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March 2010

Ridding the Arctic of Nuclear Weapons A Task Long Overdue



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March 2010

ISBN 978-0-9811463-7-9

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Cover Image:

Arctic Circle (Oct. 2003) — Three Polar bears approach the starboard bow of the Los Angeles class fast-attack submarine *USS Honolulu* (SSN 718) while surfaced 280 miles from the North Pole. Sighted by a lookout from the bridge (sail) of the submarine, the bears investigated the boat for almost 2 hours before leaving. Commanded by Cmdr. Charles Harris, *USS Honolulu*, while conducting otherwise classified operations in the Arctic, collected scientific data and water samples for U.S. and Canadian universities as part of an agreement with the Arctic Submarine Laboratory (ASL) and the National Science Foundation (NSF). *USS Honolulu* is the 24th Los Angeles class submarine, and the first original design in her class, to visit the North Pole region. *Honolulu* is assigned to Commander Submarine Pacific, Submarine Squadron Three, Pearl Harbor, Hawaii. U.S. Navy photo by Chief Yeoman Alphonso Braggs. (RELEASED)

http://www.navy.mil/navydata/cno/n87/usw/issue_23/north2.htm

Introduction

One of the most dramatic manifestations of climate change resulting from global warming is the rapid increase in the seasonal melting in the Arctic Ocean. A large area formerly under permanent ice cover is now open water during the summer months, and this area has been growing rapidly for the last 30 years.¹ The best scientific evidence suggests that the Arctic Ocean will be ice-free in as little as 20 years.²

Predictably, the drive to open new sea routes and exploit seabed resources has already begun, and may be expected to accelerate in the next few decades. In the words of a Canadian expert, “The Arctic has become a hotbed of territorial disputes as surrounding countries spar for the control of resources... competing claims over Arctic territory are escalating.”³ While thus far the most significant power players in this competition are the geologists and their seabed mapping, security experts worry that this competition may rapidly become militarized.⁴

Indeed, provocative military actions have already begun to occur. Many observers see this as the time to take steps toward improved arms control and disarmament measures, including an Arctic Nuclear-Weapon-Free Zone (ANWFZ).

Confrontation in the Arctic

On February 18, 2009, two Russian long-range strategic bombers, Tupolev 95Ms (NATO designation “Bears”) took off from Engels Airforce Base near Moscow. These long-range planes are capable of carrying up to 10 Kh-55 cruise missiles with a range of 3,000 km and a 200-kiloton nuclear warhead.⁵

Apparently on a training mission, and almost certainly without a nuclear payload, the two planes flew over the Arctic to the Beaufort Sea. According to an official of the Russian Federation Embassy in Ottawa,⁶ they came to within 200 kilometres of the Alaska/Yukon border before turning back and returning to base.

Nine days later Canada’s Defence Minister, Peter MacKay, held a press conference with the Chief of Defence Staff and the U.S. head of NORAD to announce that the flight had occurred and a Canadian CF-18 Hornet had been dispatched to meet the Russian aircraft and force them to turn back. He strongly reprimanded the Russians for the flight, and pointed out that the incident occurred a day before President Barack Obama was to visit Ottawa.⁷

The Prime Minister went further. Stephen Harper said, “I have expressed at various times the deep concern our government has with increasingly aggressive Russian actions around the globe and Russian intrusions into our airspace.”⁸

This tough talk from senior Canadian ministers was reminiscent of the Cold War. But the sabre-rattling proved embarrassing when it became clear that the Russian aircraft did not enter Canadian airspace after all.

Canadian military officials downplayed the incident, declaring it routine. Russia launched its own counterspin, declared the Canadian protests “a farce” and dispatched officials to explain that there was no violation of Canadian sovereignty since the flight occurred in international airspace, and that NATO forces regularly make similar reconnaissance flights toward Russian territory.⁹

Even the U.S. commander of NORAD, General Gene Renuart, was unmoved by the purported Russian threat, saying: “The Russians have conducted themselves professionally; they have maintained compliance with the international rules of airspace sovereignty and have not entered the internal airspace of either of the countries.”¹⁰

The incendiary talk illustrates what some have called Bear-baiting and Russophobia. Canada’s former ambassador to Russia and former UN ambassador for disarmament Chris Westdal says Canada “should stop picking fights where none need be, with Russia.”¹¹

But the current Conservative government sees Bear-baiting as good politics, in line with its increasingly aggressive efforts to assert Canadian sovereignty in the Arctic. Reporters have noticed increased use of the phrase “Arctic Power” to describe Canada in government statements.¹²

Canada’s Foreign Affairs Minister has said that “Canada will not be bullied,” and has met with Russia’s Foreign Minister to request that Canada receive advance notice of future training missions.¹³ The issue of advance notice of flights was raised in Parliament, as MPs questioned a Russian embassy official on the process. Canadian government officials claimed they had no advance notice, but the Russian official said that notice was given to the United States under the terms of the 1991 START agreement. The apparent ignorance of the Canadian government was therefore the responsibility of our NORAD partner, not the Russians.

Reporters have noticed increased use of the phrase “Arctic Power” to describe Canada in government statements

Testifying before the U.S. House Armed Services Committee, General Renuart, Commander of U.S. Northern Command and NORAD, said that in 2008, pairs of Russian TU-95 Bear-H aircraft flew into NORAD’s Air Defense Identification Zone on seven separate occasions. All but one of these flights was unannounced, but foreign planes never violated North American airspace.¹⁴ On another occasion, Renuart told a Canadian audience that “from the end of the Cold War to 2006, there were 10 or 11 or 12 Russian patrols up in the Arctic region. Since 2007, there have been a total of 30.”¹⁵

The February aircraft incident, which evoked such a strong reaction from the Canadian government, stands in stark contrast to another incident involving nuclear-capable forces and Canadian sovereignty.

In August 2008, Canadian Forces quietly deployed naval and air assets to investigate a report of a foreign submarine sighting near the eastern entrance of the Northwest Passage. The sub sighting, based on what the military described as a reliable report from hunters, occurred near the northern end of Baffin Island on August 9, 2008. The sighting was linked to a report a few days earlier of a mysterious explosion in the area, widely reported in the media. Another group of hunters heard the explosion, which was so large it shook their cabin. They emerged and saw a plume of black smoke some distance away.

But in the case of the explosion and submarine sighting, the military commented only on the explosion, and rewrote planned responses for journalists, removing any reference to the submarine.

What accounts for the sharp contrast between the government’s bellicose pronouncements in response to a routine Russian training flight and its attempts to hide a submarine sighting near the entrance of the Northwest Passage?

An obvious explanation is the difference in the Canadian Forces capability to respond to aircraft and submarine intrusions. Bomber flights are easily detectable on radar, and Canada can scramble its F/A-18 fighters to intercept the Russian aircraft. But we have no way of identifying or monitoring submarines, nor can we intercept them; in fact, the sub could have belonged to one of our allies.

Very likely the Canadian government also wanted to avoid a repeat of the 2005 visit of a U.S. nuclear attack submarine to the Arctic that coincided with the Canadian federal election. The Liberal government of the day was embarrassed when it was revealed that one of the most modern of the U.S. Navy’s nuclear-powered fast-attack submarines, *USS Charlotte*, had spent two weeks under the Arctic ice pack, surfaced at the North Pole and possibly crossed into Canadian territorial waters.¹⁶ The *Charlotte* is one of only two U.S. fast-attack submarines capable of landing and retrieving U.S. Navy Seals and other Special Operations Forces for onshore missions,¹⁷ and like all Los Angeles class submarines is capable of launching Tomahawk (BGM-109) cruise missiles¹⁸ equipped with W-80 150-kiloton nuclear warheads.¹⁹

The U.S. Navy considered the *Charlotte's* voyage a major achievement and technical milestone.²⁰ When contacted at the time, a U.S. embassy spokesperson simply said the submarine did not need Canada's permission to travel through international waterways. The problem is that the U.S. does not recognize Canadian sovereignty claims beyond 12 nautical miles from the coast, and considers the Northwest Passage international waters.

In order to monitor traffic, the Canadian government has tried to build an underwater network of listening devices to track submarines along the eastern part of the Northwest Passage. An attempt in the 1990s fell apart when its hundred-million-dollar price tag fell afoul of the government's austerity and deficit-reduction programs. A second attempt, launched in 2007 by the current government to fulfill an election promise emanating from the *USS Charlotte* incident, has also been delayed. Listening devices and land-based sensors on Devon Island were installed in 2008 as part of the Northern Watch program, with the expectation that the full system will be completed by 2012.²¹

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The Arctic's Fearful Cold War Legacy: Part I - Bombers

During the Cold War, Russian and United States played cat-and-mouse games above and beneath the Arctic ice. The airspace over the Arctic was the transit route for nuclear-armed bombers. While NORAD has taken the Russian Arctic flights in stride, and the Canadian government has used them for political hyperbole, their pilots continue to train for nuclear missions.

Russia maintains a fleet of 77 strategic bombers. Fourteen of these are TU-160's (NATO designation "Blackjack"), supersonic bombers similar in design to the U.S. B-1 bomber.²² The remainder of the fleet consists of 63 propeller-powered TU-95 Bears. Most analysts regard the aging fleet of TU-95's as too slow and clumsy to be classed as a modern bomber; for the last two decades they have been restricted to reconnaissance missions. TU-160's are too few in number to pose any significant threat to North American air defences. Nonetheless, both retain their nuclear capability.²³

Russia retains 856 nuclear warheads for potential use on these aircraft,²⁴ primarily long-range cruise missiles,²⁵ representing about a third of Russia's Strategic Offensive Forces. The aircraft have stepped up operations outside and inside Russian airspace during the past year, and have held long-range exercises in the North Atlantic and North Pacific. Because of their virtual obsolescence, these aircraft are primarily used to "show the flag" in visits to friendly countries such as Venezuela.²⁶

But the reality is that the bomber component of the Russian strategic nuclear force is for all intents and purposes obsolete; the TU-95's are far too slow, and the TU-160's do not have a true intercontinental range without forward basing outside Russia. We must not confuse inflated Russian claims and the "bean-counting" of arms control treaties with the reality of military capability. More generally, nuclear operations are no longer a significant role for manned bombers – not even the far more capable ones of the U.S. Air Force.²⁷

The real issue here is not cold military calculation but the psychology of threat and threat-perception. The increased activity of Russian aircraft in the Arctic is part of a carefully designed signal that Russian claims in the Arctic will be pursued with greater vigour, and enforced if necessary with military might. The fact that these aircraft are nuclear-capable ensures that this signal will be heard, loud and clear, by the other Arctic nations.

The Arctic's Fearful Cold War Legacy: Part II - Submarines

In the Arctic only nuclear-powered submarines can stay submerged long enough to operate. Thus far, only the United States, Russia, Britain and France have nuclear-powered submarines that can patrol the Arctic.²⁸

For our purposes, nuclear-powered submarines come in two varieties: fast-attack submarines (SSN's) and ballistic missile firing submarines (SSBN's). Fast-attack boats are designed primarily to hunt and destroy surface vessels and other submarines, although sometimes they are equipped with cruise missiles for land-attack missions. They are fast (up to 32 knots submerged speed), they can descend to 300 metres and their relatively small displacement (no more than 7,000 tonnes) makes them comparatively manoeuvrable. Most important of all, they can operate with extreme stealth, evading detection by surface ships, aircraft and usually other submarines as well.²⁹ It cannot be emphasized enough that stealth is a submarine's only real protection; it cannot outrun a destroyer or a helicopter equipped with anti-submarine warfare (ASW) weapons, and only by evading detection can it be safe from attack and destruction.

Thus far, only the United States, Russia, Britain and France have nuclear-powered submarines that can patrol the Arctic

Submarines (SSBN's) whose sole mission is to fire intercontinental-range MIRVed missiles are far larger (up to 20,000 tonnes displacement) and somewhat slower (25 knots flank speed), and therefore – and this is critical to what follows – considerably less manoeuvrable than their SSN stable mates. Long, heavy and slim (the American Ohio class is 170 m long with a beam of only 10 m),³⁰ and driven by a single propeller, SSBN's can seldom perform rapid manoeuvres safely, and almost never in such a way as to maintain the stealth critical to their mission. A helm order such as “full astern” or “hard aport” will cause the propeller to “cavitate” (simply, make noisy bubbles), which gives away its position and thus its only real protection.³¹

Russia currently claims³² to maintain a fleet of ten missile submarines, six Delta IV and four Delta III class,³³ which are equipped with 160 submarine-launched ballistic missiles³⁴ carrying 576 nuclear warheads. The Russian navy is attempting to upgrade some of the Delta III and IV hulls to carry the new R-39M missile (NATO designation SS-N-28).³⁵ The new Borey class of missile submarine is in development, but has been subjected to nearly 10 years of delay owing to technical problems and budget shortages, and will probably be cancelled.³⁶ After many failures in attempting to design a solid-fuelled submarine-launched ballistic missile, Russian naval engineers decided to modify the successful land-based Topol-M ICBM design for submarine use, and the 3M14 *Bulava* was successfully tested in June 2007.³⁷ But this was the only successful test after many staging and navigational failures; many years of development would be needed before actual deployment.³⁸

Obviously, there is a good deal of controversy and confusion concerning the submarine component of the Russian strategic nuclear force. Although submarine patrols have increased in the last few years, they are nowhere near the levels seen during the Cold War.³⁹ While Russian submarines currently carry 23 per cent of the country's 2,668 strategic warheads,⁴⁰ the oft-quoted prediction that this proportion may increase sharply in the next decade⁴¹ is contingent on a number of uncertain and rapidly changing factors. Two are especially noteworthy, as examples.

First and foremost, the Russians have had very considerable success in upgrading their land-based strategic missile capabilities, and comparatively little in bringing new sea-based systems online.

Second and even more important are developments in the United States. As of this writing, the forthcoming Strategic Posture review has not been finalized, and there has been intense debate between the

Obama White House and the “nuclear Mafia” in the Pentagon.⁴² But if President Obama’s own stated views⁴³ prevail, the United States will negotiate a sharp reduction in the overall number of strategic warheads, leaving perhaps less than a thousand “active.”⁴⁴ The Russians can hardly pass up this opportunity to relieve themselves of their own costly nuclear white elephant, but in doing so they will have to choose which warheads and which launch systems will be retained, and which scrapped. The bureaucratic in-fighting will be as fierce and bitter as its American counterpart, but it is hard to imagine that they will scrap their most reliable and easily modernized and modified new ICBM systems in favour of unproven new submarines and missiles.

So, projecting from what we know to a best educated guess, the balance of probabilities suggests that the Russians will phase out relatively more of their naval systems, and concentrate an even larger proportion of their remaining strategic forces in their traditionally strong ICBM systems. That of course does not mean that the nuclear submarines of other states will diminish in importance.

This is a critical element in the endeavour to create an Arctic Nuclear-Weapon-Free Zone. Between two-thirds and three-quarters of the Russian submarine force is attached to the Northern Fleet, whose bases are almost all north of the Arctic Circle.⁴⁵ Moreover, with only two exceptions, all of the construction and refit facilities are situated on or near the Kola Peninsula or near Murmansk.⁴⁶ This is unlikely to change, as the poor transportation infrastructure connecting central Russia with the Far East, and the cost of building new facilities at such a distance, make the transfer of additional submarine bases and their support structure to the East an unattractive proposition for the Russian Navy in an era of strained budgets. Therefore, if submarine facilities in the Russian Arctic are to be phased out, this must be part of an overall reduction in the Russian SSBN fleet.

In contrast with the Russians’ focus on land-based nuclear weapons, the United States has taken submarines as the platform of choice. The U.S. operates a fleet of 14 Ohio class Trident missile submarines that carry an estimated 1,152 warheads, or 43 per cent of the operational U.S. arsenal.⁴⁷

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Using documents obtained through the Access to Information Act, Hans M. Kristensen found that the United States continues to operate its nuclear-armed submarines at rates similar to Cold War levels, and conducts more submarine patrol missions than the rest of the world combined. In 2008, Ohio class subs conducted 31 patrols, most of them from the west coast base at Bangor, Washington. The average patrol lasts 72 days submerged, and some missions have gone past 100 days.⁴⁸

The British and French have come to rely completely on submarine fleets to deploy their respective nuclear arsenals. Britain withdrew its last air-dropped nuclear bomb in 1998, and since then has a fleet of four⁴⁹ Trident nuclear missile submarines, with one on patrol at all times. The fleet is closely integrated with the U.S. fleet, combining its D-5 nuclear missiles and approximately 200 warheads with the U.S. stockpile.⁵⁰ The French fleet of four nuclear missile submarines carries 240 of the country’s 300 nuclear warheads.⁵¹

All four of these countries can operate missile submarines in the Arctic. Although the “patrol boxes”⁵² of ballistic missile submarines are the most closely held military secrets of the nuclear submarine powers, it is certain that the Russian “boomers” are patrolling the Arctic.⁵³

It is far less likely that American Tridents patrol in the Arctic. As noted above, most patrols leave from Bangor, Washington, on the Pacific coast, and could only enter the Arctic through the narrow, shallow waters of the Bering Strait – far from ideal conditions for a large “boomer.” Although this is to some extent

speculation, a “best guess” based on simple geography would locate their patrol boxes in the vast and deep expanses of the Pacific. The British and French SSBN’s could enter Arctic waters more easily, and in principle could “hide” in the thermal and salinity layering of Arctic waters in a manner similar to the Russians.

What is certain, however, is that the Russian Arctic-based Northern Fleet is continually “stalked” by American (and perhaps British and French) fast-attack submarines from the moment the Russian submarines leave port. While, as noted above, the number of Russian “boomer” patrols has sharply declined since the days of the Cold War, the underwater games of “cat and mouse” continue as before, and several near-collisions have been reported as the Russian subs become increasingly successful in shaking off their American “tails.”⁵⁴ The Cold War is not entirely over beneath the rapidly melting Arctic ice, and Russia’s nuclear submarine bases north of the Arctic Circle are yet another powerful signal that the Russians intend to enforce their claims in the Arctic. So, while the prospects of major progress on U.S.-Russian bilateral disarmament have never been brighter, the gradual rebuilding of the Russian Northern Fleet’s roster of ballistic missile submarines and the ongoing mission of American SSN’s to track them aggressively has meant increased rather than decreased U.S.-Russian naval competition.

Military Competition in the Arctic: The Dangerous New Reality

The fact is, the Arctic is becoming a zone of increased military competition. Russian President Medvedev has announced the creation of a special military force to defend Arctic claims. Last year Russian General Vladimir Shamanov declared that Russian troops would step up training for Arctic combat, and that Russia’s submarine fleet would increase its “operational radius.”⁵⁵ Recently, two Russian attack submarines were spotted off the U.S. east coast for the first time in 15 years.⁵⁶

In January 2009, on the eve of Obama’s inauguration, President Bush issued a National Security Presidential Directive on Arctic Regional Policy. It affirmed as a priority the preservation of U.S. military vessel and aircraft mobility and transit throughout the Arctic, including the Northwest Passage, and foresaw greater capabilities to protect U.S. borders in the Arctic.⁵⁷

The Bush administration’s disastrous eight years in office, particularly its decision to withdraw from the ABM treaty and deploy missile defence interceptors and a radar station in Eastern Europe, have greatly contributed to the instability we are seeing today, even though the Obama administration has scaled back the planned deployments. The Arctic has figured in this renewed interest in Cold War weapons systems, particularly the upgrading of the Thule Ballistic Missile Early Warning System radar in Northern Greenland for ballistic missile defence.

The Canadian government, as well, has put forward new military capabilities to protect Canadian sovereignty claims in the Arctic, including proposed ice-capable ships, a northern military training base and a deep-water port.

Earlier this year Denmark released an all-party defence position paper that suggests the country should create a dedicated Arctic military contingent that draws on army, navy and air force assets with ship-based helicopters able to drop troops anywhere.⁵⁸ Danish fighter planes would be tasked to patrol Greenlandic airspace.

Last year Norway chose to buy 48 Lockheed Martin F-35 fighter jets, partly because of their suitability for Arctic patrols. In March, that country held a major Arctic military practice involving 7,000 soldiers from 13 countries in which a fictional country called Northland seized offshore oil rigs.⁵⁹

The manoeuvres prompted a protest from Russia – which objected again in June after Sweden held its largest northern military exercise since the end of the Second World War. About 12,000 troops, 50 aircraft and several warships were involved.⁶⁰

Jayantha Dhanapala, President of Pugwash and former UN under-secretary for disarmament affairs, summarized the situation bluntly: “From those in the international peace and security sector, deep concerns are being expressed over the fact that two nuclear weapon states – the United States and the Russian Federation, which together own 95 per cent of the nuclear weapons in the world – converge on the Arctic and have competing claims. These claims, together with those of other allied NATO countries – Canada, Denmark, Iceland, and Norway – could, if unresolved, lead to conflict escalating into the threat or use of nuclear weapons.”⁶¹ Many will no doubt argue that this is excessively alarmist, but no circumstance in which nuclear powers find themselves in military confrontation can be taken lightly.

The current geo-political threat level is nebulous and low – for now, according to Rob Huebert of the University of Calgary, “[the] issue is the uncertainty as Arctic states and non-Arctic states begin to recognize the geo-political/economic significance of the Arctic because of climate change.”⁶²

A Proposal to Neutralize Nuclear Threats in the Arctic: Establishing an Arctic Nuclear-Weapon-Free Zone

The Canadian Pugwash Group issued a call in 2007 for an Arctic Nuclear-Weapon-Free Zone (ANWFZ), which has been widely distributed and commented upon.⁶³ While nuclear weapons are not the only threat to peace in the region, they are the most potent.

The proposal has served to spark the imagination of many people concerned about the militarization, or re-militarization, of the Arctic and increased U.S.-Russian tensions. But, as with all substantive and original arms control proposals, there are obstacles that will hinder the negotiation of an ANWFZ. We will proceed by outlining the requirements established by the UN for such a nuclear-weapon-free zone, discuss the major political and military barriers that might hinder its establishment, and then explore strategies that various nation parties might work around them to reach our goal of de-nuclearizing the Arctic littoral.

**The Canadian
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We will begin with the guiding principles for creating a Nuclear-Weapon-Free Zone.

In 1975 the UN General Assembly recommended that the establishment of NWFZ's be guided by the following principles:⁶⁴

1. Obligations relating to the establishment of such zones may be assumed either by groups of states, continents, or geographical regions, or by smaller groups of states or *even individual countries* (emphasis added);
2. NWFZ arrangements must ensure that the zone would be – and remain – effectively free of all nuclear weapons;
3. The initiative to establish a NWFZ must come from within the region, and participation must be voluntary;
4. If a zone is intended to be specifically regional, its effectiveness would be enhanced by the participation of all militarily significant states;
5. NWFZ agreements must include an effective system of verification;
6. Arrangements should provide for the peaceful economic and scientific development of state parties;
7. The treaty establishing the zone should be of unlimited duration.

There are three major obstacles that make an Arctic Nuclear-Weapon-Free Zone extremely difficult to negotiate. The first we discussed at some length above: The Russian Federation (and perhaps other nuclear weapon states as well) routinely deploys a large proportion of its ballistic missile-firing submarines on patrol in Arctic waters. These patrols are the object of endless cat-and-mouse games involving the Russian SSBN's and the fast-attack submarines of the U.S. Navy and other NATO navies, joined with other NATO anti-submarine forces: antisubmarine-capable surface ships, aircraft and helicopters.⁶⁵ In response, Russian fast-attack submarines⁶⁶ and aircraft enter the fray.

The second major set of "facts" creating obstacles for a negotiated Arctic NWFZ directly follows from the first: virtually all of the largest and most important naval bases of the Russian Northern Fleet are located north of the Arctic Circle. The largest of these, Zapadnaya Litsa, is located on the Kola Peninsula at latitude 69° 27', and its support bases are scattered throughout the area between Murmansk and Arkhangelsk. However, as we argue below, neither the presence of nuclear-capable submarines under Arctic waters nor the presence of nuclear weapons possessed by a nuclear weapon state need *necessarily* prevent the creation of a NWFZ in the Arctic littoral.⁶⁷

A third major obstacle is the position of the United States. Like the Russian Federation, it is both an Arctic State and a Nuclear Weapon State (NWS). Unlike the Russian Federation, the U.S. does not currently deploy nuclear weapons in its Arctic territory (Alaska), but it is almost unimaginable that the Americans would agree to *declaring* any portion of their territory free from nuclear weapons.⁶⁸ But this is not the only – and perhaps not the most important – obstacle presented by the United States.

To begin with, all of the other Arctic States save the Russian Federation – Norway, Denmark, Canada and Iceland – are close military allies of the U.S. through their common membership in NATO. Historically, NATO member states have almost never undertaken a major security initiative without at least the tacit acquiescence of the United States. But membership in NATO has implications for an ANWFZ that go beyond the inevitable pressure that a militarily dominant state exerts over its lesser partners. Partners in the NATO alliance are committed to its core military doctrine, known as its "Strategic Concept," which includes specific reliance upon nuclear weapons.⁶⁹ According to NATO doctrine, nuclear weapons are not merely one tool in the arsenals of the three NWS's that are NATO members. Nuclear weapons make a "unique contribution" to the deterrence provided by the NATO alliance, and are therefore "essential to preserve peace."⁷⁰ Furthermore, "deterrence" is construed so generally as to "permit the use of nuclear weapons when deemed militarily useful in virtually any circumstance."⁷¹ Further yet, five other NATO partners who are not NWS's – Germany, Belgium, Greece, Turkey and Italy – allow American tactical nuclear weapons to be stationed on their territory as part of their commitment to NATO.⁷²

It might well be possible⁷³ to draft an Arctic NWFZ Treaty that does not conflict with the *letter* of NATO members' commitments to the Alliance's Strategic Concept, but the discussion above makes it clear that membership in a NWFZ would be incompatible with its *spirit*. Even if this were not the opinion of the participating NATO member, it would almost certainly be the view of the United States. And, historically, NATO members have almost never challenged the U.S. on matters of NATO military policy.

As if this were not enough, there is still another way in which U.S. policy could pose obstacles to an ANWFZ. The U.S. has laid down conditions for its support of NWFZ's⁷⁴ that might very well prove obstacles to the negotiation of an Arctic treaty. The most important of these are the following:

1. The content of a NWFZ Treaty should in no way disturb existing security arrangements or interfere with the rights of individual or collective self-defence guaranteed to states under Article 51 of the U.N. Charter;

2. A zone should not affect the rights of the parties under international law to grant or deny transit privileges, including port calls and overflights;
3. No restrictions should be imposed on the high seas freedoms of navigation and overflights by military aircraft,⁷⁵ the right of innocent passage through archipelagic seas, and the right of transit passage through international straits.

It is reasonable to assume that condition 1 would apply directly to the security obligations of NATO members as discussed above, and in particular their adherence to NATO's Strategic Concept. Since all Arctic states save the Russian Federation are NATO members, must we assume – as suggested above – that NATO nuclear doctrine would preclude participation in an ANWFZ treaty from the outset? We will argue, as we have previously in reference to Russian naval bases, that this need not *necessarily* be so.

Condition 2 poses another sort of problem, because although most NWFZ treaties permit the zonal state to grant transit rights, these are allowed only for ships and aircraft not carrying nuclear weapons.⁷⁶ This would seem to conflict with the long-standing U.S. policy to neither confirm nor deny the presence of nuclear weapons on board its ships and aircraft. But, as we have argued elsewhere,⁷⁷ there are ways in which this seeming conflict could be circumvented.

For Canada, the most important sticking point will be condition 3, because of the long-standing, albeit low-key, dispute between Canada and the United States over the status of the Northwest Passage. The Canadian government has long declared the Northwest Passage – a narrow ship channel wending its way through the Islands of the Canadian Arctic Archipelago – to be Canadian internal waters.⁷⁸ But the United States, joined by the E.U., claims that the Northwest Passage is an international strait.⁷⁹ “The Canadian claim of sovereignty would permit her government to deny transit of nuclear weapons, but otherwise Canada could not deny or impair any legal right of transit passage, in compliance with the UN Convention on the Law of the Sea.”⁸⁰ If the NW passage is deemed an international strait all ships may transit freely under the traditional right of “innocent passage.” As Michael Byers writes, “these new threats would best be dealt with through Canadian domestic law, enforced by an enhanced Coast Guard, RCMP and Canadian Forces presence. It simply does not benefit the United States – and other responsible countries and reputable shipping companies – to have foreign vessels shielded from scrutiny and reasonable regulations by maintaining that the Northwest Passage is an international strait.”⁸¹ Finding a solution to the problems created by conflicting claims of Canada, U.S. and the E.U. will be one of the most difficult challenges for any Canadian attempt to join an ANWFZ.

The Canadian claim of sovereignty would permit her government to deny transit of nuclear weapons...

In any case, even if the U.S. concedes Canadian sovereignty, the Americans may argue that Canada's obligations to the NATO alliance prevent Canada from denying passage to American ships. While Canada has often taken differing positions from the Americans on some foreign and military policy issues, they have never refused American requests when these are presented as an obligation under the NATO Treaty. If the Americans were to insist on untrammelled passage of their warships in order to fulfill the mutual security obligations under Article V of the NATO Treaty, it is inconceivable that Canada would refuse.

But despite all of these daunting obstacles, we should not give up before even getting started. It would be useful to take a step back and remind ourselves of the provisions that must be included, and the criteria that must be met to create a new Nuclear-Weapon-Free Zone. We might argue that while the creation of an ANWFZ poses new challenges, these are not insurmountable. An important feature of

NWFZ agreements will guide our reasoning: they do not have to be created by negotiating a single, all-encompassing legal instrument. They can be, and often have been, put together piecemeal, step by step. What follows is, first, a recapitulation of the “rules of the road” for the creation of NWFZ’s. Then, we put forward a series of initial steps of a move toward the goal of a nuclear-free Arctic. Finally, we will attempt to demonstrate that factors and forces external to the region may help us move toward the final goal of an inclusive ANWFZ treaty.

In short, we are not claiming that building an ANWFZ will be an easy task, or that it will necessarily closely resemble previous agreements. But we can combine the lessons of history with the unique circumstances of the Arctic to achieve our goal.

The History of Nuclear-Weapon-Free Zones: Putting the United Nations’ Guidelines into Practice

No one can deny that regional de-nuclearization treaties – Nuclear-Weapon-Free Zones – have been an important part of the “toolkit” of global efforts to prevent the spread of nuclear weapons. And it goes without saying that anything that might assist worldwide efforts to prevent nuclear proliferation is worth pursuing as vigorously as possible. For these reasons, the Canadian Pugwash Group, now joined by many other NGO’s, has begun a concerted effort to research the necessary preconditions for a Nuclear-Weapon-Free Zone in the Arctic.⁸² To reiterate: to create an ANWFZ is to rid the area north of the Arctic Circle of nuclear weapons. Other such zones have been established: what lessons do they hold?

A comprehensive analysis of the creation, resolution of problems, and general effectiveness of Nuclear-Weapon-Free Zones is beyond the scope of this paper,⁸³ suffice it to say that at least six de-nuclearization agreements in populated parts of the world have entered into force. These are the 1967 Treaty of Tlatelolco covering Latin America; the 1985 Treaty of Rarotonga covering much of the South Pacific; the 1992 Declaration on the Denuclearization of Korea, and the 1995 Treaty of Bangkok, covering much of Southeast Asia. The 1996 Treaty of Pelindaba (covering Africa) entered into force on July 15, 2009, and the 2006 Treaty of Semipaltinsk, covering portions of Central Asia (and the only NWFZ Treaty thus far in the Northern Hemisphere), entered into force on March 2009.⁸⁴ Also (and of some relevance to efforts to create an ANWFZ), de-nuclearization provisions have been included in as yet uninhabited areas, specifically the 1959 Antarctic Treaty, the 1967 Outer Space Treaty, the 1971 Seabed Treaty and the 1979 Moon Agreement.⁸⁵

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Article VII of the Nuclear Non-Proliferation Treaty (NPT)⁸⁶ and numerous UN resolutions affirmed the right of states to establish NWFZ’s in their territories, and the 1995 NPT Review and Extension Conference encouraged regional de-nuclearization measures as an important means of increasing global and regional peace and security. Thus, NWFZ’s have become part and parcel of the NPT regime.⁸⁷

How, then, do we go about constructing a NWFZ in the Arctic?

Including All Arctic States in the Zone

The first and most obvious problem, detailed in earlier sections, is posed by the United Nation’s admonition that all militarily significant states be included. The zone we are discussing is specifically regional, and the participation of the two major military states is most unlikely. But note the wording: it does not say all

militarily significant states *must* participate, only that it would be desirable that they do so. This leaves open the possibility that an ANWFZ could be set in motion without the participation of the United States and the Russian Federation, not precluding the possibility that these powers might join later.

Nonetheless, many would argue that an Arctic Zone without the two strongest powers wouldn't be much of a zone at all, and we have discussed at length, above, the obstacles that would interfere with these two powers joining. But there may be ways of overcoming these obstacles in the future. For example, neither power is likely to accept restrictions on the underwater transit of their submarines in Arctic waters whether or not they carry nuclear weapons. In fact, neither will provide any information whatsoever about the whereabouts or movements of their submarines at sea. This is scarcely surprising given the critical role of stealth and secrecy in protecting submarines. Detecting submarines in the open ocean is nearly impossible in any case. While the media have made much of this, in reality NWFZ treaties have accepted this as a fact of life, and none makes reference to submarine transit in its text.⁸⁸

The issue of nuclear submarine *bases* within a NWFZ is an entirely different matter, as we shall see.

With regard to the United States, the Arctic portions of its territory are de facto nuclear weapon free. And, were they to establish land-based strategic nuclear installations there in the future, they would certainly have to be subject to the restrictions of START and its successor treaty. Historically the U.S. has chosen to station its strategic missiles as far as possible from potentially hostile territory, so stationing them in Alaska would be unlikely in the extreme. To be sure, as noted above, it would be politically impossible to persuade the U.S. to *declare* northern Alaska nuclear-free, but it might be possible to write language into the treaty whereby the U.S. does not formally accede but its participation in the START follow-on treaty is taken as de facto Arctic de-nuclearization.

The Russian Federation is an entirely different matter. As noted above, they have a number of bases that act as home ports for their ballistic missile submarines well north of the Arctic Circle, as well as many weapons storage facilities.

While this seems to be an insuperable obstacle in the short term, there may be ways to circumvent it in the long term. Dr. Adele Buckley has suggested that the Russians may be persuaded to move the SSBN home ports of the Northern Fleet to expanded facilities already in place for the Pacific Fleet.⁸⁹ From the Russian point of view this would pose a number of problems: the poor infrastructure linking their Pacific bases with the nuclear command centres in the area around Moscow, the possible threat posed by an expanding Chinese navy,⁹⁰ and the state-of-the-art ASW capabilities of the Japanese destroyer and submarine fleet.⁹¹

Moreover, as we have seen, the Russians feel more comfortable manoeuvring their subs in and under the thermal and salinity "layering" produced by the Arctic ice. But given that ice-generated layering is giving way to open ocean, perhaps they may soon feel that the Arctic locations of their submarine bases might not give them the tactical advantages they have enjoyed in the past.

Might there be other reasons for the Russians to abandon their Northern Fleet bases? Here we enter into the realm of speculation. In 2002 the two largest nuclear powers appeared to be backing away from earlier commitments to achieve deep cuts in their nuclear arsenals, post Cold War. The U.S. gave notice of its withdrawal from the 1972 Anti-Ballistic Missile Treaty; immediately thereafter, the Russians repudiated the detailed limits contained within the as yet unratified 1993 START II arms control treaty. With the existing START agreement due to expire in December 2009,⁹² an interim agreement called SORT⁹³ was cobbled together to take its place. Unlike earlier arms control agreements, which set forth precise counting rules and detailed requirements as to what was permitted and what was not, SORT provided only the loosest restrictions on warhead numbers, types and configurations: each side was to reduce the

number of its deployed strategic warheads to between 1,700 and 2,200 apiece. But how this was to be done was left vague; in the words of Secretary Colin Powell, “the Treaty will allow you to have as many warheads as you want.”⁹⁴ The treaty makes no distinction between those deployed on launch vehicles, those in storage but “active” and those in “inactive storage.”⁹⁵ In a crowning absurdity, the treaty was set to expire on the very date its limits came into force!

We have developed this point at length for a specific reason: *Under the current arms control regime, there is no treaty-induced incentive to make hard choices between which strategic systems to retain and which to dismantle. The only real restrictions on the development of additional strategic systems are fiscal.* Why then would Russia wish to abandon her most powerful strategic nuclear bases, especially as they are located front and centre in the region of greatest competition for Arctic resources?

One can conceive of a possible world in which Russia would have a significant incentive to de-nuclearize its Arctic regions: if it were a condition for a much more significant and enforceable strategic arms control treaty that would guarantee Russia strategic parity with the U.S. If, as has been proposed by a number of prominent security experts, a new arms control treaty were negotiated and the number of nuclear warheads for each side reduced to 1,000 or even 500 – these numbers representing genuine parity with no “fiddles” in the form of readily retrievable reserves or ABM systems – then it would be hard to imagine the Russians turning it down. Space does not allow a detailed discussion of this here, but the bloated white elephant that represents the Russian military-nuclear complex is something most Russians, even in the military, would like to see severely pruned.

And – here is the reassuring part of the argument – if Russia is to keep only a minimal deterrent, then, as argued above, keeping its most reliable, invulnerable and effective land-based missiles is by far the most rational course. Thus, in one fell swoop, a huge obstacle to achieving an ANWFZ is swept aside.

As things stand now, this may well be the strategic equivalent of the old saying that if wishes were horses, beggars would ride. Certainly we are a very long way from legions of mounted poor. But the atmosphere for deep cuts in nuclear stockpiles is more favourable than it has been since the 1987 INF Treaty. We will know the answer, one way or the other, in the next few months.

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Don't Forget About Starting Small: A Few Small Steps to Start the Journey

As noted above, in citing the United Nations resolution creating a “road map” for NWFZ’s, there is no need for everyone to join at the same time: “Obligations relating to the establishment of such zones may be assumed either by *groups of states*, continents, or geographical regions, or by *smaller groups of states or even individual countries*” (emphasis added).

As one of the authors has argued in an earlier paper, one easy step would be to declare the Northwest Passage a NWFZ.⁹⁶ The Canadian government has an excellent claim that the NW Passage constitutes Canadian internal waters.⁹⁷ There is no reason why Canada would not be willing to negotiate transit agreements, but there is every reason why such agreements should deny the passage of radioactive cargoes, including nuclear weapons. It’s worth noting in passing that radioactive cargo transiting all newly ice-free Arctic sea routes may soon become an issue affecting the entire region, as, for example, Japanese

reactor cores are shipped to Russia for reprocessing at Mayak or elsewhere. Jozef Goldblat suggests that small and medium-sized countries in the region, such as Canada, are uniquely situated to initiate a debate on this and similar environmental problems in the Arctic littoral. He advocates declaring the entire Arctic area “a common legacy of mankind,” and notes that “the interest in creating a new regime in the Arctic would increase if the denuclearization efforts were made in parallel, as well as in conjunction, with scientific investigations leading to climate change.”⁹⁸

Naturally following from this is an idea proposed by our colleague, Dr. Adele Buckley.⁹⁹ She suggests that all Arctic states presently non-nuclear agree to work together on a regional treaty, as allowed for in the Nuclear Non-Proliferation Treaty, to “assure the total absence of nuclear weapons from their respective territories.” This would include Canada, Denmark, Norway, Sweden and Finland.

This way of proceeding is similar to that adopted in the construction of the Treaty of Tlatelolco. Under this “Tlatelolco model,” the treaty comes into force immediately once states began to ratify it, and others could opt in separately later, gradually extending the area under the treaty’s jurisdiction.¹⁰⁰

The Parliamentary Network for Nuclear Disarmament agrees with this way of proceeding, and suggests adding a protocol whereby nuclear weapon states would agree not to deploy, threaten or use nuclear weapons in the entire Arctic zone.¹⁰¹

Denmark and Sweden have already taken initiatives in this direction. In 1988, they reiterated long-standing official Danish policy that in time of peace, the introduction of nuclear weapons to the country is prohibited, and insisted that ships entering Danish ports not carry them. Iceland, Norway and Sweden have similar prohibitions. However, as we discussed above, considerable pressure has been exerted from larger NATO states (particularly the U.S. and Britain) and as a result they have generally chosen, in effect, to turn a blind eye to the telescope rather than risk offending their senior allies.¹⁰²¹

Nonetheless, the difficulties encountered in attempting to make slow, piecemeal progress toward an ANWFZ should not prevent us from moving ahead, nor should the many obstacles daunt us in making the attempt. There is too much at stake in the evolving Arctic to give up before we even begin. As Michael Hamel-Greene reminds us, “In the case of all of the successfully established zones, there were critics and pessimists who suggested such zones would never be agreed on.”¹⁰³

The final declaration from a conference held in Copenhagen August 10-11, 2009,¹⁰⁴ co-sponsored by the Danish Institute for International Studies (DIIS), Parliamentarians for Nuclear Non-proliferation and Disarmament (PNND), Danish and Canadian Pugwash Groups, the Swedish Branch of the International Physicians for the Prevention of Nuclear War (SLMK) and the International Association of Lawyers Against Nuclear Arms, was a Call for an Arctic Nuclear-Weapon-Free Zone, containing seven recommendations. The participant group was optimistic that these are practical and reasonable steps toward establishing a nuclear-weapon-free and demilitarized Arctic. At this writing, Scandinavian NGOs are anticipating a second conference in which their parliamentarians will be involved.

To sum up, there is no reason why the medium powers around the Arctic littoral cannot begin to take actions singly and collectively without waiting for the larger NWS powers. We have already discussed some of these, and would like to translate them into specific recommendations for the Canadian government.

First, Canada should establish strict rules governing transit through the NW Passage, and in particular prohibit the transit of nuclear weapons.

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Second, in the same way that Canada took the lead in drafting and promoting the Land Mines Treaty, it should take the initiative in drafting a regional treaty for signature by all the non-nuclear weapon states (NNWS) of the Arctic littoral (Norway, Sweden, Denmark and Finland) and convene a meeting of these states to induce them to sign and ratify it.

Third, Canada should take the lead in establishing a network of academic research centres to study the impact of climate change on the Arctic, similar perhaps to the Tyndall Centre for Climate Change Research in the U.K., which has brought together academic experts from many universities to study the climate change problem. But a research centre for the Arctic would differ from the Tyndall model in two very important ways: first, it would be focused specifically on the extraordinary speed and impact of the rapid changes occurring in the Arctic climate; second, research into *adaptation* to climate change should and must involve the indigenous peoples of the region from the outset. Indeed, a “Tyndall-style” centre could be a vital platform for magnifying and disseminating the often dismal reality of the impact of climate change on indigenous peoples, while at the same time give voice to their traditional knowledge about the region, and help regional state decision makers see the transformation in the Arctic through their unique cultural lens.

First, Canada should establish strict rules governing transit through the NW Passage, and in particular prohibit the transit of nuclear weapons

Many might view this as a tall order indeed. But the Canadian government has taken similar bold initiatives many times: most dramatically, the aforementioned Land Mines Treaty. Going back several decades in time, the dramatic initiative undertaken by Prime Minister Trudeau in concert with the nonaligned states to convene the first United Nations Special Session on Disarmament,¹⁰⁵ and more recently former Foreign Minister Axworthy’s initiative in opening the facilities of the Pinawa Nuclear Waste Disposal Research Centre to *all* nations to use for peaceful purposes. In recent years we have grown accustomed to Canadian governments unwilling to undertake bold initiatives in the international arena; we can only hope for a return to a greater degree of activism and initiative in our dealings with other nations.

Concluding Thoughts: Can the Tail Wag the Dog?

Most of the preceding discussion – and indeed, nearly all discussion of the problems and prospects of an ANWFZ – has proceeded on the assumption that the middle powers, the NNWS who make up much of the Arctic littoral, can only achieve our goal by cleverly manoeuvring around the immovable “givens” posed by the dominant nuclear powers that exercise *de facto* military control over the Arctic, and whose tight web of bases, nuclear deployments and alliance commitments are essentially unchallengeable.

But the world’s climate is altering. The physical climate, of course, is changing, and nowhere more rapidly and dramatically than in the Arctic Ocean and littoral. But the political climate is changing with equal speed: more and more, the states and peoples of the Arctic are challenging outmoded nuclear deployments and alliances whose rationale is rooted in the Cold War and not in present-day reality. In requesting – *insisting* – that nuclear weapons be removed from the Arctic we are neither abandoning our traditional allies nor attempting to create new conflicts. Rather we, the peoples of the Arctic, are not only challenging the leftover detritus of the rickety Cold War structure but even more fundamentally challenging the relevance of the Westphalian paradigm itself as a useful model for governance in the Arctic. The outworn zero-sum competition between nation states is everywhere giving way to geographical communities of interest aimed directly at a win-win outcome for all the participants. In the Arctic, of course, are many additional challenges, chief among them perhaps finding ways to cope with the rapidly changing physical climate and ways to assure the well-being of the oft-neglected original inhabitants.

How we shall meet these challenges is beyond the scope of this paper and certainly outside the expertise of the authors. Of this, however, we are certain: nuclear weapons play no useful role in the challenges of the rapidly evolving Arctic, and indeed can be nothing but a lethal impediment to progress.

**... nuclear weapons
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rapidly evolving Arctic**

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Endnotes

- 1 “Arctic Sea Ice Extent Remains Low,” National Snow and Ice Data Center (NSIDC), October 6, 2009; “Arctic Sea Ice Likely Record Low Volume,” NSIDC, 2 October 2009 (see especially Figure 3).
- 2 Mark Serreze, “Arctic Amplification and Loss of Sea Ice Cover,” NSIDC, December 16, 2008.
- 3 Ed Struzik, “The Arctic Resource Rush Is On,” Yale School of Forestry and Environmental Studies, July 10, 2008.
- 4 John Pike, “Countries in Tug-of-War over Arctic Resources,” information sheet published by GlobalSecurity.org, January 2, 2009.
- 5 John Pike, “A Survey of Russian Air-to-Surface Missiles,” information sheet published by the Federation of American Scientists, August 8, 2000.
- 6 Dmitry Trofimov (Head of Political Section, Embassy of the Russian Federation), Evidence of the Standing Committee on National Defence, March 23, 2009.
- 7 CBC News, “Russia denies plane approached Canadian airspace,” February 27, 2009.
- 8 *Ibid.*
- 9 Stephen Thorne, “Airspace outcry ‘a farce,’ Russia says,” The Canadian Press, February 28, 2009.
- 10 Steven Chase, “Ottawa rebukes Russia for military flights in Arctic,” *The Globe and Mail*, February 28, 2009.
- 11 Christopher Westdal, “Succeeding Putin in Power, Notes for Luncheon Remarks,” *Arctic Security in the 21st Century*, Conference Report, Simon Fraser University, April 11-12, 2009.
- 12 Doug Saunders, “Hands off our Arctic, Canada tells Europeans,” *The Globe and Mail*, May 16, 2009.
- 13 Steven Chase, “Russia won’t bully Canada in Arctic, Cannon vows,” *The Globe and Mail*, March 27, 2009.
- 14 General Victor E. Renuart, Jr. (USAF, Commander United States Northern Command and North American Aerospace Defense Command), House Armed Services Committee, March 18, 2009.
- 15 *Ibid.*, 2009 Canadian-American Border Trade Alliance Annual Conference, May 5, 2009.
- 16 “U.S. sub visit embarrasses Canada,” *The Star Phoenix* (Saskatoon), December 20, 2005.
- 17 USN COMSUBPAC press release, 5/28/03.
- 18 Raytheon Corporation, Annual Report for FY1999 (unclassified version) (Tucson, AZ, January 2001).
- 19 FY2001: “Report on the TLAM-N W80-0,” Nuclear Weapons Council, US DOD. It should be noted, however, that by the terms of the Bush-Gorbachev agreement of 1991, fast-attack submarines were no longer to carry a nuclear payload, and the W80-3 LEP (Life Extension Program) was cancelled in FY06.
- 20 Lt. Dave Ozeck, “USS Charlotte Achieves Milestone during Under-Ice Transit,” *Navy Newsstand*, 12/01/05.
- 21 Bob Weber, “Northern exposure: Surveillance devices keep track of who’s visiting Canadian Arctic,” *The Chronicle Herald*, February 1, 2010.
- 22 “Tupolev-160 ‘Blackjack,’” *Encyclopaedia of World Military Aircraft*, 1992; “A History of Strategic Arms Competition 1945-1972,” Volume 3, *A Handbook of Selected Soviet Weapon and Space Systems*, United States Air Force, June 1976, pp. 40-46; and John Pike, “A Survey of Russian Air-to-Ground and Anti-Ship Missiles,” Global Security Report, 2001.
- 23 *Ibid.* In similar fashion to their B-1 counterparts, a non-nuclear armed cruise missile is being developed to diversify their mission capabilities.

- 24 Robert S. Norris and Hans M. Kristensen, "Russian Nuclear Forces, 2008," *Bulletin of the Atomic Scientists*, May/June 2008.
- 25 Most analysts consider these obsolescent and primarily held in reserve, but they are counted as "active" for purposes of the START Treaty. See Pavel Podvig, "Russian Strategic Nuclear Weapons," Moscow, 1998.
- 26 *Wall Street Journal*, September 15, 2008.
- 27 "Report of the Quadrennial Defense Review," U.S. Department of Defense, May 1987.
- 28 The Chinese are constructing a fleet of nuclear-powered submarines, but Western analysts disagree about their capabilities and date of deployment. See Hans M. Kristensen, "Type 094 (*Jin*-class) SSBN," Federation of American Scientists Nuclear Information Project, April 24, 2008; "MND Keeping Tabs on Beijing's Development of Nuclear Submarines," Central News Agency (Taiwan), December 7, 1999. India is planning a nuclear submarine fleet, but it is still at the technical demonstration phase. Deployment is not expected until after 2020: Sandeep Unnithan, "The Secret Undersea Weapon," *India Today*, January 17, 2008.
- 29 Modern diesel-electric submarines are considerably smaller (1,500-3,500 tonnes) and, when running on electric power, are even quieter and stealthier than nuclear boats. However, they lack the range and payload of the larger nuclear submarines, and cannot stay submerged for more than 36 hours. Recent developments using fuel cell power underwater can increase their time submerged, but none are capable of the lengthy under-ice patrols so critical to Arctic operations.
- 30 Technically, this means that the typical SSBN has a very high polar moment of rotational inertia. For general information on the most advanced American SSBN's, see John Pike, "SSBN 726 Ohio-class FBM Submarines," GlobalSecurity.org, April 23, 1992.
- 31 Here and below, we will be referring to information obtained from conversations and interviews with former and serving nuclear submarine commanders and officers, and senior intelligence officers and other government personnel (serving and retired) from various countries, including the United States, the Russian Federation (and, earlier on, the Soviet Union) and a number of NATO countries. For several reasons, this information cannot be attributed to specific individuals. Some was gleaned from Pugwash workshops, and thus unattributable under Pugwash's "Chatham House Rules." Much of the rest was obtained with the specific understanding that it was not for attribution.
- 32 Norris and Kristensen, "Russian Nuclear Forces, 2008."
- 33 These are NATO designations. There is some dispute concerning the number of the Delta III class boats that are still operational. In 1999 there were at least seven, but by 2002 at least half of these were in major (reactor-replacement) refit, and as of 2009 perhaps as few as two Delta III boats can actually put to sea. At least one Delta III (K-433, *St. George the Victorious*) listed as operational was observed by the author in refit at Zvezda shipyard.
- 34 The accuracy of these numbers is dependent upon the number of seaworthy hulls that carry the missiles, as discussed above. It should be noted as well that all currently deployed SLBM's are liquid-fuelled, and therefore considered obsolete by Western standards.
- 35 It is unlikely that any R-39M's are in deployment. The test launch program has been replete with failures.
- 36 "SEVMASH Confirms Freeze of Borey-class Construction," *The Barents Observer*, December 22, 2009.
- 37 Captain Igor Dygalo in an interview with The Associated Press, June 28, 2007.
- 38 Nonetheless, the Russians claim the program is on track and successful. See "Russia calls ICBM Launch from a Sub a Success," Agence France Presse, November 1, 2009.
- 39 Hans M. Kristensen, "The Nuclear Information Project: Soviet/Russian nuclear submarine patrols," Federation of American Scientists (updated April 16, 2007).
- 40 Hans M. Kristensen and Alicia Godsberg, information sheet produced by the Federation of American Scientists, March 2008.
- 41 Norris and Kristensen, "Russian Nuclear Forces, 2008."
- 42 Paul Richter, "Obama's Nuclear-Free Vision Mired in Debate," *Los Angeles Times*, January 4, 2010; "A False Nuclear Start," *The Wall Street Journal*, January 5, 2010; Julian Borger, "START Stalled," *The Guardian*, January 7, 2010.
- 43 Robert L. Civiak, "Transforming the U.S. Strategic Posture," National Resources Defense Council, Washington, D.C., April 2009.
- 44 In this context, "active warheads" refers to those fully operational and mated to their launch vehicles for use within hours or minutes.
- 45 "Russian Northern Fleet," The Bellona Foundation, February 26, 1996; "The Arctic Nuclear Challenge," The Bellona Foundation, June 1, 2001.
- 46 *Ibid.*
- 47 Robert S. Norris and Hans M. Kristensen, "Nuclear Notebook: U.S. Nuclear Forces, 2009," *Bulletin of the Atomic Scientists*, March/April 2009.
- 48 Hans M. Kristensen, "U.S. Missile Submarines Sustain Active Schedule," Global Security Newswire, March 16, 2009.
- 49 Prime Minister Gordon Brown has recently proposed a unilateral reduction of the British submarine fleet to three boats. See Martin Butcher, "Brown Can Be Bold on Disarmament," *The Guardian*, September 24, 2009.
- 50 Robert S. Norris and Hans M. Kristensen, "British Nuclear Forces, 2005," *Bulletin of the Atomic Scientists*, November/December 2005.

- 51 Robert S. Norris and Hans M. Kristensen, "French Nuclear Forces, 2008," *Bulletin of the Atomic Scientists*, September/October 2008.
- 52 When a ballistic missile submarine leaves port, no one on board knows its precise destination. After a series of careful manoeuvres to ensure his boat is not being tailed by another submarine, the captain opens sealed orders delimiting a large area of ocean the submarine will cruise during its patrol - its "patrol box." These "boxes" are carefully chosen to avoid interference with other "friendly" SSBN's and SSN's.
- 53 Hans M. Kristensen, "Russian Nuclear Submarine Patrols," The Nuclear Information Project, Federation of American Scientists, April 16, 2007.
- 54 Comments from an anonymous Russian naval source.
- 55 "Russian general fires Arctic warning," Canwest News Service, June 24, 2008.
- 56 Mark Mazzetti and Thom Shanker, "Russian Subs Patrolling Off East Coast of U.S.," *The New York Times*, August 4, 2009.
- 57 Michael Hamel-Green, "Existing Regional Nuclear Weapons Free Zones: Precedents that could inform development of an Arctic nuclear weapon free zone," *Proceedings: Conference on an Arctic Nuclear-Weapon-Free-Zone*, August 10-11, 2009, Danish Institute for International Studies, Copenhagen, Denmark.
- 58 Bob Weber, "Denmark joins Arctic arms race," *The Toronto Star*, July 26, 2009.
- 59 *Ibid.*
- 60 *Ibid.*
- 61 Jayantha Dhanapala, "Introduction," *Arctic Security in the 21st Century*, Conference Report, Simon Fraser University, April 11-12, 2008.
- 62 Huebert, Robert "Arctic Security Challenges and Issues," Presentation to The Climate Change-Security Nexus: Implications for Canadian Defence Policy and Operations 2010-2030. Ottawa, January 28, 2010.
- 63 Canadian Pugwash Group, "Canadian Pugwash Call for an Arctic Nuclear-Weapon Free Zone," August 24, 2007.
- 64 Jozef Goldblat, "Nuclear Weapons-Free Zones: A History and Assessment," *The Non-Proliferation Review*, Spring-Summer 1997 (emphasis added).
- 65 In the last few years the U.S. Navy has taken a series of initiatives to increase its presence in the Arctic, and to step up the tempo of its multi-force exercises in the region, under the code name "ICEX." The Navy has granted media outlets an unusual amount of access to these programs, presumably to counter Russian efforts to "show the flag" in the Arctic. See for example David Kerley, "Under the Ice in the Arctic," ABC News, October 14, 2009.
- 66 Especially effective in this ASW role are the Bars (Snow Leopard) class (NATO designation "Akuka") fast-attack submarines, nearly as capable as their American Improved Los Angeles class equivalents.
- 67 Michael D. Wallace, "Towards an Arctic Nuclear Weapons-Free Zone: A step by step approach to overcoming the obstacles," *Arctic Security in the 21st Century*, Conference Report, Simon Fraser University, April 11-12, 2008.
- 68 Even the U.S. Navy will "neither confirm nor deny" the presence of nuclear weapons on board its surface ships, no matter how improbable it is that a particular ship or class of ship would be carrying them.
- 69 A thorough and critical analysis of NATO's Strategic Concept may be found in Ernie Regehr's briefing document "NATO's Strategic Concept and the Emerging Nuclear Abolition Imperative," Project Ploughshares, February 2009.
- 70 *Ibid.*
- 71 Middle Powers Initiative, "Visible Intent: NATO's Responsibility to Nuclear Disarmament," Middle Powers Initiative Briefing Paper, January 2008.
- 72 Hans M. Kristensen, "U.S. Nuclear Weapons in Europe," Natural Resources Defense Council, February 2005.
- 73 Neither of the authors have any training in international law, so this statement is entirely speculative.
- 74 U.S. State Department Briefing Document, December 8, 1995.
- 75 As negotiated with the country concerned.
- 76 Jozef Goldblat, "Nuclear Weapon Free Zone in the Arctic?," *Arctic Security in the 21st Century*, Conference Report, Simon Fraser University, April 11-12, 2009, p. 42.
- 77 Michael D. Wallace, "Towards an Arctic Nuclear Weapons-Free Zone," *Arctic Security in the 21st Century*, Conference Report, Simon Fraser University, April 11-12, 2008, p. 34.
- 78 Michael Byers, *Who Owns the Arctic?* (Vancouver: Douglas & McIntyre, 2009).
- 79 Doug Struck, "Dispute over NW Passage Revived," *The Washington Post*, November 6, 2006.
- 80 Byers, *Who Owns the Arctic?*
- 81 Byers, p. 10
- 82 Wallace, and Adele Buckley, "Establishing a Nuclear Weapon Free Zone in the Arctic," Pugwash, Parliamentarians, and Political Will: Advancing the Agenda for Abolition, Conference presentation, Pugwash, Nova Scotia, July 11, 2008.

- 83 For an excellent analysis in detail, see Jozef Goldblat, *Arms Control: A Guide to Negotiations and Agreements* (Oslo and London: PRIO and SAGE, 1994).
- 84 Jozef Goldblat, "Nuclear Weapons-Free Zones: A History and Assessment," *The Non-Proliferation Review*, Spring-Summer 1997; and Jozef Goldblat, "Nuclear Weapon Free Zone in the Arctic?," *Arctic Security in the 21st Century*, Conference Report, Simon Fraser University, April 11-12, 2008.
- 85 Goldblat, "Nuclear Weapons-Free Zones in the Arctic?," p. 41.
- 86 Goldblat, "Nuclear Weapons-Free Zones."
- 87 *Ibid.*, p. 19.
- 88 *Ibid.*
- 89 Buckley, "Establishing a Nuclear Weapon Free Zone in the Arctic."
- 90 Jeff Head, "The Rapid Growth and Modernization of the PLAN (Chinese Navy)," U.S. Naval Institute, 2009.
- 91 "The Japanese Fleet," Japanese MSDF Information Office, Yokosuka Naval Base, December 2005 (original in Japanese).
- 92 However, the two powers have an informal agreement to maintain it in force until a successor can be negotiated.
- 93 Daryl Kimball, "The Strategic Offensive Reductions Treaty at a Glance," *Arms Control Today*, December 6, 2009.
- 94 *Ibid.*
- 95 The generally accepted definition of an "active" warhead is one fully ready for deployment on a launch vehicle; an "inactive" warhead requires several weeks of preparation before deployment. In practice, the distinction boils down to the presence or absence of the tritium (H3) in the "secondary" or main explosive component in the warhead. Tritium undergoes radioactive decay, so maintaining an "active" warhead requires a difficult process of maintenance to replenish the tritium regularly. An "inactive" warhead is stored without its tritium, which simplifies maintenance but means that readying it for deployment requires a lengthy process to replace the tritium.
- 96 Wallace, "Towards an Arctic Nuclear Weapons-Free Zone," pp. 34-35.
- 97 Byers, *Who Owns the Arctic?*
- 98 Goldblat, "Nuclear Weapon Free Zone in the Arctic?," p. 44.
- 99 Adele Buckley, "Establishing a Nuclear Weapon Free Zone in the Arctic," Pugwash, Parliamentarians, and Political Will: Advancing the Agenda for Abolition, Conference presentation, Pugwash, Nova Scotia, Pugwash N.S., July 11, 2008.
- 100 Goldblat, "Nuclear Weapons-Free Zones: A History and Assessment," pp. 19-21.
- 101 Alexa McDonough and Alyn Ware, "Freeing the Poles of Nuclear Conflicts? Time for an Arctic Nuclear Weapon-Free Zone!"
- 102 Goldblat, "Nuclear Weapons-Free Zones: A History and Assessment," p. 30.
- 103 Michael Hamel-Green, "Existing Regional Nuclear Weapons Free Zones: Precedents."
- 104 Proceedings: Conference on an Arctic Nuclear-Weapon-Free-Zone, August 10-11, 2009, Danish Institute for International Studies, Copenhagen, Denmark.
- 105 "Multilateral Arms-Control Negotiations," Editorial, *Strategic Survey*, v. 79, no. 1, 1978.