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U.S. and Canadian Cooperative Approaches to Arctic Security

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PREFACE

The research and writing of this Note was supported by The RAND Corporation using its own funds. The purpose of this research was to examine why the Arctic region should be of interest to those involved in security affairs for North America, discuss what cooperative mechanisms now exist between the United States and Canada for addressing North American security issues, particularly regarding the Arctic, and finally, identify opportunities for expansion of the joint ventures bearing in mind each partner's security and sovereignty concerns.
INTRODUCTION

Until recently, little attention has been paid to the Arctic other than by those interested in research or the exploitation of natural resources. Generally speaking, the public's notion of world geography has been based on the Mercator projection that pictures the world with an east-west orientation, on which large portions of the Arctic Ocean and northern Canada are generally not even represented. Additionally, the harsh climate of the Arctic does little to encourage the thought of activity in the region. However, this pattern may be changing.

As a polar projection map shows, five countries are adjacent to the Arctic waters. The Soviet Union borders about 50 percent of the entire Arctic perimeter, with Canada being the next largest littoral nation. Until the last few decades, this geographic scheme in the Arctic was of little interest to North American defense planners because the region's extreme temperatures and ice conditions were seen to be a protective buffer against threats from that direction. However, technological advances have started to challenge that perception. Improvements in military technology now allow for operations over, on, and under the ice of the Arctic Ocean.

SOVIET BUILDPUP IN THE KOLA PENINSULA

The possibility for Soviet challenges to North American security grows with the increases in the forces of the Soviet Northern Fleet operating out of the Kola Peninsula, making it one of the largest military basing areas in the world. In terms of submarines alone, the military facilities in the Kola region now include two main SSBN bases, including 100 percent of the newest nuclear subs, the Typhoon and the Delta IV. In recent years, the implications of this buildup have worried European defense planners, but a look at a polar projection helps illustrate why it should be of concern to North American defense planners as well. In terms of air and naval threats, the former becomes
of concern because the polar route is the shortest distance for Soviet ICBMs and intercontinental bombers directed toward North America.

Further, the Arctic Ocean offers access routes into the northern waters of both the Atlantic and the Pacific. Access to the northern Atlantic can be gained through the Greenland-Iceland-United Kingdom (GIUK) gap running along Norway, or south through the Davis Strait on the western side of Greenland east of Canada. Also, the Arctic waters provide several large areas the Soviets could use as protective bastions for SSBNs.

In addition to geography, certainly a contributing factor to this buildup has been the unique water conditions presented by the Arctic Ocean. The edges of the Arctic Ocean are ringed with countless islands, and there is no land mass at the center. Instead, the ocean depths near the North Pole reach to as much as 5000 meters, and are covered in a permanent ice pack augmented by partial ice coverage in nearby areas throughout many months of the year. As the water freezes, it continually rotates and collides against other ice or land masses resulting in fractures, which may then remain open or else allow large blocks of ice to move free and then refreeze either above or below the water line.

The unique water conditions work together to complicate both submarine detection and operation. First, the salinity differences resulting from several different temperature layers cause acoustical refraction. Second, the Arctic waters are much "noiser" than other oceans because of the shifting and breaking of ice, which can add acoustical cover against listening devices. Finally, the ice itself presents an obstacle to overhead or surface antisubmarine warfare (ASW) efforts.

The Soviet Union appears to be learning a great deal about this environment and has adapted its submarine designs accordingly. All of the large Soviet Typhoon-class SSBNs are based in the Kola region and are thought to be the first submarines designed particularly for underice operation. These submarines exploit their design by using a technique called "ice picking" in which they quietly drift for months
while resting immediately below the surface of the ice. In addition, the Soviets have also apparently developed the capability to break through several feet of ice in order to reach the surface immediately before missile firing, thus minimizing the time they are vulnerable to detection.

CANADIAN AND AMERICAN DEFENSE COOPERATION

Given this potential threat posed against North America, it would appear appropriate to examine the defense cooperation between the two nations that would be immediately affected by this threat. Canadian and American cooperation on North American defense issues fall into two related categories: those now managed through strictly bilateral channels (political and operational) and those which fall under a multilateral umbrella. The focal point of the bilateral political cooperation has been the Permanent Joint Board on Defense (PJBD) which, since its establishment in 1940, has served as a sounding board for joint defense issues--political, economic, as well as operational issues. Subordinate to the PJBD is the Military Cooperation Committee (MCC), which deals with the specifics of implementing Board decisions. The MCC considers military agreements and treaties, and will look at issues affecting NORAD; for example, air defense modernization.

The multilateral aspect of defense in this region comes under the NATO umbrella, but really only involves the United States and Canada for planning purposes. The NATO-affiliated Canada/United States Regional Planning Group is responsible for writing the Basic Security Plan, also known as the North American Defense Plan, which details force plans and allocations.

Meeting the Air Threat

In general, it appears that the above mentioned channels for discussion of defense issues have led to firm, stable, cooperative ventures to handle the air threat. Since the establishment of the North American Air Defense Command (NORAD) in 1957, Canada and the United States have cooperated to defend North America against this type of
threat. But while the NORAD facilities of the 1950s and 1960s were judged appropriate for the threat of that period, that can no longer be claimed. To address the threat now presented by long-range bombers, Canada and the United States are cooperating in the North American Air Defense Modernization Program, which includes three major sections of air defense improvements: construction of the North Warning System, Over-the-Horizon radars, and the establishment of five fighter forward operating locations and three AWACs dispersed operating bases. The United States has proposed the Air Defense Initiative (ADI), which would rely upon a space-based surveillance and tracking system to complete the coverage; and Canada apparently plans to participate in the ADI program, though the extent of that participation is unclear.

Naval Cooperation Complicated by Sovereignty Concerns

As outlined above, the United States and Canada have both devoted effort to jointly addressing the air threat to North America; however, the same cannot be said for the subsurface threat. Addressing the surface and subsurface threat to North America is particularly difficult for the United States and Canada because there is not full agreement on all issues. The United States views the Arctic waters as purely a security issue. However, while Canada shares the security concern, the Canadian government also views those waters from the perspective of its sovereign rights. This issue came to the forefront in 1985 with the passage of the American icebreaker Polar Star through the Northwest Passage without Canadian approval. After two years of discussion, the two countries agreed that the United States would request passage permission from Canada when moving its icebreakers through waters held as sovereign by the Canadians. Nothing was said of the movements underwater, presumably because Canada currently has few assets to monitor underwater activity.
The United States' Approach to the Subsurface Threat

In contrast to the cooperation in addressing the air threat, disagreement over sovereignty in the Arctic region has been one of the primary reasons why cooperative arrangements have not extended to monitoring the underwater threat. Instead, the United States and Canada appear to be facing the challenges unilaterally, with the United States perhaps very much ahead technologically. In the past, the U.S. Navy has relied upon its superior capabilities as a balance against the more numerous but noisier Soviet submarines, but many in the Pentagon and in Congress do not feel that the United States has the qualitative edge any longer. The Navy is claiming that its new attack submarine Seawolf will go a long way towards addressing the ASW challenge. Additionally, the Los Angeles-class submarines are being modified for underice operations, and there are later plans for the construction of a new, quieter boat with improved sensors and better underice operating capability.

Canada's Approach to the Subsurface Threat

Much like the United States, Canada is paying increasing attention to its underwater detection capabilities. After a long period of neglect, the Canadian defense forces are now supposed to be undergoing a major modernization program, and heading the improvements list are assets needed to address the growing Arctic threat. In 1987, Prime Minister Mulroney called for the acquisition of ten to twelve nuclear submarines, but budget restrictions led to the program's cancellation. Instead, Canada is building up its surface ASW capabilities and is giving consideration to a variety of hybrid diesel-electric submarines which would provide some underice operating capability. Finally, the Department of National Defense has announced that it will proceed with a program to deploy fixed acoustic sensors in what is held as Canadian Artic waters. The intention appears to be to coordinate the surface ASW assets, underwater arrays, and submarines it would like to acquire, thereby developing a fairly extensive monitoring capability, in part designed to guard Canadian sovereignty against violation, particularly by U.S. vessels.
OPTION FOR EXTENDING COORDINATION?

If Canada succeeds in acquiring an underwater detection capability, some movement monitoring and coordination arrangements will have to be made for the Arctic waters. One of the key issues defining whether a joint effort is possible for monitoring activity has to do with the sharing of information between the United States and Canada. Information-sharing would be an essential part of any joint monitoring plan, and such sharing would require a reorganization of the existing channels of information flow.

Up to this time, the peacetime and wartime channels of information transmittal have insured that Canada has virtually no access to information about the movement of the United States Navy (USN) submarines, because those movements are passed to the USN Command Submarine Atlantic, which also serves as the NATO-sponsored movement authority for the Atlantic. However, unless there is a need to deconflict routes, Canadian naval officers receive little information about the movements of U.S. boats. Currently, it is not at all surprising that this one-way flow of information exists; however, if Canada does pursue the purchase of some hybrid submarine as well as a fixed sonar system, some modification of the command structure described above will probably have to follow. One option for expanding Canadian participation might be to have Canadian naval officers represented on the NATO-sponsored authority.

CONCLUSION

Instead of each nation attempting to unilaterally keep up with the growing threat, Canada and the United States should examine the options of working together to accomplish subsurface monitoring by the sharing of research and development costs, as proposed under the Air Defense Initiative, and by the sharing of manpower and equipment costs, as is being done under the North Warning System. For both countries, competing fiscal pressures coupled with a realization of the necessity of monitoring make this a reasonable option. However, many obstacles stand in the way of such cooperation. In the United States, a central
problem will be to overcome the U.S. Navy's reluctance to share information on ASW technologies and techniques. Also, since Canada is unlikely to have the technology or finances necessary to "go it alone" in the Arctic, it will have to make some sovereignty concessions. Both these problems present themselves as major obstacles, but the fast growth of the threat in the Arctic region has made it obvious that they must be overcome, and soon, to allow for the cooperation essential to insure security in the Arctic.
ACKNOWLEDGMENTS

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I. INTRODUCTION

Until recently, little attention has been paid to the Arctic other than by those interested in research or the exploitation of natural resources. Generally speaking, the public's notion of world geography has been based on the Mercator projection, which pictures the world with an east-west orientation. On such maps, large portions of the Arctic Ocean and the North Pole are not even represented, nor is much of northern Canada. Additionally, the harsh climate of the Arctic does little to encourage the thought of activity in the region. However, this pattern may be changing. The Arctic's geography, or rather the geography of its neighbors, coupled with technological advances, have recently given defense planners an increasing reason to pause and consider the security issues related to the Arctic.

As the polar projection map in Fig. 1 shows, five countries are adjacent to the Arctic waters (the Soviet Union, Norway, Greenland (Denmark), Canada, and the United States). Of those five, the Soviet Union borders about 50 percent of the entire Arctic perimeter, with Canada being the next largest littoral nation. Until the last few decades, this geographic scheme in the Arctic was of little interest to North American defense planners because the region's extreme temperatures and ice conditions were seen to be a protective buffer against threats from that direction. However, technological advances have started to challenge that perception. Improvements in military technology now allow for operations over, on, and under the ice of the Arctic Ocean. With even a quick consideration of Soviet activities in the Far North, it becomes clear that there could be cause for security concerns. Once established that these concerns are valid, it seems appropriate to examine how the two second-largest littoral countries, the United States and Canada, might jointly address this potential threat.
SOURCE: Honderich, p. 10. Used by permission.

Fig. 1--Polar projection
The possibility for Soviet challenges to North American security grows with the increases in Soviet forces operating out of the Kola Peninsula, with an emphasis on underice assets; for example, 100 percent of the Soviets' newest nuclear submarines are stationed in the Kola region. Certainly a contributing factor to this buildup has been the unique water conditions of the Arctic Ocean, which present both advantages and disadvantages to underwater operations.

The potential for Soviet attack against North America has certainly not been lost on either the United States or Canada. The two countries have a long history of cooperation on defense issues, first formalized by President Franklin Roosevelt and Prime Minister Mackenzie King in 1940 with the formation of the Permanent Joint Board on Defense. Such joint ventures played a role in the establishment of the North American Air Defense Command (NORAD) and, more recently, in the upgrading of NORAD systems. The same degree of cooperation, however, has not extended to monitoring the potential threat posed by underwater forces, primarily because of differing claims on sovereignty in the Arctic waters. In the political arena, the United States asserts that much of the region is in international waters, and thus sees Canadian sovereignty claims as invalid. As a result, the United States and Canada appear to be going their own ways in terms of addressing the Arctic threat.

The United States' interest in underice operations dates back to the transit of the USS Nautilus which, in 1958, was the first submarine to make the voyage from the Bering Strait under the Arctic ice to the Greenland Sea. Now that underice operations are sufficiently advanced, attention has turned to the highly technical task of locating other submarines. For example, the U.S. Navy is developing the Seawolf in the hopes of fielding a sufficiently sophisticated antisubmarine capability. Although Canada had to cancel its plans to acquire nuclear submarines, it hopes to acquire some similar capabilities through a beefed-up surface fleet and perhaps a collection of nonnuclear submarines that can function under the ice. These assets would be coordinated with an underwater sonar network that Canada is currently considering.
There are bilateral channels in place to allow joint monitoring of underwater movements, but because the United States is currently the partner with the underice assets, Canada receives very little information about the activities of the U.S. Navy—and this only when it is necessary to deconflict routes with Canada's three aging submarines. However, this one-way flow of information may be forced to change if Canada succeeds in improving its underwater monitoring capability. As will be discussed below, the growing nature of the subsurface threat coupled with American and Canadian limitations in defense spending suggest the need for cooperative research and deployment of a subsurface monitoring system. The United States and Canada would be wise to take note that "the Soviets speak of the [Arctic] region's 'exceptionally important military-strategic value'"¹ and make adequate preparations to face the challenge together.

As an aside, the focus of this research has been on how United States and Canada have addressed the potential challenge to North American territory posed by air and naval forces. Land attacks against North America are not considered here, because they are generally considered to have a very low likelihood of occurring, given Arctic conditions.

Several scenarios suggest that a land attack on North American territory by Soviet troops would be one way for the Soviets to divert American and Canadian attention from a European conflict, since such an attack would require the redirection of transatlantic deployment and resupply routes.² However, most military experts view such an attack as very unlikely, given the logistical nightmare it would present any force operating in that region. Problems presented by temperatures³ and the distances to be overcome to establish the needed logistical support

³ Recent American and Canadian training exercises (called Brim Frost) encountered many of the difficulties presented by extremely low temperatures, such as metal and rubber fatigue. ("Canada, After Losing Eight, Withdraws From Exercise," Washington Times, 31 January 1989, p.6)
links are judged to exceed the limited benefits of attacking the few targets (such as oil installations) in the northern region. Air defense stations could be fruitful targets of such an attack, but the Soviets have air assets available to accomplish the same task.
II. SOVIET BUILDUP ON THE KOLA PENINSULA

The threats posed by Soviet forces operating in the air and water of the Arctic region are receiving increasing attention because of the continuing build-up of the Soviet Northern Fleet located on the Kola Peninsula, making it one of the largest military basing areas in the world. The military facilities in the Kola region now include two main SSBN bases, two strategic bomber bases, 22 main airbases with hardened aircraft shelters, two strategic early warning and target acquisition radar complexes, and approximately 70 percent of the Soviet strategic air defense complexes. ¹ In terms of only submarines, in 1985, 66 percent of the Soviets' SSBN force was stationed on the Kola. Further, 100 percent of the newest nuclear subs, the Typhoon and the Delta IV, are located in that area. ² And apparently this buildup is not slowing: "New and more powerful warships have been added to the Soviet Northern Fleet, indicating there has been no reduction in the Soviet military buildup in the North."³ A recent estimate of Soviet forces in the Kola region is shown in the following table. With such a significant size

Table 1

<table>
<thead>
<tr>
<th>Submarines:</th>
<th>Surface Combatants:</th>
<th>Naval Aviation:</th>
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<tbody>
<tr>
<td>39 SSBN</td>
<td>2 CVV</td>
<td>65 Bombers</td>
</tr>
<tr>
<td>29 SSGN</td>
<td>13 Cruisers</td>
<td>30 Fighters/FGA</td>
</tr>
<tr>
<td>49 SSN</td>
<td>13 Destroyers</td>
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<tr>
<td>7 SSG</td>
<td>42 Frigates</td>
<td>ASW:</td>
</tr>
<tr>
<td>31 SS</td>
<td></td>
<td>80 Aircraft</td>
</tr>
<tr>
<td></td>
<td></td>
<td>65 Helicopters</td>
</tr>
</tbody>
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force in the region, it is obvious that the Arctic has become of great strategic importance to the Soviet Union.

The earlier polar projection map helps illustrate why the Arctic Ocean is becoming an area of increasing strategic importance for air and sea operations. The air threat is all too evident since, as shown by the map, the polar route is the shortest distance for Soviet ICBMs and intercontinental bombers directed toward North America.

Further, the Arctic Ocean offers access routes into the northern waters of both the Atlantic and the Pacific, several of which are shown in Fig. 2. Access to the northern Atlantic can be gained through the Greenland-Iceland-United Kingdom (GIUK) gap running along Norway, or south through the Davis Strait on the western side of Greenland east of Canada. To reach the Pacific, vessels must move through the Bering Strait separating Alaska and the Soviet Union. In a protracted NATO conflict, defense of the Sea Lines of Communication (SLOCs) connecting North American and NATO theaters will become critical to NATO's success, and thus the interruption of those SLOCs will be a major objective of the Soviet naval forces. Also as shown in the figure, the Arctic waters provide several large areas which the Soviets could use as protective bastions for the SSBNs. If a bastion was located under or near the edge of an ice field, the defending forces would have the advantage because of the acoustic conditions of those waters, as will be discussed later.

Ironically, it has been the advancements in American ASW capabilities that apparently drove the Soviet SSBN force into the unique waters of the Arctic. Prior to the introduction of long-range intercontinental SLBMs, the shorter-range missiles demanded that the Soviet submarines operate in the dangerous waters off the North American coasts. However, with the development of the intercontinental SLBMs it became possible for the Soviet submarines to launch their missiles from the relatively safe waters off the Kola Peninsula. 4

Fig. 2--Possible Soviet submarine routes and bastion areas

SOURCE: Lindsey, p. 41. Used by permission.
In the 1970s, American ASW techniques had improved so far that the Soviet fleet could no longer operate as though the Kola were a protected bastion. American submarines, tasked to track incoming and departing Soviet boats, were operating undetected in the supposedly most highly protected waters in the immediate vicinity of Soviet SSBN facilities. The Soviets had extensive protection against air and surface attacks, but with the realization of the full extent of Western ASW technology, the Soviets determined that the waters off the Kola Peninsula were not secure enough. With that, Soviet SSBNs were deployed into the Arctic Ocean where Western ASW techniques for detecting underice operations were judged to be less capable.\(^5\) As indirect evidence of this change in location of SSBN operation, none of the Soviet's Delta-class submarines has been observed passing through the GIUK gap since 1975, according to U.S. naval sources. Also, Soviet "crawl"ers" have been "found or suspected" to be operating in Canadian waters,\(^6\) thus raising speculation that Soviet underwater reconnaissance efforts in the Arctic waters are underway.

Canada's concern over these possible incursions has been stated publicly to the Soviets. Even during a recent trip to the Soviet Union in November 1989, the Canadian External Affairs Minister, Joe Clark, stated that he believed Soviet submarines had made their way into Canadian Arctic waters. Clark's statement followed comments by the Soviet Foreign Minister, Eduard Shevardnadze, who stated "we are prepared to state that Soviet submarines do not enter waters of the Canadian archipelago."\(^7\) Shevardnadze's comment suggests that staying out of the Canadian Arctic is the current Soviet policy, and Clark did not cite any evidence to the contrary. However, the Soviet Union also did not deny that such incursions had occurred in the past, and given the appropriate crisis, the Soviet Navy would no doubt rely upon its past experiences in the Arctic.

\(^5\) Ries and Skorve, p. 28.
\(^6\) "Creepy-crawlers are tracted submarine vehicles which can be driven along the sea-bed. They have been used by the Soviet Union most noticeably in Norwegian and Swedish internal waters." Elizabeth Young, "The Control of the Conflict," in Northern Waters, ed. Clive Archer and David Scrivener, p. 100, p. 107, n. 8.
CONDITIONS OF THE ARCTIC WATERS

The increase in Soviet force concentration in the Kola has occurred in part due to "the proximity, and suitable transit possibilities, of the Kola to the Arctic waters." However, while the Soviets have other major military naval facilities, their operations off the Kola are unique due to the nature of the Arctic waters. The edges of the Arctic Ocean are ringed with countless islands, and there is no land mass at the center of this water body. Instead, the ocean depths near the North Pole reach to as much as 5000 meters, and, as shown in Fig. 3, are covered in a permanent ice pack augmented by partial ice coverage in

Fig. 3--Ice conditions in the Arctic Ocean

SOURCE: Honderich, p. 89. Used by permission.

nearby areas throughout many months of the year. By the end of the
winter, the average thickness of the polar ice is about 10-13 feet, and
by the end of summer, it has usually decreased to about 6-10 feet.9 In
addition, the water movement in the Arctic is influenced by the currents
from the Atlantic and Pacific Oceans, as well as the Earth's rotation.10

As the water freezes, it is continually rotating and colliding with
other ice or land masses. These collisions result in breaks in the ice
exposing open water, known as polynyas, which can comprise up to 20
percent of the surface area in the summer. Additionally, ice movements
can cause rafts of ice to shift and then refreeze into vertical
positions known as "keels" (below the water) or "sails" (above the
water). These two different actions lead to widely differing depths in
the ice. Where open water is exposed and immediately freezes, the depth
of the ice can be as little as one foot; at the other extreme, an ice
raft moved into a vertical position can reach as much as 200 feet down
into the ocean. In addition to ice rafts, Arctic waters are littered
with icebergs which can reach 250 feet above the surface and extend 1200
feet below the water line.11 In the open areas of the ocean, such
obstacles can be avoided, but their presence in narrow and shallow
waterways such as the Davis Strait off western Greenland can greatly
complicate movement around or under them.

The ice and unique water conditions present in the Arctic Ocean
work together to complicate both submarine detection and operation due
to three factors. First, the salinity differences resulting from
several different temperature layers cause acoustical refraction to the
point that unless the operating and detecting devices are in almost the
same thermolayer, detection is very difficult. Second, the Arctic
waters are much "noisier" than other oceans because of the shifting and
breaking of ice, which can add acoustical cover against listening
devices. Some, but not all, of this "natural" noise can be filtered out

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9 Tom Stefanick, Strategic Antisubmarine Warfare and Naval
Strategy, p. 317.
10 Captain T.M. Le Marchand, "Under Ice Operations," Naval War
11 Ibid.
by the more sophisticated sensors. Finally, the ice itself presents an obstacle to overhead or surface ASW efforts; a situation which can clearly be used to the advantage of the submarine, on one hand, but which also complicates its operations since even a nuclear submarine must eventually surface to communicate, confirm a location, and fire missiles.

SOVIET ADAPTATIONS TO THE ARCTIC

The Soviet Union has apparently devoted much effort to understanding how these Arctic conditions might affect scientific and military operations in the region. For example, the Arctic and Antarctic Scientific Research Institute in Lenigrad has a staff of eighteen hundred receiving information from its more than one hundred polar ice stations. Further, military operations in the region have been going on for thirty years, as suggested by a commander-in-chief of the Soviet Naval Forces who was noted for doing "pioneer work on long voyages under the Arctic icecap" in the 1960s.12

The Soviet Union appears to be learning a great deal about this environment and adapting its submarine designs accordingly. All of the large Soviet Typhoon-class SSBNs are based in the Kola region and are thought to be the first submarines designed particularly for underice operation. These submarines exploit their design by using a technique called "ice picking" in which they drift quietly for months while resting just below the surface of the ice.13 In addition, the Soviets have also apparently addressed the problem of how to access the surface to fire their missiles. Any surface activity makes the submarines vulnerable to detection; U.S. naval reports indicate that to reduce this danger, the Soviets have developed the capability to break through several feet of ice in order to reach the surface immediately before missile firing, thus minimizing the detection time.14

14 Craig Covault, "Soviet Ability to Fire Through Ice Creates New
Additionally, submarines can obviously fire through open waters caused by breaks in the ice. These polynyas cover more of the surface area than might be expected. For example, during October in the area immediately to the north of Greenland, between 10 to 20 percent of the surface was open polynyas. Closer to Canada and the United States, in the area north of Alaska adjacent to the Beaufort Sea, the average distance between polynyas during the summer and winter was measured by two submarines:

Polynyas 100 meters wide were encountered along the submarines' tracks every 2 kilometers in summer and every 15 kilometers in winter. Polynyas 200 meters wide (wide enough for a submarine to surface in) were encountered every 4 kilometers in summer and every 25 kilometers in winter. Thus a submarine traveling at a speed of 5 knots would encounter a polynya that was large enough to surface in once every three hours, on the average.\textsuperscript{15}

The last sentence of this quote and the knowledge that the Soviets are strengthening their submarines to break through the ice suggests that the notion of an uninterrupted, and thus protective, cover provided by the Arctic ice is at a minimum misinformed, and probably also very dangerous from the standpoint of a potential defender.

\textsuperscript{15} Stefanick, p. 318.
III. CANADIAN AND AMERICAN ARCTIC DEFENSE COOPERATION

Given this overview of the potential security threat presented to two North American countries, it would seem appropriate to examine the areas of cooperation for addressing that threat. Canadian and American cooperation on North American defense issues fall into two related baskets: those now managed through strictly bilateral channels and those which fall under a multilateral umbrella. The bilateral cooperation breaks down into two groups, with one addressing primarily the political end of defense issues and the other focusing on the operational aspects of joint defense.

The focal point of political cooperation has been the Permanent Joint Board on Defense (PJBD), which was formed under the guidance of the Ogdensburg Declaration signed by Prime Minister Mackenzie King and President Franklin Roosevelt on August 18, 1940. Since its establishment, the main purpose of the PJBD has been to act as a sounding board for joint defense issues—political, economic, as well as operational issues. However, the influence of the Board has changed over the years.

Roosevelt made the first overture to the Canadians about North American mutual defense when, in March 1937, he suggested that American and Canadian staffs meet to discuss problems of continental defense given the growing aggressiveness of Germany, Italy, and Japan. Prime Minister King was reluctant to accept that North America could be the victim of foreign attack, but eventually agreed to these meetings. In the following year, Roosevelt went a step further to promise a Canadian audience in Ontario "that the people of the United States will not stand idly by if domination of Canadian soil is threatened by any other empire." King responded similarly by affirming that "enemy forces should not be able to pursue their way either by land, sea or air, to the United States across Canadian territory."¹ This announcement in August 1938 was the first time both countries had publicly recognized the mutual defense issue.

The issue of mutual defense was raised again, this time by King, when Roosevelt was trying to persuade Churchill to grant the United States 99-year leases on British holdings in the Western Hemisphere in exchange for 50 destroyers. While King supported the transfer of ships, he was also concerned about how naval forces would be strengthened on the western side of the Atlantic. In turn, Roosevelt saw that a defense agreement with Canada could aid American defense preparations, with one by-product being the acquisition of naval and airbases in Nova Scotia. King and Roosevelt met on a train in Ogdensburg, New York, and at Roosevelt's initiative, agreed to establish a permanent joint board on defense to "consider in the broad sense the defense of the north half of the Western Hemisphere."  

The written agreement itself was very informal and in fact has never been ratified by the U.S. Congress or the Canadian Parliament. Nonetheless, this agreement has provided the foundation for a lasting mutual defense arrangement. Since its establishment, the Board has met almost 200 times; it will soon hold its 184th meeting.

The importance of the Board's role has shifted over the years. Historically, the Board met monthly and exercised significant power, bolstered by the close personal ties between the U.S. and Canadian delegation leaders and their respective national leaders. (When the Board was established, as now, the chairman of the national delegation reports directly to the president.) Roosevelt was keenly interested in the Board, and this presidential tie continued for several years, even up through the advent of NORAD in 1957.

At that point, the Board meetings continued but the level of importance changed—NORAD, which quickly became the focus of bilateral discussions, was perhaps "too big" an issue for the Board to address. There were too many political factors involved in NORAD's development for a nonpolitical forum such as the PJBD to handle them. Rather than

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2 Ibid., p. 107.
3 King and Roosevelt met in a railway car and wrote the agreement on the dining car's tablecloth, which was almost carried off to the laundry. (Ibid.)
address potentially very political issues, the Board has limited itself to more "marginal" issues such as payment schemes for aerial refueling training exercises, which can be resolved within this arena. In contrast, Canada's plan to purchase nuclear submarines was never addressed at a Board meeting.4

However, the Board's past pattern of keeping away from the "hot" issues that it has no scope or power to resolve is perhaps starting to reverse. The Board members, prompted by U.S. and Canadian Secretaries of Defense Cheney and McKnight, are now trying to determine how they might revitalize the Board so that it can address critical issues. Much of the impetus for this has probably arisen because of the close personal relationship of George Bush and Brian Mulroney. The most likely first test of the viability of a revitalized Board will come when talks begin on the renewal of the NORAD agreement in 1991.

The Board generally meets three times a year, alternating between the United States and Canada. The American delegation includes representatives from the State Department, Office of the Secretary of Defense, Joint Chiefs of Staff, and the three Services. The Canadian delegation has similar representation.5

Subordinate to the PJBD is the Military Cooperation Committee (MCC), which deals with the specifics of implementing Board decisions. The colonel-level members of the Board are also members of the MCC, but within the MCC they address taskings dealing with military plans only; nothing political or economic. The MCC considers military agreements

4 In fact, an author writing on the history of the PJBD categorized the Board's phases as Phase 1: The War Years (1940-1945); Phase 2: Uncertainty (1945-1950); Phase 3: The Last Fling (1950-1953); Phase 4: Decline (1954-1959); Phase 5: Eclipse (1960-1963); and Phase 6: Limbo (1964-1988). The author's titles for the various periods clearly suggest a decline and imply that, while the Board still exists, its purpose is unclear. (Christopher Conliffe, chapter in Willoughby, p. 150).

5 Interestingly, one obstacle to open discussion between American and Canadian officers is the difference in rank. The primary American service representatives all have two stars, however, there are more two-stars in the U.S. forces than in the Canadian system due to the latter's unified structure and overall smaller numbers, and thus there can be reluctance to speak out on the part of the U.S. service representatives.
and treaties, and will look at issues affecting NORAD; for example, air
defense modernization. The MCC consists of service representatives
only; no OSD or State Department (or their equivalents) are included.
The actual working subcommittees of the MCC meet once or twice a year
and are headed by colonel-ranking officers. The subcommittees consist
of groups looking at mapping and charting, logistics, and oceanography.

The multilateral relations for defense in this region come under
the NATO umbrella, but really only involve the United States and Canada
for planning purposes. The NATO-affiliated Canada/United States
Regional Planning Group (CUSRPG) meets twice a year and has the same
membership as the MCC. The Group was set up when NATO was divided into
regional planning groups, of which North America was one. Eventually
NATO moved towards the military commands which exist today; however,
unlike the other regional groupings, the Regional Planning Group was not
dissolved.6 The CUSRPG is responsible for writing the Basic Security
Plan, also known as the North American Defense Plan, which details force
plans and allocations.7

MEETING THE AIR THREAT

In general, it appears that above mentioned channels for discussion
of defense issues have led to cooperative ventures which are firmly
established to handle the air threat. As noted earlier, the air threat
could come in the form of ICBMs and/or long-range bomber aircraft.
Since the establishment of the North American Air Defense Command
(NORAD) in 1957, Canada and the United States have cooperated to defend
North America against this type of threat. The command was established

6 When the NATO treaty came into force in 1949, the collection of
permanent bodies included five regional planning groups, of which only
one remains in its original form. The groups included Northern Europe
(dissolved 1966), Western Europe (dissolved 1951), Southern Europe
(dissolved 1952), Canada/U.S. (remains) and the North Atlantic Ocean
(responsibility transferred to Atlantic Command on its establishment in
1952). (Facts and Fig.s: The NATO Treaty Organization, NATO Information
Service, Brussels.)

7 Unfortunately, little can be said about these plans in this
unclassified research effort.
to provide warning of a Soviet bomber attack over the Arctic. To this end, a network of 31 radars, labeled the Distant Early Warning Line (DEW Line), was built along a 3,000-mile-long band stretching from Alaska across northern Canada to Greenland.

However, as Canada and the United States were improving their defenses, the Soviet Union was also improving its offensive air capabilities. It soon became clear that the DEW Line could be underflown by Soviet aircraft, and in addition, the DEW Line was found to be ineffective against the growing Soviet ICBM threat. Given that technology did not offer a means to counter the new ICBM threat, the NORAD system was allowed to deteriorate. Even then-Secretary of Defense James Schlesinger did not offer any reason for keeping up the system: "Since we cannot defend our cities against strategic missiles, there is nothing to be gained by trying to defend them against a relatively small force of Soviet bombers."  

The result of this declining interest in air defense apparently extended into the area of missile warning. NORAD receives information on missile launches from its Ballistic Missile Early Warning System (BMESWS), which was built in the 1960s. Even though the system was generally judged to be reliable, a false warning of attack occurred in June 1980, highlighting the need for modernization.  

An investigation of the false warning incident suggested that "the decreasing air defense mission of NORAD, with its resultant lack of priority assignment of resources, has carried over to the missile warning function." Driven by the realization that the system was perhaps now more dangerous than useful in its deteriorating state, Canada and the United States have taken steps to update the entire system. The BMESWS network has been undergoing modernization for the past several years, apparently designed and funded by the United States through NORAD.

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9 A 47-cent computer chip sent out two sets of false warnings that ground- and sea-launched intercontinental missiles were headed toward North America. (Michael Ganley, "NORAD Makes A Comeback As Soviet Strategic Threat Grows," *Armed Forces Journal International*, January 1986, p. 56).
10 Ibid., p. 56.
11 Honderich, p. 106. Honderich claimed that Canada was allowed to give little input into the BMESWS modernization.
There is currently no defense against incoming ICBMs, only detection capability such as that provided by the BM-EWS. In terms of the ICBMs, only sensors located in the Arctic region or in space would be able to track and determine impact points of the incoming missiles. If the Strategic Defense Initiative (SDI) becomes an operating system, the Arctic region could play a critical role, depending upon the type of defense system selected. If the missiles were to be intercepted in mid-course, then ground-based interception weapons would probably be located in Canada, Alaska, Greenland, or Iceland. If located on aircraft or surface ships, the interceptors would have to patrol over or on the surface of the Arctic Ocean. If the missiles were to be targeted immediately after firing, the interception assets would have to be located in space. Or if interception was to be in the terminal phase, then the defenses would be located near likely impact points in southern Canada and the United States.\textsuperscript{12}

While it is very likely that the Arctic will play some role in ICBM defenses, it is still too early in the SDI program to do any more than speculate about the region's involvement. Canadian participation in the SDI program has already received much attention in Ottawa, and as the deployment of some type of system approaches, more controversy undoubtedly will follow. Currently, the Canadian government is not participating in the SDI program, though it will allow individual companies to contract with the United States.

\textbf{Air Defense Modernization}

Great attention is also being paid to managing the growing threat posed by long-range bombers carrying cruise missiles. To deal with this threat, Canada and the United States are cooperating in the North American Air Defense Modernization Program. On March 15, 1985 at the "Shamrock Summit" in Quebec City, President Reagan and Prime Minister Mulroney signed the North American Air Defense Modernization Memorandum of Understanding which included three major sections of air defense improvements, as shown in Fig. 4.

\textsuperscript{12} George Lindsey, "Arctic Perspectives From Different NATO Viewpoints," \textit{Nato's Sixteen Nations}, December 1988, p. 53.
COMPONENTS OF NORAD'S NEW AIR WARNING SYSTEM

a) North Warning System: 13 Minimally-attended long-range radars
   (11 in Canada)
   39 unattended short-range radars
   (36 in Canada)

b) Over-the-Horizon Backscatter Radar (OTH-B): 4 long-range radar
   (1 in Alaska and 3 in continental U.S.)

c) Five Canadian Arctic airstrips to be upgraded for interceptor use


Fig. 4--NORAD's modernized air defense warning system
The first part of the modernization effort is the construction of a new network, the North Warning System (NWS), which is to be developed in two phases, the first scheduled to be operational by 1992. The new system will consist of 13 minimally manned long-range radars (11 in Canada) and 39 unmanned short-range radars (36 in Canada) designed as gap-fillers between the larger systems. Canada will pay 40 percent of the total bill of $1.3 billion for this new system\textsuperscript{13} and will be the system manager and integrator of the second phase.\textsuperscript{14}

With this cost and responsibility sharing, Canada apparently sees the system's development as an opportunity to exert military sovereignty. Unlike the DEW Line stations, the new NWS facilities in Canada will be manned by Canadians rather than Americans. In an additional exercise of national sovereignty, President Reagan and Prime Minister Mulroney signed an agreement in 1985 transferring control of the remaining DEW Line stations to Canada, effective 1989.\textsuperscript{15}

The second component of the NORAD improvement effort will involve the installation of Over-the-Horizon (OTH) radars designed to extend air coverage over the Atlantic and Pacific approaches.\textsuperscript{16} This $2.3 billion system will be funded entirely by the United States, but will be partially manned by Canadians. Airborne Warning and Control (AWAC) aircraft will be used to fill gaps or thicken coverage in the system, and while the aircraft will be U.S.-owned, Canadian crews are supposed to be trained for AWACs flights.\textsuperscript{17}

\textsuperscript{13} The entire modernization program has several components other than those mentioned here, and in total is expected to cost $7 billion. Of that total, Canada is scheduled to pay only 12 percent which is related to the NWS improvements. (Ganley, p. 61.)
\textsuperscript{15} Ibid., p. 23.
\textsuperscript{16} The OTH systems cannot operate in northern Canada. The OTH technology relies on the reflection of energy off the troposphere (the atmospheric layer below the stratosphere). The electromagnetic disturbances arising from the Aurora Borealis in northern Canada make the OTH reflections unreliable. (Honderich, p. 109).
\textsuperscript{17} \textit{Challenge and Commitment: A Defense Policy for Canada}, Minister of Supply and Services, Ottawa, Canada, 1987, p. 56.
The third portion involves the establishment of fighter forward operating locations (FOLs) and AWACs dispersed operating bases (DOB). The need for the FOL/DOB was a reaction to the presumed growing threat posed by Soviet aircraft's penetration capability. CINC NORAD determined the need to contact Soviet aircraft before they were able to penetrate too far into Canadian airspace. Prior to this program, no airbases were far enough north to allow for tactical warning and assessment of incoming aircraft. A total of eight airbases are involved in this modernization program in the hopes of providing this tactical level capability.

Five of the eight airbases will be used as forward operating locations for fighters: Kuujuaq, Iqaluit, Yellowknife, Inuvik, and Rankin Island. These five locations are already operating airfields, though their usage is primarily limited to small civilian aircraft. The modernization plan for these bases includes extending the runways, building more alert hangars and alert operations centers, constructing housing for about 200 people, and building munitions and POL storage. Of the five bases involved in this modernization effort, Rankin Island was focused on first since its facilities are considered inferior to the other bases. In contrast, Canadian forces now use Inuvik and Yellowknife, so their upgrading is a lower priority. The intention is that the five airbases be maintained such that they can receive operational deployments of F18s and F15s and their logistical support with only 48 hours notice. In a crisis, these aircraft will be deployed to these facilities to stand on alert and meet cruise missile carriers prior to firing.

The rest of the airbase upgrading program involves the utilization of three existing airfields for AWACs operations. In contrast to the

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18 For more detail, see North American Air Defense Modernization: Supplementary Arrangement Between the United States Air Force and the Canadian Forces on Fighter Forward Operating Locations and AWACs Dispersed Operating Bases, signed by Robert Fowler, Assistant Deputy Minister (Policy), National Defense Headquarters, November 27, 1987; and John Maresca, Deputy Assistant Secretary (European and NATO Policy), Office of Secretary of Defense, December 4, 1987.
five FOLs located far north, the DOBs--Bagotville, Churchill, and Namao--are located further south. These three facilities are now operating civilian airfields and the construction requirements to allow for AWACs operation should be minimal.\textsuperscript{19} As with the FOLs, these DOBs must be maintained such that they can receive operational deployments and logistical support with only 48 hours notice.\textsuperscript{20}

Canada was designated the lead nation in implementing this upgrade program and as such, is responsible for design, construction, contracting and management of these facilities. And once in operation, Canada will manage the facilities in accordance with Canadian laws and regulations, including safety regulations and standard operating procedures. The construction and equipment costs associated with the upgrading program at all eight facilities is supposed to be split equally between the United States and Canada;\textsuperscript{21} however, when suitable equipment and facilities already exist at a location, those items should be involved in the upgrading program in the hopes of reducing actual costs. A list of minimum-essential requirements was drawn up in 1985 and has undergone repeated revisions which have been accepted by both countries. The cost plans call for each country to pay 50 percent of this program until all the items on the minimum-essential requirements list are addressed. Once the facilities are fully operating, support and maintenance costs will all be paid by Canada since its civil airline industry will benefit through the improved facilities. No U.S. personnel or fighter aircraft may be permanently based at these facilities in peacetime, and when either country deploys aircraft into these facilities for training, each country will be responsible for the

\textsuperscript{19} The AWACs operating out of these facilities will belong to the United States, but there will be some Canadian controllers on board. 
\textsuperscript{20} For both types of facilities, normally 30 days warning is provided for training deployments.
\textsuperscript{21} Canada has actually footed the full bill so far and is expecting U.S. reimbursement once repayment terms can be worked out. U.S. firms are to have the opportunity to "compete on an equal basis with Canadian firms for award of construction contracts wholly or partially funded by the U.S. government." (North American Air Defense Modernization: Supplementary Arrangement on FOLs and DOBs, p.5).
costs associated with its own deployment, support, and maintenance expenses.  

While there seems to be a trend at least in Europe towards drawing on the local community for peacetime and wartime maintenance, such an option is not anticipated for these FOL/DOBs. The concept of joint logistical support within NORAD is apparently rather new, and while the opportunities for bilateral cooperation are still under consideration, little joint maintenance is planned for these FOLs or DOBs. These airbases are located in very isolated regions and the local communities apparently cannot supply aircraft maintenance personnel, as suggested by the fact that even the local airlines bring in their own maintenance experts.

Air Defense Initiative

In 1986, the United States announced a new research program which is designed to complement the above mentioned improvements. When fielded, the NWS and the OTH radars will improve North American air defense capability, but the systems will still have weaknesses. In particular, they do not track cruise missiles or aircraft once they have moved through the area of coverage.  

The proposed Air Defense Initiative (ADI) would rely upon a space-based surveillance and tracking system to complete the coverage. Canadian participation in the ADI project has been sought by the United States and, according to the 1987 White Paper, Canada plans to participate.

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22 More specifically, Canadian financial responsibilities will include 50 percent cost of design, acquisition of additional common base support equipment; operations and support costs; providing deployment kits and support packages associated with its aircraft; and operation and support and integrated logistics support of all common base support equipment. Similarly, United States financial responsibilities will include 50 percent cost of design, acquisition of additional common base support equipment; incremental costs caused by U.S. deployments including FOL, personnel support, and additional airfield services required solely because of the deployment of U.S. aircraft; and providing deployment kits and support packages associated with its aircraft. (Ibid., p. 6.)


25 Challenge and Commitment, p. 56. (A brief background on this White Paper begins on p. 32.)
While there are apparently plans for Canada's participation, the exact extent of desired as well as possible participation is unclear. Ever since the issue of bilateral cooperation was brought up in April 1986, the NORAD commander has supported Canadian participation in the ADI program. While most of ADI's early development was undertaken with U.S. funding, Canadian representatives participated in the initial discussions through NORAD staff, and have continued in areas such as the development of requirements, technical advice, and evaluations. Additionally, Canadian industry has become involved in ADI; two Canadian aerospace companies are subcontracting to U.S. firms developing the surveillance portion of the ADI Architecture Studies.26

NAVAL COOPERATION COMPLICATED BY SOVEREIGNTY CONCERNS

As discussed above, the United States and Canada have both devoted effort to jointly addressing the air threat to North America; however, the same cannot be said for the subsurface threat. Addressing the surface and subsurface threat to North America is particularly difficult for the United States and Canada because there is not full agreement on all the issues. Much like the air threat, the United States views the Arctic waters from purely a security standpoint. However, while Canada shares the security concern, the added dimension is that the Canadian government also views those waters from a sovereignty perspective. This difference in perspective has prevented a repeat of the relatively smooth cooperation experienced with air defense. The following passage clearly outlines the Canadian position:

Beyond its territorial boundaries, a state has exclusive jurisdiction over the natural resources of certain marine and submarine areas off its coast. The marine area extends to 200 nautical miles from the coast or from the baselines from which the breadth of the territorial sea is measured. The submarine area extends to at least 200 nautical miles.27

The difference between these positions became most pronounced with the voyage of the American ship *Polar Sea* through the Northwest Passage in 1985. The United States had consulted and informed the Canadian government of the *Polar Sea*’s plans, but did not receive Canadian approval before moving into the Passage. Canadians saw this voyage as a clear affront to their claim of national sovereignty over the waters of the Passage; so much so that then-Secretary of State for External Affairs, Joe Clark, issued a statement in September 1985 clarifying the government's policy on Canadian sovereignty over the Passage:

Canada is an Arctic nation. The international community has long recognized that the Arctic mainland and islands are part of Canada like any other, but the Arctic is not only a part of Canada, it is a part of Canadian greatness. ... Canada's sovereignty in the Arctic is indivisible. It embraces land, sea, and air. It extends without interruption to the seaward-facing coasts of the Arctic islands. These islands are joined, and not divided, by the waters between them. They are bridged for most of the year by ice. ... The policy of the Government is to maintain the natural unity of the Canadian Arctic archipelago and to preserve Canada's sovereignty over land, sea, and ice undiminished and undivided.\(^2^8\)

In contrast, the American position was that the Passage was an international waterway and, as such, transit could not be restricted by the bordering country. The position of the United States on this issue is hardly surprising given the implications of resolving the issue one way or the other. If the United States agrees with Canada that the Passage is indeed a national waterway under the jurisdiction of the Canadians, then the freedom of movement of U.S. naval forces could be restricted or even denied, and of equal concern, ship movements that are usually very tightly held due to security concerns would be more widely known. However, if the Canadians and Americans come to the agreement

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that the Passage is an international waterway, then any nation's vessels could move through those waters. This position raises U.S. concern because Soviet vessels (attack submarines, surface vessels, and ASW aircraft) would be allowed unimpeded access to those waters. That would clearly worry North American defense planners, since the air defense stations run parallel to the Passage and at some points the air defense line is on the Passage.29

Following much discussion over the sovereignty of the waters claimed by Canada, in January 1988 the United States and Canada signed an agreement calling for general cooperation on the Arctic, although it is more specifically focused on the sovereignty problems raised by the transit of the Polar Star. The full text of the agreement appears in an Appendix; the following passage points to the particular issue of Canadian sovereignty over its internal waters:

The Government of the United States pledges that all navigation by U.S. icebreakers within waters claimed by Canada to be internal will be undertaken with the consent of the Government of Canada.30

Apparently, the communication channels established as a result of this agreement function appropriately, because during the Mulroney reelection campaign in fall 1988, the Polar Star again passed through these waters, but only after receiving Canada's consent. The icebreaker had sustained damage while assisting Canadian Coast Guard icebreakers and had to move through the Northwest Passage to exit Arctic waters. This proved to be the first test of the "Icebreaker Agreement,"31 and in contrast to its earlier passage, this one received little media attention.

29 Ibid., p. 10.
30 Agreement Between the United States and Canada on Arctic Cooperation, signed January 11, 1988.
If read closely, it is interesting to note that this agreement really only addresses the issue of transit on top of the Arctic waters, and more specifically, icebreakers; it does not mention underwater activity. Unlike surface movements, Canada currently has few assets to monitor underwater activity, and therefore the agreement's exclusion of the notification requirement for submarine movement is not surprising, especially given the U.S. Navy's interest in maintaining secrecy on the movements of its submarines.

THE UNITED STATES' APPROACH TO THE SUBSURFACE THREAT

In contrast to the cooperative arrangements designed to address the air threat, disagreement over sovereignty in the region has been one of the primary reasons why cooperative arrangements have not extended to monitoring the underwater threat. Instead, the United States and Canada appear to be facing the challenges unilaterally. The United States is proceeding in perhaps a much more technologically advanced mode, as discussed in this section. The section that follows this one discusses Canadian government actions, which suggest at least the intention to acquire underwater detection capability.

An increasing amount of attention is being paid by the United States to the growing number of Soviet submarines and their capabilities. In the past, the U.S. Navy has relied upon superior capabilities as a balance against the more numerous but noisier Soviet submarines, but many in the Pentagon and in Congress feel that the United States no longer has the qualitative edge. In March 1989, Representative Les Aspin began his comments presenting the results of a House Armed Services Committee advisory panel by warning that "Rapid advances in the quieting of Soviet submarines may herald 'a sea change in sea warfare' threatening to undermine America's ability to operate beyond her shores."32 About one-quarter of the Navy's research budget goes to ASW research; however, according to the panel, simply devoting more money to the problem is not the single solution:

We (the committee) believe that the Navy must, in effect, "start over" with new approaches to ASW. This is no ordinary challenge; it is of a different nature and on a different scale than most. What is needed is not simply more money and harder work, important as those may be; what is needed is an entirely new and aggressive architecture for coping with this immensely serious development.\footnote{33}

While the need for improvements in ASW is becoming increasingly clear, the correct course to take is uncertain since "there is no single system that is a panacea."\footnote{34} Air, surface, and subsurface vessels are all involved, each utilizing techniques such as passive and active detection and magnetic anomaly detectors. Although the Navy is claiming that the new attack submarine Seawolf will go a long way towards addressing the ASW challenge, it has come under increasing criticism for being presented as a single-system solution to a multidimensional problem.

The Navy plans to purchase 29 of the SSN-21 Seawolf--with a total price tag of about $34 billion\footnote{35}--which is to be Arctic-capable and is supposed to be quieter and faster than the SSN-668 Los Angeles class, which began entering the fleet in 1988. The SSN-21 is now under construction and should join the fleet in 1995.\footnote{36}

\footnote{33}House Armed Services Committee, News Release, Executive Summary, p. 2.
\footnote{34}Bruce D. Nordwall, "U.S. Navy Debates How to Meet ASW Needs with Tighter Budgets," \textit{Aviation Week and Space Technology}, February 27, 1989, p. 51.
\footnote{36}The Navy has been granted approval by a U.S. district court judge to construct a testing site for the Seawolf in the fishing waters off the southeastern coast of Alaska; a site the Navy claimed was needed because of its "quiet waters." An environmental group sought an injunction against the Navy's construction plans for fear of damage to the waters. (Patrick Tyler, "Navy Cleared to Test 'Stealthy' Nuclear Sub," \textit{Washington Post}, November 12, 1989, p. 14.) While the Navy was granted the go-ahead, this will certainly not be the last court battle between the environmentalists and the military as the latter expands its operations in the Arctic area, where environmental damage can be very severe and lasting.
Despite the technological advances to be included in the Seawolf, critics of the program are concerned that the new attack submarines may not be sufficiently advanced to meet the growing Soviet threat. In March 1989, the Assistant Chief of Naval Operations reported to Congress that "the SSN-21 represents a revolutionary improvement in submarine warfighting capability and will restore the commanding technological and tactical margin which historically we have enjoyed over the Soviets and will maintain this advantage in the far term."\(^{37}\) Despite his optimism, however, there is concern that the Seawolf will not be a match for the long-term threat. The Defense Department Inspector General's Office criticized the threat projection used by those pushing the program, adding that while the system may be sufficient against the threat projected for the 1990s, the Seawolf may be insufficient against the threat in the year 2000 and beyond;\(^{38}\) given that the first boat is not scheduled for delivery until 1995, this criticism seems well founded. Additionally, the recent study commissioned by the House Armed Services Committee mentioned above warned that too much attention is being paid to the Seawolf as the solution to the ASW problem, and not enough is being paid to future requirements:

In our opinion, the Navy's current submarine technology program is unduly restricted to issues relating to the design of its forthcoming class of attack submarines, the SSN-21 Seawolf. While the importance of technological excellence in this new design is beyond question, we believe that more effort on research and development applicable to later designs is equally warranted.\(^{39}\)

While locating Soviet submarines may not be made any easier in the long term by the SSN-21, there are other ways in which submarines can be tracked as they move through the Arctic waters. ASW devices can be lowered from ships through the ice to locate submarines, but such techniques first require openings in the ice, and such openings might

\(^{37}\) Goodman, p. 81.
\(^{38}\) Ibid.
\(^{39}\) House Armed Services Committee, News Release, p. 2.
not always be conveniently located. Another ASW technique is to search for thermal scarring left by passing ships or submarines in the water. However, while such techniques can detect the passage of some type of vessel, it is not possible to determine whether it was a ship or submarine. On the other hand, if a Soviet submarine practices the technique of ice picking and floats in one location for a few days, then its trail of melting ice can be seen on the thermal scarring equipment.

The detection of Soviet submarines is only a part of the Navy's mission, and as those boats increase in quantity and quality, adhering to the Navy's missions as required under maritime strategy becomes much more difficult, particularly in the Arctic waters. The Navy's strategy calls for its forces to deploy as far forward as possible in order to keep the enemy vessels contained in as small an area as possible. In the case of the Arctic, the hope would be that Soviet submarines could be contained in those waters. To this end, the Los Angeles-class submarines are being modified for underice operations, and there are later plans for the construction of a new, quieter boat with improved sensors and better underice operating capability.⁴⁰

CANADA'S APPROACH TO THE SUBSURFACE THREAT

Much like the United States, Canada is paying increasing attention to its underwater detection capabilities. After a long period of neglect, the Canadian defense forces are now supposed to be undergoing a major modernization program, and heading the improvements list are assets needed to address the growing Arctic threat. Canada has long been criticized by the United States and other NATO allies for not carrying its fair share of the mutual defense burden. The most frequently cited proof of this is that, of the NATO alliance members, only Luxembourg and Denmark have smaller ratios of defense expenditures to GNP.⁴¹ Despite its low outlays, Canada still had defense commitments

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⁴¹ Military Balance, 1988-89, International Institute for Strategic Studies, London, p. 224. In 1986, the ratio of defense to GNP were as follows: Canada, 2.2 percent; Denmark, 2.0 percent; and Luxembourg, 1.0 percent. In 1984, only Luxembourg was lower: Canada, 2.2 percent and Luxembourg, 1.0 percent.
to NATO's central region and a deployment commitment into Norway, plus various peacekeeping missions around the world, and finally, of course, Canada has the commitment to defend its own national territory.

When Prime Minister Mulroney came into office in 1984, he called for a review of the nation's military responsibilities, at which point the gap between resources and commitment became quite clear. Complicating this problem of overextension of the Canadian forces, the review discovered the toll that low defense budget levels of earlier years\(^2\) had taken on equipment. Force modernization had almost ground to a halt, thus presenting the Canadian forces with the problem of "rust out"; that is, equipment aging without being replaced. For example, in 1963 there were 45 major warships and 10 minesweepers in commission. Now, the number of warships has fallen over 40 percent to 26, and there are no minesweepers in the current force.\(^3\) The situation was so bleak as to be almost comical if not so potentially dangerous: "Some of the destroyers are so ancient that vacuum tubes for their antique electronics must be imported from--of all places--the Soviet Union."\(^4\)

After several years, the end product of the government's review was the Defense White Paper, published in June 1987. This was the first official general defense planning document to come out of Ottawa since 1971. The 1987 document called for the government to scale back its commitments while increasing funding support for those it considers as vital. The major change in commitments was the withdrawal of Canada's promise to reinforce northern Norway, with a few forces being added to its in-place Central European ground forces. Coupled with this scaled-back mission list, the White Paper also called for a real increase in defense spending of 2 percent over the next 15 years. Of the three

\(^2\) For example, in the early 1960s about 20 percent of the defense budget was spent on new equipment, but by 1972, that figure had fallen to only 9 percent. It was not until 1982 that the figure rose back over 20 percent. In contrast, in 1985 the NATO countries spent an average of 25 percent on capital expenditures. *Challenge and Commitment: A Defense Policy for Canada*, p. 43.
\(^3\) Ibid., p. 44.
military services, the Maritime Forces stood to gain the most from these increased defense expenditures, with the White Paper calling for the purchase of 6 antisubmarine frigates and 10 to 12 nuclear submarines. The $2.5 billion needed for the frigates has been approved, but, as will be discussed below, the prospects for approval of the submarine acquisition plan quickly became less certain.

Submarine Acquisition

The most controversial component of the new military force buildup was the acquisition of nuclear submarines for the Canadian Maritime Forces. The plan outlined in the White Paper was for the Maritime Forces to acquire 10 to 12 nuclear submarines over the next 25 years, with cost estimates ranging from C$5 to C$8 billion. The SSNs were to be either the British Trafalgar-class or the French Rubis-class, with the British submarine estimated to cost $500 million each and the smaller French boat estimated at $350 million each. If Canada decided to purchase the British submarine, the United States would have had to support the sale due to a 1958 agreement between the United States and Britain requiring approval of technology transfers. Approval appeared likely given President Reagan's promise of support for the transfer at a United States-Canada summit in 1988.

The predicted high costs of this submarine program led many Canadians and Americans to argue against the acquisition plan, stating that such a large amount of money could be better spent in other defense and non-defense areas. The United States had long been encouraging Canada to raise its defense expenditures, but increasing the Canadian

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45 David Pugliese, "Canada OK's First Program Funds," Armed Forces Journal, February 1988, p. 34.
46 Critics of the program suggested that the cost estimates were low and that they did not include outlays for the construction of the necessary shore infrastructure, crew training, nuclear fuel, and upgrading of the hulls for Arctic underice operations. ("Fleet of A-Subs Likely to Cost Over $8 Billion, Study Says," Toronto Globe and Mail, January 16, 1987, p. 1.)
defense budget to allow for the acquisition of nuclear submarines was clearly not desired by the Pentagon. Canada received pressure from the U.S. Congress to drop the plan because "there is no need for Canada to perform submarine patrol in the Arctic, where the United States already has considerable experience." In addition, both Canadians and Americans asked what the submarines would do if they actually located an intruder in the Canadian waters; surely the foreign boat (American or Soviet) would not be engaged by the Canadian vessel. Thus, the argument ran, if the mission of these submarines is simply to monitor subsurface movements in an exercise of sovereign control over national waters, there are cheaper ways to accomplish the task. Instead, Americans and many Canadians argued for defense expenditures in other conventional force areas. Finally, as in the process of setting the American defense budget, there were those who lobbied for spending the money on domestic social programs instead of defense.

If Prime Minister Mulroney had not been reelected, the submarines would surely have been immediately cancelled, but even with Mulroney's return to office, their acquisition was still not certain. During the 1988 fall campaign, Mulroney was pressured to focus on controlling the country's $28 billion deficit and on social programs such as a national childcare program, and apparently, he did not defend the submarine acquisition program during the campaign.

In January following his reelection, Mulroney reshuffled his cabinet and moved Defense Minister Perrin Beatty, the primary backer of the submarine acquisition program, to the health ministry. Mulroney was apparently still committed to the submarine program but at the same time had promised that the program would be reexamined in light of competing fiscal pressures. This reexamination eventually led to the program's cancellation. When Finance Minister Michael Wilson submitted the 1990

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51 Ibid.
fiscal year budget on April 27, the submarine plan had been cut. As a result of these cuts, the average 6 percent growth rate of the defense budget from 1985 to 1989 had been reduced to only 1.2 percent.\textsuperscript{52} Obviously, with such low growth in defense expenditures, Canada will have to readdress many of the objectives laid out in the White Paper, due to lack of funding.

**Canadian Plans for Arctic Capabilities**

As a result of the severe budget cuts in April 1989, the Canadian defense forces are undergoing a process of reevaluation to determine appropriate missions. One of the primary missions continues to be sovereignty in the Arctic. In an attempt to guarantee Canadian sovereignty in that region, the existing program appears to focus on four primary components: aerial reconnaissance with the P-3s, Task Groups, underwater acoustic sensors, and submarines.

In terms of airborne surveillance, the acquisition plans called for the purchase of four P-3C Orion patrol aircraft; however, following budget cuts, the total purchase from Lockheed has been reduced to three. These aircraft, to be named *Arcturus*, will be designated for Arctic surveillance. While they will be unarmed, they will be outfitted with high-powered radars. The Arctic surveillance mission is now being done by the *Aurora* aircraft, which is designed and equipped for antisubmarine warfare rather than flying the simpler surveillance missions.\textsuperscript{53}

Despite earlier modernization plans that were much more ambitious, the existing program calls for the following components, most of which have an ASW focus:

\textsuperscript{52} In addition to the submarines, funding reductions involved the following: closure of seven of 45 military bases, reduced operations in seven others, and slowed purchase of light armored and all-terrain vehicles, tanks, and communication systems. "Canada Canceling Plan to Purchase Atom Submarines," *New York Times*, 28 April 1989, p.1.

Canadian patrol frigates. A total of twelve frigates will be purchased, with the first batch of six to be operational in spring 1991 and the second group to follow by late 1992. They will be general-purpose frigates, but with an emphasis on extensive ASW systems such as a towed array sonar operable up to depths of 400 meters.

Update and modernization of Tribal-class destroyers. The four existing Tribal destroyers were built 13 to 15 years ago, and between 1987 and 1992 will receive new gas turbine engines and air defense systems.

Modernization of the two Annapolis-class ships. These two remaining steam-driven ships will be extensively refit for testing of ASW equipment.

New minesweepers. Twelve mine countermeasure vessels are to be in the fleet by 1998.

New shipborne aircraft. Between 38 and 51 helicopters will be purchased for primarily ASW missions, with an operating range of up to 160 kilometers from the parent ship.\textsuperscript{54}

These new assets will be mixed with older systems in a new fleet organization that will be built around Task Groups. Three groups have been formed and, according to the commander of Canada's Maritime Command, "once these absorb new assets and upgraded equipment, the Task Group will comprise highly effective ASW and sea control forces able to operate in the high threat environment and the heavy weather conditions of the Northern waters."\textsuperscript{55} The nucleus of each group will be the refitted destroyers, accompanied by three or four of the new patrol frigates. The frigates in turn will have one of the new shipborne helicopters. A supply ship will accompany the task force to provide logistical support to a five-ship group for up to 60 days. To augment


the on-board ASW capabilities, the commander can call for support from CP-140 Aurora Long Range Patrol Aircraft.\textsuperscript{56}

Finally, the Department of National Defense has announced that it will proceed with a program to deploy fixed acoustic sensors in what is held as Canadian Arctic waters in order to monitor submarine activity.\textsuperscript{57} This recent announcement must involve the expansion of the underwater sensor network since there is already a sensor array in place across Lancaster Sound,\textsuperscript{58} which is the major route into and out of northern Baffin Bay. As explained earlier, sound surveillance under the ice is very complicated because of the noise generated by moving ice; however, it appears that Canada has been able to refine the system's "ear" to the point that ice-generated noise can be filtered out. As might be expected, no sensor locations have been made public, but they will surely be placed in limited-access areas since the open regions are supposed to be patrolled by the Task Groups.

Alternatives to Nuclear Submarines

Like many naval experts, the Canadian Maritime Commander sees the acquisition of some type of submarine as the final ingredient of the navy's fully rounded ASW capabilities. Even though the nuclear submarine program was cancelled, Canada is still interested in having some underice operating capability. One option under consideration is the purchase of diesel-electric submarines.

In the fall of 1989, the Department of National Defense was reevaluating its priorities given its drastic budget cuts; at that time the Maritime Command began urging the purchase of at least six (preferably eight) of this type of boat. Actually, the acquisition of diesel submarines was not a new idea, since there had been a plan to purchase between four and twelve such systems before it was superseded by the controversial nuclear submarine program.\textsuperscript{59} Prior to the decision

\textsuperscript{56} Thomas, p. 32.

\textsuperscript{57} William McKnight, "Outlook for Canadian Defense," \textit{NATO's Sixteen Nations}, August 1989, p. 78.

\textsuperscript{58} Honderich, p. 127.

to buy the nuclear submarines, the Canadians were talking to the Australians about their diesel-electric submarine program, and following the cancellation of the nuclear program, those talks have resumed.\textsuperscript{60}

Canada's three existing \textit{Oberon}-class submarines were commissioned between 1965 and 1968 and are supposed to be retired in the mid-1990s. If the new diesel-electric submarines were to be acquired, they would only act as replacements to the retired \textit{Oberon}-class and would not expand Canadian submarine operating capabilities other than providing additional numbers of boats. The major selling point for the now-cancelled nuclear submarines was their underice operating capability to insure Canadian sovereignty. That requirement still remains, and cannot be met by diesel-electric submarines since they are incapable of operating for long periods under the ice. Currently, the most advanced diesel-electric model can operate for at most twenty hours before having to surface.

In an effort to achieve underice operating capability in a cost-constrained environment, the navy is also examining the possibility of acquiring the developing "hybrid" submarines, known as SSKs or extended diesel-electrics. The "extended" models are said to be air-independent, and one of the more promising designs is being developed in Canada, called the Autonomous Marine Power Source (AMPS). This hybrid submarine would have a small nuclear reactor and a diesel-electric system. The small reactor would give a 2,000-ton diesel-electric submarine\textsuperscript{61} (known as an SSn) unlimited submersion time with a speed of 12 knots. The small nuclear power source keeps the batteries charged without the surfacing requirement. The shortfall of such a hybrid system lies in the system's optimum speed. While normally such a boat would operate at 12 knots, by operating with both batteries and reactor at the same time, the boat could reach 20 knots for a short time.\textsuperscript{62} However, this is far

\textsuperscript{60} "Canada, Australia Talking Subs: Jane's," \textit{The Toronto Globe and Mail}, May 18, 1989, p. B5.
\textsuperscript{61} As reference, these smaller submarines would weigh 2.5 times less than the earlier considered 5,000-ton nuclear submarines.
slower than the 32 knots usually associated with a system such as the British Trafalgar-class.

The small reactors used in such hybrid systems are still under development and have not yet been fully built and tested at sea, however once available, they could be installed in existing diesel-electric submarines when they receive their mid-life refit, or they could be installed in completely new submarines.\\(^{63}\) Ideally, the Canadian navy would like to purchase new submarines to exploit both options; that is, in the near future, purchase some new diesel submarines which could later be retrofitted with the nuclear reactor, and later purchase additional systems with the hybrid operating capability. Cost estimates for this hybrid submarine suggest that its cost would be about 20 percent more than a standard diesel-electric boat, but about half the cost of the nuclear-powered versions, which ranged from $350 million for the French Amethyst to $500 million for the British Trafalgar.\\(^{64}\)

Another suggested option involves procuring a "flock of little submarines"\\(^{65}\) smaller than the AMPS hybrids described above. An Italian company, Maritalia, has developed a mini-sub based on the GST principle (gaseous oxygen stored in a toroidal hull). The GST SSK would be constructed of concentric donut-shaped pipes which contain pressurized oxygen used by the closed-circuit diesel engine. Three experimental submarines have suggested several positive features. For example, the toroidal hull appears to be stronger than the plated steel of equal weight, plus it allows for faster construction than required to weld together two thick steel plates. Noise reduction appears possible because exhaust gases can be stored rather than ejected into the sea (an estimated 80 percent reduction), and the toroids reduce noise further by muffling internal engine noises.\\(^{66}\)

\\(^{63}\) Ibid.
\\(^{64}\) Ibid.
\\(^{66}\) Ibid.
While an interesting concept, the GST principle needs to be examined for compatibility with Canadian underwater requirements. The experimental versions built by Maritalia have been very small (about 29 tons) so obviously a scaled-up version would be required. Canadian requirements appear to be a range of six to eight thousand miles, totally air-independent propulsion, and high tactical speed. To meet those requirements, Maritalia estimates a 1,750-ton vessel would be appropriate; somewhat smaller than the AMPS hybrid described above, with probably a similar price tag.67

Another alternative to purchasing the larger versions of the AMPS SSK or the GST SSK would be to buy several small GST SSKs, thus allowing more extensive coverage of Canadian coastal waters. The smaller submarines have an estimated range of only 2,000 nautical miles at 8 knots, which is well short of desired characteristics, but with an estimated construction time of only two years, a flock of such mini-sub is under consideration since it might provide sufficient interim coverage.68 Whatever the final configuration of the submarine force, it would appear that the intention is to coordinate the Task Groups, underwater arrays, and submarines to develop a fairly extensive monitoring capability, in part designed to guard Canadian sovereignty from violation by U.S. vessels.

Given the shifts in procurement plans from the nuclear submarines to the alternatives described above, it might appear that Canada and the United States do not share the same perception of the threat. Canada was seriously interested in purchasing the nuclear submarines, and they were to be the focal point of Canadian defense forces for many years to come--both physically as well as psychologically. The psychological dimension comes in because the submarine purchase also appeared to

67 Maritalia estimated that the cost of a 1,400-ton GST SSK would be about $168 million, and once sized up, it would probably be in the range of the AMPS SSK, which was $175 to $250 million. (Ibid.)
68 These smaller versions would be 150 tons, with a burst speed of up to 25 knots, and two to four torpedoes. A two-week mission endurance was estimated. At an estimated cost of about $30 million each with sonar, at least a dozen of this GST model could be procured for the cost of one SSN. (Ibid., p. 22.)
symbolize Canada's intention to "come into its own" in terms of defending itself. The perception was that Canada would no longer allow the United States to carry the burden of North American defense. That position had been costly to Canada in terms of its national sovereignty; the call to purchase the nuclear submarines, and even this modified package, indicate an interest to discourage future challenges to Canadian sovereignty.

If fully fielded, Canada's assets operating in the Arctic will be oriented more towards monitoring activity rather than physically deterring an intruder. Put simply, the focus will be on radios rather than torpedoes, and thus Canada clearly wants intruders (both American and Soviet) to know they are being observed. In contrast, U.S. naval assets appear much more offensive. At this point, it does not appear that Canada's domestic politics will allow much more. Thus while there may not be differing perceptions of the Soviet threat, Canada sees itself as having to also prepare for American threats to Canadian sovereignty.
IV. OPTION FOR EXTENDING COORDINATION?

If Canada succeeds in acquiring an underwater detection capability, as suggested above, some movement monitoring and coordination arrangements will probably have to be made for the Arctic waters. One of the key issues defining whether a joint effort is possible for monitoring activity has to do with the sharing of information between the United States and Canada. Information sharing would be an important part of any joint monitoring plan, and such sharing would require a reorganization of the current channels of information flow.

Up to this time, the peacetime and wartime channels of information transmittal have insured that Canada has virtually no access to information about the movement of the U.S. Navy submarines. As might be expected given the U.S.N. penchant for holding submarine movements at the highest levels of security, the Canadian naval officers receive little information about the movements of U.S. boats unless there is a need to deconflict routes.

As is widely known, the NATO commander of the Atlantic (SACLANT) would only assume control over national forces once those forces had been transferred from national command in time of crisis or war. Once under his control, SACLANT could transfer those forces to the Commander-in-Chief Western Atlantic Area, and subordinate to him, to the Commander Submarine Forces Western Atlantic Area (COMSUBLANT). While Canadian naval officers serve on the SACLANT's staff, they are not represented on the staff of COMSUBLANT because of the small size of Canadian submarine forces.¹

The one-sided transfer of information becomes obvious when it is considered that COMSUBWESTLANT's staff consists entirely of U.S. naval officers attached to the Commander Submarine Atlantic (COMSUBLANT) who, in peacetime and wartime, control all U.S. submarines in the Atlantic. In peacetime, the movements of Canada's three submarines are reported to

the Submarine Movement Advisory Authority (SMAA), which is a NATO-sponsored water-management mechanism. The purpose of the SMAA is to insure there is no conflict over transit routes of submarines operating in its area of responsibility. In the western Atlantic, the SMAA is COMSUBWESTLANT. As a result, Canadian submarine movements are known to the United States through COMSUBWESTLANT (and its other "hat," COMSUBLANT); however, unless it appears there might be conflict in routes, Canada is not notified of U.S. submarine movements. In the case of operations in the Arctic, deconflicting transit routes has not been an issue since Canada does not have any underice operating capability. As a result, the U.S. Navy frequently operates in only the "info in" mode, particularly regarding Arctic movements,² even though much of the Arctic waters are considered part of Canadian sovereign territory.

Currently, it is not at all surprising that this one-way flow of information exists. However, if Canada does pursue the purchase of a hybrid submarine to obtain underice operating capability, some modification of the command structure described above will probably have to follow. As suggested by the commander of the Canadian Maritime Command:

> When we have submarines of the force that we are talking about, we will be a full participant... I suspect that anybody operating in waters of interest to Canada will make sure Canada knows about it, because the prospect of blue bumping into blue in the night at 600 feet is not entertaining.³

One option for expanding Canadian participation might be to have Canadian naval officers represented on the COMSUBWESTLANT staff.⁴

Assuming Canada does acquire some underwater monitoring capability and the United States nonetheless does not agree to some notification agreement, a political backlash similar to the one arising from the Polar Star is likely to result, severely damaging bilateral relations.

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² Ibid.
³ As quoted in Jockel, p. 30.
⁴ Ibid.
In such a situation, the United States might consider labeling passage routes, such as the Northwest Passage, as internal waters since they are covered by ice most of the year, thus bridging one land mass to another. As cited in the early quote by the Canadian External Affairs Minister, this is essentially the reasoning presented by the Canadians for laying claim to these as internal waters. For the United States, a chief concern would be for the precedent that such a move would set for other waterways, such as the Strait of Gibraltar, which the United States labels as international waters and thus not subject to national control. The United States could make the argument that the waters in Canada differ because of this ice-bridging, a condition that would obviously not hold for the warm waters of the Mediterranean Sea.
V. CONCLUSION

There is much talk all around the Arctic about demilitarizing the region; one suggestion even calls for turning the Arctic region over to the United Nations to manage.\(^1\) As long ago as the early 1970s, the Soviet Union and Canada signed formal agreements establishing an institutional framework for cooperation in non-military areas such as the environment and economics. While such agreements can certainly benefit both sides, the Canadians realize that Soviet interests probably extend past the non-military arena: "In the case of Arctic relations with Canada, the Soviet Union is undoubtedly hoping that cooperation in non-military areas will have an impact on furthering its proposals for demilitarization of the Arctic."\(^2\) Canadians realize that whether or not these demilitarization efforts are successful (and Canadians should certainly keep in mind the buildup of Soviet submarine forces before they judge Soviet intentions in the region), monitoring of activity within the region will still be necessary.

The question could certainly be raised of whether the withdrawal of Soviet forces in Central Europe might also allow for reconsideration of the threat posed by Soviet forces in the Kola Region. While there certainly appears to be justification for lowering security concerns in Central Europe, the same philosophy should not be immediately applied to the Arctic region. In contrast to the Soviet forces that have been stationed in Eastern Europe, the forces based on the Kola Peninsula are obviously located on Soviet territory, and as such, constitute one of the last lines of Soviet defense. Because of this geography, it is unlikely that the concentration of Soviet forces in the Kola region will

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be intentionally decreased. Further, even if less money is devoted to the Soviet military establishment, the assets in that region are so numerous, as well as so sophisticated, that it will be several years before the region appears nonthreatening.

Additionally, the question could be asked of why an effort to monitor the Arctic region needs to be a cooperative venture between the United States and Canada, rather than continue as simply a national effort. As is often the case with cooperative ventures, a critical motivator is money; that is, without access to more than one resource pool, the problem could still be addressed, but with perhaps less than full attention. In this particular case, the United States or Canada could certainly field sufficient assets to monitor the Soviet movements, but the cost burden could be unbearable, as shown by the Canadian effort to field a small submarine force—which would only provide very superficial coverage of the area. The recent pressure in Washington is to cut the defense budget rather than recommend growth in one of the most technologically expensive areas.

As outlined earlier, the undersea threat posed by the submarines based on the Kola Peninsula appears to be growing, but both American and Canadian defense budgets have little room, if any, to singlehandedly face it. The simple facts are that the Americans hold the submarines necessary for underice detection of intruders and, following the cancellation of the Canadian submarine program, continue to hold the only assets. Similarly, while the United States has the technology needed for underice operations, the Arctic Ocean is clearly not the only body of water with which the U.S. Navy must concern itself; thus any growth of the Arctic threat causes further extension of what is expected by many to soon be insufficient naval assets.

Instead of each nation attempting to keep up with the growing threat unilaterally, Canada and the United States should examine the options for working together to accomplish subsurface monitoring, perhaps by the sharing of research and development costs, as proposed under the Air Defense Initiative, and by the sharing of manpower and equipment costs, as is being done under the North Warning System. For
both countries, competing fiscal pressures coupled with a realization of the necessity of monitoring make this a reasonable option. However, many obstacles stand in the way of such cooperation. In the United States, a central problem will be to overcome the U.S. Navy's reluctance to share information on ASW technologies and techniques. Also, since Canada is unlikely to have the technology or finances necessary to "go it alone" in the Arctic, it will have to make some sovereignty concessions. Both these problems present themselves as major obstacles, but the fast growth of the threat in the Arctic region has made it obvious that they must be overcome, and soon, to allow for the cooperation essential to insure security in the Arctic.
Appendix

AGREEMENT BETWEEN THE UNITED STATES
AND CANADA ON ARCTIC COOPERATION

Signed January 11, 1988

1. The Government of the United States of America and the Government of Canada recognize the particular interests and responsibilities of their two countries as neighboring states in the Arctic.

2. The Government of Canada and the Government of the United States also recognize that it is desirable to cooperate in order to advance their shared interests in Arctic development and security. They affirm that navigation and resource development in the Arctic must not adversely affect the unique environment of the region and the well-being of its inhabitants.

3. In recognition of the close and friendly relations between these two countries, the uniqueness of ice-covered maritime areas, the opportunity to increase their knowledge of the marine environment of the Arctic through research conducted during icebreaker voyages, and their shared interest in the safe, effective icebreaker navigation off their Arctic coasts:

- The Government of the United States and the Government of Canada undertake to facilitate navigation by their icebreakers in their respective Arctic waters and to develop cooperative procedures for this purpose;
- The Government of Canada and the Government of the United States agree to take advantage of their icebreaker navigation to develop and share research information, in accordance with generally accepted principles of international law, in order to
advance their understanding of the marine environment of the area;

* The Government of the United States pledges that all navigation by U.S. icebreakers within waters claimed by Canada to be internal will be undertaken with the consent of the Government of Canada.

4. Nothing in this agreement of cooperative endeavor between Arctic neighbors and friends nor any practice thereunder affects the respective positions of the Governments of the United States and of Canada on the Law of the Sea in this or other maritime areas or their respective positions regarding third parties.

5. This Agreement shall enter into force upon signature. It may be terminated at any time by three months' written notice given by one Government to the other.

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