range.[7] The decision to pursue a larger system is not without challenges, as the bigger systems take up more space, thereby precluding the possibility of equipping ships with a large number of them capable of executing a swarming attack. Regardless of the solution pursued, however, it is clear that as these systems mature in the short to medium term they can – and likely will – play an increasing role in sortie control/blockade, chokepoint control and open ocean operations where harassing attacks can deter, degrade, or destroy sea- or land-based maritime targets in conjunction with other assets.

Considering now the strategic impacts of loitering munitions in the maritime environment, it is critical to note that the introduction of these weapon systems will be uneven because of their limited range and endurance. The result of this is that geography will be a key enabler of the systems in the near future, leading them to be more readily used in geographically constrained theatres of maritime operations. Constrained areas of operations could include narrow seas, such as the Persian Gulf or the South China Sea, where a substantial body of water is surrounded by a landmass or a series of islands that restrict possible entry or exit routes from the sea. This is because local operations in these areas require naval forces to operate near(er) to shore, placing them within range of modern loitering munition systems located at sea or along the coast. However, as noted above, this will likely change with time as forward delivery systems are developed and refined.

The next impact of note concerning the maritime environment is the question of costs of naval operations in the future. The low unit cost of loitering munitions can provide a lower-cost precision strike alternative to current missile offerings. This, in turn, provides lesser naval powers – including non-state actors – with a precision strike capability similar to missile systems at a fraction of the price. Coupled with the ease of use of these platforms, this removes two factors that have traditionally limited the ability of non-state actors to threaten ships at sea. As a result, the maritime environment facing naval forces will likely become contested by more actors, thereby creating new threats.

The beginnings of such a challenge have already been seen in two recent incidents. In July 2019 up to six sUAS were observed flying over and around several US Navy warships near a military training range off the coast of California.[8] This incident is of concern given that these sUAS were able to operate at night, in low-visibility conditions, off the coast of the United States, while demonstrating greater endurance and speed than commercially available sUAS. Unfortunately, further information on this incident is not available, such as where the sUAS were launched or recovered from, despite investigations by the US Navy. Currently suspicions are that a state actor was responsible for the incident given the sophistication of the sUAS and their operation.[9]

This 2019 incident, in hindsight, has proven to be a bellwether as it demonstrated that loitering munitions could be utilized by malicious state or non-state actors in pursuit of espionage, surveillance, or hybrid operations at sea. This potential was translated into reality for the first time with the attack against MT *Mercer Street* in July 2021, in which two personnel were killed, as the ship was transiting off the coast of Oman. According to the official report on the incident released by US Central Command, MT *Mercer Street* was originally targeted by two loitering munitions on the evening of 29 July before being hit by another on 30 July.[10] The report also concluded that the loitering munition used in the attack was produced in Iran and that the location of the attack was "within range of

Credit: STM Defence

A Turkish Alpagu fixed-wing loitering munition can be launched from a lightweight pneumatic tube and is set to join the Turkish military this year.

documented Iranian one-way attack."[11] It did not, however, state from where the munitions were launched, leaving open the possibility that the Iranian-backed Houthi rebels in Yemen could have been responsible given their history with this weapons system. Nor did the report state how the munition was directed to the target area, although one possibility is that the attackers used the ship's Automatic Identification System to guide the aircraft until it could be visually identified.

Thus, paradoxically, the lowered costs for lesser naval powers and non-state actors will add new costs to protect naval fleets and infrastructure from this threat. This need to provide force protection has already been recognized by the US Department of Defense which released its Counter-Small Unmanned Aircraft Systems Strategy in January 2021 outlining the threat posed by sUAS and highlighting the need to ensure force protection of bases and assets in the future.[12] While not having a direct strategic impact, the costs associated with developing land and ship-borne systems to mitigate this threat add to the rising costs to maintain a state's sea power. Barring the capability to keep up with increasing costs, this would lead to cost-cutting measures that might include developing a smaller and/or less capable naval force or the acceptance of an increased level of operational risk to ships and crew.

The final impact of note that loitering munitions have on the maritime environment is complicating amphibious operations for both the defending and attacking forces. As noted, loitering munitions can be used to benefit the attacker or defender in their capacity to act as a low-cost and effective strike and surveillance platform. Translating this effect to the strategic level, it raises the risk of amphibious operations as it provides the defender with a form of air support that is difficult to contest using modern air power. The result is that, should the defending side have sufficient loitering munition systems available when the amphibious landing begins, it can effectively undermine the local control of the air; a prerequisite that has been recognized as essential for a successful amphibious landing since the Second World War. This, in turn, will result in higher human and financial costs for amphibious operations should surprise, intelligence and/or pre-invasion bombardment be insufficient. As a result, beyond operational changes needed to meet the threat of loitering munitions, amphibious landings may need to be avoided until mitigation efforts are incorporated. However, should mitigation efforts prove too costly for the attacking state, this could lead to a decline in the frequency of amphibious landings undertaken against a prepared enemy force – thereby downgrading the utility of a previously critical component of sea power.

Conclusion

The adoption of loitering munitions in the maritime environment poses unique threats and opportunities. In the case of naval operations, currently loitering munitions may only affect local engagements, which include a variety of activities such as amphibious operations, protection of commercial shipping and strike missions. However, as these systems mature, this will likely change, leading to their incorporation in other operations such as sortie control/blockade, chokepoint control and open ocean operations. This, in turn, will generate increasing strategic effects on the conduct of maritime warfare, leading to an increasingly contested environment by state and non-state actors and complicating amphibious operations.

Notes

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2. Dan Gettinger and Arthur Holland Michel, "Loitering Munitions in Focus," Center for the Study of the Drone, Bard College, 2017, pp. 2-3.
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4. Joseph Trevithick, "The Navy Plans to Launch Swarms of Aerial Drones from Unmanned Submarines and Ships," *The Drive*, 1 March 2021.
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8. Adam Kehoe and Marc Cecotti, "Multiple Destroyers were Swarmed by Mysterious 'Drones' off California over Numerous Nights," *The Drive*, 23 March 2021.
9. Dan De Luce, "Drones that Swarmed U.S. Warships are still Unidentified, Navy Chief says," NBC News, 5 April 2021. This incident is interesting as it seems to indicate that the range of these systems exceeds what is publicly acknowledged. That said, we cannot make any firm estimations of range/endurance as we do not know what the system was, where it came from, or how it got there.
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11. *Ibid.*
12. US Department of Defense, "Counter-Small Unmanned Aircraft Systems Strategy," 7 January 2021.

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Making Waves

(Note: The commentaries included in Making Waves represent the opinion of the authors.)

The Ongoing Delays of Building a New Heavy Icebreaker

Jeff G. Gilmour

The history of Canada's federal government building a new 'heavy' icebreaker is a tale of futility stretching over five decades. It was recognized back in the mid-1970s that the country's three heavy icebreakers were aging. Cabinet first approved funding for the design phase of a Polar Class 7 vessel at this time. But it was only in July 1984 that a decision on some "basic design elements" was made.[1]

As a result of USCGS *Polar* Sea transiting the Northwest Passage in 1985, Prime Minister Brian Mulroney announced a number of official responses in September 1985 one of which was to construct a Polar Class 8 icebreaker.[2] A Polar Class is defined by a ship's icebreaking capability. The classes have been revised in recent years, and a Polar 8 in 1985 is equivalent to a Polar Class 1 today, which has the ability to break ice year-round in all polar waters.

In October 1985, three bids were received to build the vessel and in January 1987 a contract was awarded to Vancouver's Versatile shipyard.[3] In 1990 the Polar 8 project died as costs for the project increased. The original estimate of $350 million had increased to over $500 million in 1989. The shipyard itself was having financial problems. The project was officially canceled on 19 February 1990. At that point, Finance Minister Michael Wilson noted that the costs had climbed to $680 million.[4]

In 2005, the Stephen Harper government announced a string of new programs, one of which was a Polar Class icebreaker for the Canadian Coast Guard (CCG) to replace the aging *Louis St. Laurent*, which first set sail in 1969. The new icebreaker, *John G. Diefenbaker*, was planned to be able to break ice up to 2.5 metres thick and operate for three seasons of the year in the Arctic Ocean. After being funded in the 2008 budget, the design contract took three years to be awarded to the Vancouver firm STX Canada Marine. Construction was due to begin in 2015 but scheduling delays caused the construction to be halted and cost estimates rose from $720 million to $1.3 billion.[5]

A report conducted for the CCG by Transport Canada in 2016 concluded:

Credit: Vard Marine

*A graphic from Vard Marine shows three generations of North American icebreakers. From left to right: CCGS **Louis St. Laurent**, USCGC **Healy** and a computer-generated image of the unbuilt CCGS **John G. Diefenbaker**.*

> The Canadian Coast Guard fleet is aging, which has implications for maintenance as well as procurement. Given that 29 percent of the larger vessels are more than 35 years old and close to 60 percent of small vessels are older than the design life of 20 years; it is not surprising that the number of major systems repairs required is increasing, vessel days are decreasing, and the number of ships out of service is increasing over time…. The Canadian Coast Guard is not receiving the political attention, or administrative and financial resources it requires.[6]

The National Shipbuilding Strategy

Shipbuilding plans took off with the introduction of the 2010 National Shipbuilding Procurement Strategy (now the National Shipbuilding Strategy (NSS)) and later the 2017 defence policy *Strong, Secure, Engaged*.

The federal government divided shipbuilding for the NSS package between two major shipyards – Vancouver's Seaspan Shipyards and Halifax Shipyards. Seaspan would be responsible for building the non-combat package including two Joint Support Ships for the navy, smaller vessels for the CCG and the icebreaker. Both shipyards undertook extensive modernization before starting to build ships. Seaspan began construction of the first of these vessels in 2018.

CCGS *John G. Diefenbaker* built by Seaspan was to replace CCGS *Louis St. Laurent*. The cost was now estimated at $1.3 billion (2013) which had increased from an original cost of $720 million and an anticipated delivery date of

Credit: Timothy Choi

The Seaspan Vancouver Shipyard is pictured here on 28 August 2018, with one of the Offshore Fisheries Science Vessels being constructed visible on the left. Seaspan is (again) slated to build one heavy icebreaker along with a number of smaller vessels.

2017.[7] Due to the other NSS work at this shipyard, the delivery date for the new heavy icebreaker kept slipping.

In the summer of 2019 the federal government dropped *Diefenbaker* from Seaspan's work schedule and stated that the design and costs for the ship would be revisited. In 2020 Seaspan announced it still wanted to build the icebreaker and stated that it was now partnering in the project with Genoa Design International in Newfoundland and Labrador and Heddle Shipyard in Ontario.[8]

Then out of the blue Ottawa announced on 6 May 2021 that instead of building only one heavy icebreaker, two would now be built, one each at Seaspan and Quebec-based Chantier Davie.[9] The government announced that it needs one of these ships to be operational by 2030. No cost estimates for the icebreakers were to be given by the Minister of Fisheries and Oceans until contracts "are negotiated with the individual yards."[10] To date, it hasn't been determined when the work on the icebreakers will be started.

Conclusion

When the federal government announced that it now plans to build two heavy icebreakers for Arctic operations, no mention was made of the design or the icebreaking capabilities of these vessels. It is assumed that, since they will not be nuclear-powered, the two icebreakers will only be able to operate for three seasons of the year in the Arctic Ocean.

As noted, the government has stated that it wants the first of these vessels operational by 2030. This means that *Louis St. Laurent*, which set sail more than 50 years ago, will need to remain afloat for another decade. Given that in February 2021, the federal Auditor-General's report noted that the implementation of the NSS has been plagued by mismanagement and ongoing delays in the procurement process,[11] the government's production schedule for ships is very optimistic.

Needless to say, delays mean the costs increase. Take for example the building of the 15 Canadian Surface Combatant (CSCs) ships in Halifax for the Royal Canadian Navy (RCN). A decade ago the projected costs for these ships was $26 billion,[12] and the first ship was scheduled to be built by 2026. The Parliamentary Budget Officer (PBO) announced in February 2021 that the cost of building the CSCs is now projected to jump from $60 billion to $77 billion, which would rise to $79.7 billion with a one-year delay and $82.1 billion with a two-year delay.[13] The first CSC is now expected to be delivered in the 2030s, with

*The medium icebreaker CCGS **Henry Larsen** alongside at Davie Shipbuilding in July 2015. Davie is slated to build six medium icebreakers as well as a heavy icebreaker.*

the last ship anticipated to be delivered in 2047. Another example is that it took until July 2020 for the first Arctic and Offshore Patrol Ship, *Harry DeWolf*, to be built and delivered to the RCN.

It is difficult to estimate when all the shipbuilding projects promised under the NSS and *Strong, Secure, Engaged* will be complete. And, based on the Canadian government's historic tendency to reduce the budget of Canada's Armed Forces in times of financial stress, it is difficult to know how many of the NSS ships, costing billions of dollars, will actually get built. Given the icebreaker story going back to the 1970s, it will be interesting to see if either of the new heavy icebreakers will see the light of day by *2130*! When the federal government reviews the costs of shipbuilding projects, based on its current financial situation, it is likely that many of these shipbuilding programs will wither on the vine. Unfortunately, the operational capability of both the CCG and the RCN will be seriously affected if these capital projects are terminated.

Notes

1. John W. Langford, "Marine Science, Technology and the Arctic," in E.J. Dosman (ed.), *The Arctic in Question* (Toronto: Oxford University Press, 1976), p. 166.
2. As quoted in Adam Lajeunesse, *Lock, Stock and Icebergs* (Vancouver: UBC Press, 2016), p. 263.
3. Canada, House of Commons, Debates, 2 March 1987, 3rd Parliament, 2nd Session, p. 3723.
4. As quoted in Lajeunesse, *Lock, Stock and Icebergs*, p. 287.
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7. See Jane Seyd, "North Van's Seaspan Shipyards Awarded One of Two Icebreaker Contracts," *North Shore News*, 6 May 2021.
8. Seaspan, Media release, 2020, available at https//www.seaspan.com.
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12. Lee Berthiaume, "No Plan to Change Warship Building Program Despite PBO Warning of $77 Billion Costs," Canadian Press, 4 April 2021.
13. Parliamentary Budget Officer, February 2021. As discussed in interview with Troy Crosby, ADM of the Material Group, *Canadian Defence Review*, Vol. 27, Issue 2 (February 2021), p. 113.

It is Time for a Maritime Tactical Helicopter Squadron

Major (Ret'd) Les Mader[1]

The Royal Canadian Navy's (RCN) new Arctic and Offshore Patrol Ship (AOPS) is a minimally-armed sovereignty protection vessel which can carry out various constabulary-type missions off Canada's three coasts with the aid of its embarked helicopter. These aircraft can range from small utility ones through to the Royal Canadian Air Force's (RCAF) Cyclone multi-purpose maritime helicopter. Being able to carry out tasks ranging from anti-submarine warfare (ASW) through to utility flights, the Cyclone can support the AOPS by: command, surveillance, administrative and logistics flights; conducting ice reconnaissance; and supporting naval boarding parties with its sensors and machine guns.

A 2019 *Canadian Naval Review* article suggested a new role for the AOPS and their Cyclones by proposing that the RCN could use three AOPS and a Joint Support Ship (JSS) to transport, land and support up to 330 soldiers during a disaster or foreign sovereignty challenge in Canada's Arctic.[2] Distance, unpredictable sea-ice conditions and near-impassible terrain would make the ships' helicopters the preferred means for landing, redeploying and recovering these troops. Thus, this proposal raises the possibility of Canadian ship-based helicopters conducting tactical aviation missions, including air assaults and fire support for ground forces.

This article will explore this idea and urge the RCN (with the RCAF) to develop a maritime tactical aviation capability, using the Cyclone, by standing up at least one maritime tactical helicopter (MarTacHel) squadron at Halifax – which I suggest could be called 434 (Bluenose) MarTacHel Squadron.

The minimum operational requirement for such a capability can be extrapolated by counting the normal aircraft complement of those helicopter-capable RCN ships that could be routinely used to transport and land soldiers. Based on one Cyclone per AOPS and two for each of the JSS, a minimal tactical aviation requirement of 10 aircraft,

with crews and supporting personnel, can be identified. This number will grow if Canada chooses to obtain helicopter-oriented amphibious ships. These aircraft and their crews would be distributed between the Atlantic and Pacific fleets based on the number of ships assigned to each of them.

An alternative solution to meeting this tactical aviation requirement might be to use the Griffon and Chinook squadrons already within the RCAF's army-oriented 1 Wing. While such a response could be improvised during an emergency, there are two obvious reasons why these squadrons do not provide a permanent solution to the need for maritime tactical aviation. First, their aircraft are not designed to operate from small, shipboard flight decks and hangars in humid, salty conditions. Second, these squadrons already have roles; we cannot count on them being available to support the RCN, especially during a crisis.

The Cyclone is a very capable maritime aircraft that was specifically purchased to operate from relatively small ships. Its utility configuration, in which it is able to transport up to 22 passengers or a 3,100 kilogram slung load,[3] is a valuable troop carrier. These aircraft can fulfill both the tactical aviation and ASW tasks, simply by swapping their mission-specific suites, when required. In order to fulfill the tactical aviation role, the airframes would only need to be upgraded with the same weapons and survivability aids (exhaust redirect, decoys, armoured seating, etc.) as provided to 1 Wing's Griffons and Chinooks. When possible, a few more Cyclones could be purchased and assigned to the aircraft pools of the Atlantic and Pacific fleets in order to cater for attrition and any heavy simultaneous operational demands, while reducing the flight hours on each airframe.

It might be argued that the Cyclone is such a versatile aircraft that the existing maritime helicopter (MH) squadrons (Halifax-based 423 MH and Victoria-based 443 MH) could simply be tasked with also conducting tactical aviation missions whenever required. The problem with this approach is not one of equipment but rather of personnel and training. For the Cyclone's pilots, the skills required for very low-level, day and night, tactical, formation flying over land are quite different from those used during solitary ASW flights. For the remaining aircrew, the skill differences are as great. There would be little need for ASW experts and more for load masters, door gunners and flight engineers.

These differences in skill sets push for the creation of one or more specialized Cyclone tactical aviation squadrons to work alongside the existing ASW helicopter units. The Atlantic fleet's tactical aviation crews would be assigned to 434 Squadron. The Pacific fleet ones could be assigned to a new squadron (420 perhaps) or, less desirably, constitute a MarTacHel flight within 443 MH Squadron, depending on how many ships require their support.

In addition to providing the necessary tactical helicopter detachments to the East Coast-based ships, 434 Squadron

Credit: S1 Justin Spinello, AETE IDS

*A CH-148 Cyclone from 12 Wing Shearwater prepares to land on HMCS **Harry DeWolf** during Phase 4 Shipboard Helicopter Operating Limits trials off the Nova Scotia coast on 3 June 2021. Note torpedoes on the helicopter.*

would also be the centre of expertise for Canadian maritime tactical aviation with the responsibility for training relevant aircrews for the RCAF. Being located at Halifax under the command of the RCAF's navy-oriented 12 Wing, 434 Squadron would be able to work closely with the co-located 406 Maritime Operational Training Squadron (MOTS) and 1 Wing's 403 Helicopter Operational Training Squadron (HOTS) at Gagetown.

These connections would permit 434 Squadron's students to mesh in with existing courses; little would need to be invented from scratch. Pilots and flight engineers could receive their basic Cyclone training at 406 MOTS before joining trainee door gunners and load masters at 434 Squadron's training flight for the appropriate tactical aviation courses. This phase could incorporate the tactical aviation and land operation familiarization training already conducted by/for 403 HOTS at Gagetown for 1 Wing's new Griffon crews. The exact division of training effort between 403 HOTS and 434 Squadron remains to be determined. It could be envisioned, though, that 434 Squadron could provide instructors and aircraft to some of the training that 403 HOTS conducts and/or that some of this training could be carried out at Halifax, with 403 HOTS sending some instructors to assist.

Until Canada obtains specialized amphibious ships, some might feel that there is little reason for these trained aircrews to practise massed helicopter operations, as tactical aviation Cyclones will normally deploy as single aircraft detachments or as a pair. Thus, 434 and 420 (443?) Squadrons will need to use imagination, and may have to make extraordinary efforts in order to give their MarTacHel crews recurring, unit-level, collective training in formation operations. Some possible solutions are: very low-level unit formation flying without troops; conducting such exercises with local army reserve units; participating in army and 1 Wing exercises; and arranging to operate from allied amphibious ships during multinational exercises.

This need for an innovative approach to collective training will continue when MarTacHel detachments are actually deployed on operations onboard AOPS and JSS. Even if these ships do not sail with troops onboard, the Cyclone's sensors, weapons and passenger/cargo-carrying capabilities will make it a valuable supporting asset that will be kept busy. In such circumstances, the embarked aviation detachment commanders may need to push for opportunities for their crews to mass the MarTacHel aircraft from all available ships in order to practise their formation operations planning and flying. Even having two or three Cyclones launch, without troops, from several ships to conduct simulated landing operations would be valuable training. Given proper prior planning, such MarTacHel exercises would not interfere with the Cyclones' support to the deployed ships. The ability to carry out such exercises would provide a basis for future MarTacHel expansion should Canada purchase helicopter-capable amphibious ships.

It seems likely that Canada will have to protect its sovereignty

Credit: SI Justin Spinello, AETE IDS

*Master Corporal Chris Rodusek (left) watches over Corporal Mackenzie Birks while he uses a pendant to secure a load to a CH-148 Cyclone during the utility trials portion of Phase 4 Shipboard Helicopter Operating Limits trials on HMCS **Harry DeWolf** off the coast of Nova Scotia on 1 June 2021.*

Credit: Corporal Connie Valin, Canadian Armed Forces

A pair of Canadian CH-146 Griffon helicopters land during Exercise Maple Resolve on 29 April 2021 at CFB Wainwright. Note guns on both sides of the cabin.

and mitigate disasters in the Arctic in the future. Having a ship-borne infantry capability would greatly add to its options for achieving such enforcement and mitigation. These soldiers would require maritime tactical aviation support to accomplish their missions. The skills required of the MarTacHel aircrew are not simply a sub-set of those of the existing ASW crews. Given this, a separate MarTacHel capability must be developed within the RCN's fleets. This article has outlined an approach for meeting this requirement that can be achieved in the near future at minimal cost. The RCN and RCAF are urged to give it serious consideration.

Notes

1. The author wishes to thank Guy Lavoie for his editorial input.
2. Colonel (Ret'd) Brian K. Wentzell, "Arctic Amphibious Capabilities for Canada?" *Canadian Naval Review*, Vol. 15, No. 2 (2019), pp. 36-37.
3. See Lockheed Martin, "CH-148 Cyclone: Canada's Maritime Helicopter."

Canada's Northern Bridge to Iceland

Steven Bright

Canada and Iceland have a longstanding connection spanning more than 1,000 years. Maritime dimensions, of course, have shaped that relationship. From Leif Eriksson's excursions to L'Anse aux Meadows, Newfoundland, to the Icelandic settlers moving to Manitoba in the late 19th century, to ongoing fishing trade, water has bridged our two countries in many ways.

That metaphor of a bridge was the main theme of a keynote speech given by Prime Minister William Lyon Mackenzie King on 4 September 1941 in London. And in this case, he was referring to a 'northern bridge' that connected Canada to Iceland and other northern European countries, including of course Britain, during the war.

The speech was given during King's first visit to Europe since war broke out two years earlier, and following his first flight there in a plane. He was speaking at the Lord Mayor's Luncheon at The Mansion House, an event held in the Canadian leader's honour. King's assistant private secretary, Jack Pickersgill, referred to it as "the high spot of Mackenzie King's visit to Britain."[1] Knowing he had to deliver a great speech because Winston Churchill would be in the room, King fretted over the details and the overall impact his remarks might make. During the luncheon, and following a glowing introduction from the Right Honourable Sir George Wilkinson, Lord Mayor of London, King spoke about how "we of the new world stand in your defence, which we believe to be our own defence." He went on to talk about the "northern bridge" in explaining the connections between his country and Europe.

> In recent days, you and I, Prime Minister, have crossed the great northern bridge which stretches through Iceland, Greenland and Newfoundland from the Old World to the New. The narrow seas between Scotland and Iceland, between Iceland and Greenland, between Greenland and Newfoundland, through which you voyaged to your historic conference with President Roosevelt, are the most vital strategic areas in the world today.
>
> As I spanned those waters and islands, in the space of a single night, I had a new and more vivid sense of our nearness, in North America, to the heart of the new world conflict. I felt a new pride, too, that from the beginning of the war, Canada has been a keeper of that northern bridge. In Newfoundland and Iceland, Canadian forces were the pioneers from the New World. Across that bridge came vast supplies of war materials and foodstuffs; yes, and of fighting men, too. Back across that same bridge, if this island bridgehead should ever be lost, would move the enslaving hordes of the new barbarians.[2]

It was evocative language. And in many ways it had to be if King wasn't to be overshadowed – as he often was – by Churchill. In his thanks to his counterpart, Churchill called Canada "the linchpin of the English-speaking world." He expressed his gratitude for Canada's efforts undertaken to that point to save Britain. "There they [the Canadians] stand, and there they have stood through the whole of the critical period of the last fifteen months at the very point where they would be the first to be hurled into a counter-stroke against an invader."[3]

In trading rhetorical flourishes about 'new barbarians,'

Credit: Timothy Choi

An Icelandic dredging vessel is dwarfed by the mountainsides surrounding Hvalfjörður (Whale Fjord) north of Reykjavik, Iceland, on 20 May 2019. This placid setting was where dozens of camouflaged Allied warships and merchant vessels gathered on their way to or from the United Kingdom during the Second World War.

King and Churchill were referring, among other things, to naval and air force threats manifest in Germany's westward aggression. Since the fall of Denmark and Norway in April 1940, those threats – and the likelihood of further stepping-stone invasions they represented – were very much on the minds of leaders in London, Ottawa and indeed Washington. In their eyes, the Nazi march into Copenhagen and Olso presaged a German invasion of Iceland, from whence Hitler's war machine could launch U-boat and Luftwaffe attacks on Greenland, Labrador, Canada and the entire Eastern Seaboard of North America.

The imperative to forestall such an invasion, thus securing the North Atlantic for vital shipments of supplies to Britain, led Churchill, as First Lord of the Admiralty, to order the Royal Navy (RN) to occupy the Faroe Islands on 16 April 1940. Then, on 8 May, he dispatched four RN ships and 817 Royal Marines to occupy Iceland. Taking the former was comparatively easy. However, taking and holding Iceland, particularly as France started falling, was beyond Britain's capacity. It could not hold Iceland alone. US President Franklin Roosevelt, handcuffed politically by the Monroe Doctrine and US public opinion, could not help. But the senior Dominion could.

Enter the Canadians and the 'northern bridge.' Following a hasty deployment from Halifax on 10 June aboard *Empress of Australia*, members of 'Z' Force (comprised mostly of members of the Royal Regiment of Canada) shipped off to help secure Iceland. They were joined there a month later by members of the Fusiliers Mont-Royal and the Cameron Highlanders of Ottawa (Machine Gun). For the next 10 months, and despite being plagued by massive supply issues and dreadful weather, the Canadians in Iceland prevailed in protecting landing places from sea and airborne invasion, while also building aerodromes and learning how to coordinate actions between services.

Their work laid the foundations for a considerable Allied build-up in Iceland over the coming years. This included a comprehensive naval presence. In the summer of 1941, for example, the RN connected with the nascent Newfoundland Escort Force in coordinating trans-Atlantic convoy transfers at the Mid-Ocean Meeting Point, using Hvalfjörður harbour, northwest of Reykjavik, as an advance base. With its incessant winds, as Marc Milner wrote, Hvalfjörður "offered little respite to tired men and belaboured ships."[4] Nonetheless, Allied control over Iceland paid significant dividends. Many convoys passed close to – and stopped in – the small, strategic island on their way to and from Britain. These movements also included what historian Tim Cook referred to as "the cold, dreary and dangerous Murmansk Run,"[5] convoys that often left from Reykjavik to take much-needed supplies to the Soviet Union.

Iceland was a graveyard for some Canadians. By war's end, two members of the Royal Canadian Navy and 14 from the Royal Canadian Naval Volunteer Reserve died in

British and Canadian troops mounted 6" guns on the Grotta peninsula guarding the entrance to Reykjavik, undated.

or near Iceland and are buried there along with six members of Z Force and 26 men from the RCAF.[6] Many Canadian merchant mariners also died in Icelandic waters during the war.

Back in London, when King was speaking about the waters "through which you voyaged to your historic conference with President Roosevelt," he was referencing the Churchill-Roosevelt summit meeting – to which King was not invited – held a month earlier in Argentia, Newfoundland.

Churchill made his way back across the Atlantic following this historic meeting. And on the morning of 16 August in Hvalfjörður harbour, he embarked HMCS *Assiniboine*. In safe Canadian hands, Churchill and others landed at Centre Pier in Reykjavik for a whirlwind, six-hour tour of Iceland. (It was Churchill's only trip to Iceland during the war. King never went there.) At 1730, *Assiniboine* returned Churchill to HMS *Prince of Wales*, and the two Canadian destroyers that were in Iceland promptly set off for St. John's, Newfoundland. They arrived four days later, then reached Halifax the next day. The northern bridge was indeed secure.

Notes

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Global Naval Forces are Key to the World's Future

Mikaël Perron

With the end of the Cold War and the idea of a 'peace dividend,' many Westerners thought that high-end warships and other military gear were an outdated relic of the past and a waste of money. Many still think so! For those who are aware of developments in the world today, however, it is clear that a complete disposal of modern warships back then would have put us in a very difficult position today. With the resurgence of Russia, the proliferation of submarines, the build-up of the People's Liberation Army Navy (PLAN) and other Asian navies, the smuggling of weapons at sea by rogue states, the reappearance of the pirate threat wherever we let our guard down, and many other threats, modern trained naval forces have never been so important.

To protect the sea lines of communication and the world's rules-based system, it is imperative to match and exceed any potential foe's capabilities. The Russian and Chinese naval technologies and capabilities are exceeding anything thought possible 20 years ago. As the global economic and environmental situations continue to evolve, we seem locked in a move toward a war for the control of natural resources. That war might not become a hot one, as hybrid warfare might lead to weakened Western resolve as we fall back and back again in a pre-WW II style until we wake up too late.

There are better options for our world. It is of utmost importance to be ready to face challenges ahead of us. Unlike previous generations, we don't have the excuse of not knowing the tremendous effects we can have on this world and the events that shape its evolution and that

Could the United Nations, headquartered in New York, be revamped to create a Global Naval Force?

Credit: Royal Netherlands Navy

Lightly armed patrol ships like the Dutch ship HNLMS ***Groningen****, pictured here in July 2020, could be part of a Global Naval Force.*

could make all of our fighting irrelevant when they occur. There is much scientific evidence that shows us how little we are and how fragile our world is.

If we are to prove that human civilization is worth keeping and thriving, states must accept certain facts. States may be gearing up for war over resources but they are wasting a lot of resources in the process and would waste much more if war were to happen. If you read the Geneva, Hague and other conventions outlining the law of wars and take a step back, it feels like you are reading the rules of an elaborate board game but one involving living pieces. When these conventions were written it was a major step forward for mankind but we must go much further now.

We expect environmental changes to cost hundreds of billions of dollars in the coming decades. One place we could look for some money to improve things is to look into potential savings that would go along with a new way of organizing the world's defence spending. The Stockholm International Peace Research Institute (SIPRI) estimates that global annual defence spending was $1.981 trillion (US) in 2020. This could be shaved by several hundred billions if we work together. Military forces will always be relevant but their form has to evolve.

Considering those points, a bold move for this world would be to outlaw inter-state war and disband all national armed forces to create a frontierless Global Defence Force (GDF). That might take us a step further away from the perpetual cycle of the rise and fall of empires. This move would involve a major revamp of the United Nations (UN) structure, and the establishment of a set of universal rules of engagement (ROE) for basic operations. An improved Security Council would approve any major action exceeding those ROE. Such a force would function with geographical command, and most of the expensive high-end war-fighting gear and research could be discarded, achieving major saving for states. Of course, all states would need to agree in order to achieve that saving – a difficult endeavour. We cannot completely eliminate militaries because otherwise any vacuum left by disbanding national armed forces would be filled by organized crime, rogue states and so on. While on its creation, the GDF would use legacy systems, it would evolve so that eventually it had tailored, regionally procured, globally compatible equipment.

We can summarize the naval component of the GDF as follows. It would be a World Fleet allowing for maximum flexibility and mobility. Sensor technology would remain state-of-the-art, but features such as missiles, heavy torpedoes, stealth characteristics, etc., would not be necessary any more. We could conceive of a naval force composed of mainly amphibious forces allowing maximum flexibility and mobility to intervene anywhere in the world with the necessary critical mass on any type of missions. The other main surface units could be lightly armed ships like the *Holland*-class Offshore Patrol Vessel, *Harry DeWolf*-class Arctic and Offshore Patrol Vessel or maybe (reliable) American Littoral Combat Ships that possess a balance of enough fire power and capability. A modest submarine force should also be kept in order to keep a full 3D maritime awareness. Of course, a few high-end warfare fighting machines should be retained in order to contain any state or organization seeking secretly to build-up some military forces of its own. Naval forces would be a centrepiece of the world order by keeping the sea lines of communication open and fighting smuggling and piracy with frontierless freedom and efficiency. They could also provide huge disaster relief capability which will be of capital importance in the coming decades.

In order to get going on such a ground-breaking way of doing things, it is of utmost importance to show resolve by continuing to match any potential foe's capability until we all agree to stand down; the reason why we need a state-of-the-art Canadian Surface Combatant. That is the only way enemies can understand our resolve. Sadly, by lowering our guard first, we would only invite belligerents to take all the room they wish to take.

It will take a lot of work to get states driven by survival instinct, pride, or the military industrial complex President Dwight D. Eisenhower warned of so many year ago, to move ahead. But the challenges of global climate change, for example, require that we make changes. Naval forces are here to stay. In war or in peace they will always have a decisive impact. The choice of how is up to us all!

Impacts of the Arctic Fisheries Agreement on the Canadian Coast Guard

Nicole Covey

The "Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean" entered into force on 25 June 2021. It has been hailed as historic and revolutionary because it is the first international, large-scale pre-emptive fisheries agreement addressing an area of high seas. The agreement binds its signatories – Canada, Denmark, Russia, Norway, the United States, Iceland, China, Japan, South Korea and the European Union – to a commercial fishing moratorium in a specific area of the Arctic high seas and requires the signatories collectively to pursue scientific research about the area for an initial term of 16 years.[1] The agreement may be renewed for additional five-year terms if there is consensus amongst the signatories. The area to which it applies is the 'Donut Hole,' an area of the Arctic Ocean that is classified as high seas and covers about 2.8 million square kilometres. No individual state has sovereignty or jurisdiction over the area; it is considered part of the global commons.

The agreement was written because of concern amongst the Arctic littoral states about the potential for fishing of migratory and/or straddling fish stocks right outside their respective national Exclusive Economic Zones (EEZ). Littoral states have the ability to manage and set limits on fishing within their respective EEZs but cannot control a commercial fishery operation outside the EEZ, which becomes especially concerning in cases of migratory and/or straddling stocks. This concern is compounded because newly emerging fisheries are at a greater risk of being over-exploited than already existing fisheries.[2] As of 2017 only 68.5% of all fish stocks around the world were being fished at sustainable levels.[3] Since the Arctic 'Donut Hole' is part of the high seas, the only way that littoral states can limit the fishing there is by creating an international agreement that controls the fishing habits of its signatories as outlined in the United Nations Convention on the Law of the Sea.[4] Unfortunately, only six of the top 10 fish-exporting countries (as of 2018) are signatories to the agreement.[5]

Now that the agreement has come into force, the commentary will change from its historic pre-emptive nature to examining how it will affect the littoral states and the international community more broadly. This short piece will discuss possible impacts that the agreement may have on the Canadian Coast Guard (CCG), specifically focusing on increased traffic and the increased possibility of conducting high North search-and-rescue (SAR) operations.

The level of multi-year ice and the Arctic ice cover more generally has decreased significantly due to global climate change. As well, technological advances have made areas of the Arctic Ocean that were previously inaccessible now more accessible. Even though these areas are more accessible, however, that does not mean they are easily or safely accessible as climate change has made ice patterns and movements less predictable. While the agreement prohibits its signatories from establishing commercial fisheries, it requires them to conduct research in order to understand the potential fish stocks, and this means sending vessels and scientists into the high Arctic. Complicating the picture is that nautical mapping in the Arctic is less complete and less accurate than in other parts of the world. For example, only 14% of the waters within the Canadian Arctic are charted to modern or adequate standards.[6]

There are three elements here involving coast guards. First, if the Canadian government were to place a greater emphasis on mapping in order to provide the vessels traveling in the Arctic high seas with better nautical charts, the CCG and/or the Canadian navy would most likely be called on by the Canadian Hydrographic Service to assist the effort.

Credit: Norwegian government

A map provided by the Norwegian government in 2017 shows the Central Arctic Ocean where the Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean applies.

Credit: Cpl Simon Arcand, via Royal Canadian Navy Twitter

*HMCS **Harry DeWolf** approaches Cunningham Glacier in Crocker Bay, 21 August 2021 during its inaugural deployment taking it through the Northwest Passage on a circumnavigation of North America.*

Second, there is search and rescue (SAR). An increase in vessels in areas with poor/non-existent nautical charts and unpredictable ice movement means that there is a greater likelihood of an accident occurring that requires a SAR response. In 2011 all the Arctic states signed the "Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic," which divided the SAR responsibility, including over the high seas, among the Arctic states.[7] However, having the agreement in place does not necessarily mean that all of the states have the ability to provide an adequate SAR effort especially if the incident occurs in the high Arctic. In 2019 the *Viking Sky* cruise ship made international news after it experienced engine trouble near the Norwegian coast and Norway had to conduct an 18-hour rescue operation. The passengers and crew in this incident were lucky that the problems occurred near the Norwegian coast so the responders were able to arrive quickly. If a large-scale response was needed in the high seas of the Arctic Ocean, it would take a significant amount of time for the SAR teams even to arrive on the scene. In an emergency the ability to arrive quickly is a vital requirement. Having the ability to provide a sufficient SAR response as states begin their scientific efforts is an important consideration when attempting to understand the impacts that the fisheries agreement will have on the littoral states and their coast guards.

Third, the agreement will also increase the importance of monitoring vessels traveling to and through the littoral states' respective maritime territory. In Canada the organization responsible for monitoring fisheries is the CCG under the Department of Fisheries and Oceans. The fact that Canada is a signatory to this agreement brings more attention to the state's role in combating illegal and unregulated fisheries. Maritime vessels cannot access the Arctic high seas without first travelling through littoral maritime zones, making the role of monitoring fishery activity even more important. As noted, littoral states cannot enforce behaviour outside their EEZ, but they can monitor and enforce domestic regulations on any vessel passing through waters over which they do have jurisdiction.

Now that the agreement has entered into force the conversation needs to evolve. There is no longer need to speculate about whether the agreement would ever enter into force – it has entered into force. Instead, investigation of the impact that this revolutionary agreement may have is necessary. As global climate change continues to allow for increased traffic to and through the Arctic, preventing the over-fishing of this emerging fishery is key to sustainable growth and development of international sustainability norms. The CCG and the coast guards of all the Arctic littoral states play a key role in the enforcement and safety of Arctic maritime travel and their responsibilities are not going to get any smaller with the agreement entering into force.

Notes

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Dollars and Sense:

Canadian Patrol Submarines: Complementing or Competing with Continental Defence?

Dave Perry

This past July, Lee Berthiaume of the Canadian Press reported that the Royal Canadian Navy (RCN) had officially stood up a team to start examining a replacement of Canada's *Victoria*-class submarines.[1] The Canadian Patrol Submarine Project will examine options for replacing the submarines and provide information for informed decision-making about whether Canada will replace the *Victoria*-class boats with a new fleet – something that has yet to be determined. This is welcome news, if long overdue, and comes at a time when strategic circumstances warrant that Canada at least give very serious consideration to replacing its submarine fleet. Around the world, submarines are proliferating widely, especially in the waters of the Indo-Asia-Pacific region.[2] If Canada wants to remain fully internationally engaged in the maritime domain in the Pacific and elsewhere, it needs to understand what is happening under the water. Closer to home, there is an imperative to contribute to continental defence and help deliver on Canadian and American commitments to make new investments in situational awareness "in the northern and maritime approaches to the continent" including a network of sensors from "sea floor to outer space."[3]

And yet, it is unclear to what extent a future Canadian Patrol Submarine will fit into the investments made to improve continental defence situational awareness. Answering that question, which will presumably be part of the Canadian Patrol Submarine Project team's remit, may go a long way towards determining whether a future government decides to replace the existing fleet. On the literal eve of the 2021 election, Canada and the United States issued a joint statement about NORAD modernization. In addition to reaffirming the importance of improving the defence of the North American continent, it identified "Priority areas for new investments" that spanned "Situational awareness, especially in the northern and maritime approaches to the continent; Modernized command and control systems; Capabilities to deter and, if necessary, defeat evolving aerospace threats to North America; Research, Development, and Innovation."[4]

The joint statement follows on the heels of the "Roadmap for Canada-US Cooperation"[5] released in February 2021 by President Joe Biden and Prime Minister Justin Trudeau. The statement makes a clear expression of commitment to a broad array of investments identified as necessary for improved continental defence, and not just a narrow focus on replacing the North Warning System series of early warning radars, which had emerged as a focal point for some discussions. Rather, as was made clear, a whole host of other investments has been identified, including those "to complement and eventually replace the North Warning System with more advanced technological solutions as soon as possible."[6]

Canada's commitment to a much broader set of investments to enhance the defence of North America rather than a narrower commitment to replace the North Warning System will have significant consequences for any other potential future defence investment. While $11 billion (US) has been circulated as the potential cost of the North

Credit: Capt Trevor Ackland, Canadian Armed Forces

*HMCS **Windsor** sails off Nova Scotia during Exercise Cutlass Fury 21 on 9 September 2021.*

Credit: Lianne Girard, via Royal Canadian Air Force

North Warning Site BAF-3 on Brevoort Island, Nunavut, is pictured in this undated photo. It was established in October 1988.

Warning System replacement,[7] the much broader set of investments to which Canada has committed will likely push up dramatically the potential range of investment costs the Department of National Defence and the Canadian Armed Forces put before Cabinet. Given the wide range of other investment priorities highlighted, the $11 billion for North Warning System renewal will probably represent the lower bound of that range, with somewhere north of $100 billion a plausible upper range. To put that in perspective, depending on what Cabinet decides to do and how much, if any, of the tab the Americans pick up, future continental defence investments could exceed the $62.3 billion in new money over 20 years the government pledged in *Strong, Secure, Engaged* just four years ago.[8]

This leads back to the question of whether new submarines may be part of that enhancement of continental defence, or a separate discussion entirely. As has been well noted elsewhere, submarines are expensive,[9] and the general consensus is that Canada should expect to pay something like $5 billion for each boat.[10] Given Canada's approach to budgeting for large projects, in which the acquisition costs of an asset represent 50-60% of the project budget required to obtain them, Canadians can expect something on the order of $10 billion budgeted to buy each new sub. Even if all that is considered is a one-for-one replacement of the current four submarines (and we have witnessed over the last decade the significant availability problems that can arise with such a small fleet), replacing the submarines will be seriously expensive, at a time when National Defence is in the process of generating options for improving the defence of North America with their own, immense, costs.

One thing working in the RCN's favour at the moment from a fiscal (but not an operational capability) point of view is that the bill for such an investment would not come due for likely another 20 years at least. Given the complexity of the capability, inevitable examination of the options of domestic construction, and unique Canadian capability demands that are likely to stretch both the limits of non-nuclear propulsion plants and the practicalities of otherwise Canadianizing someone else's design, no one should expect this project to deliver any new capability until the 2040s. So the bill will not even start coming due for another generation.

Having said that, given the massive sums involved, and the equally massive sums already committed to new naval fleets, serious consideration should be given to the role a new fleet of submarines could play in continental defence. Inexorably, the Canadian Armed Forces will want assets with 'away game' capabilities, as is the case with practically every other weapons system in the Canadian inventory. But given the current focus on continental defence, and its competing investment, the RCN should think long and hard about how new submarines can help keep Canada strong at home and secure in North America before focusing on how they can be engaged in foreign waters.

Notes

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Warship Developments: Expeditionary Sea Basing

Doug Thomas

The US Navy and US Marine Corps (USMC) are very large and complex organizations, both under the control of the Secretary of the Navy. Although any state can exploit the freedom of manoeuvre conferred by operating on and from the sea, the gold standard is exemplified by the United States, with the world's most-capable navy and the high-readiness combat force of the US Marine Corps. The USMC's role is to conduct Expeditionary Maneuver Warfare (EMW): its principal war-fighting organization during large crises is the Marine Expeditionary Force (MEF). The USMC has three MEFs, and each is made up of ground, air and logistics forces – one on each coast of the USA, and the third forward-deployed to Okinawa, Japan. They act as standing Marine air-ground task forces (MAGTFs) in peacetime and war. MEFs are capable of projecting power on land or at sea and are able to support themselves in combat for up to 60 days.

These large forces depend on transportation of personnel, equipment and fuel to the mission area. This short article discusses some of the key means of achieving this.

Afloat Prepositioning Force

Sea basing is a naval concept to free the fleet from relying on shore facilities when conducting operations, particularly amphibious operations. To this end, very large cargo vessels have been leased or built for Military Sealift Command and operated by US Department of Defense civilian crews. Some of these vessels are forward-deployed to Diego Garcia in the Indian Ocean, and to Guam and Samoa in the Pacific as the Afloat Prepositioning Force – near areas of potential future conflict. Materiel, ammunition, fuel and war-fighting equipment such as armoured fighting vehicles are embarked in these ships and are available for use when necessary. As many readers will know, effective logistics support to operations ashore – for example, the campaign to free Kuwait from Iraq in 1990/91 – are essential to achieving success. The vast majority of the equipment and supplies (fuel, munitions, food, etc.) needed to commence and sustain operations ashore during the first Gulf War arrived by sea.

There is a need to provide sea-borne connectors from the Afloat Prepositioning Force to battle zones in coastal areas, and some of these vessels can be built to commercial standards rather than to more expensive warship specifications. Part of the answer is a new type of vessel which has been under development by the US Navy for some years. Concepts have been trialed and experiments conducted with a range of existing ships, both warships and auxiliaries. This led to a new class of vessel, the Mobile Landing Platform (MLP). This is a strange-looking but very functional vessel, rather like a heavy-lift ship, the centre section of which can be flooded down to water level to embark and disembark boats and Landing Craft Air Cushion (LCACs) – large hovercraft capable of transporting armoured fighting vehicles, marines and material at high speed to landing beaches. It can provide harbour facilities to smaller vessels, and also dock larger vessels alongside which can transfer vehicles and materiel across its deck to smaller vessels which then transit to landing areas. This ability can also be used for a broad range of other operations, such as humanitarian assistance and disaster relief, especially when harbour facilities are non-existent.

The United States has built a number of vessels known as the Mobile Landing Platform (MLP) and a variant, the MLP Afloat Forward Staging Base (AFSB) during the past decade. In September 2015, they were renamed the Expeditionary Transfer Dock (ESD) and the Expeditionary Mobile Base (ESB) respectively.

The design of these ships was based on the hull and machinery of the *Alaska*-class crude oil carrier, built by General Dynamics' National Steel and Shipbuilding Company (NASSCO). Leveraging commercial designs ensures lower development costs and civilian crews familiar with their commercial sister-ships meant a separate training and spares pipeline from that of the navy. Uniformed personnel are also embarked as needed to support military operations. Two ESDs have entered service, as well as several ESB variants. Both types are highly flexible platforms that may be used across a broad range of military operations

Sailors assigned to expeditionary sea base USS ***Miguel Keith*** *(ESB 5) stand in formation on the flight deck somewhere in the Pacific Ocean, 19 August 2021.*

Credit: Mass Communication Specialist 2nd Class Dawson Roth

*An MV-22 Osprey prepares to take off from the Expeditionary Sea Base USS **Lewis B. Puller** (ESB 3) in the Arabian Gulf, 17 July 2021.*

supporting a range of operational missions, including humanitarian assistance and disaster relief. Acting as a mobile sea base, they support the deployment of forces and supplies.

The first two, United States Naval Ship (USNS) *Montford Point* (T-ESD 1) and USNS *John Glenn* (T-ESD 2) (the T- indicates they are civilian-manned) are configured with the Core Capability Set (CCS), which consists of a vehicle staging area, vehicle transfer ramp, large mooring fenders and up to three LCAC vessel lanes to support core equipment transfer requirements. With a 9,500 nautical mile range at a sustained speed of 15 knots, these 80,000-ton, 785-foot ships employ float-on/float-off technology and a reconfigurable mission deck to maximize capability. Additionally, the ships' size provides 25,000 square feet of vehicle and equipment stowage space and 380,000 gallons of JP-5 fuel storage for helicopter and LCAC operations.

USS *Lewis B. Puller* (ESB 3) along with sister-ships *Hershel 'Woody' Williams* (ESB 4) and *Miguel Keith* (ESB 5) are being optimized to support a variety of maritime-based missions including Special Operations Forces and airborne mine counter-measures in which the M-53 heavy-lift helicopters tow minesweeping sleds. The ESBs include a four-spot flight deck, mission deck and hangar, and are designed around four core capabilities: aviation facilities; berthing; equipment staging support; and command and control assets. Unlike the ESDs, the ESB does not flood down to disembark boats and LCACs – instead large cranes are used to launch and recover boats – and the ships have a very large raised flight deck with four landing spots for heavy-lift helicopters such as the CH-53 Sea Stallion and the tilt-rotor MV-22 Osprey.

Crewing

Montford Point (T-ESD 1) and *John Glenn* (T-ESD 2) are both operated by Military Sealift Command, but the ESBs (five built and building) are commissioned ships due to their planned operational roles. In August 2017, the first (ESB 3) was commissioned as a US Navy ship – USS *Lewis B. Puller* – commanded by a Navy Captain with a permanently-embarked uniformed crew of about 100. In fact, there are two naval crews, Blue and Gold, so that the ship can be deployed for extended periods and exchange crews as needed. Commissioning these ships provides combatant commanders greater operational flexibility in employing them in accordance with the laws of armed conflict. In addition to naval personnel, their hybrid crew includes 44 merchant mariners from Military Sealift Command to operate the ship's propulsion system.

Credit: Mass Communication Specialist 3rd Class Madailein Abbott

*USNS **Montford Point** (T-ESD 1) (rear) simulates being a floating pier to receive items from the USNS **Fred W. Stockham** (T-AK 3017) (foreground) off Pohang, South Korea, on 13 March 2016.*

Conclusion

The Expeditionary Mobile Base in particular is a very capable vessel. It could stay in a geographic area for extended periods, act as a mobile base for airborne mine counter-measure operations and Special Forces operations, provide an additional large deck for amphibious operations and would be an excellent command and control platform. However, it should be noted that a surface combatant such as an *Arleigh Burke*-class guided missile destroyer (DDG) will frequently act as an escort for these vessels as they are very lightly armed.

Book Reviews

Operational Warfare at Sea: Theory and Practice, by Milan Vego, London: Frank Cass Publishers, 2017, 296 pages, tables, index, charts, USD$170.00, ISBN (hardback) 978-1-138-22425-4

Reviewed by Ambjörn L. Adomeit

Milan Vego divides *Operational Warfare at Sea* into two over-arching themes. The first is the presentation of theory and examples of maritime warfare theory, and the practice of operational warfare at sea. His second theme is the discrepancies in such practices *vis-à-vis* strong naval fleets and the implementation of theory in operational maritime warfare by smaller naval forces. An easy comparison is the disparity between the Royal Canadian Navy (RCN), and the United States Navy (USN). It is in effect a book which updates half of Vego's 2003 book *Naval Strategy and Operations in Narrow Seas*.

For readers interested in joint service operations, and for navalists in particular, Vego's *Operational Warfare at Sea* identifies the thematic components driving the study, and utilizes detailed case studies to illustrate finely nuanced terms and concepts. Of greatest immediate use is the detail he applies to what is a glossary of sorts throughout the volume, in which he describes the importance of strategy and operational art. Vego investigates the relationship between these concepts and others, and compares the prerequisites and fundamental characteristics of the use of operational war theory in history to that of the present. Chapters two through four are all linked through their assessment of the effect politics, operational and strategic events, objectives and necessities have on naval development and on the ability of navies to wage war in wartime, and to be in full readiness in peacetime.

Vego explains different aspects of command and control in the political and the military arenas. He outlines the use of military intelligence to assess one's own naval capacity at sea *contra* that of an opponent(s), and to develop the necessary *desiderata* and processes for decision-making. This conversation leads into the creation of an effective operational plan and the execution of operational concepts. These include the civilian component of war, and the complications and utility it offers in a time of war. Vego concludes his book by outlining the planning process, leadership requirements and direction, and the delineation between operational planning and tactical perspectives on naval combat.

There are several considerations with which a reader is faced when engaging in the teachings of *Operational Warfare at Sea*. It is evident that Vego spent considerable time and effort constructing the flow of his narrative, which improves upon that of the previous edition (2009), clarifying logically discursive elements which were otherwise confused in the 2009 edition. A reader may find engaging with the text difficult because of the bifurcation of chapters five and nine, which serve as bookends within the current edition, opening and closing the concepts delineated in chapters six, seven and eight. An example is the epistemological nature of the questions – and the conclusions Vego derives from his analysis – of chapters seven (Operational Design) and eight (Operational Idea). The subject matter of these two chapters might be more suitably placed antecedent to chapter five. In other words, leadership necessitates an understanding of how past decisions – past theory, practice and consequences – work on the collective effect of history upon contemporary events.

The second confusing element in Vego's work is the lack of a conclusion to the book. He is absolutely correct in asserting that the development of theory cannot reach a final conclusion, but it would be appreciated if he concluded his book with a wrap up of his opinions. The exclusion of a formal conclusion requires readers to pull from the text the essence of what Vego has written, making them work harder than is necessary.

Milan Vego's work is invariably dense and rather opaque to those without some background knowledge of naval issues, or at least some familiarity with military history and a basic knowledge of contemporary military security issues and jargon. It is, however, convincing and an essential theoretical text for naval specialists, and is highly recommended.

HMCS *Corner Brook* sits on the floating drydock *Seaspan Careen* at Esquimalt in preparation for refloating, 10 June 2021, following its Extended Docking Work Period.

Credit: James Charsley, Babcock Canada Inc., via Royal Canadian Navy