CANADIAN NAVAL REVIEW

VOLUME 7, NUMBER 4 (WINTER 2012)

Arctic Theme Issue

Deep Freeze or Warm Peace? Canada's Arctic Strategy in a Changing Regional Regime

Meeting the Challenge of Oil Spill Mitigation in the Arctic

Bridging the Gap: The Limitations of Pre-AOPS Operations in Arctic Waters

The Cold War Frogmen of the Far North

The Navy's Arctic Challenge

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Credit: Martin Langford

"We know where the rocks aren't" – a view of Oliver Sound from CCGS ***Henry Larsen****.*

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Editorial

Should Observer Participation in Arctic Ocean Governance be Enhanced?

The April 2011 Ministerial Meeting of the Arctic Council in Nuuk, Greenland, marked the handover of chairmanship of the Council from Denmark to Sweden and adopted new rules for observers. At the commencement of its Chairmanship of the Council, Denmark stated that "the Arctic Council should look for ways to further involve those that are ready to cooperate under the premise that the primary role of the Arctic Council is to promote sustainable development for the Peoples of the Arctic and the Arctic States."[1] Since its inception, the Arctic Council has permitted participation of non-Arctic states, global and regional inter-governmental and inter-parliamentary organizations and non-governmental organizations as observers.[2]

The adoption of new rules was prompted, at least in part, by the council's decision not to grant requests for permanent observer status to China, European Union (EU), Italy and South Korea. Only the EU application was controversial as it occurred during a messy diplomatic and political row between Canada and the EU concerning the latter's ban of the import of seal products from the former. In response, Canada led opposition to permanent observer status for the EU. The council went on to deny the requests of other applicants, committing instead to a review of the rules on observer status.

The new rules continue to recognize observers as a valuable feature of the Arctic Council because of "provision of scientific and other expertise, information and financial resources."[3] Non-Arctic states and entities have made substantial contributions to Arctic research, for example: the EU is a major funder of Arctic research; China has now conducted four major CHINARE scientific expeditions to the Arctic; several non-Arctic states maintain research stations in Svalbard, Norway; and the single largest research project on Arctic shipping, the Northern Sea Route Project (INSROP), was co-funded by Japan. There are also bilateral partnerships involving institutions in non-Arctic states. The Canadian Polar Commission has numerous non-Arctic international partners from around the globe.[4] The scope, scale and depth of the contribution of non-Arctic states to Arctic science is not in doubt, but has that investment been translated into, or is it likely to entail any greater participation, in the region's governance processes?

Several non-Arctic states have been observers for years – namely France, The Netherlands, Poland, Spain and United Kingdom. New applicants now find themselves facing different rules. The distinction between permanent and ad hoc membership has been removed (although a temporary ad hoc status pending permanent membership remains). Most significant, the new rules impose conditions that go beyond what was contemplated by the Danish statement quoted above. Indeed, the commitment to the "primary role of the Arctic Council … to promote sustainable development for the Peoples of the Arctic and the Arctic States" is relegated below other undertakings, some quite far-reaching. Standing out in particular is the extent to which an applicant recognises "Arctic States' sovereignty, sovereign rights and jurisdiction in the Arctic." This is curious because the Arctic states themselves do not necessarily recognize each other's maritime claims. The United States holds that the Northwest Passage is a strait and the Northern Sea Route includes straits used for international navigation, a claim which both Canada and Russia respectively deny.

The next consideration is the extent to which the applicant recognizes "that an extensive legal framework applies to the Arctic Ocean including notably, the Law of the Sea, and that this framework provides a solid foundation for responsible management of this ocean." While at first glance, this sounds good, but if the reference to "Law of the Sea" is to the UN Convention on the Law of the Sea, 1982, the United States is still not a party. If it is meant to refer both to conventional and customary law of the

Credit: Peter Lovstrom

The Ministerial Meeting of the Arctic Council was held in Nuuk, Greenland, in April 2011.

Credit: George Roth, University of Washington

Student researchers conduct field work near Svalbard, Norway.

sea, there is a problem that the procedure for defining the outer limits of the extended continental shelf is established exclusively in the UN Convention. Under treaty law, the ability of the United States to benefit from this procedure is in question. In fact this is a major concern if the United States remains outside the treaty. It is thus unclear what exactly non-Arctic states are expected to recognize in relation to a future US extended continental shelf as long as the latter remains a non-party the UN Convention.

Although no one criterion overrides another, an order of priority appears implicit. The first undertaking is to accept and support the objectives of the Arctic Council. Recognition of the claims of Arctic states is next. In comparison, the undertakings to respect "values, interests, culture and traditions of indigenous peoples" and "to contribute to the work of permanent participants," key reasons for the establishment of the Arctic Council, are relegated to fourth and fifth places.

Also curious is the requirement that observers "may propose projects through an Arctic State or a Permanent Participant," but that "financial contributions from observers to any given project may not exceed the financing from Arctic States, unless otherwise decided by the SAOs [Senior Arctic Officials]."[5] As mentioned earlier, several non-Arctic states and entities are major funders of Arctic climate and ocean science. This rule has the potential to discourage future non-Arctic scientific initiatives from being brought under the umbrella of the Arctic Council. Other than exercise of control, it is unclear what functional purpose this rule is expected to achieve, and may simply have the effect of leaving council activities to be mainly funded by council members or failing this, underfunded.

If the purpose of the new observer rules is to attract interest in the work of the Arctic Council by important non-Arctic states and actors, the response can be expected to be mixed, if not lukewarm. The Arctic Council was established with a cooperative mission divorced from issues of sovereignty and security. Its work over the years led participants to believe that its mission was to protect the region and to do so by building knowledge and cooperation for the protection and sustainable development of the region and in the interests of aboriginal peoples. In many respects, the problems of the Arctic are global, change in the region has planetary significance and its future use is likely to be driven by global supply and demand. The cooperation of non-Arctic states is important for long-term strategic responses to the needs of the region.


Credit: Ansgar Walk

Inuksuk Point on Foxe Peninsula, Nunavut, Canada.

One wonders whether the principle guiding the Arctic Council's imposition of the new observer rules is really to strengthen the capacity of the council to pursue its mission or rather a measure to enhance regional control and provide political insurance (possibly with legal implications) for the maritime claims of individual Arctic Ocean coastal states. It should be remembered that the Central Arctic Ocean includes high seas and international seabed over which the rest of the international community enjoys rights and duties under the law of the sea. Constraining non-Arctic state participation in this way might entail political costs in the future when and where their cooperation will be needed. It is in the interests of Arctic states and the region's aboriginal peoples to secure support of the rest of the international community for their initiatives.

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Notes

1. Kingdom of Denmark, "Chairmanship of the Arctic Council 2009-2011," 24 April 2009, available at www.ambottawa.um.dk/NR/rdonlyres/DCA27296-499A-4FC2-934F-1A2D87DC3083/0/PDF_Arkprogram.pdf.
2. Declaration on the Establishment of the Arctic Council, Ottawa, 19 September 1996, available at http://arctic-council.org/article/about.
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4. See Canadian Polar Commission website, available at www.polarcom.gc.ca/index.php?page=international&hl=en_US.
5. SAO Report to Ministers.

2nd Place Essay in the Bruce S. Oland Essay Competition

Deep Freeze or Warm Peace? Canada's Arctic Strategy in a Changing Regional Regime

Adam P. MacDonald

Three interconnected forces – the increasing effects of climate change, heightened interest in resource development and increasing concern for demarking and patrolling maritime boundaries – are altering the geopolitical make-up of the Arctic, ushering in a distinct era in regional relations. The underlying principles of this new regime, however, are uncertain. Will a focus on sovereignty and traditional security concerns create a competitive system guided by a balance of power logic? Or will the Arctic states work cooperatively to deal with the transnational issues affecting this rapidly changing region? While there are examples of both cooperation and competition, this is the formative stage when the policies, behaviours and interactions of those involved will cement the norms and values governing their future relations.

Credit: 2Lt Dave Bowen

Captain Karl Hawpt gives direction to Warrant Officer Andy Price and Master Corporal Mike Honey of the Arctic Response Company Group deployed to ***Operation Nanook*** *2009 during training near Iqaluit.*

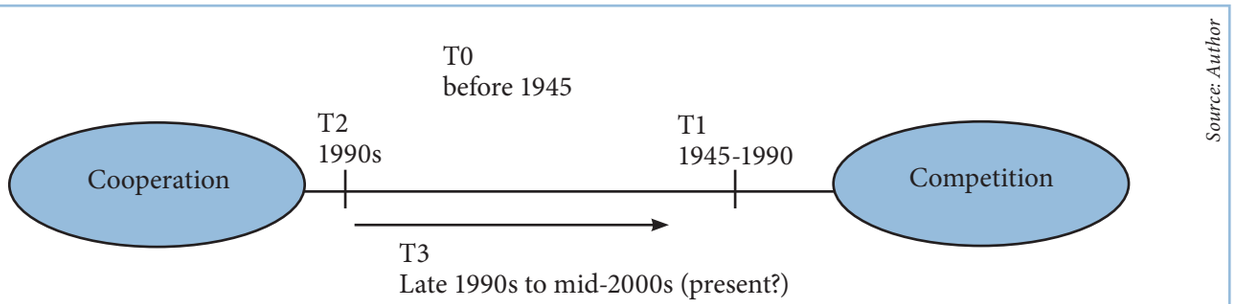
Over the last few years Canada has attempted to clarify its intentions via public declarations, policies and most recently the Northern Strategy released in 2009. Although the strategy demonstrates a wider policy orientation than before, evident by its focus on sustainable development and environmental impacts, the protection of sovereignty via military security remains the top priority. It is important to have the forces necessary to exercise control over territory and promote Canada's maritime claims, but Ottawa must understand it is both a product and agent of this evolving international regime. It is in Canadian interests to promote and operate in a rule-based multilateral regime bounded by recognition that security concerns are complex and interdependent, demanding regional coordination.

By making regional cooperation a defining feature of its Arctic strategy, Canada can be a leader in promoting multilateralism in the interest of all. This will not be easy, in particular because Moscow and Washington have both shown themselves loathe to be bound by such frameworks. The transnational nature of the issues facing the Arctic, however, makes multilateral processes vital if they are to be addressed. To achieve this, a broadening of the concept of security that moves away from strictly military concerns over sovereignty and encompasses other non-traditional issues must be constructed and accepted by Arctic states. Recent developments within Canadian Arctic policy point to such a transition but Ottawa must continue to promote the construction of an effective regional regime to tackle the real and pressing contemporary issues.

A Short History of the Arctic

It is important to understand the concept of a *regime*, specifically in relation to security (see Figure 1). An international regime is defined as a series of norms, values and rules which become the paradigm guiding the nature of interactions among actors in an area. A key facet of any international regime is the issue of security, specifically how actors view one another in terms of their survival. States must decide whether their neighbours are (1) important in their definition and achievement of their own security and (2) whether they enhance or inhibit security. The traditional understanding of security is based upon comparisons of military power among states and is focused on issues such as territorial defence and spheres of influence. More recent and constructive views of security, however, say that it should be viewed as a process of competing ideas about what is being protected (the referent), how (the means employed) and from what (the existential threat). The changing emphasis and referents throughout the history of the Arctic have dictated

Figure 1. The Arctic International Regime



Source: Author

International Paradigm: Int'l forums; rules-based system	Power politics; Balance of Power logic
Driving Concerns: Environmental and ecological impact of climate change	Sovereignty; traditional security concerns
Political Behaviour: AEPS (1991); Arctic Council (1996)	Increased military allocation of resources

the perceptions and actions of states in the region, and thus behaviour will vary from competition to cooperation depending on the nature of the issue and the importance attached to it.

The Arctic has historically been seen as a remote place sparsely populated with small bands of natives who have become habituated to the harsh climate. The only people interested in the area in the pre-WWII era were explorers, many of whom wanted to find a maritime passage between the Atlantic and the Pacific Oceans. The Arctic's climate and geography made it a mostly undisturbed area and the major powers were unwilling to invest significant capital and energy into it. There existed, therefore, no Arctic regime due to the disinterest in the region.

With the beginning of the Cold War, however, advancement in the projection of military power via the bomber, and later intercontinental ballistic missiles, made the Arctic of interest to the Soviets and Americans as it provided the shortest route for an attack on each other. The Arctic became a key strategic region for both the United States and the Soviet Union. As the country in between, this made it an important interest for Canada as well. The regime during the Cold War was a balance of power focusing on traditional security concerns within the wider global relationship between Washington and Moscow.

A new regime began to emerge with the end of the Cold War. Measures were undertaken – most notably by Norway, Finland and Canada – to establish an Arctic regime based on a multilateral framework. There were increased levels of cooperation amongst states, dealing with 'low politics,' such as sustainable development and scientific research.[1] The first concrete result was the signing in 1991 of the Arctic Environmental Protection Strategy by the eight Arctic states (Canada, United States, Denmark, Iceland, Norway, Sweden, Finland and Russia), which established a number of committees to monitor climate change, specifically ice reduction and changes to flora and fauna. The agreement started a period of growing regional cooperation and dialogue culminating with the Canadian-led initiative to create the Arctic Council in 1996. This provided a permanent multilateral forum for interstate cooperation in the areas of climate change research, oil and gas research and Arctic shipping. Canadian attempts to include security matters in the mandate were rejected by the Americans and subsequently scrapped to ensure the United States would become a member. But it was the overall disinterest in the region from a geopolitical perspective throughout the 1990s that ensured the development of a cooperative multilateral Arctic international regime focused on low political issues.

By the late 1990s, however, interest in the region had grown as its accessibility increased, creating opportunities for

Credit: US Air Force

A Soviet Tu-95 Bear aircraft being escorted by a CF-18 Hornet in 1987.

Credit: Martin Langford

Accessibility to the Arctic is increasing, at rates higher than predicted. Here, adventurers explore the Northwest Passage.

Credit: Sgt Ron Flynn, RCAF Public Affairs

resource extraction and transport. A 2008 US Geological survey estimated that 90 billion barrels of recoverable oil and 1,670 trillion cubic feet of natural gas lies in the region.[2] This represents approximately 22% of the world's undiscovered natural resources, attracting great attention from regional actors, specifically the circumpolar states (i.e., those states that directly border the Arctic Ocean) of Canada, United States, Denmark, Norway and Russia. Such heightened interest, though, has mostly been focused on military security in defence of national sovereignty, not only of land but, more importantly, of waters claimed by various actors. This has shifted relations off a cooperative track towards a competitive one with the introduction of 'high' political issues into the region.

The growing deterioration of the ice and estimates that 84% of the natural resources are offshore,[3] have motivated states to exercise their perceived sovereignty in the Arctic Ocean. There may be debate about the *rate* and *specific implications* of climate change, but there is a consensus that accessibility to the Arctic is increasing at rates higher than predicted.[4] As a result states are investing huge sums of capital to finance scientific research to determine exactly where their extended Exclusive Economic Zone (EEZ) lies. The extended EEZ is an area where a state does not have absolute authority but does have the right to develop the resources, as outlined in Part V of the United Nations Convention on the Law of the Sea (UNCLOS). In order to make a claim for the extension of the EEZ (beyond their granted 200 nm zone), parties to UNCLOS must collect data to argue that their territory is an extension of an underwater continental shelf. The UN Commission on the Limits of the Continental Shelf, established through UNCLOS, is a group of leading scientists in the field who will determine if a state's claims are valid. Upon ratification of UNCLOS, each state has 10 years to provide findings to the committee. All the circumpolar states except the United States are signatories and are cognisant of the deadlines for submitting their proposals. Russia submitted its claim in 2001 but it is being revised after feedback from the UN committee. Norway accepted the committee's finding of its claim in 2009, Canada has until 2013 and Denmark has until 2014 to submit. There are, however, overlapping claims, specifically: Denmark, Canada and Russia around the North Pole; Russia and Norway in the vicinity of Spitsbergen Island; and Canada and the United States in the Beaufort Sea.

Although there are multilateral agreements and institutions, since the mid-2000s traditional security concerns have been a growing force driving state policies. The region has quickly become a new strategic domain, and the geography has been re-infused with importance due to national interests relating to control of and access to resources and transport routes. Russia, having recovered from the turbulence of the early post-Soviet years, is now re-emerging in the region. It is investing heavily in scientific research and military equipment to secure its northern claims. Although perhaps the least involved in the Arctic directly, since 9/11 the United States has grown

concerned with continental security and, therefore, is interested in securing the Arctic region as a protected northern flank. The other major Arctic states with claims to enlarging their EEZ – Denmark, Norway and Canada – are also moving to develop a stronger military presence in the region, and showing at times a complete unwillingness to compromise on their claims.

Master Corporal Sean Wickett of the Grey and Simcoe Foresters passes by a traditional Inuit Inukshuk at Camp Resolute Bay.

The Emerging International Arctic Regime: Challenging Traditional Concepts

There is thus an atmosphere of growing competitive unilateralism in the Arctic. A number of actions by various states between 2004 and 2007 demonstrated the increasing emphasis on using military forces to enforce and promote territorial and maritime claims. For example, the military contingents sent to Hans Island by Denmark and Canada heightened tensions between the two countries until it was agreed in 2005 to pursue a political solution to the dispute over the island. As well, Russia's growing muscular approach to the region became clear with the resumption of Arctic bomber flights in 2007, the planting of the Russian flag at the North Pole in the summer of 2007, and the resumption of surface patrols in the region in 2008.

In an effort to calm tensions in the region, the circumpolar states met in Ilulissat, Greenland, in 2008 and pledged to handle their boundary disputes peacefully, proclaiming UNCLOS as the main legal framework governing the region.[5] Will this temper the increase of competitive behaviour? All the circumpolar states have continued to augment their military capabilities in the area. While the chance of conflict amongst the circumpolar states is unlikely, the introduction of military forces can cause uncertainty, mistrust and/or miscalculation, affect the willingness of states to work together, and lead – without any state consciously planning this – to an emphasis on balance of power logic.

There are thus signs of increased military presence in the Arctic but there are signs that cooperation is becoming an embedded aspect of this emerging regime as well. Let me give five examples. First, the declaration of Ilulissat is the first time the circumpolar states have agreed publicly to resolve maritime boundaries through diplomatic-legal avenues. Second, numerous scientific projects including studying the Lomonosov Ridge by Canada and Denmark show that cooperation on work of mutual interest is possible. Third, Canada and Russia have agreed to work on projects pertaining to their indigenous populations. Fourth, in May 2011 the Arctic Council states signed a search and rescue treaty, delineating the area of responsibility of each state – the first comprehensive treaty signed by the council's members.[6] Finally, Canada's annual Arctic military exercise, *Operation Nanook*, has increasingly involved other militaries in scenarios relating to non-traditional security matters, and the creation of a training centre in Resolute Bay demonstrates a growing focus on coordinating resources to respond to issues.

It is perplexing to see such a mix of cooperative and competitive behaviour. The circumpolar states declare themselves willing to work multilaterally on a number of issues from climate change effects to studying the sea bed and Arctic shipping regulations. At the same time these states use unilateral action – often via pumped-up military forces – to protect what they see as their national interests. It seems that the reactions are related to whether the issues are seen as low politics or high politics.

Concerns over physical control of territory, maritime zones and resources are considered 'high' politics and are easily overtaken by a zero-sum mentality whereby the gain of one is at the loss of another. Matters of 'low' politics are seen as important but not directly affecting sovereignty (i.e., the authority of the state over its territory and people). In the Arctic, security and sovereignty have been interlinked based on the notion that protecting the integrity of the state is paramount. The focus on security has usually been through a lens of relative comparisons of

Credit: Sgt Kev Parle

A CP-140 Aurora aircraft taxis to its parking spot after arriving at Iqaluit Airport during ***Operation Nanook*** *2011.*

military power. Instead of delineating interests in terms of low and high politics, the states involved must realize the interconnectedness of these matters and their transnational character. Climate change will affect the entire region, regardless of jurisdiction. Indeed, the effects of a melting Arctic will be felt worldwide. Promoting safe transit and resource development will require multilateral efforts to harmonize policies to protect the fragile region. Greater security force cooperation will be needed to tackle search and rescue operations, natural or human-made disaster response and perhaps counter the introduction of smuggling and terrorism into the region.

The Future of Canada's Arctic Strategy in a Changing Environment

The 2009 Northern Strategy was the first substantial Canadian policy document delineating an approach to the region that was not just focused on traditional security concerns. Alongside protecting Arctic sovereignty (which is still listed as a main priority), social and economic development, improving northern governance and protecting the environment are listed as priorities. The strategy states that the various maritime disputes "pose no sovereignty or defence challenges to Canada,"[7] but despite this, there are calls for a stronger military presence in the Arctic, specifically improving surveillance, training and new aerial and naval platforms to put "more boots on the Arctic tundra, more ships in the water and a better eye in the sky."[8] The challenge for Canada, therefore, is how to employ security forces, in concert with other states, to deal with the wide array of issues confronting the region.

Developing positive, rule-based working relations with Russia and the United States will be vital to ensure power politics – in particular a split between the four NATO circumpolar states and Russia – does not lead to an escalation of competition and mistrust in the region. Canada has maritime disputes with both Russia and the United States, and it is imperative that avenues are designed to ensure these disputes do not lead to a deterioration of cooperation. Ottawa should emphasize strengthening the Arctic international regime based on a rule-based institutional approach in which bilateral and multilateral venues are preferred over unilateral actions and outbursts of sovereign pride. Recognizing that many of these matters will not be resolved in the near future, Canada must work to ensure an open dialogue is pursued to strengthen norms of reciprocity and cooperation in order to build a regime capable of handling such issues. This must be done soon as deadlines for EEZ claims are quickly approaching and there remains no clear method for resolving such conflicts.

One of the first matters on which Canada should focus is the potential militarization of the Arctic. Making the Arctic a nuclear-weapon-free zone would be a significant movement in this direction. The inability of the Arctic Council to address such matters is a serious liability and

Arctic states need either to improve existing or create new multilateral instruments to allow militarization to be discussed. Regular meetings of Arctic states within multinational working groups would create a forum to discuss and investigate security issues along with coordinating the resources required to address them. While many states, including Canada, will continue to use military forces to enforce sovereign claims and conduct patrols, resources should be allocated to developing constabulary forces to counteract the most likely threats to the region.

As well, Canada should work towards establishing and strengthening liaison with regional militaries and security forces through exchanges and joint exercises. These initiatives would reduce tensions, build trust, develop infrastructure for information sharing and signal understanding of the collective security challenges Arctic states face. In terms of maritime disputes, perhaps options such as creating a demarcation zone around the North Pole where Canadian, Russian and Danish claims conflict, and making this area international waters should be investigated. Or perhaps Canada could push for an agreement that exploration of resources in contested areas will be based on joint projects.

A strong rule-bound regime is necessary to ensure conflict is avoided while maintaining national sovereignty and protecting the sensitive ecosystem. It appears that the Arctic states are not willing to recreate the institutional make-up of the region, but Canada should take the lead, specifically when it assumes the Arctic Council's chairmanship in 2013, in promoting and developing further multilateral instruments necessary to deal with the changing region. Arrangements in the Arctic must not only deal with regional states, but also try to accommodate other actors who would like to be included, specifically China, Japan and South Korea. These three Asian states are ad hoc observers at the Arctic Council but are seeking permanent observer status, although the Arctic states seem somewhat reluctant to increase their status. China's growing interest in particular is raising concerns among other Arctic states, most notably Russia, but even so joint resource ventures by Chinese and Russian companies in the Arctic are decreasing traditional security concerns between the two. Joint ventures in resource development and scientific research may be excellent avenues for confidence-building measures between the Arctic states.

Canada must take a more assertive role in the Arctic, specifically pushing for a multilateral framework. Like the other Arctic states, Canada continues to intensify its military activities in the region rather than calling for a strong regime defined by a rule-based multilateral framework.

*USCG **WIllow** and HMCS **Summerside** operate together off the coast of Saglek, Labrador, during **Operation Nanook** 2011.*

There needs to be an institutional configuration in place to deal with future uncertainties and provide meaningful levels of security to members thereby ensuring that unilateral military-security action does not become the overriding paradigm. While security forces will be needed to handle traditional and non-traditional challenges, the militarization of the region would be detrimental to resolving existing issues with fellow Arctic states.

In order to ensure this does not happen, new ways of thinking about security that include both 'low' and 'high' politics must be promoted. Security in the Arctic needs to be understood as a process clearly delineating what needs to be protected, with what methods and against what threat. While sovereignty is a security issue, it is not the only one states should be addressing – climate change and increased activity in the region, including shipping and resource development, raise new challenges that need to be dealt with in a coordinated manner. Military forces, while useful in a variety of aspects, should not be the only resources available to deal with these matters. Critical reflection on the nature of security and the resources necessary to achieve it are vital. In the Arctic security is dependent on collective action and trust to handle the transnational issues that affect not just the region but the world as well.

Notes

1. Carina Keskitalo, "International Region-Building: Development of the Arctic as an International Region," *Cooperation and Conflict*, Vol. 42 (2007), p. 194.
2. US Geological Survey, "90 Billion Barrels of Oil and 1670 Trillion Cubic Feet of Natural Gas Assessed in the Arctic," 23 July 2008.
3. *Ibid*.
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6. Arctic Council, "The Agreement on Cooperation on Aeronautical and Maritime Search and Rescue (SAR) in the Arctic," 12 May 2011.
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8. *Ibid*., p. 9.

Adam MacDonald received his Masters in political science in 2009 from the University of Victoria and his research interests include Canadian foreign policy, international relations and Chinese foreign and defence policy.

Meeting the Challenge of Oil Spill Mitigation in the Arctic

David Prior

Credit: STX Europe

The MS ***Norilskiy Nickel*** *is a cargo vessel built to service mining operations in the Arctic without support from icebreakers.*

We are increasingly aware of the difficulties in the Arctic facing any company that chooses to drill for offshore oil or operate mines that require ships full of fuel to transport materials into and out of the area. The problems include very remote industrial sites and long, dark and extremely cold winters. Fierce storms, fast currents and moving ice make marine operations hazardous. There is the threat of polar bears stalking workers, requiring the posting of armed guards. There is also concern about the psychological impact of constant darkness and isolation on workers' mental health and their ability to avoid accidents.

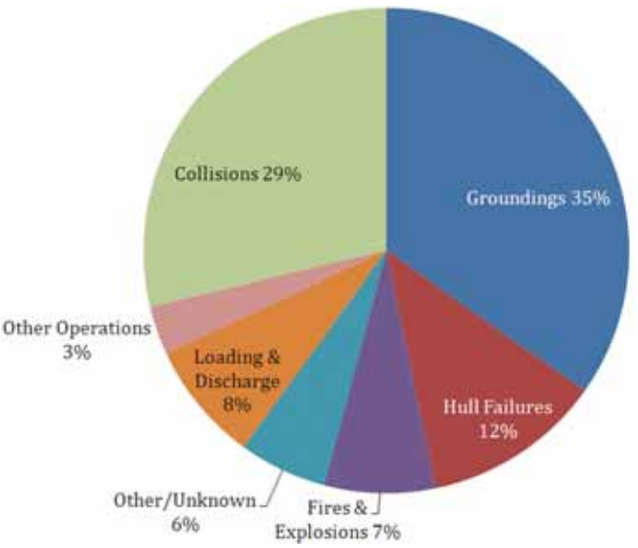
The thought of a future Captain Queeg commanding a huge tanker through the Arctic night is a sobering one. Even on well-run ships a series of mistakes combined with inexperience, lack of proper preparation and gear, bad management and bad luck (which is always lurking) can lead to the disaster the world witnessed in the summer of 2010 in the Gulf of Mexico. Hundreds of new vessels are soon to be sent to Arctic waters and yet experienced ice captains are now almost all retired.[1]

Oil companies have been aware of these challenges for 40 years because of their activity in the Arctic. Shell Oil has invested well over $300 million assembling and promoting a fleet of state-of-the-art oil spill response vessels.[2] Other major oil companies have also been active there for decades. The risks are well-known by all.

Oil Spill Mitigation

The historical record of oil spill mitigation on the ocean is a litany of failure. The International Tanker Owner Pollution Federation (ITOPF) examined the causes of large spills (greater than 700 tonnes) from 1970-2010. It concluded that 76% of these spills are caused by groundings, collisions and hull failures.[3] The accidents occurred almost entirely in mild climates, not the Arctic. In this region we can expect hull and equipment failures to increase dramatically because the extreme cold weakens the steel and impedes maintenance. As well, in the Arctic, ships travel through the ice pack in a single-file convoy following an icebreaker. This increases the likelihood of collisions. Finally, groundings are a much greater threat in

Large maritime oil spills by cause, 1970-2010 (>700 tonnes)



Credit: International Tanker Owners Pollution Federation Limited

the Arctic than elsewhere. The water is mostly uncharted with large, shallow regions and fast currents and moving ice that can take hold of a ship. The Arctic has extremely high tides so huge volumes of water, and ice, are moving quickly and continuously.

ITOPF notes that large oil spill incidents involving ships declined by almost 90% from 1970 to 2010.[4] That fact is cold comfort to the people living by the Gulf of Mexico today where, a year later, large amounts of BP oil are still washing up and contaminating beaches and fishing grounds. It only takes a single accident to cause catastrophic damage so incident trends are irrelevant unless you are playing the odds. In addition, the decline in accidents over the last 40 years occurred in safe and manageable waters, not the Arctic. Just because it is now safe in, say, the Gulf of Mexico, doesn't mean that it will be safe in the Arctic. The risks in the Arctic are orders of magnitude greater.

There are three primary oil spill mitigation methods used worldwide. Unfortunately, these methods are not tremendously effective. The first method is booms and skimmers. Even in *ideal* conditions this method rarely recovers more than a relatively small proportion (10-15%) of the spilled oil. And, of course, conditions are rarely ideal on any ocean, but particularly in the Arctic. *Ideal* means no wind, no waves, no current, no darkness, no fog, no remote locations, etc. In other words, no normal ocean conditions. The average successful oil recovery rate on the ocean over the last 40 years has ranged from 0-5%.[5] BP demonstrated this fact again in 2010 – the months-long application of 48,000 workers, more than 3 million feet of containment boom, millions of gallons of dispersants, more than 6,500 vessels, 120 aircraft and $8 billion (US) resulted in the successful capture of only *3%* of the spilled oil.[6]

The second method of oil spill mitigation is in-situ burning (ISB). This technique is rarely effective in most ship-source spills because of the difficulty collecting and maintaining a thick enough layer of oil to burn. Furthermore, the most flammable components of the spilled oil evaporate quickly, which means that ignition can be difficult. Another problem is that residues from burning may sink, which can have long-term effects on sea bed ecology and fisheries. And if you can get the oil to burn, close to the shore or the source of the spill, there may be health and safety concerns or atmospheric fall-out from the smoke plume.

In-situ burning has really only been applied to mild, southern waters and even then, as noted, it is not very effective. BP had every advantage and perfect weather conditions in the Macondo blowout mitigation effort but ISB only managed to burn 5% of the spilled oil.[7] In the Arctic, according to the World Wildlife Federation (WWF), moving ice, winds greater than 10 knots, darkness, waves, snow and bitter cold make ISB and *all* other mitigation impossible 72% of the time during the short drilling season and completely impossible the rest of the time.[8] When ISB can be used, it damages the albedo – the light-reflecting ability of the surface – which is an essential tool in the fight against global warming.

The third oil spill mitigation technique is dispersants. For a large spill, the amount of dispersant you'd need would be huge. There is some question if these dispersants are safe. Since chemical dispersants tend to move the oil from the surface into the water column, both the oil and the dispersants can make their way into the marine environment. In addition to their possible toxicity, the Macondo blowout in the Gulf of Mexico demonstrated the ineffectiveness of using dispersants. Again under perfect conditions, only 8% of the oil was broken up by chemical dispersants, and natural processes caused 16% of the oil to disperse.[9] Dispersants made the oil disappear from view – however, it merely went to the sea bed and into the water column. There is also strong evidence that the chemical dispersants created a toxic brew that continues to sicken local residents.

If the oil just sinks to the bottom, it will wash up on shore regularly every time there's a storm. It may make the oil industry, government and locals happy that the oil is no longer visible, but paying off claims rather than actually dealing with the oil is not going to get rid of it. On top of all this, the dispersants do not work if the water is too

cold. Disperants are not an accepted cold-water response option and are not approved for use in Alaska.

The oil industry often makes reassuring, but misleading, statements which help undermine support for innovation. For example, ITOPF says:

> The reality is that even after the largest oil spills, such as *Torrey Canyon*, *Amoco Cadiz*, *Exxon Valdez*, *Nakhodka*, *Erika* and *Prestige*, the affected environments and associated marine life have recovered remarkably quickly and with no overt signs of lasting damage. Perhaps the most compelling fact is that fisheries and mariculture resources for which Brittany, Alaska, Japan and Galicia are famous had recovered to pre-spill levels within a year.[10]

The reality is very different. Twenty years after the 1989 *Exxon Valdez* spill, lingering oil from the spill has persisted, long past initial forecasts, and can still be found on rocks and in small pools on beaches in Prince William Sound. Some of this oil remains toxic and in virtually the same state it was in just days after the spill. Scientists believe it may persist for decades to come. Pacific herring were exposed in the midst of spawning and didn't suffer the full consequences of contamination until four years later, when the population collapsed. As well, the population of orcas in the area – already in decline at the time – has never recovered from the spill and is now believed headed for extinction as a result. A 2006 report by the Exxon Valdez Oil Spill Trustee Council, which tracks the status of fish and wildlife and other resources affected by the spill, found numerous species still not fully recovered.[11]

On 3 September 2010, in the aftermath of the BP Macondo blowout, the Joint Industry Oil Spill Preparedness and Response Task Force published "Draft Industry Recommendations to Improve Oil Spill Preparedness and Response."[12] This is a very positive and self-congratulatory report of the response to the crisis. According to the report, "the current surface oil spill response system – as exhibited in the DWH [Deepwater Horizon] Incident – continues to be effective." Contrary to what the industry says, however, the response was not effective, the Gulf of Mexico is still full of oil and thousands of lives and livelihoods were wrecked. Despite the positive tone of industry reports, human action was ineffective at cleaning up the oil – 3% of the oil was skimmed off, 5% was burned, and 8% was broken up with chemical dispersants – the rest of the oil either evaporated/dispersed by natural processes, or lurks on or below the surface of the sea, leaving us to await the future environmental consequences.[13]

Credit: PO2 Justin E. Stumberg

Smoke billows over a controlled oil fire in the Gulf of Mexico off Venice, Louisiana.

Credit: MCS1 Demetrius Kennon

Longshoremen stage oil containment booms to support clean-up efforts following the Deepwater Horizon oil spill in 2010.

Oil Spills in the Arctic

There have been virtually no oil spills coinciding with sea ice. The biggest so far was the sinking of the cargo ship *Runner 4* on 5 March 2006 in the Gulf of Finland following a collision. *Runner 4* was in a convoy travelling through ice in single file and was rammed in the stern. This can happen in convoys through ice because in an ice pack the ships cannot turn away. The wreck started leaking both light and heavy fuel oil but this was difficult to detect in the first week due to severe ice conditions.[14]

Some people have argued that pack ice will contain any oil that is spilled in the Arctic and prevent it from spreading. However, this very small – 300 barrels (bbl) – spill spread to 500 square kilometres in only 13 days. Operations to combat the spill only started when the wind pushed the ice floes away and the oil was observed in the open sea areas. The scientists involved did not at the time understand how the oil had spread so far. An oil spill will quickly get away from the best technology currently available, and developing high-technology tracking systems does not remove the oil from the sea. All modern oil spill mitigation techniques are incredibly slow and ineffective under most normal conditions.

The *Runner 4* spill occurred in the Gulf of Finland in March-April with average winds of only 13 knots and maximum winds of only 26 knots. Air temperatures averaged a mild -5°C. In the Beaufort Sea, in contrast, the air temperature averages -20°C in March-April. The ice pack averaged only 45 cm thick in the Gulf of Finland, whereas it can be up to four *metres* thick in the Beaufort Sea depending on the circumstances. Conditions in the Arctic are thus far more severe than in the Gulf of Finland where this spill occurred.

Ten days after the *Runner 4* sank, the oil spill mitigation effort began using three very large oil spill skimmer ships, including the ultra-modern ORV *Halli*. Working continuously for five days, these ships were able to gather up a total of only 90 bbl of oil. Industry predictions for the oil recovery performance of the *ORV Halli* at ship speed of one knot is 5,000 bbl/day. But following the *Runner 4* spill the three large skimmer ships each recovered an average of *six* bbl/day.[15]

The Finnish Environment Institute concluded that it is possible to respond to *small* spills in ice but much work is required to develop effective response methods for *large* spills in ice. The Macondo blowout was 60,000 bbl/day so many people would say that the *Runner 4* spill of only 300 bbl was a *very* small spill. Three modern oil skimmer ships operating close to home and crewed by oil-in-ice mitigation experts were only able to capture 30% of the tiny oil spill.

It has been claimed that the presence of ice makes it easier to clean up an oil spill because the ice acts like a floating boom and also 'preserves' the oil for burning. In reality, the *Runner 4* experience shows that this 'natural boom' *prevents* the mechanical clean up of the oil. Since ISB is unworkable in winds over 10 kts, dispersants are outlawed by many developed states and no techniques work when the ice is moving, it appears that ice cover is of no advantage in dealing with the oil. The oil spill mitigation process for *Runner 4* could only begin when open water appeared. In addition, oil released in broken ice spreads on the surface along the leads and openings between ice floes and blocks. These areas are essential for air-breathing animals – but, if the oil had not already harmed them, ISB and dispersants would probably kill them.

Another oil spill in ice occurred 25 February 2011 when

the containership *Godafoss* ran aground in Norway. This was the first significant oil spill in ice-covered waters in Norway. It took some time to organize a response, and two days of snowfall made it difficult to locate and respond to the spill. As it was the first spill in the winter, the Norwegian Coast Guard had to learn as it went along. Norwegian authorities attempted to contain the spill but it was difficult because of the ice and currents along the coast, and the oil spread up the coast.

Ironically, the Norwegians are considered the world leaders in oil spill mitigation. They had experience cleaning up an oil spill in mid-summer 2009. On this occasion, a small, empty cargo ship grounded and contaminated 200 km of coast with bunker C fuel oil. The Norwegians used skimmer devices which are expensive – a small skimmer device costs over $1 million, and building a big ship costs over $75 million. And, as the Norwegians discovered, the skimmers could only function in fairly calm water with very little ice and no currents.

Hubris

In 2011 Shell Oil submitted an Arctic plan – entitled "Preventing and Responding to Oil in the Alaskan Arctic" – to the US Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE). In the plan, Shell stated it can recover most oil spilled in Arctic water using mechanical containment and recovery efforts (like booms and skimmers). Shell claims that mechanical containment devices "have been proven to work well in the Arctic," that in-situ burning can eliminate 80-95% of oil and "has been proven to work well in the Arctic," and dispersants "have proven highly effective in the Arctic."[16] It made these claims despite the fact that such efforts only recovered 8% of oil after the *Exxon Valdez* spill, and only 5% of oil after the Deepwater Horizon spill. Shell's plan also ignores the fact that a recent oil spill response drill in the Beaufort Sea described mechanical clean-up efforts in icy conditions as a "failure."[17] It seems that the oil industry plans for a 'worst case' spill are for a spill in relatively warm and ice-free August conditions. And this is despite the fact that Shell, for example, wants to drill through until October, when ice, darkness and bad weather prevail.

The 2010 Report to the US President about the Macondo spill observed, "[t]he Macondo well blowout can be traced to a series of identifiable mistakes made by BP, Halliburton, and Transocean that reveal such systematic failures in risk management that they place in doubt the safety culture of the entire industry."[18] The BOEMRE "Report Regarding the Causes of the April 20, 2010 Macondo Well Blowout," released 14 September 2011, stated that

> The loss of life at the Macondo site on April 20, 2010, and the subsequent pollution of the Gulf of Mexico through the summer of 2010 were the result of poor risk management, last-minute changes to plans, failure to observe and respond to critical indicators, inadequate well control response, and insufficient emergency bridge response training by companies and individuals responsible for drilling at the Macondo well and for the operation of the *Deepwater Horizon*.[19]

There is no reason to believe that behaviour would be any different in Arctic operations. The oil industry has responded by saying that its mitigation efforts are very effective.

Credit: State of Alaska

*Birds killed as a result of oil from the **Exxon Valdez** spill in 1989.*

Norwegian Coastal Administration

Booms deployed to contain an oil spill near the Norwegian shoreline.

Conclusion

A 12 July 2011 report by SL Ross Environmental Research Ltd. for the Canadian National Energy Board (NEB), "Spill Response Gap Study for the Canadian Beaufort Sea and the Canadian Davis Strait," states that ISB is not possible in winds over 10 kts, and mechanical recovery and dispersants are not possible in winds over 15 kts.[20] In the Beaufort Sea, from July to September, westerly to northwesterly winds in excess of 20 kts become persistent.[21] This period is when the ice is mobile and most dangerous. The rest of the year the ice is solid and oil spill mitigation is extremely ineffective due to factors such as cold, darkness and, yes, polar bears. This suggests that the three available mitigation methods (in-situ burning, mechanical recovery and dispersants) are not operable most of the year in the Arctic. They accomplished almost nothing in the balmy Gulf of Mexico in the summertime of 2010. The Arctic will be orders of magnitude more difficult.

The key to preventing catastrophic damage and liability in a marine environment is a fast and effective clean up response. This capability does not currently exist.

Notes

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7. Justin Gillis, "US Finds Most Oil from Spill Poses Little Additional Risk," *The New York Times*, 4 August 2010, available at www.nytimes.com/2010/08/04/science/earth/04oil.html?_r=1&hp.
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20. SL Ross Environmental Research Ltd., "Spill Response Gap Study for the Canadian Beaufort Sea," 12 July 2011, p. 12, available at www.aleutiansriskassessment.com/documents/A2A6V0_-_SL_Ross_Environmetal_Research_Limited_-_Spill_Response_Gap_Study_for_the_Canadian_Beaufort_Sea_and_the_Canadian_Davis_Strait.pdf.
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Bridging the Gap: The Limitations of Pre-AOPS Operations in Arctic Waters

Commander Paul Forget

Both the Canada First Defence Strategy and the Northern Strategy commit the Canadian Forces (CF) to the robust defence of Arctic islands, seas and airspace. Consequently, the Royal Canadian Navy (RCN) has been directed to perform a larger role in asserting Canada's sovereignty over its Arctic waters. This raises a number of challenges for RCN ships and personnel since the Arctic is a harsh and often unforgiving operating environment. Even small growlers and bergy bits – the types of ice that will become more prevalent as climate change breaks up first-year ice – can sink large warships. Uncharted straits, the huge distances between communities and fuel supplies, and Canada's own stringent Arctic pollution laws all place limitations on RCN operations in the Arctic.

Contrary to popular perception, Arctic waters are not completely unknown to RCN sailors. Sovereignty patrols occurred throughout the Cold War, and the RCN has gained a significant amount of operating experience from joint sovereignty exercises such as *Operation Nanook*. However, until versatile and ice-strengthened Arctic Offshore Patrol Ships (AOPS) are built and integrated into the RCN fleet, the navy must continue to expand its Arctic operations with the fleet it has. Maintaining a viable presence in fluctuating weather and ice conditions will have to take logistical, environmental and engineering limitations into account. In this article I will explore the difficulties we face presently with Arctic operations and some of the solutions that the navy is implementing to overcome them.

The Halifax-class Frigates: An Interim Arctic Presence

Since 2007, the primary sovereignty exercise of the CF has been *Operation Nanook*, usually held in August and September. This is a whole-of-government exercise, incorporating various military and other government assets in a scenario-based approach to managing security and sovereignty threats in the Arctic. Exercises have involved the landing of Canadian Army troops on the shores of Baffin Island (2009), a multinational naval task group operating in Arctic waters (2010), and this past summer, an emergency response to a real-life air disaster just outside Resolute, Nunavut.[1] The RCN's role in *Operation Nanook* is extensive, and often includes port inspection divers, *Kingston*-class maritime coastal defence vessels (MCDVs) and *Victoria*-class submarine operations. But the most visible and enduring of RCN contributions to *Operation Nanook* is the deployment of a *Halifax*-class frigate.

Credit: Cpl Rick Ayer, Formation Imaging Services, Halifax

*HMCS **Montréal** off the coast of Grise Fiord in Jones Sound during **Operation Nanook** 2010.*

Although not the most specialized navy asset, the *Halifax*-class frigate is the best platform the RCN has to maintain a physical presence in Arctic waters until the AOPS join the fleet. As a general-purpose frigate, it possesses sophisticated sensors and communications capable of building and maintaining a recognized maritime picture in the Arctic, and its Sea King helicopter is useful for ice reconnaissance, search and rescue and local transport. Once on station, the frigate provides the most versatile navy response to immediate threats in Arctic waters. At least one frigate is kept available on the East Coast at all times as a Maritime Forces Atlantic (MARLANT) 'ready duty ship' for contingency response. This means that any security threat in the Arctic demanding immediate RCN attention would likely incorporate the despatch of a *Halifax*-class frigate to the region, provided certain logistical hurdles, primarily availability of fuel and ice density (time of year dependent) could be overcome.

This is certainly not what the original designers of the *Halifax*-class ships had in mind when the frigates were built in the late 1980s and early 1990s. Although the frigates were intended to be 'multi-purpose' platforms capable of fulfilling a range of combat missions, their overriding concept of operations embraced the Cold War threat of the time. Naval planners envisaged utilizing the frigates

HMCS ***Montréal*** *alongside in Nuuk, Greenland, taking on fuel and food during* ***Operation Nanook*** *2010.*

for anti-submarine warfare against Soviet submarines in the north Atlantic, as well as integrated anti-air and anti-surface operations as part of a combined Canadian or NATO fleet. There was little talk of sending surface vessels to the Arctic to exercise northern sovereignty – the Department of National Defence (DND) still intended to procure nuclear submarines for Arctic patrol as outlined by the 1987 White Paper.[2] After the submarine acquisition was quietly dropped and the Cold War came to an end, the *Halifax*-class frigates were delivered and they have since been the workhorse of the navy, utilized for a range of missions from maritime interdiction operations in Mediterranean and Middle Eastern waters, to humanitarian assistance/disaster relief operations in the Caribbean, to littoral warfare operations in the coastal waters off Libya.

Once the frigates began exercising in the Arctic as part of *Operation Nanook*, the RCN discovered a catalogue of operating limitations that must be carefully managed. This is not to say that they cannot operate in the Arctic, or that it is dangerous to sail these frigates north of 60°N. Indeed, these workhorses of the fleet have proven year after year that they can sail at increasingly more northerly latitudes and in challenging weather and ice conditions. Every Commanding Officer, however, must recognize the risks and realities of conducting Arctic operations with a warship designed for combat in the open north Atlantic. Some of these factors are strategic in nature, and both the RCN and the federal government are moving to rectify them. Others are managed on a day-to-day basis. All of them are applicable not just to the *Halifax*-class frigates, but to all RCN warships that might be called upon to operate in the Arctic, including MCDVs and submarines.

Fuel Constraints

The lack of northern fuelling facilities is one of the biggest challenges that the RCN faces in Arctic operations. No major Canadian fuelling depots exist north of St. John's, Newfoundland. Currently, MARLANT ships participating in *Operation Nanook* top up their fuel tanks in St. John's en route to Baffin Bay, expend large amounts of fuel while sailing in Arctic waters, and then conduct a long re-fuelling in St. John's when returning home to Halifax. While this arrangement is viable for a defined exercise such as *Operation Nanook*, it is not flexible should MARLANT ships respond to security contingencies when they are in Arctic waters. Canada's Danish allies maintain a fuelling depot at Nuuk, Greenland, but this is at best an expensive and a non-national means of maintaining Canadian warships on station. Fuelling is such a concern for sustained northern operations that ships proceeding north must typically make arrangements to rendezvous with Canadian Coast Guard ships operating in the Arctic in order to take on fuel while at anchor.

HMCS ***Montréal*** *passes an iceberg in Strathcona Sound near Nanisivik, Nunavut Territory, during* ***Operation Nanook*** *2010.*

*HMCS **Toronto** sails past an iceberg near Frobisher Bay off the coast of Baffin Island during sovereignty patrols for **Operation Nanook** 2009.*

Although possible, fuelling by tanker is also not a preferable means of maintaining RCN operations in the Arctic. Stringent regulations governed by the 1970 *Arctic Waters Pollution Protection Act* (*AWPPA*) make fuelling at anchor the only viable means of replenishment – and even this relatively benign activity requires the deployment of specialized fuel booms and other monitoring processes to ensure pollution does not occur. With regard to tanker resources, the venerable HMCS *Preserver* and *Protecteur* are the only remaining RCN refuelling assets on both East and West Coasts, and neither can be dedicated to the Arctic for extended periods of time. Contracting a civilian tanker is a costly measure, and as the 2010 grounding of a community-resupply fuel tanker demonstrated, fraught with risks for the Arctic's fragile environment.[3]

This means that *Halifax*-class warships must take on as much fuel as possible in St. John's and retain as much of it as possible while in Arctic waters. Indeed, the *AWPPA* regulations state that all vessels navigating in the Arctic must maintain enough fuel either to leave the applicable Arctic zone or reach a refuelling facility.[4] Complicating this requirement is the presence of significant ice that can puncture the hull of *Halifax*-class ships. These ships are most manoeuvrable in close quarters with icebergs, growlers and bergy bits when their two gas-turbine engines are used, rather than the more economical diesel engine. Of course, this engine configuration consumes a considerable amount of fuel if used over an extended period of time, thus necessitating that Commanding Officers carefully balance the risks associated with the presence of ice and fuel considerations in support of the mission.

During previous iterations of *Operation Nanook*, the frigates have compensated for extended daytime gas-turbine use by turning off main engines and drifting throughout the quieter night hours. This is only safe, however, if ice and weather conditions are benign, and doing so meets the parameters of the mission. Another solution is to take on an additional fuel load in the salt water ballast tanks. These tanks cannot be used for the remainder of the deployment once their additional fuel load is consumed and they are refilled with sea water. Since the purpose of these ballast tanks is to correct trim and list, this function becomes degraded once they are used primarily for fuel storage. These tanks must then be thoroughly cleaned and inspected upon return to Halifax, both a time-consuming and costly process.

Although these fuel-maximizing actions are indeed possible, the most sustainable solution is to build a dedicated fuelling facility in the Arctic. The federal government is planning to achieve this capability by constructing a "deep-water berthing and fuelling facility" at Nanisivik, Nunavut.[5] Located on a northern peninsula of Baffin Island, close to an airport and the community of Arctic Bay, Nanisivik already possesses a berthing jetty that is being expanded to achieve full resupply capability by 2015. Its strategic location at the eastern entrance of the Northwest Passage will allow future AOPS to extend their operational deployments in the heart of Canada's Arctic waters.

Environmental Constraints

One of the RCN's primary missions in the Arctic is to lend support to other government departments as they reinforce Canada's integrated security and sovereignty framework in the region. An important plank of this framework is the *AWPPA*, originally legislated after the infamous transit of the American oil tanker *Manhattan* through the Northwest Passage in 1969 and 1970.[6] The RCN may be called upon to help Transport Canada enforce

*An oil spill recovery boom is deployed while CCGS **Pierre Radisson** comes alongside HMCS **Toronto** to refuel during **Operation Nanook** 2008.*

the *AWPPA* regulations upon ill-prepared commercial vessels seeking to utilize the more accessible Northwest Passage. For a navy that has conducted countless fishery patrols and overseas maritime interdiction operations, this is familiar territory. But enforcing the regulations also means abiding by them. Here the operational reach of the *Halifax*-class frigate is affected, and the ships and sailors must find creative solutions in the interim while AOPS are constructed.

Since a *Halifax*-class ship carries upwards of 200 sailors, the sewage treatment plant is almost always in use. Normally, 'black' (toilet) and 'grey' (showers and washing) water is specially treated and then can be discharged more than 12 nautical miles (nm) off shore – essentially, outside Canada's territorial waters. However there are restrictions on the authorized discharge of black and grey water within Arctic waters – defined as all waters of Canada's Exclusive Economic Zone (up to 200 nm from land) north of 60°N.[7] Discharge of untreated sewage is not permitted in Arctic waters. All black and grey water, as well as garburated food waste, is directed through the sewage treatment plant.

In order not to overload the plant, some excess water is collected in the bilges. This can be minimized with severe water restrictions which will affect crew comfort. Since bilges are located under the main machinery spaces, all bilge water is automatically classified as 'oily water' and thus cannot be discharged at all in Arctic waters. Based on previous *Halifax*-class deployments to *Operation Nanook*, water can be collected in the bilges for three weeks before they are so full that they affect the ship's safety. This must be incorporated into overall planning of individual Arctic operations.

Because of the low salinity of Arctic seas, large quantities of table salt may need to be added to ensure the proper operation of sewage treatment systems. Without this, the plant runs the risk of becoming inoperable. Without a treatment mechanism for black and grey water, the bilges will fill at least twice as quickly even with severe water restrictions, which would severely limit operations north of 60°N. The dumping of non-garburated food waste and all types of solid garbage is prohibited in Arctic waters. *Halifax*-class ships have sufficient space to accommodate the collection of solid garbage, however, the accumulation of food waste over a longer than expected Arctic deployment can become a health concern. All of these discharge restrictions may necessitate a *Halifax*-class ship passing below 60°N to pump out bilges or dump food waste in extreme circumstances, potentially affecting the mission. All of the above limitations must be carefully planned for and managed prior to deploying north.

Credit: Cpl Rick Ayer, Formation Imaging Services, Halifax

Sailors from HMCS ***Montréal*** *communicate with the ship via radio during a boat transfer to Grise Fiord.*

Navigational Constraints

The echo sounder is one of the most vital sensors used to help a warship navigate in both open and pilotage waters. In the Arctic, where large areas of the seabed remain unsounded, use of the echo sounder becomes essential. In the Arctic littoral region, however, echo sounders may only be operated at low power if marine animals are sighted. In deeper Arctic waters, where echo sounder use is less essential, it must be powered off. Depending on the mission, the restricted use of the echo sounder may severely restrict a warship's ability to navigate through littoral waters. Since most of Canada's Arctic domain consists of an archipelago, and thus the RCN will almost always be operating in littoral waters, this can become a serious concern depending on the mission. Continued route survey work is required in littoral areas in order to build upon existing navigation data to offset these limitations.

Ice remains a threat to the hull integrity of the *Halifax*-class frigates, but weather-induced ice build-up may also threaten the stability of these ships. The perfect recipe for disaster would be if ice build-up on the *Halifax*-class superstructure is greater than 25 cm, fuel levels are low and a storm is building. Likewise, ice build-up in the embarked rigid-hull inflatable boat (RIB) may lead to a damaged RIB-launching davit. The RIB and Zodiacs must be winterized, batteries fully charged and bilges dry. These small boats are vital to the rescue capability of the frigates, as well as for local transport and reconnaissance. They were designed for operations in the northern Atlantic and as such are not particularly well suited for Arctic operations and movements of personnel. Another lesson learned in recent years is the importance of using appropriate Personal Protective Equipment (PPE) for the harsh Arctic climate.

Although I have explored some of the restrictions that Arctic weather and environmental concerns present to

Credit: Cpl David Cribb

Credit: Cpl Rick Ayer, Formation Imaging Services, Halifax

*HMCS **Montréal** sails past some glaciers in Jones Sound during **Operation Nanook** 2010.*

the RCN, there are also advantages to the Arctic's cold weather and cold waters. For example, the *Halifax*-class machinery is generally designed to favour cold temperatures over hot ones. Many pieces of equipment and computers are designed to run at cool temperatures and being in such a cold environment reduces the demands placed on the ship's chillers and cooling systems.

Conclusion: Bridging the Gap before AOPS

Most of the aforementioned limitations posed by the Arctic environment and weather cannot be helped. If there's one thing that we cannot control, it's the environment in which we are called upon to operate on a daily basis. However, the *Halifax*-class frigates, and the RCN as a whole, have done a remarkable job of adapting to an Arctic operating area for which they were not originally designed. The construction of AOPS tailor-made for challenging Arctic operations will draw upon these lessons learned, as well as mitigate some of the operating restrictions imposed by ice, weather and the necessity of preserving the Arctic environment.

With the announcement in fall 2011 of Irving Shipyard as the firm contracted to build AOPS, construction of these vessels can begin shortly. The design phase is almost complete and the first of these vessels is expected to be delivered in 2015. They are being designed with a hull that can operate in hard first-year ice, and they will have a greater ability to sustain themselves for longer in challenging Arctic conditions. In the meantime, the RCN is continuing to develop a long-term Arctic operating capacity. Junior officers are being posted to Canadian Coast Guard icebreakers in order to gain experience operating in ice-infested waters. The *Halifax*-class and other RCN warships will continue to sail north to participate in *Operation Nanook* and undertake other Arctic operations, regardless of the challenges and limitations in doing so, gaining much-needed experience and exposure to conducting operations in an Arctic environment. Operating in Arctic waters is not impossible; it just requires some long-term planning and creativity. The men and women of the RCN possess both in spades, and they will continue to secure Canada's security and sovereignty in cooperation with other government departments in this vital national territory for the foreseeable future.

Notes

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7. "Halifax-class Safety and Environmental Management System," Part II (May 2010), SOP E10, Canadian Arctic Waters, p. E10–1/7.

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The Cold War Frogmen of the Far North

Lieutenant (N) Jason Delaney

The September 2011 edition (Vol. 14, No. 27) of *The Maple Leaf* presented a remarkable underwater photo by Master Corporal Peter Reed. The photo illustrates two navy divers in pristine blue water inspecting a grounded iceberg off Resolute Bay in the Arctic. The divers were there as part of a team consisting of Canadian and American divers participating in *Operation Nanook* 2011. Interestingly, this is not the first time Canadian navy divers have been to Resolute Bay. Royal Canadian Navy (RCN) 'frogmen'[1] have a notable history of being sent to the northern frontier, albeit a long time ago. Sadly, very little has been written on these operations despite their contribution to northern operations and the high praise they received by both US and Canadian authorities. In this article, the early exploits of RCN divers in the far north will be rediscovered to reveal a remarkable group of highly trained professionals that made a difference during the Cold War.

In the early 1950s, one of the greatest military threats to North America was Soviet long-range aircraft carrying nuclear bombs over the Arctic region. Their payloads promised devastation to North American cities many times that of Hiroshima and Nagasaki. To defend the continent, the United States convinced Canada that an array of radar sites cresting the northern landmass was the best way to obtain early warning of an attack. To this end, Canada and the United States completed one of the most secretive and complex radar systems the world had ever known: the Distant Early Warning (DEW) Line. The DEW Line was an intricate array of long-range radar stations largely designed, financed and manned by the United States, yet most of it was on Canadian territory. With growing American interest in the Arctic, Canada was faced with a dilemma – either assume a greater share of the effort, or allow its territory to become ever more populated by American forces. Within this context, a team of Canadian divers from the operational clearance diving unit in Halifax began a series of deployments that would last well into the next decade and span the length of the DEW Line from Tuktoyaktuk to Baffin Island.

Around the same time, the Clearance Diving Branch was formed from an amalgamation of the explosive disposal/clearance and standard deep-sea/salvage diving organizations in February 1954. The result was a strange combination of frogman and deep-sea diver, and an interesting mix of professional skills. By summer 1954, the first divers were deployed to the Arctic onboard the icebreaker HMCS *Labrador* for the ship's legendary voyage through the Northwest Passage. Here, they gained valuable experience in operating in the Arctic environment. The following year, an Underwater Demolition Unit (UDU) sailed in *Labrador* to Foxe Basin north of Hudson's Bay to help survey and clear landing sites for the initial construction of DEW Line stations. This second deployment was pioneering because it involved beach reconnaissance, hydrographic surveys and diving in unfamiliar conditions, including ice.

Credit: DND Photo: HS-73957

Divers in Halifax Harbour showing typical gear for ice diving, 6 February 1964.

Arctic operations were (and still are) complicated by a lack of docking facilities so everything had to be done amphibiously, over the beach. Supplying these stations was a test of sea transportation in an inhospitable climate with very little support. There was a constant threat of freezing, heavy ice-choked harbours, inlets and bays, and perpetual darkness for six months of the year, leaving a very short window of opportunity for re-supply operations. For over 15 years, the UDUs cleared the way for large convoys of the US Navy's Material Sea Transportation Service (MSTS) which faced hazards and hardship to deliver vital cargo by sea. These operations were complicated by the seasonal advance and retreat of pack ice, together with the

Credit: DND Photo LAB-1588

*The dive team embarked in HMCS **Labrador** with a tidal marker, circa 1955.*

normal tides and currents as well as regular freezing and thawing, that continually moves massive boulders and other obstructions around.

In light of these conditions, beach-clearing operations were an ongoing concern and one for which the skills of the UDU were uniquely suited. The Canadian divers had few references to guide them, so they developed their own techniques that were later added to the RCN's Diving Manual. A team was typically made up of six to seven divers including an officer-in-charge (OinC) plus a handful of Petty Officers, Leading Seamen and below. A team this size was small enough to be highly mobile, yet big enough to be divided into two if necessary. Initially, all the ice would be cleared from the site then it would be surveyed by a skiff or other boat equipped with booms and lines; this allowed divers to be pulled along in a prescribed search pattern. When obstructions were spotted, the swimmer would raise his hand and a weighted float would be heaved over the side of the skiff. Once the survey had been completed, the team returned to each float, assessed the amount of explosives required and laid the necessary charge.

Several types of explosives were used, such as C3 obtained from American sources and PE3A from the British. These explosives were good for certain jobs like breaking up large chunks of grounded ice but the high rate of detonation made them unsuitable for other tasks such as removing boulders. If these explosives were used on a large boulder, it would shatter leaving numerous smaller fragments which then had to be cleared. To avoid this, the teams preferred a Canadian-made explosive called Nitrone – an ammonium nitrate-based explosive manufactured by Canadian Industries Limited. This explosive was favoured for several reasons: first, it had a detonation rate less than half that of other explosives; second, it was available in one pound canisters threaded on both ends that could be screwed together to make the required charge; and third, this packaging protected the explosive from moisture and freezing. A charge could be put together from the Nitrone supply in the skiff with the swimmer still in the water. Using these techniques, a landing site of 300 feet by 400 feet completely blocked with ice could be cleared by seven frogmen in two and a half hours.[2]

The capabilities of the Canadian divers became of such value that the US Navy requested the unit embark in its icebreaker, USS *Edisto*, to continue providing this service after *Labrador* was transferred out of the RCN in 1958. At this point, these deployments served as the navy's only contribution to northern operations other than providing communication facilities for American task groups

Credit: DND

A frogman sits on the ice with DEW Line radar site PIN Main (Cape Parry, NWT) in the background, July 1967.

operating in the area. UDU Bravo went aboard *Edisto* in July 1958 and proceeded into northern waters to conduct a preliminary survey of the DEW Line extension located along the northern coast of Newfoundland and Labrador (a series of radar sites known as the GAP/PINE sites). To complete the reconnaissance phase of the task, part of the team remained on the ship while the rest of the team was sent ashore using either the ship's helicopter or motor launch. The use of helicopters was preferred because a beach-clearing reconnaissance party could proceed ahead of the icebreaker while the ship remained underway. The OinC of UDU Bravo, Lieutenant-Commander J.C. Ruse, described the work in the summer of 1958 as follows:

Credit: DND

Divers from Esquimalt preparing Nitrone charges at DEW Line site PIN-3 (Lady Franklyn Point, Victoria Island, Nunavut), July 1967.

> The prime difficulty in examining these beaches turned out to be getting to them. It had been decided that airlifting divers from the ship would expedite their arrival at beaches and inconvenience the transporting ship for the least time. In fact, it was possible to lift in the OinC while the ship was still miles off, perform the examination, inform the ship by aircraft radio of the results of the examination, and, if work was not immediately contemplated, the ship continued on her course up the coast without deviation. It was adopted as policy that immediate beach clearance work would be indicated if the total estimated working time exceeded three or four hours. Anything less than that time could be done from a base in the sealift after its arrival, and before its craft were ready to hit the beach.[3]

After inspecting the sites, *Edisto* sailed to Resolution Island where the UDU waited for the US Coast Guard icebreaker *Westwind* to transport it to sites on Baffin Island. The US Commander of the summer re-supply operation had ordered a detailed beach survey of the Brevoort Island site including underwater hydrography so Ruse and his divers went to work.

Here, Ruse discovered, "the main problem in these northern waters is the management of divers, ice, strong currents and properly taking care of men operating from the beach." For the men of the UDU, the hardships of survival in the far north were, by now, fully understood, but the rigorous physical nature of the work made these deployments that much more challenging – indisputably, these men were tough. To say that the Brevoort Island site was inhospitable is an understatement, as heavy surf and harsh conditions took their toll leaving neither men nor equipment unscathed. Battered and bruised by the cold, high winds and heavy surf, "PO Powers got a deep, ugly-looking bruise on the right quadriceps, which would have put a lesser man in Sick Bay for days," and "AB Line's back, already weakened from carrying too heavy loads of explosives at Resolution Island, gave out."[4] The young diver had actually ruptured an inter-vertebral disc and would later be sent home. In terms of equipment, two of the team's boats were holed and one outboard motor was submerged and damaged on the rocks during the Brevoort Island operation.

Despite this, the task was completed. In his Diving Progress Report, Ruse lauded his men.

> I feel very strongly that in the field of Naval diving particularly, the character of the effort produced over a sustained period depends more upon the outlook of the men, both individually and as a group, than any other single factor. The divers of the UDU BRAVO were all volunteers. One man was married six days before the team left Halifax. Several left families for a period known in advance to be in excess of five months. It was also known there would be no rum issued, cigarettes or exposure ration carried. The reasons for their attitude are not the hope of financial gain since allowances where payable were meagre and most permanent labourers on the DEW Line by comparison, draw more pay than the OinC of the unit. I think these men pulled long and hard because they felt that they were working for an organization who appreciated their value, insisted upon their being adequately equipped, and was not afraid to spend a dollar on them to save ten in the long run.[5]

With the supply convoy on its way, the UDU moved farther north to Cape Dyer. As the terminus of the Foxe Basin extension, Cape Dyer acted as a staging site with access to

Credit: DND Photo LAB-1588

*The dive team embarked in HMCS **Labrador** preparing to dive in ice, circa 1955.*

Davis Strait and open water. Almost immediately upon arrival, the team got to work clearing two large boulders. Overzealous and perhaps agitated by the beating they took at Brevoort Island, extra explosives were used resulting in a blast sizeable enough to elicit "complaints from representatives of every operating group in the area."[6] With this abrupt introduction, the team transferred ashore to a tent as *Westwind* departed for Thule, Greenland.

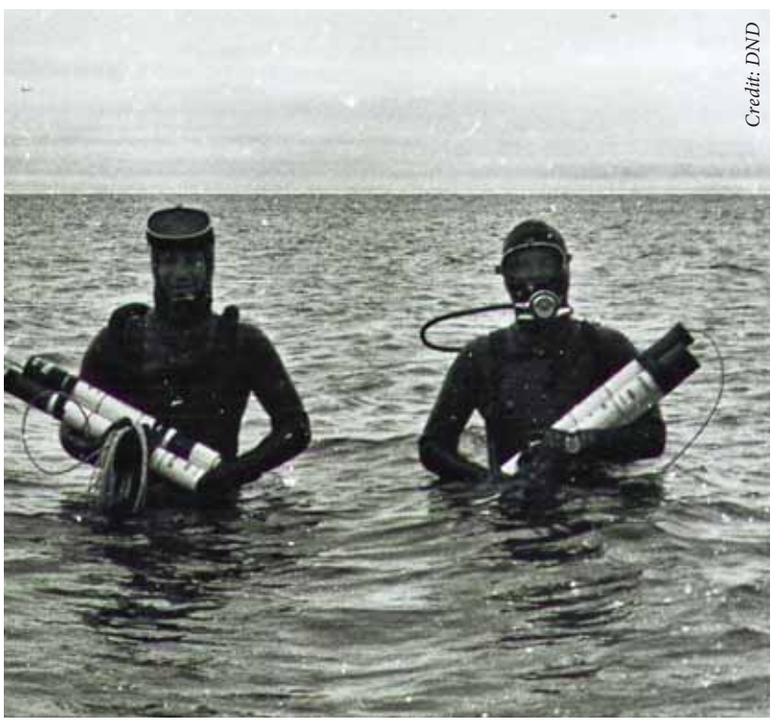
The results achieved in the summer of 1958 earned the Canadian divers a solid reputation. The US Commander sent the following message to the flag officer in Halifax: "I wish to extend my sincere thanks and appreciation for the use of the RCN UDU Bravo and their outstanding contribution to MSTS Arctic Operations/East/1958."[7] The commanding diving officer added:

> The mobility, zeal and effectiveness of this team in many arduous tasks called forth high praise from these [MSTS] authorities and considerable information was brought back by the Officer-in-Charge. Indications are that this will be a continuing commitment for the Unit as long as there is work to be done in the Arctic area.[8]

These efforts eventually involved divers from both Atlantic and Pacific operational Clearance Diving Units working across the entire archipelago. But, they did not work alone. They plied their skills alongside the Underwater Demolition Teams (UDTs) of the US Navy – frogmen who would eventually serve as the basis for the formation of the vaunted Sea, Air and Land (SEAL) teams in 1962.

Whereas the American frogmen were less than enthusiastic about the bitter cold and kept out of the water as much as possible, their Canadian counterparts immersed themselves, not just in the frigid water, but in the inhospitable climate ashore. Lieutenant-Commander Ruse insisted that "every effort was made to keep the men 'cold-water acclimatized' by encouraging sleeping in the open, the wearing of light clothing, and exercise rather than sweaters and parkas, as a means of keeping warm."[9] Whether or not this practice was the right one, it was adopted by UDU Bravo that summer and no cases of hypothermia or fatigue were reported. Canadian divers apparently looked forward to swimming in the pristine waters and felt quite comfortable in their Pirelli wetsuits owing to special long underwear worn underneath, developed by the Defence Research Board.[10]

On the other side of the Canadian Arctic, the West Coast team began operations in 1959 and on its second deployment travelled a total of 5,000 miles in two months as it moved east along the line from Tuktoyaktuk to the Boothia Peninsula.[11] The operations grew from single deployments to multiple ones and teams would often be called upon for some emergency that required their expertise. During the 1964 deployment, part of the UDU from Halifax was flown from base camp at Cape Dyer to Resolute Bay where a late thaw rendered the main beach unusable. The Canadian Department of Transport summer re-supply convoy had arrived to find the bay blocked by ice as much as five feet thick. Despite the best efforts of the escorting icebreaker, the shoreline remained unreachable by landing craft. Using over 3,000 pounds of explosives from a stockpile



Credit: DND

Divers about to lay Nitrone charges to blast an obstruction at DEW Line site PIN-3 (Lady Franklyn Point, Victoria Island, Nunavut), July 1967.

Credit: Master Corporal Peter Reed, Formation Imaging Services

Credit: Master Corporal Peter Reed, Formation Imaging Services

While participating in ***Operation Nanook*** *2011, divers survey the wreckage of a C-54 Skymaster that crashed near Resolute Bay in 1951.*

left by the Department of Mines and Technical Surveys, the OinC of the UDU, Lieutenant A. Sagar, accompanied by two of his divers, cleared the beach after more than 18 hours of continuous blasting.[12] For this effort and countless others, the Deputy Minister of Transport, J.R. Baldwin, later wrote:

> I would like to express my appreciation for the work done by the Naval underwater demolition teams. These teams, which have been provided by the RCN for a number of years, are employed in both the Eastern and Western Arctic in clearing rocks, boulders and ice from the beaches and their approaches and on emergency underwater repairs to ships and are an essential element in the success of annual resupply of Arctic stations.
>
> While it is difficult for me to single out any particular aspect of the work of these teams, which is always most efficiently carried out, I believe that the Resolute incident this year merits particular commendation for the highly professional, competent and expeditious execution of the task.[13]

The letter was passed to the East Coast command with the added note that the UDU had earned the appreciation of the first post-integration Chief of the Defence Staff, Air Chief Marshall F.R. Miller.

When it was first constructed, the DEW Line was the most remote and difficult array of radar sites to build and re-supply. Eventually, many of the radar sites were converted to unmanned stations virtually eliminating the need for annual re-supply operations but the sites initially required massive sealift operations involving large numbers of ships that had a small window of opportunity during the summer months to get the job done. Not only did these re-supply operations involve tons of material, vehicles and provisions, they required icebreaking services and a clear path to the shore. In a majority of cases, the beaches were cleared by Canadian frogmen.

The RCN deployed its first dive team into the Arctic just after the trade had been amalgamated in 1954 and, thus, these activities are an integral part of the early history of the branch. The men of the UDUs felt they were contributing to an important cause and were appreciated by their superiors. Moreover, this small, but important contribution to the Cold War effort was both frequently sought and highly praised by American authorities. One could say that the sealift operations essential to building and maintaining one of the world's most intricate radar networks depended on a handful of exceptional Canadian divers: the RCN's Cold War frogmen of the far north. To survive in the Arctic in small groups with little support, they had to be the best of the best – highly motivated and physically fit – anything less would result in failure. In the end, the RCN frogmen who deployed to the Arctic in the 1950s and 1960s were a remarkable group of highly trained men that made a difference during the Cold War – and they were the right men for the job.

Credit: DND

Notes

1. The word 'frogman' is used to describe a diver/swimmer engaged in activities other than traditional deep-sea diving. Usually, these activities are amphibious in nature involving inshore or water-to-shore operations. The term has been in use since the Second World War. Although the term is not gender-neutral, the author hopes reader accept the terms used in this article as part of the lexicon of the day, in this case the 1950s and 1960s. Perhaps a more contemporary word might be 'frogs.'
2. Diving Progress Report, 1 April 1957-31 March 1958, Library and Archives Canada (LAC), R112, vol. 33625, file 1425-9.
3. Diving Progress Report for the period 31 March to 31 November 1958, LAC, R112, vol. 33625, file 1425-9.
4. *Ibid*.
5. *Ibid*.
6. *Ibid*.
7. Message from CTF 6 to CANFLAGLANT, 29 October 1958. DHH, 81/520/1650-239/2, box 105, file 7.
8. Diving Progress Report, 31 March to 31 November 1958, p. 5. Reports of these Arctic diving operations generated much interest among Canada's allies, particularly the Royal Navy and US Navy. Memo from Naval Secretary to Flag Officer Atlantic Coast and Flag Officer Pacific Coast, 30 September 1957, LAC, R112, vol. 33625, file 1425-9.
9. Diving Progress Report, 31 March to 31 November 1958.
10. Lieutenant-Commander B.F. Ackerman, "*Labrador*'s Divers Spend Busy Summer: Frogmen Towed Beneath Sea in Harbour Surveys," *Crowsnest*, Vol. 9, No. 1 (November 1956), pp. 14-15.
11. Beach Clearance Canadian Arctic 1960, 21 July to 9 September 1960, 21 September 1960, LAC, R112, vol. 33625, file 1425-10, pt. 3.
12. Report of northern diving operations by Lieutenant A. Sagar, 9 December 1964, LAC, R112, vol. 33625, file 1425-10, vol. 4.
13. Letter of Appreciation, 17 September 1964.

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The Navy's Arctic Challenge

Martin Langford

One has only to read the briefest history of Arctic exploration to be aware that Canada's Royal Navy ancestors, who established claim to what is now the Canadian Arctic, were slow to learn from their Arctic experiences. Although their courage, fortitude and spirit are undoubted and their achievements legend, they doggedly persisted in hauling sledges loaded with unnecessary equipment, dressed in sweat-absorbing wool garments on a diet of salt meat long after they should have learned how to survive and move in the harsh environment from the native Inuit, or from experienced Arctic whaling captains. Have we overcome this inability to learn?

The Royal Canadian Navy (RCN) is about to venture once again into the far north to fulfil the government of Canada's direction contained in the Canada First Defence Strategy and Canada's Northern Strategy. This represents a significant challenge to a force designed to focus on blue-water anti-submarine warfare (ASW), and recently re-tooled and re-trained to participate in littoral maritime security operations securing the seaward flank of NATO efforts in the Middle East and North Africa.

Making the transition from a Cold War navy to one capable of meeting the maritime challenges of the 21st century has not been an easy task and has frequently required imaginative thinking and improvisation, often to meet extremely short-notice mission requirements. Look no further than the example set in preparing the old fleet for operations in the Persian Gulf in 1990 for an illustration of the can-do attitude that has had remarkable success in adapting to unfamiliar roles. This is still happening and has led to maritime interdiction operations (MIO) replacing ASW as the RCN's speciality. Arguably, this transformation has been driven principally by operational necessity rather than vision and planning. The point is that, particularly in the case of the Arctic, a can-do attitude is no substitute for proper and enlightened preparation. The Arctic is unlike any other environment in which the navy operates. There is time and opportunity to learn and prepare for the introduction of the Arctic Offshore Patrol Ships (AOPS) but it will mean shifting from the can-do focus that means diving in at the deep end as the ships are delivered, to recognising that Arctic operations are different and accepting help and advice from others who have the knowledge and experience of the region. In particular this will mean working with the Canadian Coast Guard (CCG).

This is not to say that progress has not been made. The small, dedicated team that has guided the AOPS project has worked hard to gather information and build relationships with what might be called the Arctic community of subject matter experts. Similarly, the navy has participated in the Canadian Forces (CF) annual *Operation Nanook* for several years, resulting in a number of seagoing personnel, some quite senior, with some level of relevant experience. What is now needed, however, is a coherent program to:

- leverage this limited expertise by ensuring it is identified and used appropriately;
- develop maritime operating concepts and what the army calls TTPs (tactics, techniques and procedures);
- derive maximum benefit from the annual opportunity of *Operation Nanook* to experiment and validate operating concepts and methods; and,
- identify and take advantage of every opportunity for cooperation with the CCG in the region.

I do not claim to be an expert on the Arctic or on Arctic operational issues, but for my last two years of service I was on the staff of the Canadian Forces Maritime Warfare Centre working to provide the groundwork for maritime operational concept development for the Arctic. In that role I had the privilege of spending some time in the region during two successive *Operation Nanooks* as a guest onboard a frigate (HMCS *Toronto*) in 2009 and a Coast Guard icebreaker (CCGS *Henry Larsen*) in 2010. My intention here is to share that experience and highlight from my observations some issues for consideration and discussion.

Credit: Sgt Kevin MacAulay

*HMCS **Toronto** and CCGS **Pierre Radisson** sail in the Hudson Strait off the coast of Baffin Island.*

*CCGS **Henry Larsen** off Beechey Island.*

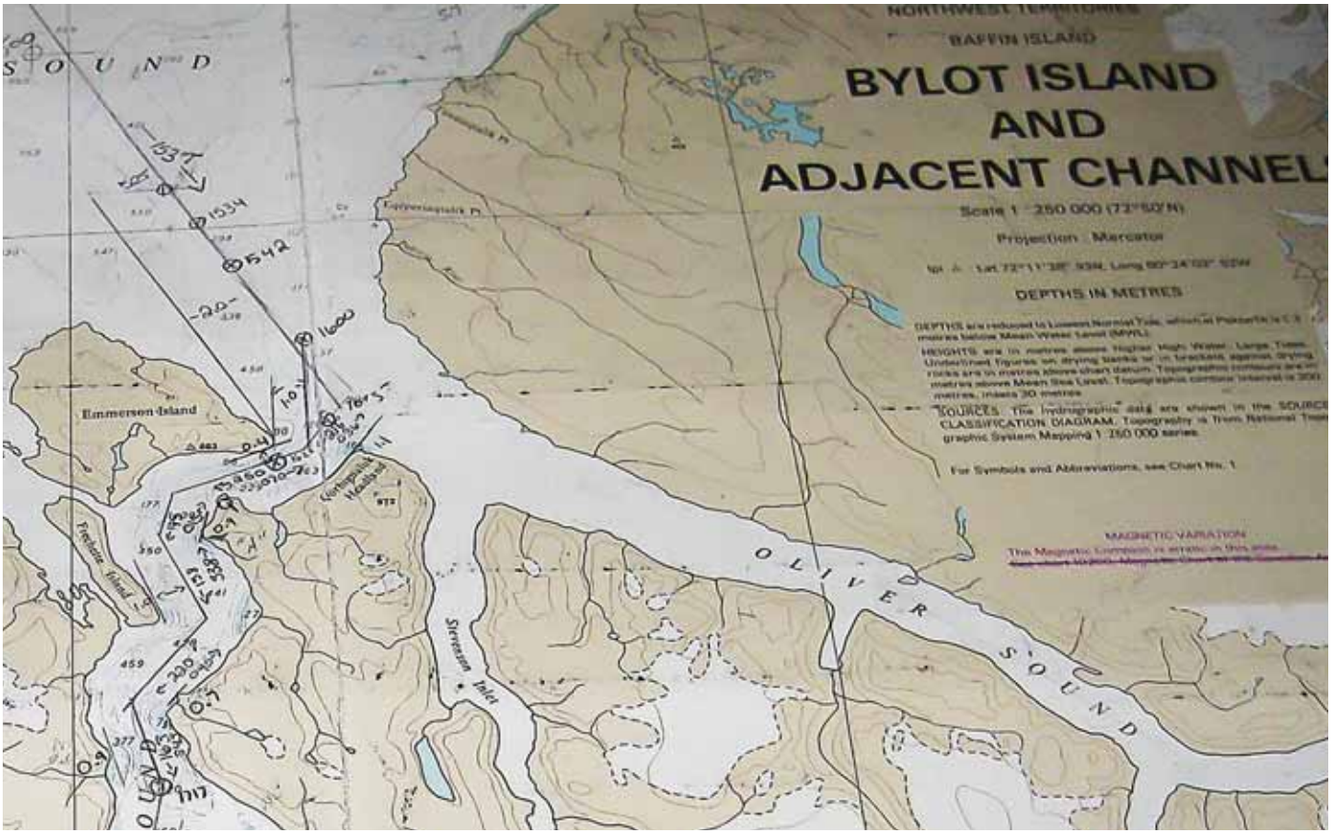
Ice islands – a large speedbump – are sometimes not detected by Radarsat.

Not surprisingly, ice affects every aspect of navigation and operations. The navy's current fleet has very little capability to work in any ice conditions other than very loose pack – i.e., when there is sufficient water to allow manoeuvring without the risk of contacting anything much denser than brash ice which is roughly the consistency of a coarse Slurpy. This has restricted operations to date to the ice edge and made them at times more than normally stressful on the Commanding Officer (CO) because of the difficulty in predicting ice density and movement and the weather. As a result it is extremely challenging both to plan and to execute Arctic maritime operations. Predicting what areas will be free enough of ice, when and for how long is not possible with any certainty or reasonable lead-time, nor is determining an exact time of arrival at a given place. This is anathema to the navy, which sets great store in its ships being where they are ordered to be at exactly the time they are ordered to be there. In fact in 40 years of service the first time I ever heard a CO respond (justifiably I must emphasise) to direction to be somewhere at a certain time with "we'll get there when we get there," was during *Nanook* 2009. In 2010, despite significant effort, ice conditions prevented any warship getting to Resolute for the culminating VIP/Public Relations day of *Operation Nanook*.

I had this naïve vision of the sturdy icebreaker cleaving its way effortlessly through the virgin white ice field leaving a clear wake behind for the following ship. The reality – I discovered partly through minor bruising – is quite different. Breaking ice is a rough ride. Particularly in old ice, the ship is thrown around and can even be spectacularly brought to a standstill. Large chunks of broken ice fill the wake with what are effectively floating concrete blocks ready to inflict severe pain on the following ship. Hence escort is only possible for ice-rated ships, not the comparatively paper-thin hulls of very expensive warships. In this case, even if one of the warships had made it to Resolute, it would not have been able to remain safely at anchor due to drifting ice. Although the AOPS will not, of course, be so restricted, this limitation will not change for the major components of the fleet unless future warship classes are built with at least a minimal ice rating.

Breaking and operating in ice is a skill that the navy currently does not have and needs to acquire. There are two elements to this: assessing the ice; and handling the ship. Both require knowledge and experience. The CCG has a contract with Environment Canada's Ice Service for the provision of Ice Observers to its icebreakers. The Ice Observer's role is to analyse and assess ice reports, observe and report ice conditions and advise the CO on the state of the ice and likely movement. Although provided with all the necessary technology, there are no guarantees. *Larsen* unexpectedly encountered an ice island which was relatively small at about half-a-mile across but imposing nevertheless – it had not shown up on any of the Radarsat images because of the pools of water on its surface. At the end of the day, as in all other things, the reliance has to be on the knowledge and experience of the CO. During my time onboard, the CO of *Larsen* was in his twelfth season in the Arctic, his Chief Officer in his eighth. The navy will need to tap into the available expertise and experience in order to operate effectively and safely in its new environment. To do this it will need to 'buy in' to the Ice Observer program and arrange to embark an experienced Ice Pilot in AOPS during Arctic patrols to advise and mentor COs, logically in collaboration with the CCG. This will require a change in navy thinking and potentially another look at the Command, Charge and Control orders, which I suspect is the nautical equivalent of re-opening the constitution.

It is not only the ice that makes navigation in the Arctic archipelago different from other operations. The Arctic



Credit: Author

Here there be dragons, but no soundings! A chart showing Oliver Sound.

region as a whole is not well charted. While some more commonly used routes have been surveyed and charted to modern standards, many areas show single lines of soundings dating back to the era of Sir John Franklin in the 1840s and there are enough large blank spaces to give even the most adventurous mariner pause for thought. Data does exist for some of these areas. Some formal survey work has been done and information has been gathered during operations by the coast guard, oil companies and other commercial shipping. However, while this information exists in survey sheets and in the data systems of the organizations that gathered it, release, validation and incorporation into approved charts has not caught up. A combination of ice conditions and the paucity and reliability of soundings imposes far greater restriction on naval vessels in the region than the RCN is used to. The CCG has much data gathered by its icebreakers during the normal course of its seasonal operations and does go where the navy would not. This data does not in many cases meet formal survey requirements but is exchanged among the ships and used as required. As it was put to me while on passage along the spectacularly beautiful Oliver Sound at the north end of Baffin Island – a passage notable on the chart for its blank white purity – "we know where the rocks aren't."

Why is it important to be able to access the archipelago straits and sounds? After all, Oliver Sound may be beautiful but there has to be a better reason than sightseeing for a warship to go there. As more shipping, more natural resource exploitation and more fishing and adventure cruising, both by commercial companies and private vessels, occurs in the region, it seems to me that presence, monitoring and search and rescue response demand that the navy not only be able to operate in as much of the area as possible but be familiar with it and comfortable doing so. This means making use of all available data, even that which has not been subject to the rigorous validation required by the hydrographic service to incorporate it into charts. In turn, this means that the navy must be prepared to accept a somewhat higher level of risk. Dare I suggest that to do this will require some flexibility in the ultra-cautious approach provided for in the navigational tablets of stone passed down with the Ten Commandments? I am not suggesting throwing caution to the winds but an extension of current practice whereby the source, date and quality of sounding data are assessed and navigational safety factors applied accordingly.

Tidal conditions in the eastern Arctic passages come close to being as extreme as those in the Bay of Fundy. Apart from the navigational challenge this presents, it limits how close ships can anchor to communities such as Iqaluit. The only alongside deep-water berth in the Canadian Arctic is at Nanisivik, site of the planned Nanisivik Naval Facility. Throughout the archipelago the transfer of stores, fuel and people to and from local communities must be done across the beach, or by helicopter. Beach operations are a challenge. Many of the beaches are gently shelving and rock strewn, threatening boat hulls and propellers, a fact illustrated by the casualty rate of boats and equipment during *Operation Nanook* 2010. The shallow approaches can be whipped up by the wind to produce untenable beach surf conditions, and ice collecting along

the shoreline can pack in and render getting to the beach difficult or impossible – in fact *Henry Larsen*'s crew change at Resolute Bay in August 2010 would not have been possible by boat because of the ice conditions on the beach at the time. Here the CCG is the undisputed expert and the navy, which has excellent boat handling skills in the ship-to-ship role, must learn from it and take every opportunity to practice with it. Some innovative thinking is required to address the problem of transferring people and stores, particularly bulky or heavy stores, to and from boats. The planned use of a highly effective makeshift wooden beam and milk crate arrangement to embark VIPs in a CCG boat from the beach at Pond Inlet might have had the effect of making the Minister of National Defence walk the plank if it had been used! Clearly Arctic beach operations require forethought, preparation, cooperation and practice.

This brings us to the issue of helicopters. Embarking a Cyclone helicopter will bring huge enhancement to AOPS capability and range of influence, not least for search and rescue. However, it comes with much baggage including big flight and maintenance crews, a large and ungainly support system, complex, and understandably cautious, operating limits and procedures, and significant fuel demand, to name just the obvious. I am not arguing here that there is no requirement for a Cyclone capability in AOPS, clearly there is. However, everything I observed during my time in the north screams to me that to operate


Credit: Author

*CCGS **Henry Larsen** approaching HMCS **Montreal** off Nanisivik to pass fuel.*

effectively in the Arctic requires a small utility helicopter with simple operating and maintenance procedures that can be treated like a taxi/courier van; available at short notice and capable of working in and out of unprepared sites. From crew change, to ice reconnaissance, to stores and personnel transfers in isolated communities and to support visits to remote scientific locations, *Larsen*'s helicopter proved its worth over and over again during *Nanook* 2010, including delivery of all the equipment for the army during its deployment ashore from the naval task group.

The need for an ice reconnaissance capability and the ability to investigate contact reports is obvious. However, this could be met by a suitably equipped uninhabited air vehicle (UAV) as long as the necessary equipment and expertise is onboard to provide real-time observation and interpretation. The movement of people and stores when a suitable beach is not available or is unusable, however, can only be done by helicopter and the Cyclone is an expensive and cumbersome beast for the light utility role. AOPS will be required to transport and deploy ashore small Canadian Ranger and Army units, RCMP and Fisheries Officers and others. The navy and air force need to examine options for meeting this requirement, again in collaboration with the CCG, which has been operating light utility helicopters from its icebreakers for a long time. If this is to be done successfully it will require a fundamental re-examination of current rules and procedures for helicopter operations from warships in the context of the unique nature of the operating area and vessel.

Finally, there are distinct differences between the way the CCG and the navy operate. Both are professional organizations with highly capable and competent people, but


Credit: Author

Utility helicopters – don't leave home without one.

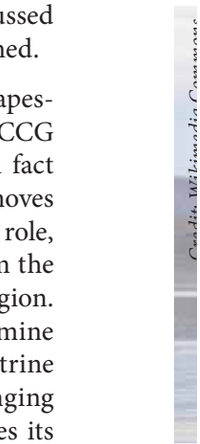
Credit: Sgt Kevin MacAulay

*HMCS **Toronto** and CCGS **Pierre Radisson** sail past an iceberg in the Hudson Strait off the coast of Baffin Island during **Operation Nanook** 2008.*

each organization has its own specific roles for which it has developed its own operating methods and procedures. Normally the boundaries of responsibility are as clear as the difference in appearance between a red hull and a grey one. In the Arctic and with the introduction of AOPS, however, those boundaries will become blurred, although we are a long way yet from pink ships![1] CCG ships in the Arctic provide icebreaking services, local navigational and ice information to shipping, support to scientific research, delivery of supplies to remote communities (when not commercially viable) and of course search and rescue services. They also monitor shipping and their well-known red hulls provide an obvious and respected visible presence of the government of Canada. But their numbers are limited and the Arctic is a vast area. With the exception of icebreaking services, the AOPS will also be capable of these tasks and can support the CCG, enhancing government presence in the region.

The AOPS, however, will be armed and will also be able to carry and deploy armed boarding teams and soldiers. Deploying warships to the region also sends a strong message of the government's intent to protect the region and its people. Navy and CCG roles and tasks therefore both overlap and complement each other and so there is a need for jurisdiction and responsibilities to be defined and agreed, and mutual operating procedures developed and applied. During *Nanook* 2010, I was struck by the difference in approach to transient shipping between navy and coast guard ships. On encountering a vessel the navy initiated what are known as formal 'hailing procedures.' These have been developed for international maritime interdiction operations and are a formatted series of questions to determine all relevant information about the vessel including owners, cargo, recent and next ports of call, etc, conducted over VHF radio. The CCG approach on VHF was much less formal and often included the passing of ice and navigation information to the vessel. In the case of the oarsman (yes, oarsman) and a private yacht encountered attempting the Northwest Passage, the crews were invited over for a meal, shown the latest ice information and given navigational advice. Both these methods have their merits and their place. I am not trying to suggest that one method is more correct than the other or that either approach needs to be changed, simply that since both services will be representing the government of Canada in the Arctic a conscious decision should be made as to what methods or method should be used. There has been recent discussion as to whether the CCG should be armed. An alternative might be for the CF to provide the armed presence in CCG ships if required. It is entirely possible that there might be a requirement to operate an armed navy boarding team from a coast guard ship. These things need to be discussed and the necessary protocols and procedures established.

There are two major threads running through this tapestry. First, it is abundantly clear that the navy and the CCG will need to develop a much closer relationship, in fact become partners in Arctic operations. Before it moves into this new and unaccustomed environment and role, the navy has much that it can and should learn from the coast guard which has a wealth of experience in the region. Second, the navy (and the air force) needs to re-examine some of its fundamental rules, regulations and doctrine in the context of this new and extremely challenging operating environment. When the first AOPS makes its maiden deployment north, it should be validating Arctic-specific operating concepts and procedures – concepts and procedures that recognise the unique nature of the environment and the platform and provide for efficient and effective operations.



Credit: Wikimedia Commons

Note

1. As far as the government of Canada is concerned, the waters of the Arctic archipelago are internal Canadian waters under the UN Convention on the Law of the Sea. From a jurisdictional point of view, for the navy this makes the waters akin to operating in the St. Lawrence and Great Lakes. This means that, in normal circumstances the CCG, RCMP, Department of Fisheries and Oceans, Department of Aboriginal and Northern Affairs and others will have the lead, not the RCN. It is not my intention here to delve into the complexities of this but to draw attention to it to provide context.

Martin Langford is a retired Commander with over 40 years combined RCN and RN service, the last two of which were spent working on maritime operational concepts for the Arctic at the Canadian Forces Maritime Warfare Centre.

Over the Top: The Navy and the North

Janet Thorsteinson

The Royal Canadian Navy's Arctic Offshore Patrol Ships (AOPS), the first of which could be delivered as soon as 2015, reinforce national commitment to the north. A century ago, whatever Canada's aspirations to establish Arctic sovereignty, financial resources tempered resolve. The Canadian Arctic Expedition sailed from Vancouver in June 1903 and by the middle of August, the flagship *Karluk*, an "old and underpowered wooden barkentine"[1] was locked in ice off Alaska. On 14 January 1904, Captain Robert Bartlett and fellow expedition members watched her finally succumb to the crushing ice. As Bartlett wrote, the ship sunk "with the blue Canadian Government ensign at her main-topmast head, blowing out straight and cutting the water as it disappeared, and the Victrola in the galley sending out the strains of Chopin's Funeral March."[2]

Credit: Wikimedia Commons

HMCS ***Goose Bay*** *moored at the future site of the Nanisivik Naval Facility during* ***Operation Nanook*** *2010.*

In 1922, when the Coast Guard Ship (CGS) *Arctic* was refitted for a northern expedition, it had been stripped for two years of lightship service on the St. Lawrence River. *Arctic* had been repainted but the engines and fittings were in poor shape, which meant that it had to make stops for repairs during the voyage. Expedition leader Commander J.D. Craig wrote in his diary that "no boat but a Government boat would be allowed to sail in the condition the 'Arctic' was in."[3]

Six to eight AOPS ships are scheduled to be built in the coming years, and the new coast guard icebreaker is projected to join them by 2017. These ships will be designed for use in the Arctic – unlike *Arctic* which was not. As well, the AOPS and icebreaker will be supported by a deep-water berthing and fueling facility in Nanisivik, by a space-based wide area surveillance and support program (called Polar Epsilon), long-range Aurora Maritime Patrol Aircraft, and networks of undersea sensors which are under development by Defence Research and Development Canada.

Government ships in the Arctic will need that support because they will be busy. Decreasing ice cover due to climate change will open up the north as a commercially viable, and much shorter, sea route between Europe and Asia – and this may happen sooner than many thought possible even a few years ago. Along with the economic opportunities of more accessible resources will come other changes in the north, in particular social changes and risks to the environment.

Energy companies want to explore for oil and gas in Arctic waters and they are prepared to spend large amounts of money for the privilege. In August 2010, Chevron committed itself to spend more than $100 million in the Beaufort Sea, while BP has committed to spend up to $1 billion over five years on exploration.[4] When developed, the Baffinland mine in Mary River on Baffin Island could provide 300 jobs and $2 billion in royalties and benefits to Nunavut over the life of the project.

In its 2011 "Interim Report on Sovereignty and Security in Canada's Arctic," the Senate Standing Committee on Security and Defence summarized Canadian claims to those resources quite simply. According to the report, "Canada therefore does not claim sovereignty of the Arctic. We own it."[5] Canada does have disputes with other states in the Arctic – with Denmark about Hans Island and the United States about a maritime boundary in the Beaufort Sea – but according to Canada's Northern Strategy, "[a]ll of these disagreements are well-managed and pose no sovereignty or defence challenges for Canada."[6]

For many years, through diplomacy and action, far-sighted public servants worked hard to establish Canadian sovereignty, finding the money to establish police outposts in the Arctic and devising legal tactics to build the Canadian case. In 1930, Canada established ownership of the Sverdrup Islands by purchasing the maps and journals of the Norwegian explorer Otto Sverdrup for $67,000. This huge sum of money – at the time it *was* a huge sum of money – meant Ottawa received a few papers, photographs and 13 notebooks. This may not have seemed like a good investment, but the use of the information meant that Norway recognized Canadian sovereignty over the islands, and as oil and gas discoveries get developed, Canada will benefit greatly.[7]

Over the years, Canadian sovereignty has been established in the Arctic. In order to establish this, international law stipulates that discovery claims must be followed by government actions to meet the criteria of 'effective occupation.' International law has been interpreted over the course of the 20th century to include administrative acts which include responsibility for a region's indigenous peoples and their environment. Therefore, "in other words, Arctic sovereignty was no longer simply a right, but a responsibility."[8]

In 2007, the Premiers of Yukon, Northwest Territories and Nunavut addressed that responsibility with the publication of "A Northern Vision: A Stronger North and a Better Canada." In this document the Premiers stated that "Canada's sovereignty over northern lands, internal waters and waters covered by ice is rooted in history, international law and the occupancy and use of Aboriginal people. Northerners are the embodiment – the human dimension – of Canada's Arctic sovereignty. But in order for Northerners to continue to act as stewards of Canadian sovereignty, the North needs sustainable communities." According to the Premiers, "Canada's sovereignty over the Arctic region can only be asserted by building prosperous and sustainable communities in the North."[9]

Corporate Canada can be a partner in creating that prosperity and sustainability. Corporations have begun to pay attention to the north, and to consult with northern residents. GE Canada, for example, with the Canadian Chamber of Commerce, conducted the Remote Communities Initiative consultation, a series of roundtables with various stakeholders, and an online survey. Participants at the roundtables looked for new technologies to fill infrastructure gaps like energy and transportation, for innovative funding that includes the private sector, and for integrated planning. The report produced from the roundtables, "Towards a Remote Communities Investment Strategy for Canada," stated that "there was a notable frustration with the sense that Canada tends to treat spending in rural, remote and northern parts of the country as a social obligation more than an economic imperative."[10] There are significant opportunities for remote communities and for Canada if business, governments and communities can find a way to unleash the potential of the region.

Credit: Cpl Vicky Lefrancois, Canadian Forces Combat Camera

Canadian Ranger Simon Tulurialik ties off one of the tents for Patrol Group Three to sleep the night near Resolute Bay, Nunavut, during ***Operation Nunalivut*** *2011.*

Credit: Cpl Shilo Adamson, Canadian Forces Combat Camera

Canadian Rangers stand on parade near CFS Alert during the closing ceremonies of ***Operation Nunalivut*** *2010.*

Remote communities support resource development. Resource development supports remote communities. Government estimates place the potential value of the Mackenzie Gas Project at more than $16 billion and diamond mining in the north is currently an industry worth $2-billion annually, about half of the economy of the Northwest Territories.[11] Canada's northern communities want more, and they have the resource base to help them earn it. In the north, Canada's growing naval capabilities will help that happen.

Notes

1. Jenny Higgins, "The Karluk Disaster," 2008, Newfoundland and Labrador Heritage website, available at www.heritage.nf.ca/exploration/karluk.html.
2. Robert Bartlett and Ralph Hale, *The Last Voyage of the Karluk* (Toronto: McClelland, Goodchild & Stewart, 1916), p. 91.
3. Shelagh Grant, *Arctic Justice: On Trial for Murder, Pond Inlet, 1923* (Montreal: McGill-Queen's University Press; 2005), p. 133.
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6. Minister of Indian Affairs and Northern Development, "Our North, Our Heritage, Our Future: Canada's Northern Strategy," Ottawa, 2009.
7. For an account of this see Shelagh D. Grant, *Polar Imperative: A History of Arctic Sovereignty in North America* (Toronto: Douglas & McIntyre, 2010).
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9. Northern Premiers' Forum, "A Northern Vision: A Stronger North and a Better Canada," May 2007, p. 9.
10. GE National, "Towards a Remote Community Investment Strategy for Canada: Shaping Economic Growth in Canada's Remote Communities," 2011, available at www.remotecommunities.ca/sites/default/files/en/ge_canada-full_report-remote_communities-en.pdf.
11. Minister of Indian Affairs and Northern Development, "Canada's Northern Strategy."

After over 30 years in the public service, Janet Thorsteinson became Vice-President Government Relations at the Canadian Association of Defence and Security Industries (CADSI).

Bergy Bits

Iron and Ice: The Mary River Project

Joe Spears

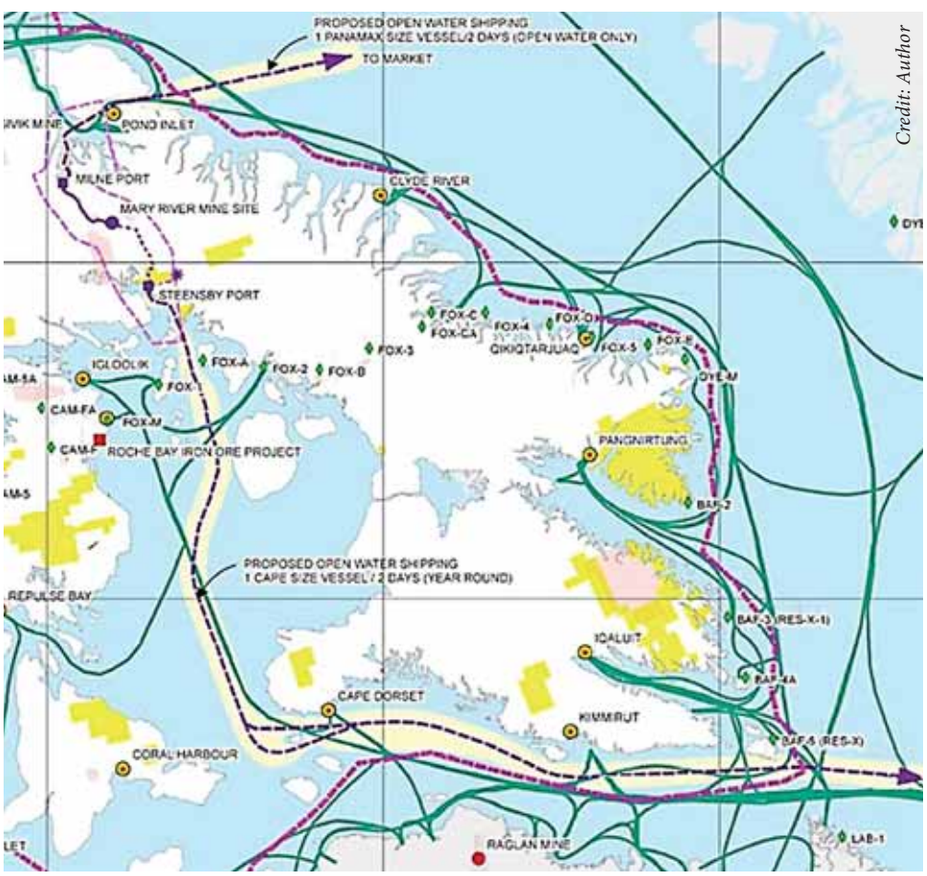
Marine transport is an important component of Canada's foreign trade and economic prosperity. Canada's ocean governance provides rigorous regulation of shipping within Canada's 9.3 million square kilometres of ocean space. In Canada, south of 60°N there is a mature regulatory shipping regime. That is not the case north of 60. This article will examine the massive Mary River project on Baffin Island and its impact on Canadian Arctic shipping.

In the Arctic Ocean Basin, sea ice is diminishing which is allowing the development of mineral and hydrocarbon projects because of the possibility of cost-effective ocean transport of cargoes to markets. Commercial feasibility is also enhanced by the steady increase in commodity prices driven by the strengthening economies of India and China. All of the new projects in the Arctic depend on marine transportation to move the product to market – whether hydrocarbons, minerals or fish. Much of Canadian policy attention has focused on *in transit* international shipping through the Northwest Passage and the status of these waters. There has been very little examination of *destination* shipping (to a port or facility) and its governance within the Canadian Arctic. The Arctic Council Arctic Shipping Assessment in 2009 predicted that the largest increase in Arctic voyages would be destination rather than trans-Arctic.

The Mary River iron ore project located on northern Baffin Island will have the most immediate effect on Canadian Arctic shipping. This $4 billion project consists of the mine site, railway and road links, two ocean terminals and a fleet of up to 10 icebreaking bulk carriers. The Mary River deposit was discovered in the 1960s but has not been commercially viable to date. The mineral deposit with proven reserves of 365 million tons is a highly pure body of iron ore (67%) that is located approximately 144 nautical miles from tidewater in the Mary River drainage. It is a mountain of almost pure iron ore. There are eight other deposits in this geological complex. The mineral property was originally owned by Baffinland Mines of Toronto but was recently taken over by ArcelorMittal, the world's largest steel producer, and an equity partner. The iron ore will be used by ArcelorMittal for steel making. For the project to be viable, year round shipping is required.

The iron ore is extracted from an open pit and requires no refining. It is proposed that 21 million tons of iron ore would be exported yearly. There are two ports with tidewater access for movement of the iron ore by bulk carrier. A 100 kilometre tote road has been built to the mine from Milne Port which is located at the upper end of Milne Inlet at the north end of Baffin Island. However because of the high density of narwhals in Milne Inlet, Steensby Port in Foxe Basin on the west coast of Baffin Island was proposed for year-round shipping to minimize the impact on marine mammals.

The Mary River project will involve the construction of a 144-kilometre railway to move the large volume of ore from the mine to a loading facility at Steensby Port. The world's most northern railway will take four years to complete and 2,800 workers will be required for all



Shipping routes and mining sites for the Mary River project on Baffin Island.

elements of the project. Steensby Port will have a dedicated deepwater two-berth loading facility allowing the self-dumping of the railcars, stockpiling and vessel loading year round.

When completed, 10 dedicated ice-strengthened bulk 'Cape Size' carriers (160,000-190,000 dwt) will operate year-round. There will be 102 round trips (204 transits) from the proposed Steensby Port in Foxe Basin to Antwerp, Belgium, a 20 day voyage. By contrast, the cargo vessel M/V *Arctic* (28,000 dwt) is presently operating year round from Nunavik. It is estimated that 18 million tonnes of iron ore would be moved through Foxe Basin. During the period of open water, additional tonnage would be chartered to move the iron ore. A ship movement will occur every 1.8 days. For half the year, there will be 24 hours of darkness with ice cover. Fednav of Montreal, long experienced in Arctic shipping, would operate these vessels under charter.

Additionally, 60 vessel movements from Milne Port would occur during open water along with re-supply of fuel and dry cargo to the mine site. The Mary River project would have a total of 184 vessel voyages per year and 4,350 voyages during the 25 year lifespan of the first mineral deposit. At present there are less than 10 summer voyages in Foxe Basin yearly.

Foxe Basin is the site of another major iron ore deposit at Roche Bay on the east side of Foxe Basin. Chinese interests have invested $1 billion to secure these mineral rights. The Roche Bay iron ore deposit is only a few kilometres from tidewater.

Both these mineral deposits are located near pristine and biologically diverse marine environments. In these shallow tidal waters are large walrus and bowhead whale populations, and two large Arctic seabird colonies. These waters have seen very little marine traffic and no year-round shipping.

The Mary River project is moving forward to development. The project entered an initial draft environmental impact assessment with the Nunavut Impact Review Board (NIRB) in January 2011. The process is at the technical review stage. There have been a number of concerns expressed by residents and federal government departments. One issue is the lack of any comprehensive environmental baseline data for the marine or land environment. There is very little existing science to examine the impacts of year-round shipping (for example, ice edge and hydro acoustics). As well, there is no requirement for a permit or license, nor is it necessary to undertake a risk assessment under Canadian marine legislation for the shipping component of this project. There is no statutory requirement for analysis of the marine infrastructure for additional aids to navigation, search and rescue, charting or vessel assistance. Vessel transits would occur on an almost daily basis with no requirement for a Canadian-licensed marine pilot. There is no compulsory pilotage regime in the Canadian Arctic, only an ice navigator is required.

From a geopolitical and ocean management standpoint, what does year-round Arctic shipping mean for Canadian defence and security? How will continuous shipping affect the environment and the Inuit communities who rely upon the sea ice to obtain food? These are issues which require analysis if Canada's northern strategy is developed and given real effect.

Arctic issues are ocean issues and destinational shipping will be becoming increasingly important in the coming decades. Indo-Pacific economic development will affect Canadian Arctic interests. Canada, as a coastal state, must have capacity to respond to new shipping in its waters. If these questions are answered and Canada keeps a close eye on developments, it may well be that iron and ice will be a good mixture for Canada's Arctic development and Mary River can be a model for other Arctic states to regulate Arctic shipping. Mary River is an ore deposit that needs to be mined to strengthen Canada's Arctic ocean infrastructure. This will also strengthen Canada's position with future in-transit international Arctic shipping.

The Arctic Search and Rescue Agreement: Is Canada Really Playing Ball?

Jean-François Bélanger

It is becoming increasingly common to talk about the Arctic as an untapped pool of resources. A 2008 US Geological Survey report speculated that the Arctic might contain up to 25% of the world's undiscovered oil reserves.[1] Moreover, scientists are coming to agreement that the ice is melting in the Arctic, and that the phenomenon is picking up speed. There are already numerous commercial flights over the Arctic and as the ice melts, there will be increased human activity at sea and increased risks of accidents. It makes sense that search and rescue would become a priority for the eight Arctic countries.

The "Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic" signed in

May 2011 is the first binding document to emerge from the Arctic Council. The agreement is historic in that it was the first time all the major Arctic players discussed cooperative efforts and the overall message is one of optimism. Article 2 stipulates that parties have to establish and maintain proper search and rescue (SAR) capabilities, and cooperate with the other signatories. In Article 9, the agreement demands a higher level of cooperation on issues such as exchanging experience, carrying out joint SAR exercises, sharing techniques, systems and facilities, and trying to reduce the time of intervention. The most important element of the agreement is Article 8, which explains in detail the procedures to be followed if a state wants to enter into another's territory. Permission has to be requested in order to enter the territorial waters of a particular country, and the host country has to confirm the receipt of a request of entry. The party receiving the request has to respond to it as quickly as possible in accordance with international laws and obligations. Article 17 makes clear that the agreement has no enforcement mechanism. In case of any dispute arising from the agreement, the parties are to engage in direct negotiations to settle the problem. It should be noted that the agreement does not settle the territorial disputes among the eight Arctic countries – indeed, it has nothing to do with any delimitation or boundary issues.

Is this agreement the first concrete step towards cooperation in the Arctic? Given the high-level participation at the signing – the United States, for example sent Secretary of State Hillary Clinton – it illustrates a step in the right direction. A number of high-profile Canadian commentators (Michael Byers, Janice Gross Stein and Thomas Axworthy) have also been positive about the agreement and the Arctic Council. It seems that the Canadian government believes cooperation is the way to go in the Arctic. Canada hosted a gathering of search and rescue specialists in October 2011 in Whitehorse, Yukon. Participants were to present their SAR capabilities and discuss how future events should be handled, and what type of resources would be necessary to ensure international cooperation. This discourse, however, illustrates a clear departure from the early stance of the government of Stephen Harper in the Arctic. In 2007, for example, Harper made it clear that the Arctic was a 'use it or lose it' environment where Canadian sovereignty had to be protected. This stance was modified in 2009 with the release of Canada's Northern Strategy. On this occasion the former Foreign Affairs Minister Lawrence Cannon argued that Canada wanted to move away from a stance of confrontation toward cooperation and collaboration in the Arctic.

Credit: Sgt Norm McLean, Canadian Forces Combat Camera

Captain Ross Black, a CC-138 Twin Otter search and rescue pilot, surveys his surroundings prior to his departure from Resolute Bay, Nunavut, during ***Operation Nanook*** *2011.*

But is Canada really cooperating? Recent actions by the Canadian government have put into question its commitment to the Arctic Council. Since the creation of the council, successive governments have substantially reduced their support to it. In 2006, the Harper government eliminated the position of Circumpolar Ambassador of Canada to the Arctic Council. The government has claimed to support more involvement in the Arctic Council, but there is little evidence that support has been given to any significant degree. The government allocated $10 million over four years for this endeavour, but stipulated that the funds would also need to support the University of the Arctic and a program to improve relations with Russia. There thus seems to be a disconnection between the political discourse on the matter and the actual actions of the government. Will this trend be reversed with the SAR agreement? Even the choice to send Health Minister Leona Aglukkaq to represent Canada instead of the Foreign Affairs Minister may not have been the wisest – although being a northerner she sent a certain message, she did not illustrate high-level commitment to the issue.

There is also the question of capabilities. The territory that Canada has to cover in SAR missions is enormous. Current Canadian capability includes naval vessels that are not designed for operations in ice, non-nuclear submarines that (once they get out of refit) have a hard time manoeuvring in regular seas, and six Arctic/Offshore Patrol Ships that have not been built yet. The Canadian Coast Guard and the Canadian Rangers will lend assistance in rescue

missions, but Canada's capabilities are clearly minimal. Moreover, if the agreement is to be effective it will require a permanent SAR base in the Arctic. Does Canada have the will, or the resources, to build such a facility? It is one thing to say that we have a SAR communication facility in Trenton, it is another to boast that we have the right capabilities on the ground in the Arctic. How will we fare on rescue missions? The incident involving a C-130 Hercules in 1991 is a good example of the problems Canadian capabilities could face in the Arctic. The air transport crashed in the Arctic on a resupply mission 30 kilometres away from its runway – 18 passengers and crew died in the incident. The rescue effort was slowed down by a blizzard, the local terrain and the isolated nature of the crash site. The situation has not changed.

If the Arctic is really the priority Prime Minister Harper says it is, this will have to be demonstrated with dollar signs. Even then, it is unclear whether Canada can afford the type of policies the SAR agreement demands. If Canada is unable to maintain its end of the bargain, how much cooperation can come out of the agreement? Canada's recent actions towards the Arctic Council put into question the potential for cooperation we see in the agreement. And if one of the players is not playing, what does it say for the future of cooperation in the Arctic? At the moment, Canada has not put its money where its mouth is.

Notes

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Commentary: Is Canada an Arctic Nation or a Maritime Nation?

Tim Lynch

When some Ottawa speechwriter fed his political master the catchy phrase describing Canada as a country "from coast, to coast, to coast," he fragmented Canada's coastline into three segments. Successive generations of politicians seem comfortable perpetuating the image of Canada's coastline being comprised of three mutually exclusive littoral regions. In an era of global warming and melting sea ice, with the Northwest Passage becoming a reality, this 20th century political rhetoric needs to be updated in keeping with the maritime responsibilities Canada must adopt in the 21st century.

Rather than seeing Canada's shoreline as comprised of three segments, the time has come to recognize a single shoreline embracing the Pacific, Arctic and Atlantic Oceans. In keeping with the intent of the *Canada Oceans Act*, the entire shoreline must be treated with equal respect. To emphasize one over another does not do justice to the North American peninsula Canada will become in an era of routine shipping through the Arctic.

The concept of Canada's shoreline as three parts arose during the Cold War. Then Canadians accepted that their north was frozen solid, separating East and West Coasts. During this era Canada was reliant on the Americans for protection against the USSR. (The current emphasis on purchasing fighter aircraft and battleships suggest that the Cold War state of mind is still prevalent in Ottawa.) Canada and the United States have a tradition of respecting each other's sovereignty while establishing border relations. How such bilateral relationships relate to governance issues within the Arctic Council will be interesting to observe.

Maritime history for most Canadians originates with European immigrants arriving at the Atlantic port of Halifax to begin their trek westward, and Canadian naval vessels leaving Halifax in defence of Britain and Europe. More recently, Canada has provided naval support in military theatres around the globe. Canadians identify with these accomplishments through TV images of naval vessels at Halifax. Partly because of time differences feeding into broadcast news cycles, Canadians rarely see similar imagery from their Pacific naval port at Esquimalt.

In addition to providing a sea route between Europe and Asia, the melting of Arctic sea ice will open the opportunity to exploit undersea energy resources. Canada's ability to provide energy to states in need of such resources will be pivotal to its role in the future global economy. Accessing energy from the Arctic Ocean has considerable environmental risk, is dependent on unproven technologies and will be undertaken in unpredictable weather conditions. Assuming these risks is questionable when there are other parts of the Canadian shoreline where opportunities are well documented, less risky and accessible year round with proven technologies.

Canada's maritime history evolved from its European genealogy. Its maritime future will be determined by its management of Asia-Pacific trading routes. Consequently, Canada needs to build sustainable relationships with Indo-Pacific countries, which are homelands of many new Canadian immigrants. Faced with this rationale Canada's naval presence in the Indian and Pacific Oceans is critical to defining its role in a globalized economy.

Seeing Canada's maritime challenges through an Arctic prism is limiting. Adopting a more holistic vision of Canada as a North American peninsula is more realistic. Under the UN Law of the Sea, the role of the navy in protecting the 'shoreline' needs to be understood by Canadians as defending our maritime domain. Leadership is urgently needed to convince Canadians that they are part of a maritime nation. This process has to begin by turning the Canadian ship of state in a Pacific direction.

The Risks of Shipping Disasters in the Arctic

Matthew Gillis

The grounding of three vessels in Canada's Arctic waters across the span of a single month in 2010 perhaps offers a glimpse of things to come for marine traffic in the north. Traffic has increased in recent years and likely will increase into the future – not only in terms of numbers of voyages but also in size of vessels as more bulk carriers, tankers and cruise ships take to the north. As more vessels attempt to navigate Canadian Arctic waters, the additional traffic could mean a greater risk of accidents. What, then, do these three groundings indicate about how well Canada is prepared for increased marine traffic in the Arctic and the accidents that could result?

On 1 September 2010, while delivering diesel fuel to communities in western Nunavut, the tanker MV *Nanny* became lodged on a sandy shoal in Simpson Strait, 50 kilometres southwest of Gjoa Haven. Despite the accident, *Nanny*'s cargo of 9.5 million litres of diesel fuel remained intact and no spill occurred. After being stuck for two weeks, a second tanker came to *Nanny*'s aid, and she was successfully refloated after offloading some cargo.

The story of *Nanny*'s grounding may have been otherwise unremarkable had it not been for the fact that this was the third grounding of a ship in the Canadian Arctic in the span of a single month. On 8 August, the tanker *Mokami* ran aground off the Baffin Island hamlet of Pangnirtung. The tanker was refloated in high tide the same day, and, as in the case with *Nanny*, no spill occurred. Then, on 27 August, the cruise ship *Clipper Adventurer* carrying over 100 passengers and crew ran aground on an uncharted rock in Coronation Gulf. All passengers were safely offloaded to the Canadian Coast Guard (CCG) ship *Amundsen*, which arrived on scene two days later. Again, no spill occurred as a result of the grounding.

Despite the fact that these groundings ended happily with no serious injuries or pollution of the Arctic environment, these incidents sounded alarms about the risks attached to increased marine traffic in the Arctic. University of British Columbia professor Michael Byers observed that "[t]he increase in traffic is almost exponential, and we're not prepared for that…. We're not prepared in terms of navigation charts; we're not prepared in terms of what we call ports of refuge, essentially deepwater harbours; and we're not prepared in terms of search-and-rescue equipment and personnel in the North."[1] Northern communities seem unprepared to respond to marine shipping disasters such as oil spills. As *Mokami* lay grounded off Pangnirtung, the community's senior administrative officer Ron Mongeau noted that "[w]e could have had a significant incident here for which we are totally unprepared to handle."[2] The CCG has delivered containerized oil spill response kits to many northern communities, and training in their use is ongoing. Response times to a major shipping accident or oil spill in the Arctic are long, with the nearest Canadian Forces search and rescue helicopters based in Comox (BC), Trenton (Ontario) and Greenwood (NS), far to the south, and response by ship varying according to availability and season.

To complicate responses to shipping disasters in the Arctic even more, existing spill recovery methods are largely untested in Arctic waters. The limited experience suggests that existing recovery methods – which might function well in open ocean – can be prone to failure in frigid or ice-filled waters. Oil spill recovery exercises conducted in broken ice in the Beaufort Sea in 2000 demonstrated that skimmers clogged with sea ice and booms failed at much lower ice concentrations than expected. Some experiments with in-situ burning of oil in Arctic waters had promising results, but oil trapped under pack ice is inaccessible for burning, and oil that has become emulsified in water for too long does not burn efficiently.[3]

Given these limitations, it seems miraculous that these three back-to-back accidents did not erupt into larger crises which could have truly stretched Canada's capacity to provide disaster relief in the Arctic. In the wake of these three groundings, it is a prudent time to reassess how Canada should manage the risk of major marine disasters in the Arctic. Marine traffic in the Arctic is there to stay and, indeed, will increase. Therefore, there is no possibility of eliminating the risk of marine shipping disasters in the north. However, a rational appraisal and understanding of this risk helps to illustrate the measures necessary both to prevent and to respond to Arctic shipping disasters.

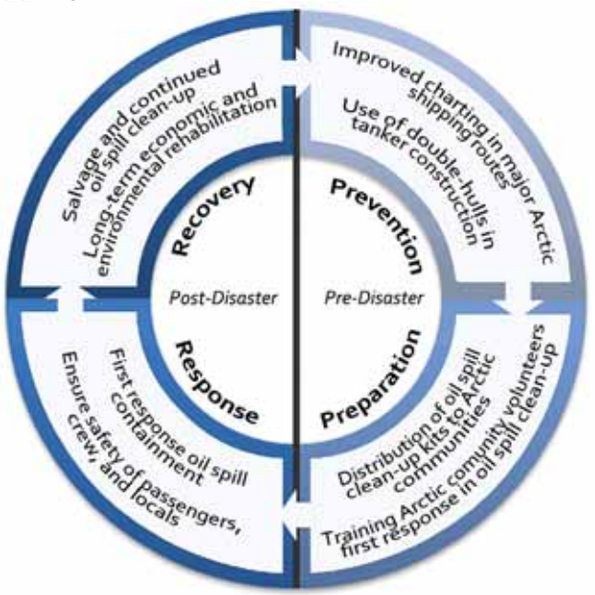
An assessment of the risks involved in Arctic marine traffic provides some surprising insights. The first insight is the frequency of accidents. Despite the marked increase in Arctic voyages over the last few years, annual accident rates have remained relatively constant. This means that while traffic in the Arctic is increasing, the rate of accidents per voyage actually demonstrates a steep downward trend. The second insight is about the consequences of marine accidents – i.e., despite the concerns over oil spills after these three groundings, no pollution took place, no serious injuries were sustained and passengers and crew were rescued and the vessels refloated in timely manners. Indeed, of the 599 marine accidents in the Canadian Arctic between 1975 and 2008, there have been no major disasters resulting in significant discharge of contaminants or serious injuries or fatalities to crew or passengers. From these two insights, it seems that the danger posed by shipping accidents to the Arctic environment, wildlife and people is overstated.

Increased Arctic shipping may not pose an imminent threat, but the absence thus far of any major catastrophe is not an indication that there could never be one. The risk, however small, is still present, and the consequences are huge. Therefore, a measured approach to managing the risk of a major shipping disaster in the Arctic is necessary. Such an approach must be comprehensive and preventative in nature – an ounce of prevention is very much worth a pound of cure. A four-phase approach borrowed from disaster management is an ideal model as it adds emphasis to prevention and preparation. A proposal for an approach using a comprehensive disaster management model is illustrated in Figure 1. While 'recovery' is an important component of this context, it is not discussed here given that it encompasses the longer-term actions that would be taken after a disaster.

Prevention is especially important in this context, given the fact that of these three groundings, *Nanny* and *Clipper Adventurer* struck uncharted undersea features. Much of the Arctic remains woefully uncharted. As marine traffic in the Arctic increases and more areas become accessible, additional charting is necessary to help prevent a major marine disaster in the Arctic, and shipping companies must keep their charts up to date. Another preventative measure is restrictions on the sorts of ships permitted to operate in the Arctic. At least one of these three vessels, *Nanny*, was double-hulled, which may have helped to prevent the release of any pollutants.

Preparing for and responding to a disaster is important as well. The development and distribution of oil spill clean-up

Figure 1: A comprehensive model for marine shipping disasters in the Arctic



Source: Author

kits to northern communities is a good idea, but how big of a spill can they manage? Are people being adequately trained in their use? What of the navy's future Arctic Offshore Patrol Ships – how well can they contribute to response operations? Will they be able to deliver fuel to CCG ships, which are often the first responders when a ship is in trouble? These are the sorts of issues that should be addressed well in advance of a major catastrophe.

What do the 2010 groundings of the *Mokami*, *Nanny* and *Clipper Adventurer* tell us about the future of marine disasters in the Arctic? Well, there is good news. In each case there was a successful resolution, and statistics indicate that, despite increasing vessel traffic, there is a declining rate of accidents in the Arctic overall. This suggests that the risk of a major shipping disaster in the Arctic is perhaps not as great as popularly understood. Nevertheless, the risk is there and it requires a measured, comprehensive plan. This plan must emphasize preventative measures – in particular improved charting – to minimize the possibility of a major accident, as well as preparation and response measures to minimize the consequences of an accident when it does occur.

Notes

1. Tobi Cohen, "Cruise Ship Rescue: 'We Dodged a Bullet,'" *Edmonton Journal*, 30 August 2010, available at www2.canada.com/edmontonjournal/news/story.html?id=afeb5c69-d992-442d-83fc-234163fd726f.
2. "Arctic Fuel Spill Fears Raised in Pangnirtung," CBC News, 11 August 2010, available at www.cbc.ca/news/canada/north/story/2010/08/11/pangnirtung-fuel-spill-concerns.html.
3. Pew Environment Group, "Oil Spill Prevention and Response in the US Arctic: Unexamined Risks, Unacceptable Consequences," November 2010, pp. 77, 89, available at www.pewtrusts.org/uploadedFiles/wwwpewtrusts-org/Reports/Protecting_ocean_life/PEW-1010_ARTIC_Report.pdf.

View from the West:

The Interests of Non-Regional User-States in Arctic Affairs

Daniel Baart*

There is a natural feeling amongst the populations of the Arctic states that the future of the region is theirs to determine. Good relations among the five Arctic littoral states – Canada, Denmark, Norway, Russia and the United States – and a collective respect for dialogue and international law have ensured steady progress in working towards a common goal of delimiting individual sovereignty claims. There has been little evidence to suggest that this cooperation will give way to friction between claimants. However, there is a risk that the growing involvement of non-regional states could derail this orderly process.

The promise of new, potentially cost-effective shipping routes and newly discovered mineral deposits is attracting world attention to the Arctic. For instance, China has accelerated its polar expedition schedule, and in the near future will possess two icebreaking research vessels. Japan and South Korea have applied for observer status with the Arctic Council, and Indian officials have also expressed an interest. A growing number of states from all latitudes are tuning in to developments in the Arctic, and are hoping to gain a stake in determining the political developments of the region.

Although there are only five states with Arctic Ocean coasts, there are numerous others that have stated their interest in the region. Some of these have territory within the Arctic Circle and are active and welcome participants in forums like the Arctic Council, while others are located in the lower latitudes and are pressing to be allowed to participate. It is becoming increasingly apparent that non-Arctic states want a greater say in the future management of the region, for a variety of reasons. Most of these reasons relate to commercial and economic considerations, although they could relate to undisclosed military aspirations as well.

The opening of new shipping routes through the Arctic is the most likely, and most immediate, development in the region. There are apparent concerns amongst potential user-states, however, that Arctic governance decisions made by states in the region could limit the ability of foreign ships to operate in the area. The concept of free navigation is central to world trade; it ensures that commercial vessels can move freely without harassment in international waters, and can likewise make peaceful passage through the territorial waters of other states. This allows ships to take the fastest or safest route, a concept that is of growing importance in the Arctic where decreasing sea ice is allowing for more extensive navigation.

For now, it is hard to predict when or if the Arctic ice will retreat enough to allow for efficient and safe ocean transits. Thick ice remains in most areas of the Arctic Ocean for a good portion of the year, and areas that are called 'ice free' contain enough residual ice to pose serious hazards to vessels that aren't ice-strengthened. The possibility that the region will become as busy as other major routes in even the long term is remote, although this does not mean that concerned states should not be worried about the ways in which legal or political decisions made now might mean restrictions on the activities permitted in the area in the future.

How well founded are these concerns? Notwithstanding areas that are already internal or territorial waters, and thus wholly under the jurisdiction of a state – which for

Credit: Martin Langford

Even 'ice free' areas contain enough residual ice to pose serious hazards to vessels that are not ice-strengthened.

Credit: Chinese Arctic and Antarctic Administration

*The Chinese research vessel **Xue Long** (Snow Dragon) on a research mission in 2008.*

this analysis includes Canada's Northwest Passage – it is possible that regional states could enact special regulations regarding vessel traffic within large swathes of the polar ocean that are within a state's 200 nautical mile exclusive economic zone (EEZ). However, fears that territorial expansions, as per the United Nations Convention on the Law of the Sea (UNCLOS), could impede shipping are largely baseless; boundary extensions along continental shelves relate only to seabed resources and do not grant the title state any control over activities in the waters above. Within these zones, the claimant state is permitted to enforce environmental protection rules, but these must be in accordance with other international regulations and must be applied universally to all vessels, foreign and domestic. It is unlikely that any government would meet with much success in trying to limit shipping in this way.

It is useful to keep in mind that the major entrances to the Arctic Ocean are already contained within the EEZs of the bordering states. Concerns related to the progress of UNCLOS claims are almost irrelevant when addressing issues related to the freedom of navigation, as the extent of the surface boundaries is for the most part already established. This fact pertains to nearly all of the Arctic Ocean areas which are currently open to shipping, as well as most of the area expected to be free of pack ice within the next few decades (although whether this will be accessible for commercial shipping is another matter). Even though no state would be legally capable of restricting foreign shipping from operating in these areas, user-states will undoubtedly continue to monitor developments in this regard to ensure that their rights to free navigation are not being infringed upon.

The second major interest of non-regional states is the Arctic's apparent abundance of petroleum and mineral reserves. This is also a topic that is likely to draw the suspicions of citizens of Arctic states who are sensitive to suggestions that a foreign country might benefit from these resources. The Chinese in particular are interested in somehow staking a territorial claim in the region, incredible as this might seem. An embrace of worst-case scenarios leads many people to ignore what is most likely to occur – i.e., that the non-regional states are seeking to enter partnerships with the countries holding claim to the territory. States like South Korea, Japan and China have either the money or the expertise to participate in resource extraction operations, and have voiced their interest in doing so. There is nothing underhanded about seeking partnerships to exploit natural resources in foreign countries, and indeed it is a well-established process.

This is not to say that none would be interested in staking a claim to a resource-rich area, although it is hard to conceive of how such a venture could ever be justified in international law, or how the belligerence needed to enforce such a seizure could ever be balanced with the international political capital lost by such an act. The reality is that the bulk of proven reserves in the Arctic region are within areas that are already the legally recognized territories or EEZs of the regional states. Changing this would require a wholesale re-evaluation of internationally agreed legal conventions, or a transfer of sovereignty through other means.

While a degree of suspicion is prudent, we cannot begrudge non-regional states the same interest in the Arctic region that we ourselves hold towards other areas. The Arctic regional states must remain united in promoting the existing legal frameworks governing territorial expansion in the region, but should also recognize the validity of these outside interests and work to smooth their integration into the governance process. Although there has so far been little evidence to suggest any conscious effort on the part of the Arctic states to restrict this outside access, more needs to be done to assure these interested parties that no unwarranted barriers to their reasonable and lawful participation should be expected.

Note

* This article is the opinion of the author and does not represent the views of the Canadian Navy or the Department of National Defence.

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Plain Talk:
Is A/OPS an Acceptable Compromise?

Sharon Hobson

It's apparently full steam ahead for the navy's Arctic/Offshore Patrol Ships (A/OPS) now that the National Shipbuilding Procurement Strategy (NSPS) shipyard selections have been made. The question is, will the ice-capable vessels be adequate for the tasks the navy has been assigned?

Definition, engineering, logistics and management support contracts were awarded to BMT Fleet Technology in Kanata, Ontario, STX Marine Europe, and BAE in 2008, and the design and hull form have been tested and validated. Once the umbrella agreement for the navy's combat ships is negotiated and signed with Irving Shipbuilding, a contract to build the A/OPS will follow, likely in mid-2012 and first ship delivery is scheduled for 2015.

Briefings for the six to eight A/OPS which are to be acquired under a $3.1 billion procurement program focus heavily on the Arctic role. But the ships will be required to operate off all three of Canada's coasts, so their capabilities have to be considered in regards to the Atlantic and Pacific Oceans, both of which experience regular and intense storms, as well as the ice-strewn northern waters.

The fleet of A/OPS will be tasked with providing presence, surveillance, response and control, and support to other government departments off of Canada's three coasts. Although the military's background documents say the ships will provide "armed, sea-borne surveillance of Canada's waters," they are not intended to counter a military threat. Rather they will be used in a constabulary role, and the threats envisioned include small-calibre guns and ramming by other ships. The ships will be fitted with a 25 mm gun and two 12.7 mm heavy machine guns.

For the first 15 years or so, the 5,730 tonne ships will deploy to the Arctic for four months a year, but then, in the longer term, as climate change causes the Arctic ice to melt, it is predicted that the ships will be able to deploy in the north for up to six months per year. The navy has increased the ships' ice capability from Polar Classification 5[1] – being able to operate in medium first-year ice (70-120 cm thick) including old-ice inclusions – to PC5+ with a PC4 bow which will allow year-round operation in thick first-year ice which may include old-ice inclusions.[2] The ships are to have an ice capability for their own mobility but will not provide icebreaking services to other vessels.

No one is expecting the ships to provide a rapid response capability in the Arctic. Ice conditions and extreme distances will impede and complicate any ship movements. And things may get worse before they get better. Environment Canada's Canadian Ice Service is predicting that climate change will mean *more* ice in the Canadian Arctic for the next 10-15 years, only after this will it begin to decrease.

The Canadian Navy is moving back into the Arctic after an absence of about 50 years. Although aided by exercises in the north over the past 10 years, its corporate knowledge of that environment is limited so it is therefore relying on the Canadian Coast Guard (CCG) for help. As others have noted in this issue, charting is a major challenge because most of the charts were plotted before Global Positioning Systems (GPS) were widely used. GPS is becoming the primary navigational system, and it has been noted that even areas that have been charted may vary significantly from the GPS readings. The charts need to be updated using the more precise GPS systems. That takes time, operational resources and money.

The helicopter-carrying patrol ship KV ***Nordkapp*** *in Adventfjord, Spitsbergen, is one possible model for Canada's Arctic/Offshore Patrol Ships.*

Because there will be no support infrastructure in the Arctic for the ships other than what will be provided by the naval berthing and refuelling facility at Nansivik on Baffin Island, the A/OPS must have a high degree of system redundancy and self-sufficiency. The distances to be travelled in the north are breathtakingly long: Halifax is closer to London, England, than it is to Nanisivik (2,741 nm vs 2,805 nm) and Esquimalt is closer to Tokyo than Nanisivik (4,196 nm vs 4,646 nm). The ships will have an endurance of 6,800 nm at 14 knots transit speed – a distance that is not enough according to the CCG – but the navy expects that the distance can be increased if the speed is reduced to 10 knots.

Credit: Cpl Rick Ayer, Formation Imaging Services, Halifax

*HMCS **Summerside** deploys a rigid-hull inflatable boat to take members of the Canadian Rangers ashore during **Operation Nanook** 2011.*

According to documents acquired by the Canadian Press, the navy is concerned about how it will get fuel into Nanisivik to be used to refuel the A/OPS. The options include hiring a commercial tanker or asking the US Navy for help.[3] Regardless of the route, the cost has to be factored into the A/OPS annual operating budget. In addition, operating costs for the A/OPS will also be higher when they patrol off Canada's Atlantic and Pacific coasts because of the hull form and the added weight of the ice-strengthening. In order to provide capability in the north for four months of the year, the ships will consume more fuel and travel more slowly the other eight months. With a top sustained speed of only 17 kts (reduced from the 20 kts that the navy originally wanted), the ships will be limited in their ability to engage in any kind of pursuit. Instead the navy will have to rely on intelligence gathering to pre-position the ships which will then use their helicopter and fast rigid-hull inflatable boats to interdict any illegal activity.

Department of National Defence Deputy Minister Robert Fonberg referred to the A/OPS as "Frankenboats" (although I suspect he wishes he had never said that out loud) and he is right. These are compromise vessels, combining various reduced capabilities to fulfill a variety of roles in a variety of extreme conditions, for a price the taxpayer can afford. Compromises such as this rarely make everyone happy.

But the question is, will the ships do enough of everything to meet the navy's assigned tasks? Commodore (retired) Eric Lerhe thinks they will. He argues that they are more capable in equipment and size than the Maritime Coastal Defence Vessels (MCDVs), and the MCDVs have already done "a sterling job" off the coast addressing illegal activities, logging problems and fishing violations. The A/OPS will be more capable, and they will carry "a big honking helicopter" at times, which will greatly expand the ships' surveillance capabilities.[4] The limitation, of course, is that there will likely be only six ships, not eight.[5]

While the A/OPS have been referred to as 'corvette-sized' vessels, they are actually quite substantial. At 5,730 tonnes, they are bigger than the *Halifax*-class frigates and the *Iroquois*-class destroyers. Not only will they be able to negotiate a route through the icy waters of the Arctic, but they will be sturdy enough to provide decent seakeeping capabilities in the rough seas of the Atlantic and Pacific. Lerhe thinks that the A/OPS are the right ships given the budgetary expectations of the Canadian Forces and the government's emphasis on Arctic development.

Perhaps the usefulness of these ships will be limited not so much by their inherent capabilities but by the navy's budget. In recent years, as the navy found itself straining to live within its financial and personnel budgets, it tied up some of its MCDVs. With the operating costs of the A/OPS so much higher than the current fleet of offshore patrol vessels, it's possible that the navy will look to save money by reducing patrols of the new fuel-burning offshore patrol ships.

Notes

1. Classification from the International Association of Classification Societies.
2. Given that the PC4 rating is more robust than PC5, perhaps the classification should have been PC5- or PC4+, rather than PC5+ which would more properly indicate a lesser ice capability than PC5.
3. Canadian Press, "Canadian Forces May Need US Help Supplying Arctic," 14 November 2011, available at www.cbc.ca/news/canada/story/2011/11/14/pol-military-arctic-supplies.html.
4. Phone conversation with the author, 1 December 2011.
5. In testimony before a Senate committee, even the project officers were not optimistic about being able to afford the 7th and 8th ships. See, Standing Senate Committee on Fisheries and Oceans, 27 October 2009.

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Warship Developments:
Ramping Up for the Arctic

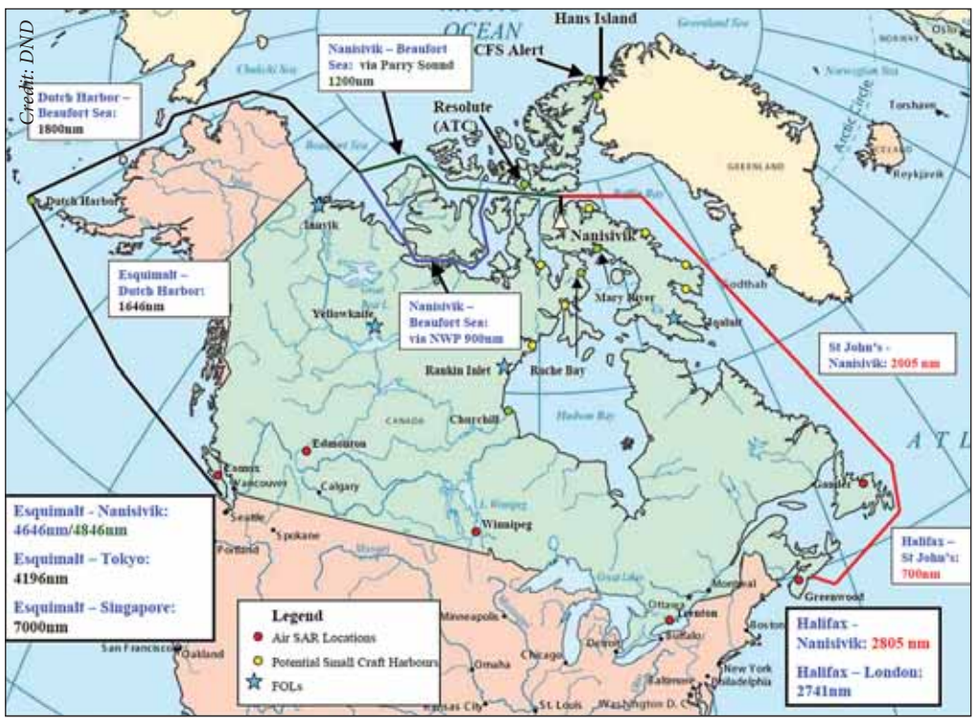
Doug Thomas

As other articles in this issue have indicated, operations in the Arctic require very specialized vessels. We send thin-skinned frigates and the smaller Maritime Coastal Defence Vessels (MCDVs) into Arctic waters for a few weeks during the annual *Operation Nanook* exercises when the ice has retreated to its maximum extent, but four month summer and early fall deployments are envisaged for the Arctic Offshore Patrol Ship (AOPS). These ships will also have an offshore patrol role along Canada's Atlantic and Pacific coasts during the rest of the year, but this article will concentrate on their operations in the far north.

The Statement of Requirement for AOPS calls for ice-strengthened hulls to meet an internationally recognized standard, rugged overall construction, specialized ship's boats capable of transiting to uncharted beaches to land or pick up personnel and light vehicles, an organic helicopter capability, and redundancy of propulsion and sensor systems. There is little in the way of repair facilities in the Arctic, and these ships will have to be robust and self-sufficient.

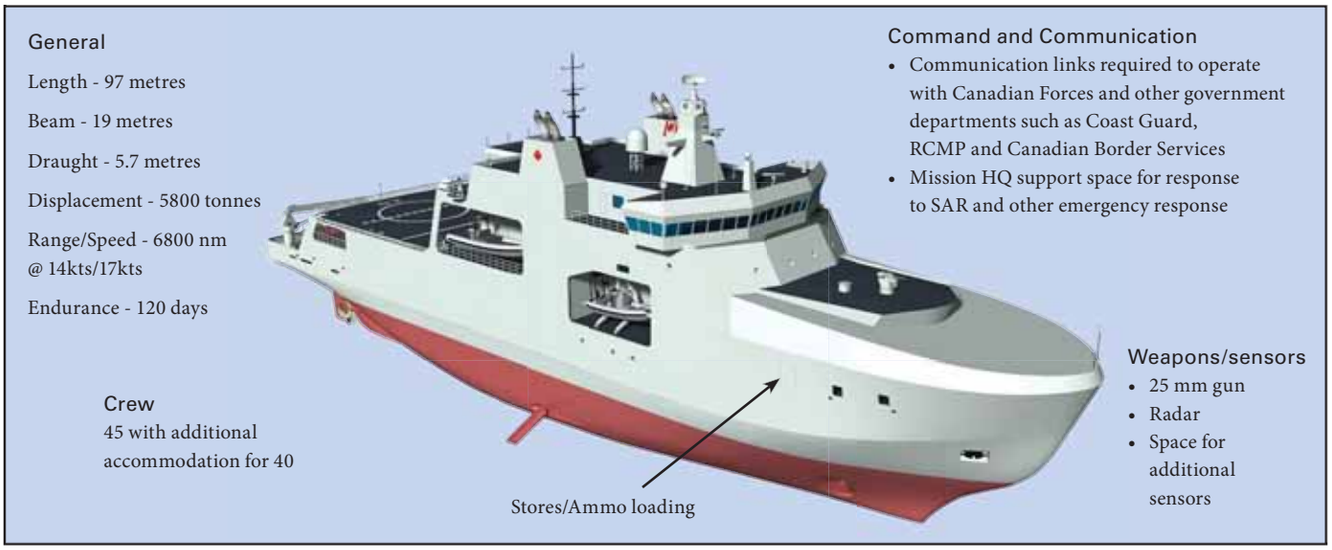
The AOPS will be based in Halifax and Esquimalt along with the rest of the fleet, but it will be a very different vessel than those other grey hulls. Their crews will be small in number, with a core complement of 40-45 men and women likely formed from both the Regular and Reserve Force, and individuals must be willing and able to multi-task. They will, for example, load stores on the ship, prepare food, conduct ship's husbandry (cleaning, chipping and painting), operate boats, perform seamanship duties such as line handling and fuelling, form armed boarding and landing parties, operate weapons and sensors, and compile and disseminate the surface picture to other units and headquarters. There are some similarities to the USN's new Littoral Combat Ship, another relatively large ship with a small, multi-tasked crew; but AOPS will have the added complication of conducting independent operations in isolated waters for extended periods of time.

Since July 2007, when the government announced a requirement for these vessels and their fuelling and support base at Nanisivik in northern Baffin Island, the project has developed a design that has received Lloyd's Classification Approval. With the decision in October 2011 to award construction of combat vessels to Irving Shipbuilding Inc. in Halifax, it is hoped that a contract for six ships will be signed in mid-2012, with delivery of the first ship to the navy in the 2015/16 period.



The vast distances between ports in the north mean the Arctic Offshore Patrol Ships will be required to conduct operations in isolated waters for extended periods of time.

My expectation is that there will be a very steep learning curve in the operation of these ships and that early deployments will be challenging. What can be done now to set up this project for success? The Royal Canadian Navy (RCN) should consider establishing a 'Centre of Excellence' in preparation for the introduction of this capability. A logical location would be in the CF Maritime Warfare Centre (CFMWC), located in Canadian Forces Base Halifax. The Maritime Warfare Centre has been a centre of excellence for tactical training and development since it was first stood-up in 1952, and its staff is experienced in teaching and assessing the conduct of naval operations, running tactical experiments and evaluating new equipment and platforms. CFMWC has a skilled staff of operators and technical personnel, excellent simu-



Credit: DND

An artist's depiction of the Arctic Offshore Patrol Ship.

lation facilities, it is the navy's Lessons-Learned Centre, it is located several hundred yards from a Shiphandling and Navigation Trainer where operations in and near ice could be simulated, and it is situated in Halifax, where at least half of these Arctic patrol vessels will be based. Halifax is also the principal home base for Canadian Coast Guard (CCG) icebreaker operations, and we have much to learn from the CCG's expertise in Arctic operations. After the navy's Command Staff moved to Ottawa in 1997, it has seemed to this and other observers that CFMWC was 'out-of-sight, out-of-mind.' It is time to put the task of organizing this new capability where it belongs – on the coast where mariners practice their craft, rather than in a land-bound headquarters!

A CFMWC AOPS Centre of Excellence should develop a concept of operations for these new ships, compile a reference manual for Arctic operations and act as the custodian of this publication in the future, and revitalize the CFMWC's existing Arctic Reference Library in advance of the delivery of these vessels. Arctic patrol is a new capability for the RCN, and it is going to take a concerted and coordinated effort to ensure it is successful. We have not gained much experience from past *Operation Nanook* deployments, which have generally been very basic and have emphasized interoperability with different players each year. Indeed, most frigate Commanding Officers who have deployed to the Arctic are now in senior positions and will never go north again.

I suggest that a cadre of personnel be formed to operate AOPS. This should include MARS officers (who command and stand bridge-watches in warships) and MARE officers (technical) at the Lieutenant and Lieutenant-Commander level, and selected Petty Officers. This cadre should be sent to international and national naval and coast guard courses in Arctic and Antarctic ice operations. This would be followed by exchange positions and familiarization cruises in ice-capable ships of allied navies and coast guards. The individuals should not be so senior that they will retire before serving in AOPS, and career managers should ensure that their qualifications are put to good use. This may sound obvious, but too often in the past individual training and qualifications have been wasted. The Centre of Excellence should be involved in the management of this important resource.

The AOPS Centre of Excellence should:

- establish a liaison with the CCG to share expertise, organize attachment of naval personnel to CCG icebreakers, and seek advice on Arctic operations;
- resolve issues with regard to helicopter operations from AOPS, again by calling on expertise from the CCG which has been doing this for years;
- develop expertise in fast boat and beaching craft operations, using knowledge available from CCG, Seamanship Division in Halifax and other relevant operators;
- establish an operating concept for the refuelling facility in Nanisivik; and
- convene periodic seminars with appropriate subject-matter experts to explore issues pertaining to AOPS and Arctic patrol.

This is a complex project and it requires the early establishment of a team dedicated to sorting out the practical problems of operating these ships – preferably not in Ottawa!

Announcing the 6th Bruce S. Oland Essay Competition

The *Canadian Naval Review* will be holding its annual essay competition, the Bruce S. Oland Essay Competition, again in 2012. The first prize of $1,000 will be provided by Commander Richard Oland in memory of his father Commodore Bruce S. Oland. The top two essays will be published in *CNR*. (Other non-winning essays will also be considered for publication, subject to editorial review.)

The contest deadline is **17 June 2012**. Submission guidelines, details of topics and judging criteria are available from naval.review@dal.ca or on our website at www.naval.review.cfps.dal.ca.

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Wings for the Fleet: Fifty years of the Canadian Sea King

In 1963, the Sikorsky Sea King helicopter was acquired for the Royal Canadian Navy (RCN). In 2012, the venerable maritime 'warrior' will have completed nearly 50 years of service in the RCN, Maritime Command, Air Command and the Royal Canadian Air Force. To mark this remarkable achievement, the Canadian Forces Aerospace Warfare Centre is sponsoring the 18th Annual Royal Canadian Air Force Historical workshop in Halifax on 13-14 June 2012 with a Sea King theme.

In peace and war, the Sea King has carved out a name for itself in the annals of Canadian military aviation history. Topics may examine: the policy concerning the acquisition of the Sea King and its integration with the destroyer escorts of the Canadian Navy; the Sea King on operations; Sea King personnel, training and maintenance issues; and others. Individuals interested in presenting a paper should forward a one or two paragraph proposal to Major Bill March prior to 29 February 2012. Notification of selection will be provided by 16 March 2012. Proceedings will be published.

Major Bill March: 613-392-2811 x 4656 or william.march@forces.gc.ca

Operation Nanook 2011

Operation Nanook 2011 was the centrepiece of the sovereignty operations conducted annually by the Canadian Forces in the north of Canada. The operation maintained the momentum established in 2010 by conducting ***Operation Nanook*** 2011 in the Lancaster Sound area of the eastern and high Arctic from 4 to 26 August.

Here, HMCS ***Summerside*** sails past an iceberg in the Davis Strait on 16 August 2011.

Photo by Cpl Rick Ayer, Formation Imaging Services, CFB Halifax, Nova Scotia.