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Titanic Blunder

Arctic/Offshore Patrol Ships on Course for Disaster

Michael Byers and Stewart Webb

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ABBREVIATIONS

A/OPS Arctic/Offshore Patrol Ship

CCG Canadian Coast Guard

CRS Chief Review Services

DND Department of National Defence

EEZ Exclusive Economic Zone

HHRSD Helicopter Hauldown and Rapid Securing Device

MCDV Maritime Coastal Defence Vessel

MSPS Mid-Shore Patrol Ship

NATO North Atlantic Treaty Organization

PBO Parliamentary Budget Office

RCMP Royal Canadian Mounted Police

RCN Royal Canadian Navy

SSCNDS Standing Senate Committee on National Defence and Security

Introduction

> There is no likelihood of Arctic states going to war.
> — *Prime Minister Stephen Harper, January 2010*[1]

IN DECEMBER 2005, then opposition leader Stephen Harper announced that, if elected, he would budget $5.3 billion over five years "to ensure sovereignty over our land, waters, and airspace in Canada's north."[2] Central to the commitment was the purchase of "three new heavy naval ice breakers" and the construction of "a new combined military civilian deep water docking facility in the Iqaluit region."[3] Mr. Harper added: "At least 500 sailors will be committed for operating these icebreakers and the docking facility."[4]

In July 2007 Harper, who was by then Prime Minister, announced a change of plans. Instead of heavy icebreakers, he promised the "construction and deployment of six to eight new state-of-the-art offshore patrol ships" that would be "custom-designed and built in Canada" and "exceptionally versatile, with equal ability to navigate the major rivers, coastal waters and open seas of Canada's Atlantic, Pacific and Arctic."[5] These Arctic/Offshore Patrol Ships (A/OPS) would have steel-reinforced hulls "able to crunch through ice up to a metre thick."[6]

During the same speech, Mr. Harper said he would soon announce the location for "the construction of a deep water port in the far North" that would "serve as a forward operating base for the new patrol ships, but... have important civilian and commercial applications as well."[7] One month later, in August 2007, he did just that, announcing the "Arctic Docking and

Refuelling Facility" would be located at Nanisivik on northwest Baffin Island where an old wharf exists at the site of a disused lead-zinc mine, 34 kilometres from the Inuit hamlet (pop. 1000) of Arctic Bay.[8]

Originally, the construction contract for the A/OPS was supposed to be awarded in 2009, with delivery of the first vessel set for 2013.[9] This contract has yet to be signed and the first delivery has been delayed, initially to 2015, and now until at least 2018.[10]

Construction of the "Arctic Docking and Refuelling Facility" was supposed to begin in 2010, with an initial operating capability in 2012 and a full operational capability by 2015.[11] The opening of the facility has since been delayed until at least 2016, with "a significant reduction of the site layout and function plan" that will see it "operational during the navigable (summer) season" only.[12]

At the time the A/OPS plans were announced in 2007, the estimated construction cost of the ships was $3.1 billion, with an additional $4.3 billion for operations and maintenance over a projected 25-year lifespan.[13] In May 2012, documents tabled in the House of Commons revealed the project is now expected to cost $40 million more, in total, than initially expected.[14]

In October 2011, the government announced that Irving Shipbuilding would construct the vessels.[15] Earlier this year, Irving completed the first phase of the project: a $9.3 million contract for preparatory work.[16] The project is now in a 30-month-long design phase, the contract for which was signed with Irving Shipyards on 7 March 2013 and is worth an estimated $288 million.[17] Much of the work in this phase will be subcontracted to the Danish firm Odense Maritime Technology.[18]

Apart from the lengthy delays, the A/OPS procurement might seem unproblematic. But as this report demonstrates, the Harper government is actually headed for a disaster with the A/OPS — for two reasons. First, the Cold War has been over for more than two decades: Russia has been integrated into the global economy and is a member of the WTO, G20, Council of Europe, and Arctic Council. In January 2010, Stephen Harper told the Secretary General of NATO that "Canada has a good working relationship with Russia with respect to the Arctic" and that "there is no likelihood of Arctic states going to war."[19] To the degree that security threats exist in the Arctic today, they concern non-state actors such as drug smugglers and illegal immigrants. Purpose-built Arctic naval patrol ships are an expensive and inefficient response to these challenges.

Second, the Harper government is choosing to build compromise vessels that are suitable neither for an Arctic role nor as offshore patrol vessels. At

stake is not just the $7.4 billion (or more) that will be spent, but also Canada's ability to operate effectively on all three of its coasts. An urgent change of course is required, one that would see the Royal Canadian Navy provided with purpose-built offshore patrol ships based on proven and therefore less expensive designs. These vessels would be used on the Atlantic and Pacific coasts, with the Arctic role being left to the Canadian Coast Guard.

A Cautionary Precedent: Kingston-Class Maritime Coastal Defence Vessels

SOME OF THE risks associated with compromise vessels are apparent in the history of the Kingston-class Maritime Coastal Defence Vessels (MCDVs). Canada built twelve of these 55-metre ships between 1995 and 1998. The Royal Canadian Navy currently describes their main roles as "coastal surveillance, naval reserve force training, mine countermeasures for route survey, minesweeping and mine inspection operations."[20]

The Kingston class replaced the Anticosti class, the Bay class, and to a lesser degree the deep-dive support vessel HMCS *Cormorant*. The Anticosti class, commissioned in 1989, was made up of two former oil rig supply ships. Fourteen Bay-class 46-metre minesweepers were originally built between 1951 and 1952. Ten of the Bay-class vessels were sold to France and Turkey in the 1950s.[21] Six replacements where constructed in 1956 and 1957. Others were sold or broken up, while the six replacement others continued in service as "patrol escorts" until the 1990s.[22]

The Kingston-class MCDVs were born out of the 1987 Defence White Paper.[23] In that document, the Mulroney government stated that the "maritime forces have too few operational vessels, very limited capacity to operate

Canadian Maritime Coastal Defence Vessel (MCDV)

in the Arctic and no capability to keep Canadian waterways and harbours clear of mines."[24] The White Paper also stated that Canada was vulnerable to having its waterways and harbours mined.[25] But the White Paper was very much a Cold War document; it also called for the procurement of nuclear submarines to patrol the Arctic.[26]

The original procurement plan, produced in 1991, was to construct 18 MCDVs as well as six "patrol corvettes."[27] Economic and geopolitical changes soon led to the plan being scaled back. The Cold War was over, mines were no longer a threat to Canada, and the country was entering a recession. In the end, the Navy never received the patrol corvettes and only obtained 12 MCDVs. This meant the Kingston-class ships had to undertake both mine-sweeping and patrol duties.

In short, the MCDVs were designed and built during a time of fiscal constraint to conduct two quite different activities. Moreover, the Navy was distinctly hesitant about the coastal patrol function, which is mostly "constabulary" in nature — in that it involves the enforcement of fisheries, immigration and customs laws against non-state actors.[28] This helps to explain why the

resulting compromise vessels have a top speed of just 15 knots, which is far too slow for effective patrol and interdiction duties.[29]

The slowness of the MCDVs resulted from three decisions: (1) to combine minesweeping and patrol functions in a single class of vessel; (2) to reduce costs by using "mild steel" and building to commercial rather than military standards; (3) to reduce costs with a shorter hull.

The propulsion systems on the MCDVs were designed to reduce their acoustic signatures, since some mines are activated through acoustic detection. But the MCDVs are still not suitable as minesweepers, because they have steel hulls and some mines activate themselves through magnetic detection.[30] Canada's allies use a combination of wood and fibreglass for the hulls of their minesweepers to reduce their magnetic signature and also their weight.[31]

Mild (i.e., soft, low-carbon) steel was used to reduce costs and displacement, but the MCDVs then proved to be top-heavy, which meant that ballast had to be added, and that non-structural steel had to be removed from the bridge.[32] The light displacement of the vessels and their consequent instability makes them unsuitable for open-ocean and overseas deployments. The Senate Standing Committee on National Security and Defence (SSCNSD) reported in 2007 that "Crews become seasick when these vessels are stationed off the Grand Banks for more than a few hours."[33] According to documents obtained by the *Journal de Montréal* via an access-to-information request in 2006, the ship's movements are excessive even in "moderate seas," causing crew fatigue and increasing tensions on the machinery and superstructure.[34]

The Senate Standing Committee also found that the MCDVs were being used primarily for training rather than patrol or minesweeping.[35] This was presumably because of their unsuitability for either of the latter two roles, and the absence of any need for minesweeping in the post–Cold War era.

The Senate Standing Committee concluded that the Navy is so overtaxed with its primary role of blue-water (i.e., overseas) engagement that coastal defence duties have been given very low priority.[36] In fact, in 2012 the Navy planned to mothball six of the MCDVs as a cost-saving measure.[37] However, that plan was rescinded the day after it was announced.

According to the documents obtained by the *Journal de Montréal*, the Department of National Defence had by 2006 concluded that the MCDVs were too small, too slow, and too poorly equipped to carry out their missions adequately.[38] This limited utility led to the cancellation that year of a planned $100 million refit that would, among other things, have added 12 metres to the hulls and cabin space for an additional 25 personnel.[39] The cancella-

tion of the refit means that the vessels, which were originally intended to last until 2055, will likely be decommissioned by 2020. As a point of comparison, Canada's Halifax-class frigates, which were built around the same time as the MCDVs, have just undergone a major refit and are expected to remain in service until 2027–31.[40]

The premature decommissioning of the Kingston-class MCDVs means the A/OPS will necessarily assume many of their responsibilities. As a result, the A/OPS will spend a great deal of their time on the Atlantic and Pacific coasts, with very little time left for the Arctic. And like the MCDVs, the A/OPS will suffer from serious limitations as the result of being compromise vessels — in this case, suitable neither for an Arctic role nor as offshore patrol vessels.

A/OPS Are Unsuitable for the Arctic

THE ARCTIC ROLE is fundamentally different from the offshore patrol role on the Atlantic and Pacific coasts. The distances are much greater, with distance from port being a major concern. Moreover, sea-ice and icebergs pose risks that will continue for decades to come.

Limited Range

The current plan is for the A/OPS to have a range of 6,800 nautical miles.[41] As the following table shows, this compares poorly with Canada's current Arctic vessels.

Unless they refuelled en route, A/OPS based at Halifax, Nova Scotia, would have just enough range to sail the 6,000 nautical miles to and from Resolute in the middle of the Canada's Arctic archipelago. A/OPS, based at Esquimalt, B.C., would use up more than half their fuel reserves just to reach the Beaufort Sea, unless they refuelled in Alaska en route — an option that might not be available if one or both of Canada's two Arctic sovereignty disputes with the United States (over the Beaufort Sea maritime boundary and the Northwest Passage) were to become fractious in the future.

For these reasons, the plan to open a refuelling facility at Nanisivik has some merit, at least for the ships based in Halifax. However, relying on it

TABLE 1 Comparison of Range of Canadian Icebreakers with A/OPS

	Cruising Range (nm)	Designation
CCGS Louis S. St-Laurent	23,000	Heavy icebreaker
CCGS Terry Fox	20,000	Heavy icebreaker
CCGS Amundsen	35,000	Medium icebreaker
CCGS Des Groseilliers	30,600	Medium icebreaker
CCGS Henry Larsen	20,000	Medium icebreaker
CCGS Pierre Radisson	15,000	Medium icebreaker
A/OPS	6,800	Ice-strengthened patrol ship

heavily — as the only Canadian refuelling facility in the Arctic for the limited-range A/OPS — will carry risks. Depending on the movement of winds and currents, access to Nanisivik could be blocked by drifting late-season ice, as happened at Iqaluit in 2012.[42] At some point, fuel transfers from other vessels will likely be necessary, meaning that one or both of Canada's proposed Joint Support Ships will need to be kept on standby for Arctic duty. From both a financial and an operational perspective, this is hardly efficient.[43]

It is also significant that A/OPS will not have the range to operate along the northern coast of Canada's Arctic archipelago or in the Central Arctic Ocean, even if they refuelled at Nanisivik — and this despite projections that the Central Arctic Ocean will become an international shipping route by 2040.[44]

Diminished Security Role

Remoteness, small populations, low levels of shipping activity, and major geopolitical developments have combined to greatly reduce the security threats present in the post–Cold War Arctic.

Distances in northern Canada are immense. The North Pole is 3000 kilometres from Iqaluit, which is in turn 2000 kilometres from Ottawa and Montreal. The southern, "classic route" of the Northwest Passage is over 2500 kilometres long. And the combined population of Canada's three northern territories is just over 100,000 — in other words, about the same population as that of St. John's, Newfoundland. As a consequence, the amount of human activity in the Canadian Arctic is extremely low relative to the size of the region, and outsiders appearing in the small communities are inevitably noticed.

Although Arctic shipping is increasing at a rapid rate, the actual level of shipping remains very low compared to that on the Atlantic and Pacific

Arctic/Offshore Patrol Ship (as envisaged by the Department of National Defence in 2009)

coasts. There were 30 transits of the Northwest Passage in 2012.[45] In comparison, there were 12,000 transits annually through the Strait of Juan de Fuca between Vancouver Island and Washington State, and more than 100,000 "ship movements" in the Gulf of St. Lawrence each year.

Contributing to the diminished security role are geopolitical developments, including (1) the end of Cold War; (2) increased co-operation among the Arctic states; and (3) the absence of any threat of conflict with our Arctic sovereignty disputants, namely, the United States (over the Beaufort Sea boundary and the Northwest Passage) and Denmark (over Hans Island).

Two decades after the end of the Cold War, Russia is a member of the G20, WTO, Council of Europe, and Arctic Council. Its largest trading partner is the European Union, made up mostly of NATO states. Russia's military power has also declined significantly: in 2011, its military spending was just one tenth that of the United States (US$72 billion versus US$711 billion).[46]

The leaders of the Arctic countries agree there is little risk of conflict in the region. In January 2010, Stephen Harper told the Secretary General of NATO that "Canada has a good working relationship with re-

spect to the Arctic," that "a NATO presence could backfire by exacerbating tensions," and that "there is no likelihood of Arctic states going to war."[47] Nine months later, Russian prime minister (now president) Vladimir Putin said: "If you stand alone you can't survive in the Arctic. Nature makes people and states to help each other."[48]

Senior members of the Canadian and U.S. militaries have confirmed these views. In 2009, Canada's then chief of the defence staff, General Walter Natynczyk, said: "If someone were to invade the Canadian Arctic, my first task would be to rescue them."[49] In 2010, the U.S. Chief of Naval Operations, Admiral Gary Roughead, produced a memorandum on Navy Strategic Objectives for the Arctic that stated "the potential for conflict in the Arctic is low."[50]

The decline in state-to-state security concerns has been matched by a significant increase in co-operation among the Arctic countries. In 2008, Canada, Denmark, Norway, Russia and the United States issued the "Ilulissat Declaration" in which they reaffirmed their commitment to resolving any disputes over maritime boundaries within an existing framework of international law.[51] In the 2010 Speech from the Throne, the Harper government signalled its desire to "work with other northern countries to settle boundary disagreements";[52] this was followed by a public invitation to the United States to open discussions on the Beaufort Sea boundary dispute.[53] In 2011, Norway and Russia ratified a boundary treaty for the Barents Sea, resolving a long-standing dispute over 50,000 square nautical miles of water and seabed.[54] In 2012, Canadian Foreign Minister John Baird and Danish Foreign Minister Villy Søvndal announced that negotiators had reached "a tentative agreement on where to establish the maritime boundary in the Lincoln Sea," which lies north of Ellesmere Island and Greenland.[55]

To the degree that security threats exist in the Arctic today, they concern non-state actors such as drug smugglers and illegal immigrants. Even then, great distances, challenging weather and small populations combine to keep the threat levels far below those that exist in more southerly regions.

Multi-Purpose Platforms Are Needed

The low level of security threats and their non-state character mean that the provision of maritime security in the post–Cold War Arctic is an exclusively constabulary role. This reality is reflected in the fact that the Harper government has not seen fit to arm Canada's existing Coast Guard icebreakers, nor has it planned anything beyond a very light gun for the AOPS. In the

M/S Explorer foundering off Antarctica, 2007

circumstances, naval vessels represent an inefficient and expensive means of delivering just one of a suite of essential federal services in a vast, remote and challenging region.

This point takes on even greater importance when one considers the federal government's other responsibilities in the maritime Arctic, including search and rescue, icebreaking for commercial vessels, resupplying northern communities as well as military and meteorological stations, maintaining (and seasonally removing and replacing) navigation aids, and supporting scientific research. These roles are currently fulfilled by Coast Guard icebreakers, and will necessarily be fulfilled by Coast Guard icebreakers in the future regardless of whether A/OPS are also deployed in the region. Sending two ships to the same remote location to fulfill tasks that could be carried out by one ship is, quite frankly, a waste of taxpayer money. It may also result in *less* coverage and capability because both the ships and their responsible departments are likely to be underfunded as a result of the unnecessary duplication.

There is no reason why Coast Guard icebreakers could not be given an additional, constabulary role, enabling them to fulfill the Arctic role of the

Norwegian Coast Guard ice-strengthened ship KV Svalbard

A/OPS at much lower cost. How the additional role would be managed is a question beyond the scope of this report. However, one could imagine mounting light guns on the icebreakers and deploying RCMP or Canadian Armed Forces personnel to operate the weapons and carry out other security-related tasks.

Sea-Ice and Icebergs

Coast Guard icebreakers have much greater ability to operate in the presence of sea-ice and icebergs, thus extending their potential security presence beyond what A/OPS could provide. Although the sea-ice is thinning and receding, the number of icebergs is actually increasing, especially in the Eastern Arctic, as climate change causes the glaciers of Greenland to move more quickly into the sea. Glacial ice is very hard ice, and even small pieces called "growlers" pose a significant threat to ice-strengthened vessels like A/OPS, which are designed only for relatively soft "first year" sea-

ice. In 2007, the Canadian-owned, ice-strengthened cruise ship MS *Explorer* sank during an Antarctic voyage after striking what was either a growler or a piece of hard "multi-year" sea-ice.[56]

The hull design for the A/OPS will reportedly be based on the KV *Svalbard*, an ice-strengthened ship operated by the Norwegian Coast Guard. Again, an ice-strengthened vessel is not an icebreaker, and the A/OPS hull will not be strong enough to allow operations in the Canadian Arctic except during the late summer and early fall. The Norwegian Arctic presents very different conditions due to the Gulf Stream, which carries warm water from the Gulf of Mexico across the Atlantic Ocean to the Barents Sea, as well as the Arctic Oscillation, a clockwise motion of winds and ocean currents that pushes sea-ice away from the Russian and Norwegian side of the Arctic Ocean towards the Canadian side. This makes the KV *Svalbard*'s design suitable for Norway but not for Canada.

The A/OPS will also be significantly less capable that the KV *Svalbard*. The latter is a "double acting" ship, capable of travelling in both directions, with bow-first working best in open water and stern-first working best in sea-ice. This capability is achieved with "Azipod" propeller units that can be rotated 180 degrees. It was initially planned that the A/OPS would be double-acting also, but this capacity was removed from the plans, presumably to save cost.[57]

The KV *Svalbard* has a displacement of 6375 tonnes.[58] The A/OPS will displace 5874 tonnes.[59] Since ice operations involve using the weight of the vessel to break the ice, rather than the hull cutting through it, this is another reason why the A/OPS will be less capable than the KV *Svalbard* and much less capable than a Coast Guard icebreaker. The lighter displacement also translates into less fuel storage, which detrimentally affects the range of the vessels — as discussed above.

Poor ice capabilities mean the A/OPS will be unable to break ice for other vessels. They will also lack the deck space or cranes needed for deploying, retrieving and servicing aids to navigation, or for supporting scientific research, as well as the storage capacity necessary for re-supply missions to communities or military and meteorological stations.

Finally, the officers and crews of the A/OPS will lack experience operating in ice. The Royal Canadian Navy has not been involved in icebreaking activities since 1958. In contrast, as the Standing Senate Committee on National Security and Defence explained: "The Coast Guard's experience and expertise are recognized worldwide, and most of its commanding officers have over 20 years' experience in the Arctic. Experienced ice captains were said to be one of the agency's most valuable assets."[60]

A/OPS Are Unsuitable for Patrol

Too Slow

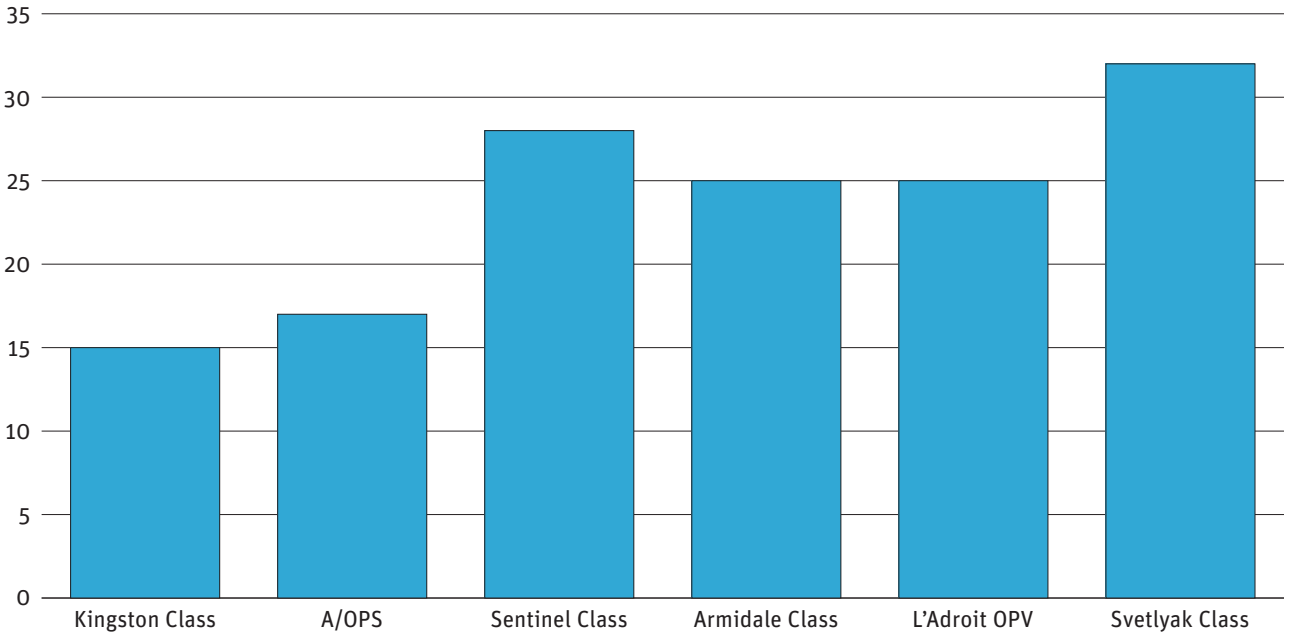
A/OPS will be too slow to fulfill a patrol role effectively. Their initially planned top speed of 20 knots has been reduced to 17 knots for cost-savings reasons.[61] This means that the A/OPS will be just marginally faster than the current MCDVs, which have a top speed of only 15 knots.[62] By comparison, Canada's two-decade-old frigates have a top speed of 29 knots, which even then only approaches the speed of many of the small boats used by smugglers. The remarkably low speed of the A/OPS is highlighted by comparisons with patrol vessels operated or being built by other countries.

For example, the U.S. Coast Guard is building dozens of 46-metre Sentinel-class Fast Response Cutters with a top speed of 28 knots.[63] Australia operates twelve 56-metre Armidale-class patrol ships with a top speed of 25 knots.[64] The French 87-metre *L'Adroit* Offshore Patrol Vessel also has a top speed of 25 knots.[65] The Russian 49-metre Svetlyak-class patrol boat has a top speed of 32 knots.[66]

As retired Navy Captain John Dewar told the Standing Senate Committee on National Security and Defence, offshore patrol vessels need a top speed of at least 25 knots to be effective for maritime interdiction operations.[67]

U.S. Coast Guard Sentinel-class Fast Response Cutter / Photo U.S. Coast Guard by Petty Officer 1st Class Jennifer Johnson

FIGURE 1 Top Speeds (Knots)



Too Unstable

A/OPS will be unable to deploy a helicopter in conditions above Sea State 3, which involves waves as small as 0.5–1.25 metres.[68] According to the Beaufort Wind Force Scale, the waves found at Sea State 3 are generated by a "moderate breeze" of just 11–16 knots.[69] By comparison, Canada's Halifax-class frigates can launch and recover helicopters in Sea State 6 with waves between 4 and 6 metres.[70] Inexplicably, the A/OPS will not be equipped with a "beartrap" — also known as a Helicopter Hauldown Rapid Securing Device (HHRSD) — a technology pioneered by the Royal Canadian Navy in the 1960s and used widely by other countries.[71]

Yet, as Captain Dewar told the Standing Senate Committee on National Security and Defence, a new offshore patrol vessel needs to operate in high sea-state conditions.[72] Any helicopter capability, which provides over-the-horizon surveillance and enhanced search-and-rescue capabilities, cannot be weather-dependent. Weather conditions on all three of Canada's coasts are often severe, and search-and-rescue situations tend to occur in periods of heavy weather.

In addition, the lack of stability will impact negatively on the crew, equipment and infrastructure of the A/OPS, as has happened with the Kingston-class MCDVs. And so, despite the fact that offshore patrol vessels need to operate comfortably anywhere in the 200-nautical-mile exclusive economic zone, the A/OPS will not be able to do so.

Too Lightly Armed

The A/OPS will be under-armed for the patrol function, with only one 25 mm cannon.[73] Originally, the 2008 "Arctic Offshore Patrol Ship Definition Design" foresaw a 40 mm "primary gun" as well as 12.7 mm guns for "self protection."[74] Again, this was presumably scaled back for cost-saving reasons.

By comparison, Norway's KV *Svalbard* carries a Bofors 57 mm cannon and a 12.7 mm machine gun.[75] The Australian Armidale class is fitted with a 25 mm chain-fed cannon, similar to those on M2 Bradley infantry fighting vehicles.[76] The American Sentinel class is armed with a similar cannon as well as four .50 calibre machines guns.[77] The French *L'Adroit* has a 20 mm gun as well as two .50 calibre machine guns.[78] The Russian Svetlyak class is armed with a 76.2 mm AK-176M cannon and a six-barrel 30 mm AK-630 gun.[79]

Unlike Arctic vessels, offshore patrol vessels may encounter situations where weapons are useful as either deterrent or defence. The relatively high

volumes of shipping on the Atlantic and Pacific coasts, on their own, increase the statistical probability of such situations. Moreover, higher population densities and more temperate climates increase the chances of encountering criminal actors with armed capabilities of their own. Finally, offshore patrol vessels having sufficient speed and stability would potentially be deployable overseas. They could, for instance, fulfill the anti-piracy role currently played by Canada's Halifax-class frigates in the Arabian Sea, and do so more efficiently than those larger vessels. But they would have to be armed appropriately for the task.

Too Big

Designed to operate within 200 nautical miles of their own shoreline, most offshore patrol ships are not designed with helicopter decks. Canada's existing MCDVs — which the A/OPS will replace — cannot carry helicopters.

Adding a helicopter deck to the design requires a significantly longer and wider vessel, with consequently higher construction, operation and maintenance costs. It can also result in a significantly less capable vessel, if the additional costs related to size result in an effort to reduce costs elsewhere — for instance, with regard to propulsion systems, construction materials or weapons.

A/OPS only require helicopters because of the Arctic role, since remoteness and low populations result in Arctic vessels being many hundreds and sometimes thousands of kilometres away from airports and land-based helicopters. If the A/OPS project were redirected into producing purpose-built offshore patrol ships for the Atlantic and Pacific coasts only, the helicopter decks could be dispensed with — and faster, higher-quality, better-armed and significantly less expensive vessels procured.

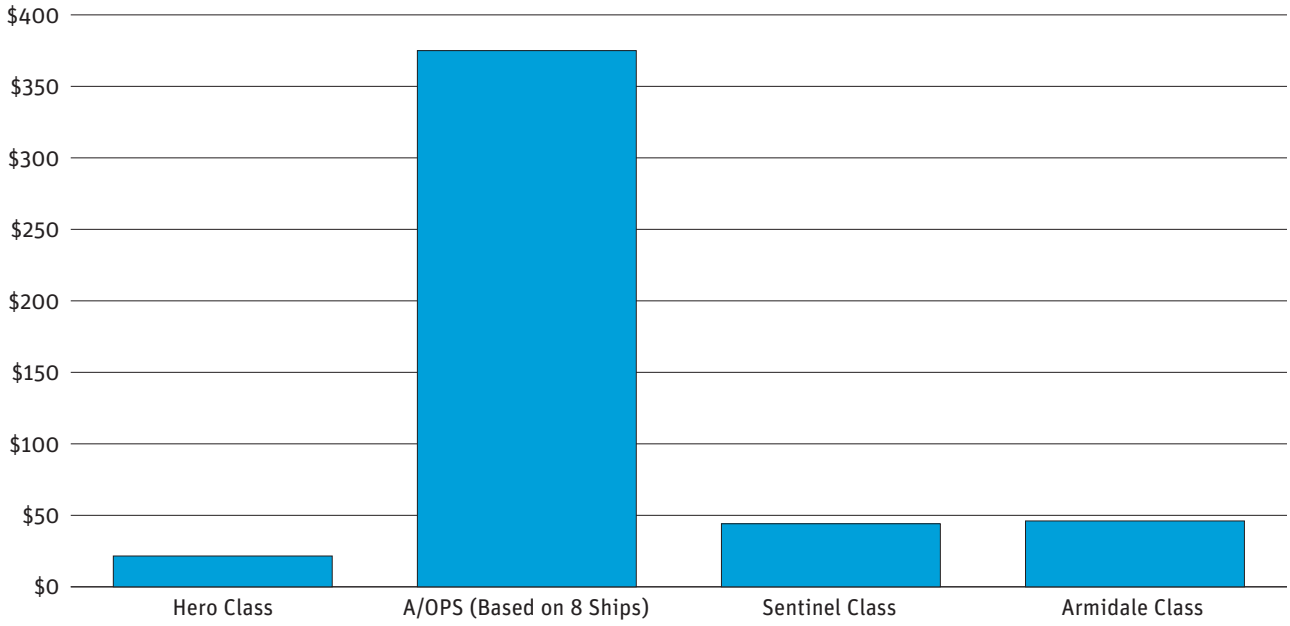
A/OPS Are Too Expensive

THE ORIGINAL, LONG-STANDING budget for the A/OPS is $3.1 billion for six to eight ships, with the exact number of vessels remaining uncertain.[80] Costs of offshore patrol vessels are substantially lower. In 2009, the Canadian government awarded a contract of $194 million for nine Hero-class Mid-Shore Patrol vessels for the Canadian Coast Guard.[81] The U.S. Coast Guard has awarded a contract of $1.5 billion for 34 Sentinel-class Fast Response Cutters.[82] Australia's fleet of twelve Armidale-class patrol ships cost $553 million, including the design, construction and 15 years of support and maintenance.[83]

For the cost of the A/OPS *design* contract alone, the Harper government could have acquired another 14 Hero-class patrol boats. For the total cost of 6 to 8 A/OPS *without* support and maintenance, it could acquire more than 45 Armidale-class patrol ships *with* support and maintenance. Clearly, there is something wrong with the price being paid for the A/OPS by the government — and part of the problem is that they are compromise vessels requiring a new and unproven design.

The Harper government estimates that operation and maintenance of the A/OPS will account for another $4.3 billion in expenses over their 25-year lifespan.[84] This estimate too is seriously problematic, because it uses an artificially short time-line for life-cycle costs. Given that Canada's three destroyers are, on average, 42 years old, and Canada's frigates are now ex-

FIGURE 2 Cost Per Ship ($ Millions, Based on Average Initial Procurement)



pected to be in service for an average of 35 years, a more realistic life cycle period for the A/OPS is between 30 and 40 years — though this will depend on the quality of materials, construction, and ongoing maintenance of the hull. In any event, using a 25-year period for life cycle costs results in an artificially small number, because there are readily foreseeable operations and maintenance costs that will extend beyond that period. The parallel with the F-35 fighter jets is striking, Canada's Auditor General having found that the full life cycle costs were not presented to Canadians, because an artificially short time period was used.[85]

Another useful point of comparison concerns Canada's four medium icebreakers, all of which are more than three decades old, and whose lives will now be extended as part of a $360 million refit of the Coast Guard fleet.[86] Beyond demonstrating that life cycles of well-built vessels generally exceed 25 years, the refit will also reduce some of the urgency with regard to replacing Canada's current Arctic fleet. The government can now refocus the A/OPS program towards purpose-built offshore patrol ships designed strictly for the Atlantic and Pacific coasts.

Financial Limitations Are Eating Away at Capabilities

THE CAPABILITIES OF the A/OPS have already been pruned due to fiscal restraints. The reduction in top speed from 20 to 17 knots was described above, as well as the change from a double-acting to a single-acting propulsion system. The ships will be smaller than originally planned, which limits their range, their ability to operate in ice, and their ability to deploy a helicopter in moderate or heavy seas.

In addition, it seems likely that only six of the A/OPS will be built, instead of the possible eight that have (at least notionally) been projected since 2007. The six vessels will replace 12 MCDVS as well as, implausibly, four multi-purpose medium icebreakers—since only the heavy icebreaker *Louis S. St. Laurent* has an actual replacement plan in place.

It seems likely that financial limitations will cut even deeper, as the Royal Canadian Navy and Irving Shipyards struggle to complete the A/OPS and as the allocated budget for the procurement is being further eroded by inflation. The latter problem is illustrated by the audit of the Joint Supply Ship program carried out by Department of National Defence's own Chief Review Services (CRS) office in November 2011, which found that inflation had improperly been assessed at 2.7 percent instead of the 3.5 to 5 percent inflation factor "acknowledged to be prevalent in the shipbuilding industry."[87]

The Parliamentary Budget Office (PBO), in its February 2013 report on the Joint Support Ship program, similarly found that traditional consumer price indexes cannot be applied to defence acquisitions because the chief inputs are minerals, energy and labour, and energy inflation, in particular, has far exceeded that of traditional consumer price indexes.[88] The PBO cited a report written for the RAND Corporation, showing that the U.S. think tank found that annual cost escalation rates in the shipbuilding industry have ranged between 7 and 11 percent over the past 50 years.[89]

As explained above, this is exactly what happened with the Kingston-class MCDVs, where under-budgeting and increasing costs led to compromises in the design and construction of the vessels which rendered them of limited operational utility and ultimately unworthy of refits.

Nanisivik

THE PLAN, ANNOUNCED in August 2007,[90] to build a deep-water port at the old lead-zinc mine at Nanisivik became even more important when — as explained above — the range of the A/OPS was reduced for budgetary reasons. The A/OPS now have a planned range of only 6,800 nautical miles.[91] If the ships were located in Halifax, it would take 2,800 nautical miles of sailing just to reach Nanisivik.[92]

The original plan for Nanisivik was to have a renovated jetty and storage for enough fuel to sustain two years of operations, as well as a modernized jet-capable airport, telecommunications network, offices and living quarters — with a total estimated cost of $100 million.[93] Indeed, when the location of the facility was first announced, a backgrounder to the Prime Minister's speech cited the "sheltered harbour, nearby jet-capable airstrip, and proximity to the North West Passage."[94] It also stated: "Construction at the Nanisivik site is expected to commence in the summer of 2010, with an initial operating capability planned for 2012, and full operational capability by 2015."

Although Nanisivik could have been a stand-alone project, it was included in the A/OPS budget.[95] This means that as both projects continue, any escalating costs directly affect both. The purchasing power of the funds allocated for the project five years ago have already diminished by at least 9.6 percent, based on the general rate of inflation over that period. And as was noted above, inflation rates tend to be higher in the shipbuilding industry.

In response to financial considerations, the Department of National Defence has significantly curtailed the plans for the Nanisivik facility. Under the new plans the facility "would become a part-time summer-only fuelling

Existing wharf at Nanisivik / Photo

station."[96] Although the proposed "jet-capable" runway would have enabled quick response times as well as landings by high-payload cargo aircraft like the C-17 *Globemaster*, that part of the plan was dropped completely. The old but long gravel runway at Nanisivik has been shut down, replaced by a new and much shorter gravel runway at Arctic Bay, 34 kilometres away, which has been built by the Government of Nunavut.[97] At just 3,935 feet, the new runway is too short for a fully loaded C-17.[98]

In February 2012, the Department of National Defence informed the Nunavut Impact Review Board that it had reduced by half the planned fuel-storage capacity at Nanisivik.[99] DND has also shelved the plan to have permanent accommodations on site and will rely instead on three already-present trailers that provide living space for up to six people.[100] As mentioned above, the facility, which was due to open in 2013, is now delayed until at least 2016.

The scaling back of the Nanisivik plan renders the A/OPS much less meaningful as Arctic platforms, since their limited range and lack of icebreaking capability will preclude their operating except when the seasonal refuelling facility is open, accessible, and has sufficient fuel on hand. Coast Guard icebreakers will not be so limited, having much greater range and actual icebreaking capabilities.

Canada's Actual Needs in the Arctic

AS MENTIONED ABOVE, General Walter Natynczyk said in 2009: "If someone were to invade the Canadian Arctic, my first task would be to rescue them."[101] In January 2010, Stephen Harper told the Secretary General of NATO that "Canada has a good working relationship with Russia with respect to the Arctic" and "there is no likelihood of Arctic states going to war."[102] In August 2010, the Department of Foreign Affairs issued a Statement on Canada's Arctic Foreign Policy that asserted: "Canada does not anticipate any military challenges in the Arctic."[103]

Again, insofar as security threats exist in the Arctic today, they concern non-state actors such as drug smugglers and illegal immigrants. Even then, great distances and challenging weather combine with small populations to keep the threat levels far below those that exist in more southerly regions. For these and other reasons, the Standing Senate Committee on National Security and Defence wrote:

> With defence on the Canada's littoral waters in disarray on our East, South [i.e. Great Lakes] and West coasts, the Committee finds it unfathomable that the government has announced its intention to get the Canadian Navy much more involved in Canada's northern waters, where little or no threat exists to the security of Canadians. Disagreements over Canada's sovereignty in these waters are not going to be settled through the use of gunboats. They

The medium icebreaker CCGS Amundsen is celebrated on Canada's new $50 banknote

> will be settled through the use of diplomacy or in the courts. Canada's Navy is not trained or equipped for icebreaking, nor is it the right agency to exert Canadian sovereignty in the North. Draining the Navy's already inadequate budget to play such an inappropriate role makes no military sense.[104]

This report is not specifically about the CCGS *Diefenbaker*, the proposed replacement for the 44-year-old *Louis S. St-Laurent*, though it is clear that, as the sea-ice thins and retreats, several new medium icebreakers would be more suitable and provide greater coverage than one new heavy icebreaker. At the moment, the youngest medium icebreaker in Canada's fleet is the 26-year-old *Henry Larsen*, followed by the 30-year-old *Terry Fox*. Next are three sister ships: the 31-year-old *Des Groseilliers*, the 34-year-old *Amundsen* (formerly the *Sir John Franklin*), and the 35-year-old *Pierre Radisson*.[105] These vessels are busy in the Arctic each summer providing a range of essential services, from breaking paths for commercial vessels, to maintaining navigation aids, resupplying communities and military and meteorological stations, and supporting scientific research. They also serve as highly mobile platforms for other government agencies such as the Department of Fisheries and Oceans and the Royal Canadian Mounted Police.

Given the limited ice capabilities of the A/OPS, it is foreseeable that Coast Guard icebreakers might need to accompany them on particular missions.

The possibility of having to send two ships worth hundreds of millions of dollars each to deal with a single non-state security threat, such as a drug smuggling or illegal immigration incident, defies logic — given the vastness of the Canadian Arctic and the obvious efficiency of sending a single vessel with a full range of the necessary capabilities. And regardless of whether or not the A/OPS are built, Canada will continue to require Coast Guard icebreakers able to operate across the Arctic — in order to maintain and expand this country's capability to break ice for commercial vessels, maintain navigation aids, et cetera. In short, it would be easy and cost-efficient to render the A/OPS unnecessary by giving the Coast Guard an additional, constabulary role in the Arctic.

Canada's Actual Needs on the Atlantic and Pacific Coasts

CANADA'S COASTAL DEFENCE requires ships that are able to conduct interdiction operations against vessels engaged in illegal fishing, dumping of pollutants, immigration or smuggling. As was explained above, offshore patrol vessels built and operated by other countries are generally much faster than the current Kingston-class MCDVs and the planned A/OPS.

The ships should be able to deploy for several weeks at a time and in all weather conditions. At 56 metres, Australia's Armidale-class patrol boats are just slightly larger than Canada's current MCDVs but can operate comfortably at Sea State 5 (in waves that are 4 metres high) and engage in boarding missions at Sea State 4 (in waves that are 2.5 metres high). Indeed, the Armidale class is designed to survive cyclonic conditions.

The Canadian Coast Guard's new 43-metre Hero-class Mid-Shore Patrol Ships (MSPS) could provide an excellent start to Canada's coastal defence. These ships can be deployed for up two weeks, anywhere within the Exclusive Economic Zone and with a range of 2,000 nautical miles.[106] The Hero class, with its top speed of 25 knots, is more suited for maritime interdiction than the Kingston-class MCDV or the A/OPS. However, it lacks any credible deterrent except for the RCMP officers stationed on board.[107] The Harper government has considered arming these vessels — and Defence Min-

Australian Armidale-class Patrol Boat

Canadian Coast Guard Hero-class Mid-Shore Patrol Ship

ister Peter MacKay reported that the Organization of American States has put pressure on Canada to do so—in order to help counter drug and contraband smuggling.[108]

This report does not enter into the debate as to whether the coastal defence function (that is to say, within the 200 nautical mile EEZ) should be vested entirely in the Canadian Coast Guard rather than shared between the Coast Guard and the Royal Canadian Navy. It simply concludes that, if the Hero class were armed and small number of slightly larger, more stable but equally fast offshore patrol vessels were procured, Canada's patrolling and interdiction needs along the Atlantic and Pacific coasts would be secured.

Conclusion

IN DECEMBER 2005, then opposition leader Stephen Harper promised "three new heavy naval ice breakers" and "a new combined military civilian deep water docking facility in the Iqaluit region."[109] However, since Mr. Harper became Prime Minister in February 2006, the project has repeatedly been delayed. It now seems possible that he could leave office before a construction contract for new Arctic vessels is signed.

Furthermore, the "three heavy naval ice breakers" have been scaled back to "Arctic/Offshore Patrol Ships" (A/OPS) — essentially, vessels that are supposed to combine the coastal patrol role of the existing, inadequate and soon-to-be-decommissioned Maritime Coastal Defence Vessels (MCDVs) with a new security role in the Arctic. Unfortunately, the result is a compromise ship that is not very good at either role.

The A/OPS will have a range of just 6,800 nautical miles, which is inadequate for Arctic operations and will leave the vessels dependent on a proposed new facility at Nanisivik being open, accessible, and having sufficient fuel reserves. The A/OPS will not be able to launch or retrieve helicopters in moderate or heavy seas. They will not be able to break ice for other vessels, nor will they have much protection against small pieces of iceberg called "growlers."

With a top speed of just 17 knots, the A/OPS are too slow for effective patrol duties, which include interdicting boats suspected of drug or people smuggling. Coastal patrol vessels constructed and operated by other countries typically have top speeds of 25–32 knots.

The choice of a compromise design has also resulted in a remarkably expensive procurement. The original, long-standing construction budget for the AOPS is $3.1 billion for just six to eight vessels. But comparison, the U.S. Coast Guard has awarded a contract of $1.5 billion for 34 Sentinel-class Fast Response Cutters.

At stake is not just the $7.4 billion (or more) being spent on the AOPS and their maintenance, but also Canada's ability to operate effectively on all three of its coasts. An urgent change of course is required — one that would see the Royal Canadian Navy provided with purpose-built high-speed offshore patrol ships based on a proven design, such as, for example, the Australian Armidale class. These vessels would be used on the Atlantic and Pacific coasts, with the Arctic role being left to the Canadian Coast Guard.

Recommendations

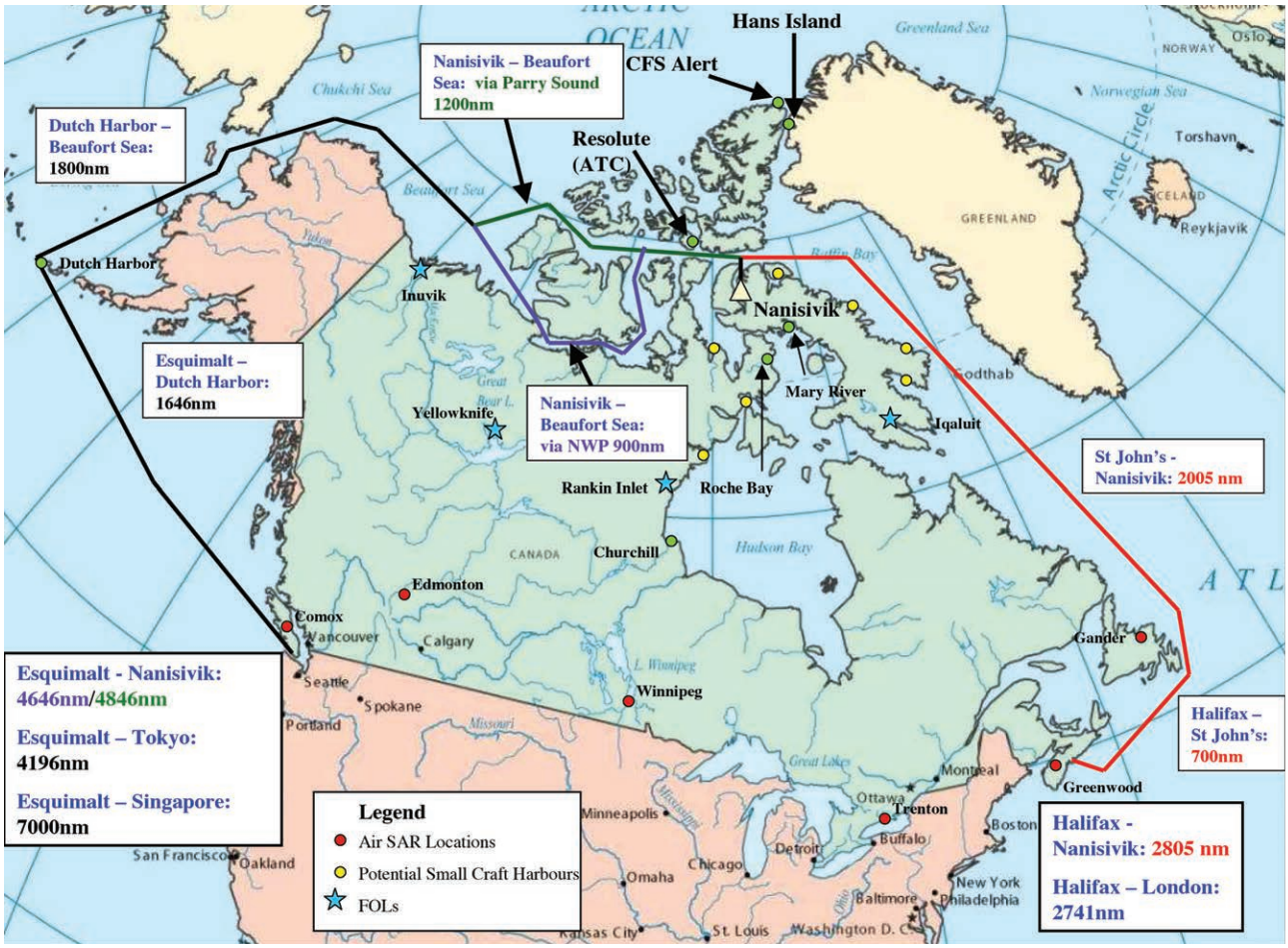
1. Cancel the procurement of Naval Arctic/Offshore Patrol Ships.

2. Commission 6 to 8 purpose-built high-speed offshore patrol ships based on a proven design.

3. Rebuild the Coast Guard icebreaker fleet taking into account changing ice conditions and the need for the vessels to fulfill an additional, constabulary role.

Appendix 1

Operational Arctic Patrol Distances[110]



References

Arena, Mark V., Blickstein, Irv., Grammich, Clifford A. & Younossi, Obaid. "Why Has the Cost of Navy Ships Risen? A Macroscopic Examination of the Trends in U.S. Naval Ship Costs Over the Past Several Decades," 2006 *RAND Corporation*, http://www.rand.org/content/dam/rand/pubs/monographs/2006/RAND_MG484.pdf (accessed 30 March 2013)

ATCO Structures and Logistics. "Modular Offices & Accommodations — Nanisivik

Naval Facilities," 22 March 2013, http://www.atcosl.com/en-ca/Projects/Modular-Office-Camp-Nanisivik (accessed 30 March 2013)

Battleships-Cruisers.co.uk. "Canadian minesweepers," http://www.battleships-cruisers.co.uk/canadian_minesweepers.htm (accessed 30 March 2013)

Bell, Jim. "Nanisivik: Nunavut's incredible shrinking naval facility," 22 March 2012, *Nunatsiaq News*, http://www.nunatsiaqonline.ca/stories/article/65674nanisivik_nunavuts_incredible shrinking_naval_facility/ (accessed 30 March 2013)

Berthiaume, Lee. "Auditor General turns attention to feds' $35-billion shipbuilding plan," *Postmedia News*, 14 December 2012, http://www.canada.com/Auditor+general+turns+attention+feds+billion+shipbuilding+plan/7702028/story.html (accessed 30 March 2013)

Boswell, Randy. "Canada ready to settle Beaufort Sea dispute with U.S.: Cannon," Vancouver Sun, 14 May 2010, available at http://byers.typepad.com/arctic/2010/05/canada-ready-to-settle-beaufort-sea-dispute-with-us-cannon.html (accessed 30 March 2013)

Bureau of Maritime Affairs, Liberia. "Report of Investigation in the Matter of Sinking of Passenger Vessel EXPLORER (O.N. 8495)," http://www.photobits.com/dl/Explorer%20-%20Final%20Report.PDF (accessed 30 March 2013)

Canadian American Strategic Review. "*Background* — Arctic Offshore Patrol Ship (AOPS) Naval Icebreaker," October 2012, http://www.casr.ca/bg-navy-aops-icebreaker.htm (accessed 30 March 2013).

_____. Department of National Defence / Canadian Forces News Release: "Armed Naval Icebreakers — the Arctic/Offshore Patrol Ships," October 2012, http://www.casr.ca/doc-dnd-icebreaker.htm (accessed 30 March 2013)

_____. "Contract for Canadian Coast Guard Mid-Shore Patrol Vessels: Damen Shipyards Announces $194M Award for partner, Irving," 3 September 2009, http://www.casr.ca/doc-news-mid-shore-patrol-vessel-2009.htm (accessed 30 March 2013)

_____. "Canada Announces Deepwater Port at Nanisivik on Baffin Island & Army Base at Resolute — Key Points on North-West Passage," August 2007, http://www.casr.ca/id-arctic-empires-2.htm (accessed 30 March 2013)

Canadian Coast Guard. "Mid-Shore Patrol Vessel, 12 August 2012, http://www.ccg-gcc.gc.ca/vessel-procurement/mid-shore-patrol-vessel (accessed 30 March 2013)

Carson, Lee. "The Perilous Route to Nanisivik," (February/March 2013) *Vanguard Magazine*, 36–38.

CBC News. "Government to consider arming the coast guard vessels," 13 November 2012, http://www.cbc.ca/news/canada/nova-scotia/story/2012/11/13/ns-mackay-arming-coast-guard.html (accessed 30 March 2013)

_____. "Ice Blocks Iqaluit's shores," 1 August 2012, http://www.cbc.ca/news/canada/north/story/2012/08/01/north-iqaluit-frobisher-ice.html (accessed 30 March 2013)

_____. "Order to cut the navy's coastal vessels rescinded," 14 May 2010, http://www.cbc.ca/news/canada/story/2010/05/14/navy-cut-rescind014.html (accessed 30 March 2013)

Chief Review Services. "Internal Audit of the Joint Support Ship (JSS) Project," November 2011, http://www.crs-csex.forces.gc.ca/reports-rapports/pdf/2011/P0934-eng.pdf (accessed 30 March 2013)

_____. "Audit of the Halifax-Class Modernization/Frigate Equipment Life Extension (HCM/FELEX) Project," March 2011, http://www.crs-csex.forces.gc.ca/reports-rapports/pdf/2011/P0913-eng.pdf (accessed 30 March 2013)

Department of Fisheries and Oceans. "Harper Government to Extend the Life of the Canadian Coast Guard Fleet," 21 February 2013, http://www.dfo-mpo.gc.ca/media/npress-communique/2013/hq-ac02-eng.htm (accessed 30 March 2013)

_____. "Minister Ashfield Announces the Acceptance of the CCGS *Corporal Teather C.V.*," 8 February 2013, http://www.dfo-mpo.gc.ca/media/npress-communique/2013/hq-ac01-eng.htm (accessed 30 March 2013)

_____. "Extending the Life of the Canadian Coast Guard Fleet," February 2013, http://www.dfo-mpo.gc.ca/media/back-fiche/2013/hq-ac02-eng.htm (accessed 30 March 2013)

Department of Foreign Affairs and International Trade. "Canada and Kingdom of Denmark Reach Tentative Agreement on Lincoln Sea Boundary," News Release, 28 November 2012 (with backgrounder), http://www.international.gc.ca/media/aff/news-communiques/2012/11/28a.aspx?lang=eng&view=d (accessed 30 March 2013)

_____. Statement on Canada's Arctic Foreign Policy, 20 August 2010, available at http://www.international.gc.ca/polar-polaire/assets/pdfs/CAFP_booklet-PECA_livret-eng.pdf (accessed 30 March 2013)

Department of National Defence. "Arctic/Offshore Patrol Ship (A/OPS)" 14 January 2013, http://www.materiel.forces.gc.ca/en/aops.page#ship (accessed 30 March 2013)

_____. "Arctic/Offshore Patrol Ship (PMO AOPS)," http://www.materiel.forces.gc.ca/en/aops.page (accessed 30 March 2013)

_____. "Joint Support Ship (JSS)," http://www.materiel.forces.gc.ca/en/jss.page (accessed 30 March 2013)

_____. "Leadmark: The Navy's Strategy for 2020," 18 June 2001, http://www.navy.dnd.ca/leadmark/pdf/ENG_LEADMARK_FULL_72DPI.PDF (accessed 30 March 2013)

_____. "Challenge and Commitment: A Defence Policy for Canada," 1987, http://www.forces.gc.ca/admpol/downloads/Challenge%20and%20Commitment%201987.pdf (accessed 30 March 2013)

Deshayes, Pierre-Henry. "Arctic threats and challenges from climate change," Agence France-Presse, 6 December 2009, http://www.google.com/hostednews/afp/article/ALeqM5iESW9KN4XHyuP2QpnDqDf5wGxJVg (accessed 30 March 2013)

Doucette, Keith. "Ottawa offers $288 million deal to kick state design of Arctic Patrol Ships," Canadian Press, 7 March 2013, http://www.ctvnews.ca/canada/ottawa-offers-288m-deal-to-kick-start-design-of-arctic-patrol-ships-1.1185492 (accessed 30 March 2013).

Dufour, Valérie "Encore neufs et déjà désuets," *Journal de Montréal*, 29 May 2006, http://fr.canoe.ca/cgi-bin/imprimer.cgi?id=235130 (accessed 30 March 2013)

Harding, Luke. "Vladimir Putin calls for Arctic claims to be resolved under UN law," *Guardian*, 23 September 2010, http://www.guardian.co.uk/world/2010/sep/23/putin-arctic-claims-international-law (accessed 30 March 2013)

Harper, Stephen. "Prime Minister announces expansion of Canadian Forces facilities and operations in the Arctic," Press Release, 10 August 2007, http://www.pm.gc.ca/eng/media.asp?id=1784 (accessed 30 March 2013)

_____. "Prime Minister Stephen Harper announces new Arctic offshore patrol ships," 9 July 2007, http://www.pm.gc.ca/eng/media.asp?id=1741 (accessed 30 March 2013)

_____. "Harper Stands Up for Arctic Sovereignty," 25 December 2005, available at http://www.dennisbevington.ca/pdfs/en/2005/dec25-05_speech-harper.pdf (accessed 30 March 2013)

Lehre, Eric. "The National Shipbuilding Procurement Strategy: An Update," February 2013, http://www.cdfai.org/PDF/The%20National%20Shipbuilding%20Procurement%20Strategy%20-%20An%20Update.pdf (accessed 30 March 2013)

Kingdom of Norway, "2010 Treaty between the Kingdom of Norway and the Russian Federation concerning Maritime Delimitation and Cooperation in the Barents Sea and the Arctic Ocean," English translation available at http://www.regjeringen.no/upload/ud/vedlegg/folkerett/avtale_engelsk.pdf (accessed 30 March 2013)

Mackrael, Kim. "Canada, Denmark a step closer to settling border dispute," *Globe and Mail*, 30 November 2012, http://www.theglobeandmail.com/news/national/canada-denmark-a-step-closer-to-settling-border-dispute/article5831571/ (accessed 30 March 2013)

McLeod, Paul. "Questions Arise as Next Phase of Shipbuilding Deal Nears," *Halifax Chronicle Herald*, 13 February 2013, http://thechronicleherald.ca/novascotia/688927-questions-arise-as-next-phase-in-shipbuilding-deal-nears (accessed 30 March 2013)

National Oceanic and Atmospheric Administration, "Beaufort Wind Scale," http://www.spc.noaa.gov/faq/tornado/beaufort.html (accessed 30 March 2013)

Naval Technology. "MDA extends Canadian Navy's Kingston-class vessels operational support," 18 May 2012, http://www.naval-technology.com/news/newsmda-extends-canadian-navys-kingston-class-vessels-operational-support (accessed 30 March 2013)

_____. "Armidale Class Patrol Boat, Australia," http://www.naval-technology.com/projects/armidaleclass/ (accessed 30 March 2013)

_____. "Avenger Class Mine Countermeasures Vessels, United States of America," http://www.naval-technology.com/projects/avenger-mine-countermeasures-ship/ (accessed 30 March 2013)

_____. "Halifax Class Frigates, Canada," http://www.naval-technology.com/projects/halifax/ (accessed 30 March 2013)

_____. "L'Adroit Offshore Patrol Vessel, France," http://www.naval-technology.com/projects/ladroit-offshore-patrol-vessel/ (accessed 30 March 2013)

_____. "Sentinel Class Fast Response Cutter, United States of America," http://www.naval-technology.com/projects/sentinel-class/ (accessed 30 March 2013)

_____. "Svetlyak-Class Patrol Boats, Russian Federation," http://www.naval-technology.com/projects/svetlyakclasspatrolb/ (accessed 30 March 2013)

Norwegian Armed Forces. "Equipment Facts — Sea," http://mil.no/organisation/equipmentfacts/sea/Pages/default.aspx (accessed 30 March 2013)

Office of the Auditor General. "Report of the Auditor General to the House of Commons: Chapter 2 — Replacing Canada's Fighter Jets," 2 April 2012, http://www.oag-bvg.gc.ca/internet/docs/parl_oag_201204_02_e.pdf (accessed 30 March 2013)

Office of the Parliamentary Budget Officer. "Feasibility of Budget for Acquisition of Two Joint Support Ships," 28 February 2013, http://www.pbo-dpb.gc.ca/files/files/JSS_EN.pdf (accessed 30 March 2013)

Office of the Prime Minister. "Expanding Canadian Forces Operations in the Arctic," Backgrounder, 10 August 2007, http://www.pm.gc.ca/eng/media.asp?id=1785 (accessed 30 March 2013)

_____. "Strengthening Canada's Arctic Sovereignty — Constructing Arctic Offshore Patrol Ships," Backgrounder, 9 July 2007, http://www.pm.gc.ca/eng/media.asp?id=1743 (accessed 30 March 2013)

Priestley, Stephen. "The *Kingston* Class: 'Mid-Life' or Move Over for the MCDV?Reviewing Navy Plans for the Future of the MCDVs [Part 1]," June 2006,*Canadian American Security Review*, http://www.casr.ca/id-mcdv-midlife-1.htm(accessed 30 March 2013)

_____. "The *Kingston* Class: 'Mid-Life' or Move Over for the MCDV? Reviewing Navy Plans for the Future of the MCDVs [Part 3]," June 2006, *Canadian AmericanSecurity Review*, http://www.casr.ca/id-mcdv-midlife-3.htm (accessed 30 March2013)

Proc, Jerry. "Radio Communications and Signals Intelligence in the Royal Canadian Navy — Bay Class Minesweepers," http://jproc.ca/rrp/bay.html (accessed 30 March 2013)

Pugliese, David. "Arctic Offshore Patrol Vessels Hit by Three Year Delay," 8 May 2013, http://blogs.ottawacitizen.com/2012/05/08/arcticoffshore-patrol-vessels-hit-by-three-year-delay/ (accessed 30 March 2013)

_____. "DND Significantly Cuts Back on Harper's Much-Ballyhooed Plan to Build a Naval Facility at Nanisivik," 22 March 2012, http://blogs.ottawacitizen.com/2012/03/22/dnd-significantly-cuts-back-on-harpers-much-ballyhooed-plan-to-build-a-naval-facility-at-nanisivik/ (accessed 30 March 2013)

ReadyAyeAye.com. "The Beartrap — A Canadian Invention," (1965) 17 (3 & 4) *Crowsnest Magazine*, available at http://readyayeready.com/timeline/1960s/beartrap/index.htm (accessed 30 March 2013)

Royal Canadian Navy. "Coastal Defence — Kingston Class," 14 August 2012, http://www.navy.forces.gc.ca/cms/1/1-a4_eng.asp (accessed 30 March 2013)

_____. "Domestic Stories: Arctic Deep Water Port," 20 August 2007 http://www.navy.forces.gc.ca/cms/3/3-a_eng.asp?category=7&id=623 (accessed 30 March 2013)

Standing Senate Committee on National Security and Defence. "Controlling Canada's Arctic Waters: Role of the Canadian Coast Guard," December 2009, http://www.parl.gc.ca/Content/SEN/Committee/402/fish/rep/rep07dec09-e.pdf (accessed 30 March 2013)

_____. "Canadian Security Guidebook 2007: An Update of Security Problems in Search of Solutions, Coasts," Full Report, March 2007, http://www.parl.gc.ca/Content/SEN/Committee/391/defe/rep/rep10mar07-4-e.pdf (accessed 30 March 2013)

_____. "Canadian Security Guide Book 2007: An Update of Security Problems in Search of Solutions, Coasts," Executive Summary, March 2007, http://www.parl.gc.ca/Content/SEN/Committee/391/defe/rep/ExecSumRep27mar07-e.pdf (accessed 30 March 2013)

_____. "Canada's Coastlines: The Longest Under-Defended Borders in the World," 17 October 2003, http://www.parl.gc.ca/Content/SEN/Committee/372/defe/rep/rep17oct03vol1-e.pdf (accessed 30 March 2013)

STX Canada Marine Inc. "2008 Arctic Offshore Patrol Ship (AOPS) Definition Design," 13 November 2008, http://naval.review.cfps.dal.ca/pdf/BMT-STX_Industry_Day_Presentation.pdf (accessed 30 March 2013)

Soule, Cdr CD. "Brief to Dalhousie University Centre for Foreign Policy Studies — AOPS Evolution of the Operational Requirement and the Associated Design Challenges," October 2011, http://www.dal.ca/content/dam/dalhousie/pdf/cfps/Events/Soule_AOPS_CFPS_Sep11.pdf (accessed 30 March 2013)

Speech From the Throne. 3 March 2010, http://www.speech.gc.ca/eng/media.asp?id=1388 (30 March 2013)

Stockholm International Peace Research Institute, 2010,http://www.sipri.org/research/armaments/milex/resultoutput/milex_15 (accessed 30 March 2013)

U.S. Chief of Naval Operations. "Navy Strategic Objectives for the Arctic," 21 May 2010, http://greenfleet.dodlive.mil/files/2010/09/US-Navy-Arctic-Strategic-Objectives-21-May-2010.pdf (accessed 30 March 2013)

U.S. State Department. "Cable # VZCZCXR03302," 20 January 2010,http://aptn.ca/pages/news/2011/05/11/while-harper-talked-tough-with-nato-on-arctic-u-s-believed-pm-all-bark-no-bite/ (original cables are reproduced below the article) (accessed 30 March 2013)

Vanderklippe, Nathan. "Study predicts Arctic shipping quickly becoming a reality," 4March 2013, *Globe and Mail*, http://www.theglobeandmail.com/report-on-business/international-business/study-predicts-arctic-shipping-quickly-becoming-a-reality/article9264672/ (accessed 30 March 2013)

Woods, Allan. "Two winners and one big loser in contest to build military ships," *Toronto Star*, 19 October 2011, http://www.thestar.com/news/canada/2011/10/19/two_winners_and_one_big_loser_in_contest_to_build_military_ships.html (accessed 30 March 2013)

Notes

1 U.S. State Department cable # VZCZCXR03302, 20 January 2010, available at http://aptn.ca/pages/news/2011/05/11/while-harper-talked-tough-with-nato-on-arctic-u-s-believed-pm-all-bark-no-bite/ (original cables are reproduced below the article) (accessed 30 March 2013)

2 Stephen Harper, "Harper Stands Up for Arctic Sovereignty," 25 December 2005, available at http://www.dennisbevington.ca/pdfs/en/2005/dec25-05_speech-harper.pdf (accessed 30 March 2013).

3 Ibid.

4 Ibid.

5 Stephen Harper, "Prime Minister Stephen Harper announces new Arctic offshore patrol ships," 9 July 2007, http://www.pm.gc.ca/eng/media.asp?id=1741 (accessed 30 March 2013).

6 Ibid.

7 Ibid.

8 "Prime Minister announces expansion of Canadian Forces facilities and operations in the Arctic," Press Release, 10 August 2007, http://www.pm.gc.ca/eng/media.asp?id=1784 (accessed 30 March 2013).

9 David Pugliese, "Arctic Offshore Patrol Vessels Hit by Three Year Delay," 8 May 2013, http://blogs.ottawacitizen.com/2012/05/08/arcticoffshore-patrol-vessels-hit-by-three-year-delay/ (accessed 30 March 2013).

10 Lee Berthiaume, "Auditor General turns attention to feds' $35-billion shipbuilding plan," Postmedia News, 14 December 2012, http://www.canada.com/Auditor+general+turns+attention+feds+billion+shipbuilding+plan/7702028/story.html (accessed 30 March 2013).

11 "Expanding Canadian Forces Operations in the Arctic," Backgrounder, 10 August 2007, http://www.pm.gc.ca/eng/media.asp?id=1785 (accessed 30 March 2013).

12 Jim Bell, "Nanisivik: Nunavut's incredible shrinking naval facility," 22 March 2012, Nunatsiaq News (quoting letter of 24 February 2012 from DND project manager Rodney Watson to the

Nunavut Impact Review Board), http://www.nunatsiaqonline.ca/stories/article/65674nanisivik_nunavuts_incredible_shrinking_naval_facility/ (accessed 30 March 2013).

13 "Strengthening Canada's Arctic Sovereignty — Constructing Arctic Offshore Patrol Ships," Backgrounder, 9 July 2007, http://www.pm.gc.ca/eng/media.asp?id=1743 (accessed 30 March 2013).

14 David Pugliese, "Arctic Offshore Patrol Vessels Hit."

15 Allan Woods, "Two winners and one big loser in contest to build military ships," Toronto Star, 19 October 2011, http://www.thestar.com/news/canada/2011/10/19/two_winners_and_one_big_loser_in_contest_to_build_military_ships.html (accessed 30 March 2013).

16 Paul McLeod, "Questions Arise as Next Phase of Shipbuilding Deal Nears," *Halifax Chronicle Herald*, 13 February 2013, http://thechronicleherald.ca/novascotia/688927-questions-arise-as-next-phase-in-shipbuilding-deal-nears (accessed 30 March 2013).

17 Keith Doucette, "Ottawa offers $288 million deal to kick start design of Arctic Patrol Ships," Canadian Press, 7 March 2013, http://www.ctvnews.ca/canada/ottawa-offers-288m-deal-to-kick-start-design-of-arctic-patrol-ships-1.1185492 (accessed 30 March 2013).

18 Ibid.

19 U.S. State Department cable # VZCZCXR03302.

20 Naval Technology, "MDA extends Canadian Navy's Kingston-class vessels operational support," 18 May 2012, http://www.naval-technology.com/news/newsmda-extends-canadian-navys-kingston-class-vessels-operational-support (accessed 30 March 2013).

21 Battleships-Cruisers.co.uk, "Canadian minesweepers": http://www.battleships-cruisers.co.uk/canadian_minesweepers.htm (accessed 30 March 2013).

22 Jerry Proc, "Radio Communications and Signals Intelligence in the Royal Canadian Navy — Bay Class Minesweepers," http://jproc.ca/rrp/bay.html (accessed 30 March 2013).

23 Department of National Defence, "Challenge and Commitment: A Defence Policy for Canada," 1987, http://www.forces.gc.ca/admpol/downloads/Challenge%20and%20Commitment%201987.pdf (accessed 30 March 2013).

24 Ibid., 43.

25 Ibid., 51.

26 Ibid., 53–55.

27 Stephen Priestly, "The *Kingston* Class: 'Mid-Life' or Move Over for the MCDV? Reviewing Navy Plans for the Future of the MCDVs [Part 3]," June 2006, *Canadian American Security Review*, http://www.casr.ca/id-mcdv-midlife-3.htm (accessed 30 March 2013).

28 Stephen Priestley, "The *Kingston* Class: 'Mid-Life' or Move Over for the MCDV? Reviewing Navy Plans for the Future of the MCDVs [Part 1]," June 2006, *Canadian American Security Review*, http://www.casr.ca/id-mcdv-midlife-1.htm (accessed 30 March 2013).

29 Ibid.

30 Ibid.

31 Naval Technology, "Avenger Class Mine Countermeasures Vessels, United States of America," http://www.naval-technology.com/projects/avenger-mine-countermeasures-ship/ (accessed 30 March 2013).

32 Stephen Priestley, "The *Kingston* Class [Part 1]."

33 Standing Committee on National Security and Defence, "Canadian Security Guidebook: An Update of Security Problems in Search of Solutions, Coasts," March 2007, p. 9, http://www.parl.gc.ca/Content/SEN/Committee/391/defe/rep/rep10mar07-4-e.pdf (accessed 30 March 2013).

34 Valérie Dufour, "Encore neufs et déjà désuets," *Journal de Montréal*, 29 May 2006, http://fr.canoe.ca/cgi-bin/imprimer.cgi?id=235130 (accessed 30 March 2013).

35 Senate Standing Committee on National Defence and Security, "Canada's Coastlines: The Longest Under-Defended Borders in the World," 17 October 2003, p. 24, http://www.parl.gc.ca/Content/SEN/Committee/372/defe/rep/rep17oct03vol1-e.pdf (accessed 30 March 2013).

36 Ibid., 25.

37 CBC News, "Order to cut the navy's coastal vessels rescinded," 14 May 2010, http://www.cbc.ca/news/canada/story/2010/05/14/navy-cut-rescind014.html (accessed 30 March 2013).

38 Valérie Dufour, "Encore neufs et déjà désuets."

39 Stephen Priestley, "The *Kingston* Class [Part 1]"; Dufour, "Encore neufs et déjà désuets."

40 Chief Review Services, "Audit of the Halifax-Class Modernization/Frigate Equipment Life Extension (HCM/FELEX) Project," March 2011, p. 6, http://www.crs-csex.forces.gc.ca/reports-rapports/pdf/2011/Po913-eng.pdf (accessed 30 March 2013).

41 Department of National Defence, "Arctic/Offshore Patrol Ship (PMO AOPS)," http://www.materiel.forces.gc.ca/en/aops.page (accessed 30 March 2013).

42 CBC News, "Ice Blocks Iqaluit's shores," 1 August 2012, http://www.cbc.ca/news/canada/north/story/2012/08/01/north-iqaluit-frobisher-ice.html (accessed 30 March 2013).

43 On the Joint Support Ship program, see generally Department of National Defence, "Joint Support Ship (JSS)," http://www.materiel.forces.gc.ca/en/jss.page (accessed 30 March 2013).

44 Nathan Vanderklippe, "Study predicts Arctic shipping quickly becoming a reality," 4 March 2013, *Globe and Mail*, http://www.theglobeandmail.com/report-on-business/international-business/study-predicts-arctic-shipping-quickly-becoming-a-reality/article9264672/ (accessed 30 March 2013).

45 Information supplied by the Canadian Coast Guard, 29 November 2012.

46 "The 15 countries with the highest military expenditure in 2009," Stockholm International Peace Research Institute, 2010, available at http://www.sipri.org/research/armaments/milex/resultoutput/milex_15 (China: $143 / US: $711 / France: $62.5 / Germany: $46.7 / Italy: $34.5) (accessed 30 March 2013).

47 U.S. State Department cable # VZCZCXR03302.

48 Luke Harding, "Vladimir Putin calls for Arctic claims to be resolved under UN law," Guardian, 23 September 2010, available at http://www.guardian.co.uk/world/2010/sep/23/putin-arctic-claims-international-law (accessed 30 March 2013).

49 Pierre-Henry Deshayes, "Arctic threats and challenges from climate change," Agence France-Presse, 6 December 2009, available at http://www.google.com/hostednews/afp/article/ALeqM5iESW9KN4XHyuP2QpnDqDf5wGxJVg (accessed 30 March 2013).

50 U.S. Chief of Naval Operations, "Navy Strategic Objectives for the Arctic," 21 May 2010, p. 3, available at http://greenfleet.dodlive.mil/files/2010/09/US-Navy-Arctic-Strategic-Objectives-21-May-2010.pdf (accessed 30 March 2013).

51 "The Ilulissat Declaration," 29 May 2008, available at http://byers.typepad.com/arctic/ilulissat-declaration-may-28-2008.html (accessed 30March 2013).

52 Speech From the Throne, 3 March 2010, available at http://www.speech.gc.ca/eng/media.asp?id=1388 (accessed 30 March 2013).

53 Randy Boswell, "Canada ready to settle Beaufort Sea dispute with U.S.: Cannon," Vancouver Sun, 14 May 2010, available at http://byers.typepad.com/arctic/2010/05/canada-ready-to-settle-beaufort-sea-dispute-with-us-cannon.html (accessed 30 March 2013).

54 Kingdom of Norway, 2010 Treaty between the Kingdom of Norway and the Russian Federation concerning Maritime Delimitation and Cooperation in the Barents Sea and the Arctic Ocean, English translation available at http://www.regjeringen.no/upload/ud/vedlegg/folkerett/avtale_engelsk.pdf (accessed 30 March 2013).

55 "Canada and Kingdom of Denmark Reach Tentative Agreement on Lincoln Sea Boundary," News Release, Canadian Department of Foreign Affairs, 28 November 2012 (with backgrounder), available at http://www.international.gc.ca/media/aff/news-communiques/2012/11/28a.aspx?lang=eng&view=d (accessed 30 March 2013). See also Kim Mackrael, "Canada, Denmark a step closer to settling border dispute," *Globe and Mail*, 30 November 2012, http://www.theglobeandmail.com/news/national/canada-denmark-a-step-closer-to-settling-border-dispute/article5831571/ (accessed 30 March 2013).

56 Bureau of Maritime Affairs, Liberia, "Report of Investigation in the Matter of Sinking of Passenger Vessel EXPLORER (O.N. 8495)," available at http://www.photobits.com/dl/Explorer%20-%20Final%20Report.PDF (accessed 30 March 2013).

57 Canadian American Strategic Review, "*Background* — Arctic Offshore Patrol Ship (AOPS) Naval Icebreaker," http://www.casr.ca/bg-navy-aops-icebreaker.htm (accessed 30 March 2013). For the 2008 Arctic Offshore Patrol Ship (AOPS) Definition Design, which favours Azipods as providing "the best ice capability and operational flexibility" while listing a more conventional "geared diesel mechanical propulsion system" as a "lower cost alternative," see http://naval.review.cfps.dal.ca/pdf/BMT-STX_Industry_Day_Presentation.pdf (accessed 30 March 2013).

58 Norwegian Armed Forces, "Equipment Facts — Sea," http://mil.no/organisation/equipmentfacts/sea/Pages/default.aspx (accessed 30 March 2013).

59 Canadian American Strategic Review, "*Background* — Arctic/Offshore Patrol Ship," October 2012, http://www.casr.ca/bg-navy-aops-icebreaker.htm (accessed 30 March 2013).

60 Standing Committee on National Security and Defence, "Controlling Canada's Arctic Waters: Role of the Canadian Coast Guard," December 2009, p. 34, http://www.parl.gc.ca/Content/SEN/Committee/402/fish/rep/rep07dec09-e.pdf (accessed 30 March 2013).

61 Eric Lehre, "The National Shipbuilding Procurement Strategy: An Update," February 2013, p. 5, http://www.cdfai.org/PDF/The%20National%20Shipbuilding%20Procurement%20Strategy%20-%20An%20Update.pdf (accessed 30 March 2013).

62 Royal Canadian Navy, "Coastal Defence — Kingston Class," 14 August 2012, http://www.navy.forces.gc.ca/cms/1/1-a4_eng.asp (accessed 30 March 2013).

63 Naval Technology, "Sentinel Class Fast Response Cutter, United States of America," http://www.naval-technology.com/projects/sentinel-class/ (accessed 30 March 2013).

64 Naval Technology, "Armidale Class Patrol Boat, Australia," http://www.naval-technology.com/projects/armidaleclass/ (accessed 30 March 2013).

65 Naval Technology, "L'Adroit Offshore Patrol Vessel, France," http://www.naval-technology.com/projects/ladroit-offshore-patrol-vessel/ (accessed 30 March 2013).

66 Naval Technology, "Svetlyak-Class Patrol Boats, Russian Federation," http://www.naval-technology.com/projects/svetlyakclasspatrolb/ (accessed 30 March 2013).

67 Standing Committee on National Security and Defence, "Canadian Security Guidebook: An Update of Security Problems in Search of Solutions, Coasts," March 2007, pp. 55–56.

68 Department of National Defence and Canadian Forces, "Arctic/Offshore Patrol Ship (A/OPS)" 14 January 2013, http://www.materiel.forces.gc.ca/en/aops.page#ship (accessed 30 March 2013).

69 National Oceanic and Atmospheric Administration, "Beaufort Wind Scale," http://www.spc.noaa.gov/faq/tornado/beaufort.html (accessed 30 March 2013).

70 Naval Technology, "Halifax Class Frigates, Canada," http://www.naval-technology.com/projects/halifax/ (accessed 30 March 2013).

71 See "The Beartrap — A Canadian Invention," (1965) 17 (3 & 4) *Crowsnest Magazine*, available at http://readyayeready.com/timeline/1960s/beartrap/index.htm (accessed 30 March 2013).

72 Standing Committee on National Security and Defence, "Canadian Security Guidebook," pp. 55–56.

73 Eric Lehre, "The National Shipbuilding Procurement Strategy," p. 5.

74 2008 Arctic Offshore Patrol Ship (AOPS) Definition Design, http://naval.review.cfps.dal.ca/pdf/BMT-STX_Industry_Day_Presentation.pdf (accessed 30 March 2013).

75 Norwegian Armed Forces, "Equipment Facts — Sea," http://mil.no/organisation/equipmentfacts/sea/Pages/default.aspx (accessed 30 March 2013).

76 Naval Technology, "Armidale Class Patrol Boat."

77 Naval Technology, "Sentinel Class Fast Response Cutter."

78 Naval Technology, "L'Adroit Offshore Patrol Vessel."

79 Naval Technology, "Svetlyak-Class Patrol Boats."

80 David Pugliese, "Arctic Offshore Patrol Vessels Hit."

81 Canadian American Strategic Review, "Contract for Canadian Coast Guard Mid-Shore Patrol Vessels: Damen Shipyards Announces $194M Award for partner, Irving," 3 September 2009, http://www.casr.ca/doc-news-mid-shore-patrol-vessel-2009.htm (accessed 30 March 2013).

82 Naval Technology, "Sentinel Class Fast Response Cutter."

83 Naval Technology, "Armidale Class Patrol Boat."

84 Canadian American Strategic Review, "Department of National Defence/Canadian Forces News Release Armed Naval Icebreakers — the Arctic/Offshore Patrol Ships," October 2012, http://www.casr.ca/doc-dnd-icebreaker.htm (accessed 30 March 2013).

85 Office of the Auditor General, "Report of the Auditor General to the House of Commons: Chapter 2 Replacing Canada's Fighter Jets," 2 April 2012, pp. 26–29, http://www.oag-bvg.gc.ca/internet/docs/parl_oag_201204_02_e.pdf (accessed 30 March 2013).

86 Department of Fisheries and Oceans, "Harper Government to Extend the Life of the Canadian Coast Guard Fleet," 21 February 2013, http://www.dfo-mpo.gc.ca/media/npress-communique/2013/hq-ac02-eng.htm (accessed 30 March 2013). See also Department of Fisheries and Oceans, "Extending the Life of the Canadian Coast Guard Fleet," February 2013, http://www.dfo-mpo.gc.ca/media/back-fiche/2013/hq-ac02-eng.htm (accessed 30 March 2013).

87 Chief Review Services, "Internal Audit of the Joint Support Ship (JSS) Project," November 2011, p. 1, http://www.crs-csex.forces.gc.ca/reports-rapports/pdf/2011/P0934-eng.pdf (accessed 30 March 2013).

88 Office of the Parliamentary Budget Officer, "Feasibility of Budget for Acquisition of Two Joint Support Ships," 28 February 2013, pp. 38–40, http://www.pbo-dpb.gc.ca/files/files/JSS_EN.pdf (accessed 30 March 2013).

89 Mark V. Arena, Irv Blickstein, Clifford A. Grammich, and Obaid Younossi, "Why Has the Cost of Navy Ships Risen? A Macroscopic Examination of the Trends in U.S. Naval Ship Costs Over the Past Several Decades," 2006 RAND Corporation, p. xiv, http://www.rand.org/content/dam/rand/pubs/monographs/2006/RAND_MG484.pdf (accessed 30 March 2013).

90 Canadian American Strategic Review, "Canada Announces Deepwater Port at Nanisivik on Baffin Island & Army Base at Resolute — Key Points on North–West Passage," August 2007, http://www.casr.ca/id-arctic-empires-2.htm (accessed 30 March 2013).

91 Department of National Defence, "Arctic/Offshore Patrol Ship (PMO AOPS)," http://www.materiel.forces.gc.ca/en/aops.page (accessed 30 March 2013).

92 Department of National Defence, "Leadmark: The Navy's Strategy for 2020," 18 June 2001, p. 99 http://www.navy.dnd.ca/leadmark/pdf/ENG_LEADMARK_FULL_72DPI.PDF (accessed 5 March 2013).

93 Royal Canadian Navy, "Domestic Stories: Arctic Deep Water Port," 20 August 2007, http://www.navy.forces.gc.ca/cms/3/3-a_eng.asp?category=7&id=623 (accessed 30 March 2013).

94 "Expanding Canadian Forces Operations in the Arctic," Media backgrounder, 10 August 2007, http://www.pm.gc.ca/eng/media.asp?id=1785 (accessed 30 March 2013).

95 Lee Carson, "The Perilous Route to Nanisivik," (February/March 2013) Vanguard Magazine 36-38 at 37.

96 David Pugliese, "DND Significantly Cuts Back On Harper's Much-Ballyhooed Plan to Build a Naval Facility at Nanisivik," 22 March 2012, http://blogs.ottawacitizen.com/2012/03/22/dnd-significantly-cuts-back-on-harpers-much-ballyhooed-plan-to-build-a-naval-facility-at-nanisivik/ (accessed 30 March 2013).

97 Ibid.

98 Canadian American Strategic Review, "Canada Announces Deepwater Port at Nanisivik on Baffin Island."

99 David Pugliese, "DND Significantly Cuts Back On Nanisivik."

100 Ibid. See also ATCO Structures and Logistics, "Modular Offices & Accommodations — Nanisivik Naval Facilities," 22 March 2013, http://www.atcosl.com/en-ca/Projects/Modular-Office-Camp-Nanisivik (accessed 30 March 2013).

101 Pierre-Henry Deshayes, "Arctic threats and challenges from climate change."

102 U.S. State Department cable # VZCZCXR03302.

103 Statement on Canada's Arctic Foreign Policy, 20 August 2010, p. 25, http://www.international.gc.ca/polar-polaire/assets/pdfs/CAFP_booklet-PECA_livret-eng.pdf (accessed 30 March 2013).

104 Standing Senate Committee on National Security and Defence, "Canadian Security Guide Book 2007," Executive Summary.

105 Standing Senate Committee on National Security and Defence, "Canadian Security Guide Book 2007," Full Report, March 2007, p. 39.

106 Canadian Coast Guard, "Mid-Shore Patrol Vessel, 12 August 2012, http://www.ccg-gcc.gc.ca/vessel-procurement/mid-shore-patrol-vessel (accessed 30 March 2013).

107 Department of Fisheries and Oceans, "Minister Ashfield Announces the Acceptance of the CCGS *Corporal Teather C.V.*," 8 February 2013, http://www.dfo-mpo.gc.ca/media/npress-communique/2013/hq-ac01-eng.htm (accessed 30 March 2013).

108 CBC News, "Government to consider arming the coast guard vessels," 13 November 2012, http://www.cbc.ca/news/canada/nova-scotia/story/2012/11/13/ns-mackay-arming-coast-guard.html (accessed 30 March 2013).

109 Ibid.

110 Cdr CD Soule, "Brief to Dalhousie University Centre for Foreign Policy Studies — AOPS Evolution of the Operational Requirement and the Associated Design Challenges," October 2011, p. 9, http://www.dal.ca/content/dam/dalhousie/pdf/cfps/Events/Soule_AOPS_CFPS_Sep11.pdf (accessed 30 March 2013).

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