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THE ROLE OF THE ROYAL CANADIAN AIR FORCE AS A FORCE ENABLER IN THE CANADIAN ARCTIC

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INTRODUCTION

The Canadian Arctic has been ongoing political issue for successive Canadian governments for decades. During the Cold War, Canada and the United States cooperated in building defensive infrastructure, radar sites and underwater listening posts, throughout the Arctic Archipelago. As will be shown, this led some critics to argue that Canada was sacrificing its Arctic sovereignty. Some proposed that this lack of sole Canadian military presence would lead to forfeiting Canada's rights to the abundant resources in the area. In the current age of global climate change, the security of the Arctic has again been brought to the forefront. In a much quoted speech by Stephen Harper in 2007, the Canadian Prime Minister said,

> "Canada has a choice when it comes to defending our sovereignty over the Arctic. We either use it or lose it. And make no mistake, this Government intends to use it. Because Canada's Arctic is central to our national identity as a northern nation. It is part of our history. And it represents the tremendous potential of our future."[1]

This is one of many speeches given by the Prime Minister with respect to Arctic sovereignty since his government was initially elected in 2006. Along with these speeches, multiple policy papers have been produced such as *Canada's Northern Strategy: Our North, Our Heritage, Our Future* and *Canada's Arctic Foreign Policy*. These cornerstone documents have established the Government of Canada's (GoC) long term goals for the Arctic and include a Whole of Government (WoG) approach. Many departments, such as the Canadian Coast Guard (CCG), Environment Canada (EC), Canadian Border Services Agency (CBSA) and the Royal Canadian Mounted Police (RCMP), along with the Department of National Defence (DND) all have roles to play. Requiring all of these departments to work together creates challenges, as Jim

[1] Prime Minister of Canada, "Prime Minister Stephen Harper Announces New Arctic Offshore Patrol Ships," last accessed 12 May 2015, http://www.pm.gc.ca/eng/news/2007/07/09/prime-minister-stephen-harper-announces-new-arctic-offshore-patrol-ships.

Balsillie realized when he became involved in the search for the HMS Erebus, "It was obvious to me that the different silos of government didn't co-operate. It was really freezing progress."[2]

In order to further delineate the Canadian Armed Forces (CAF) plans for an Arctic strategy, the GoC published the *Canada First Defence Strategy* (CFDS). This document sets out the GoC expectations of domestic and expeditionary operations of the CAF, including its role in the Arctic. To support the policy statements and expectations, equipment (Arctic Offshore Patrol Ships (AOPS)) and infrastructure (Arctic Training Centre in Resolute Bay, NU) improvements to facilitate a stronger military presence in the Canadian Arctic have also been announced.

All three CAF services, the Canadian Army (CA), Royal Canadian Navy (RCN) and the Royal Canadian Air Force (RCAF) have roles to play in supporting the WoG approach to Arctic sovereignty. However, from a CAF perspective, the RCAF is uniquely poised as the most probable lead service in supporting the other services and OGDs in the Arctic. This is due to the characteristics of air power such as: elevation, payload, precision, reach, speed and stealth. The inherent capabilities that these characteristics proved the RCAF in supporting Arctic objectives will be discussed with the following framework. A background of the Arctic issues will be presented, followed by an examination of the current RCN and CA capabilities in the Arctic. Following this will be an in-depth examination of the RCAF capabilities and how they are essential for enabling operations in the Canadian Arctic, along with future equipment and infrastructure improvements that will improve RCAF capabilities.

BACKGROUND

[2] Chris Sorensen, "Selling the North," *Maclean's Magazine,* Vol 128, No 18 (2015), 26.

With Global Warming becoming an international issue in the past decade, there has been a renewed interest in the Arctic, both within Canada and throughout the world. Canada, and Canadians, seem to have always considered themselves an Arctic Nation, which is consistently reinforced by the GoC in many publications in the past few years. According to *Canada's Northern Strategy: Our North, Our Heritage, Our Future*, "Canada's far North is a fundamental part of Canada – it is part of our heritage, our future and our identity as a country"[3] This strategy document lays the framework and, "four priority areas: exercising sovereignty; promoting social and economic development; protecting the North's environmental heritage; and improving and delivering northern governance."[4]

As Adam Lajeunesse explains in his paper (*Lock Stock and Icebergs?*) during the Cold War, Canada's interest in the Arctic was mostly of a military nature. A large, permanently frozen area, it was known to contain natural resources, however the extraction of them on a large scale was too costly due to the extreme climate and distance from markets. Canadians and Americans felt secure that an overland attack through the Arctic was not an imminent danger, however Soviet bombers carrying nuclear weapons flying over the North Pole to attack North America was a concern. Canada and the United States cooperated on northern defence through the North American Air Defence Command (NORAD) established in 1957. This led to the building of a northern radar warning system, the DEW line, across Canada's Arctic. However, this was largely funded and manned by Americans, leading some question if Canada was relinquishing her sovereignty over the North.[5] Until the fall of communism in the 1990s,

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[3] Department of Aboriginal Affairs and Northern Development Canada, *Canada's Northern Strategy. Our North, Our Heritage, Our Future* (Ottawa: Minister of Public Works and Government Services, 2009), 71-72.

[4] Ibid., i.

[5] Adam Lajeunesse. *Lock, Stock and Icebergs? Defining Canadian Sovereignty from Mackenzie King to Stephen Harper*, (Calgary, Centre for Military and Strategic Studies, 2008), 4.

Canada's Arctic remained to most Canadians, a far off frozen landscape with few people and limited uses.

As Rob Huebert points out, "Until very recently, the Arctic climate has allowed Canadian leaders the luxury of spending very little to secure the region – the North was inaccessible to all but those willing to expend great effort to get there."[6] During the late 1990's, word of global warming began to spread and Canada saw a resurgence in interest in the North. No longer was it secure due to its harsh climate; the thawing of the icepack led to interest from many areas. It has long been known that a large supply of oil and gas are trapped below the Arctic, but extracting was deemed too expensive and dangerous. International shipping companies looked forward to the day that and ice free Northwest Passage will allow a shorter route from the Atlantic to the Pacific Ocean to be feasible. With the potential of greater numbers of ships, aircraft and people in the Arctic, issues such as environmental protection and security brought to the forefront. There have already been cruise ships that have run aground in the Arctic which raises questions on Canada's ability to respond to rescue, salvage and environmental contamination issues.[7] As well, there have been instances of people attempting to illegally enter Canada through the north, raising questions on Canada's ability to secure its northern boundary against terrorists, illegal migrants and organized crime.[8]

The cornerstone document for the CAF is the CFDS. Six core missions that the CAF is responsible are clearly articulated:

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[6]Robert Huebert, "Canada and the Changing International Arctic: At the Crossroads of Cooperation and Conflict," In *Northern Exposure: Peoples, Powers and Prospects in Canada's North*, (Montreal, Institute for Research on Public Policy, 2009), 78.

[7] Canada.com, "Canadian Rescue Capacity Questioned in Wake of Arctic Ship Grounding," Last Accessed 12 May 2015, http://www.canada.com/technology/Canadian+rescue+capacity+questioned+wake+Arctic+ship+grounding/3457291/story.html.

[8] Michael Byers, *Who Owns the Arctic*, (Vancouver, Douglas & McIntryre, 2009), 61.

1. Conduct daily domestic and continental operations, including in the Arctic and through NORAD
2. Support a major international event in Canada, such as the 2010 Olympics
3. Respond to a major terrorist attack
4. Support civilian authorities during a crisis in Canada such as a natural disaster
5. Lead and/or conduct a major international operation for an extended period
6. Deploy forces in response to crises elsewhere in the world for shorter periods[9]

Of these six missions, numbers 1, 3 and 4 can be directly related to missions the CAF could be required to support in the Arctic as part of the "exercising sovereignty" pillar of *Canada's Northern Strategy*. To further elaborate on the CFDS, the Chief of Defence Staff (CDS) released a directive in 2011 that states that, "The CF will employ joint capabilities in Canada's North to support the GOC in achieving its national objectives for the region."[10]

For the other three pillars of *Canada's Northern Strategy*, departments other than DND have the lead roles; however, often DND and CAF are requested to assist in supporting these OGDs. Unfortunately, after years of fighting a war in Afghanistan and fulfilling other high priority missions for the GoC, the CAF has neither the Arctic infrastructure nor the experience to support all potential missions. In the following sections, it will be shown the RCN and CA have only limited capabilities to operate in the Canadian Arctic.

ROYAL CANADIAN NAVY

The history and heritage of the RCN is written on the high seas of the Atlantic and Pacific Oceans during WWII, supporting convoy escorts and anti-submarine operations. After the war, the RCN remained at the forefront of anti-submarine warfare against the rising Soviet threat. Operations in the Arctic have never been at the primary mission of the RCN; the only

[9] Department of National Defence, *Canada First Defence Strategy*, (Ottawa: Government of Canada, 2008).

[10] Darwin Ziprick, "Leveraging Air Mobility to Support Canadian Arctic Sovereignty" (Masters of Defence Research Project, Canadian Forces College, 2014), 40.

icebreaker ever commissioned, the HMCS Labrador, was transferred to the CCG in 1958.[11] In the 1990s, the Mulroney government made an effort to purchase nuclear powered submarines that would have given the RCN some Arctic capabilities, but this never materialized. The current Harper government push on Arctic issues has led to a renewed interest in acquiring ice-breaking capabilities (AOPS) for the RCN, albeit icer-breaking at a limited scale.

Currently the RCN is primarily equipped with the Halifax Class Frigate and Kingston Class Maritime Coastal Defence Vessels (MCDV). Both of these classes of vessels have operated worldwide in support of GoC missions with excellent results for many years. Although both are highly capable and flexible platforms, able to support RCNs stated mission, "to generate combat-capable, multipurpose maritime forces that support Canada's efforts to participate in security operations anywhere in the world, as part of an integrated Canadian Armed Forces"[12], they have very limited Arctic capabilities.

The twelve Halifax Class Frigates were launched between 1992 to 1996 and are in the midst of completing their mid-life upgrades (HCM-FELEX)[13] to allow them to remain the back-bone of the RCN fleet until a new Canadian Surface Combatant (CSC)[14] ship is launched. These ships have very limited Arctic capability, only allowing them to operate in brash ice. This is defined as "first year ice that is non-uniform and in small pieces."[15] Brash ice is simply floating pieces of ice not more than 10 cm thick. For this reason, Halifax Class ships cannot operate in

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[11] The Globe and Mail, "Making Waves: The Navy's Arctic Ambition Revealed," Last Accessed 12 May 2015, http://www.theglobeandmail.com/news/national/the-navys-arctic-ambition/article23290380/.

[12] Government of Canada, "Royal Canadian Navy," Last Accessed 12 May 2015, http://www.navy-marine.forces.gc.ca/en/about/index.page.

[13] Government of Canada, "National Defence and the Canadian Armed Forces," Last Accessed 12 May 2015, http://www.forces.gc.ca/en/business-equipment/halifax-frigate.page.

[14] Public Works and Government Services Canada, "CSC Industry Engagement: Speaking Points for the ADM," Last Accessed 12 May 2015, http://www.tpsgc-pwgsc.gc.ca/app-acq/sam-mps/111214-eng.html.

[15] Defence R&D Canada, *Arctic Maritime Security and Defence: Canadian Northern Security Opportunities and Challenges*, (Ottawa: National Defence, 2005), 53.

the Arctic in any other than summer months. Commander Paul Forget outlines multiple challenges for the Halifax class ships when operating in the Arctic, including navigation, fuel and environmental concerns. In particular, he explains that, "fuelling is such a concern for sustained northern operations that ships proceeding north must typically make arrangements to rendezvous with Canadian Coast Guard ships operating in the Arctic in order to take on fuel while at anchor."[16]

The twelve Kingston Class MCDVs were launched between 1995 and 1998. These ships are more resilient in ice than the Halifax class; and cleared to operate in thin first year ice up to 50 cm thick.[17] They have seen service in the Canadian Arctic during training exercises such as Op Nanook, however their small size, limited capacity and slow speed make them less than ideal of sustained operations so far away from support services.

The GoC announced in February 2015 the contract award for six Arctic Offshore Patrol Ships (AOPS).[18] These ships will be built in Canada, with delivery of the first vessel scheduled for 2018. They will be capable of operating in "first year ice up to 1 metre thick"[19] These new ships will bring new and expanded capabilities, however the RCN admits, "how the ships are going to be deployed in the Arctic is yet to be determined".[20] The proposed Canadian Surface Combatant will be the replacement for the Halifax Class. Though still early in the planning stages, they "do not seem to include certifying the vessels in any way for operations in ice

[16]Paul Forget, "Bridging the Gap: Limitations of Pre-AOPS Operations in Arctic Waters," Naval Review, Vol 7, No 4, (2012), 17.

[17] Defence R&D Canada, *Arctic Maritime Security and Defence: Canadian Northern Security Opportunities and Challenges*, (Ottawa: National Defence, 2005), 54.

[18] Government of Canada, "Harper Government Awards Shipbuilding Contract That Supports Jobs Across Canada," Last Accessed 12 May 2015, http://news.gc.ca/web/article-en.do?mthd=tp&crtr.page=1&nid=924929.

[19] Ibid.

[20]The Globe and Mail, "Making Waves: The Navy's Arctic Ambition Revealed," Last Accessed 12 May 2015, http://www.theglobeandmail.com/news/national/the-navys-arctic-ambition/article23290380/.

covered waters."[21] Thus, in the future the RCN will likely still be equipped with a majority of ships not suitable for Arctic operations.

The final piece to the RCN puzzle is the refueling site at the deep water port in Nanisivik, NU. First announced in 2007, the project was initially slated to be operational by 2015, however the project has been delayed and scaled back from its original design.[22] Currently, the site is scheduled to be operational by 2018, which will provide the RCN with a vital northern resupply and support facility.[23] However, in order for the RCAF to fully support these operations, upgrades will need to be completed on the Nanisivik airport, in order to open it for use to the CC-177 Globemaster aircraft.[24] Currently, only the smaller Arctic Bay airfield is available, limiting air support operations for the facility.[25]

Overall the RCN has limited capability to operate in the Canadian Arctic and, even after the delivery of the AOPS, will still not be able to operate throughout the Arctic year-round. An analysis done for the RCN in 2005 states that, "there is little benefit for the Government to invest significant resources in acquiring platforms with a second year or multi-year ice capability. As this study demonstrates, the Canadian Navy should maintain its interoperable multi-purpose combat-capabilities, and ensure it remains an expeditionary force."[26]

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[21] Paal Sigurd Hilde, "The "new" Arctic – the Military Dimension", Journal of Military and Strategic Studies, Vol 15, Issue 2, (2013), 136.

[22] Sylvain Lescouture, "Forward Operating Location Nanisivik – Halifax's Gateway to Canada's Arctic", Canadian Military Journal, Vol 13, No 1, (2013). 67.

[23] The Canadian Broadcasting Corporation, "Arctic naval facility at Nanisivik completion delayed to 2018," Last Accessed 12 May 2015, http://www.cbc.ca/news/canada/north/arctic-naval-facility-at-nanisivik-completion-delayed-to-2018-1.2980312.

[24] Paul Dittman, "In Defence of Defence: Canadian Arctic Sovereignty and Security," (Master of Defence Research Project, Canadian Forces College, 2008), 48.

[25] W. Barlow, "Keeping up with Arctic Requirements: The Canadian Forces and the Future of the Arctic," (Masters of Defence Research Project, Canadian Forces College, 2013), 37.

[26] Defence R&D Canada, *Arctic Maritime Security and Defence: Canadian Northern Security Opportunities and Challenges*, (Ottawa: National Defence, 2005), iv.

CANADIAN ARMY

Currently the Canadian Army has few forces dedicated to defending the Canadian Arctic. A headquarters, Joint Task Force North (JTFN) HQ is located in Yellowknife, NT with a mission to "exercise sovereignty and contribute to safety, security and defence operations in the Canadian North."[27] To accomplish this task, JTFN commands 440 Squadron (which will be addressed below in the RCAF section), a detachment of 1 Field Ambulance, C Company of the Loyal Edmonton Regiment (an Army Reserve unit) and the Canadian Rangers.

When Canadians think of an Army presence in the Arctic, many think of the Canadian Rangers whose mission is to "to provide lightly equipped, self-sufficient, mobile forces in support of Canadian Forces sovereignty and domestic operation tasks in Canada."[28] The Rangers are made of up over 4000 Inuit at approximately 170 locations throughout the North. Often referred to as the "eyes and ears" of the Canadian Forces in the North[29] these members also provide training in Northern operations to many of the southern Army units during Operations such as Op Nanook and Op Nunaluvit.

In 2007, the CA announced it was standing up Arctic Response Company Groups (ARCG). Four of these groups have been established as consolidated Reserve units associated with the Army Divisions across Canada. "The plan is to have them congregate at least twice a year in the North to conduct cold weather training before returning to their regular, part-time

[27] Government of Canada, "Joint Task Force North," Last Accessed 15 May 2015, http://www.forces.gc.ca/en/operations-regional-jtf-north/jtf-north.page.

[28] Government of Canada, "Canadian Army," Last Accessed 15 may 2015, http://www.army-armee.forces.gc.ca/en/1-crpg/index.page?.

[29] Staff Article. "The Canadian Rangers: A CF Touchstone in Canada's Remote Regions." The Sentinel, (July 2011): 10.

military tasks and civilian employment"[30], according to LCol Cairroni from the directorate of land force development, responsible for reserve issues. Many of these exercises have been completed over the years since the ARCGs have been stood up, allowing the reserve, Rangers and regular force personnel to experience and learn Arctic maneuvers together. With the 2013 standup of the Canadian Armed Forces Arctic Training Centre (CAF ATC) in Resolute Bay, NU, the CA has a permanent presence and support facility in the high Arctic.

The most challenging issues the CA has in the Arctic are transportation and sustainment. With little infrastructure and few roads, the Army would be hard pressed to travel any distance overland. And with the limited number of communities and stored supplies, operations of any duration are difficult to support. The Army has civilian pattern snowmobiles and quad wheel all-terrain vehicles, but these have limited personnel and equipment carrying capabilities. The one military grade of transportation in the CA inventory is the 1980s vintage BV206; a tracked all-terrain vehicle capable of carrying 19 personnel. Initially 78 of these were purchased and approximately 47 remain in the inventory.[31] A very capable vehicle, the BV206 can be used to traverse snow, ice, tundra and other forms of rugged terrain; however the small number and age of the vehicles in the CA inventory indicate that they would not be available to move large numbers of troops at one time. Any other military vehicles in the CA inventory would not be able to operate reliably in the diverse rugged landscape of the North.

Thus, although the CA does have a presence in the Arctic, it is small and limited by transportation and support issues. Long duration operations in the Arctic by any significant CA force will require a robust support network provided by formations in southern Canada, along

[30]Canadian Broadcasting Corporation, "When Will we Get Serious About Arctic Defence?," Last Accessed 12 May 2015, http://www.cbc.ca/news/canada/when-will-we-get-serious-about-arctic-defence-1.813981.

[31] Canadian American Strategic Review, "Canadian Forces — Hägglunds Bv206 Medium Over-Snow Vehicle," Last Accessed 12 May 2015, http://www.casr.ca/101-army-mosv-bv206.htm.

very long lines of communications. This will be an enduring challenge that the CA will face for the foreseeable future and one for which the only solution is RCAF support.

Although both the RCN and the CA have definite roles to fulfill in the Arctic, they also have some severe limitations. Neither element has sufficient reach to be able to exert their power in the vast expanse of the Arctic. This means they cannot complete the required surveillance to ensure that the Arctic and its approaches are secure. They do not possess the speed necessary to respond to threats or a crisis in the Arctic. Finally, once they have deployed, they do not have the ability to support themselves for any duration in this sparse and challenging landscape. For these reasons, any missions in the Canadian Arctic require a robust RCAF presence.

ROYAL CANADIAN AIR FORCE

In this section, the current capabilities of the RCAF with respect to Arctic operations will be examined by discussing each major airframe and their roles. It will be shown that the RCN and CA require the support of RCAF assets in order to operate in Arctic for any duration. However, the RCAF also requires a boost to infrastructure and equipment in order to be more Arctic capable. Without these upgrades, the abilities of the CAF as a joint force to project power to the most remote areas of the Canadian Arctic will not be realized.

The CP-140 Aurora has been the backbone of Canada's anti-submarine and long range patrol flights since 18 of them were acquired in the 1980s. After finding corrosion and structural issues, it was decided that 10 aircraft would be upgraded in two separate programs. The Aurora Structural Life Extension Program (ASLEP) was implemented to extend the airframe life of

these aircraft.[32] As well, they underwent an extensive equipment upgrade program (Aurora Incremental Modernization Program (AIMP)), making them a state of the art surveillance platform.[33] These surveillance aircraft are in high demand. In domestic operations, they perform long range patrols off the West and East coasts of Canada, both for defence purposes and in support of OGD mandates such as fisheries, CBSA and EC. They also perform NorPats (Northern Patrols), where their 10,000 km range and 17 hour endurance allow them to cover a large patrol area.[34] As well, the Aurora aircraft have recently been tasked with high profile international operations such as Op Mobile (Libya, 2011) and Op Impact (Kuwait, 2015), where they have proven to be extremely capable. However, with only 10 aircraft, having two deployed to overseas operations has a direct negative impact on the ability to fulfill domestic operations.[35] Rob Huebert describes how the lack of Canadian surveillance in the Arctic with respect to fishermen from Greenland and the Faeroe Islands is thought to be occurring. "Canadian Coast Guard officials believe that these fishers have been illegally entering Canadian waters, although, due to Canada's weak surveillance capabilities this has not yet been confirmed."[36] Although the Aurora's radar and EO/IR camera system are perfectly matched to detect this type of surface intrusion on Canadian territory, the reality is that with such a small number of aircraft, they are unable to provide timely coverage of all of the approaches to Canada.

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[32] Canadian American Strategic Review, "CP-140 ASLEP (Aurora Structural Life Extension Project) — MERX ACAN (Advance Contract Award Notice) — ASLEP Kits," Last Accessed 12 May 2015, http://www.casr.ca/doc-acan-aurora-aslep.htm.

[33] Government of Canada, " Royal Canadian Air Force CP-140 Aurora", Last Accessed 12 May 2015, http://www.rcaf-arc.forces.gc.ca/en/aircraft-current/cp-140.page.

[34] The Simons Foundation, "Disarming Arctic Security – Fighter Aircraft and Arctic Sovereignty," Last Accessed 12 May 2015, http://www.thesimonsfoundation.ca/sites/all/files/Fighter%20aircraft%20and%20Arctic%20sovereignty%20-%20DAS%2C%20May%2014%202013_0.pdf., 2.

[35] Paul Dittman, "In Defence of Defence: Canadian Arctic Sovereignty and Security," (Master of Defence Research Project, Canadian Forces College, 2008), 48.

[36] Robert Huebert, "Canadian Arctic Sovereignty and Security in a Transforming Circumpolar World," In *Canada and the Changing Arctic*, (Waterloo, Wilfred Laurier University Press, 2011), 21.

One way to improve the availability of airborne surveillance is through the use of UAVs. The RCAF used UAVs in Afghanistan, acquiring them through a two year lease contract with MacDonald Detwiller and Associates Ltd (MDA), however at the end of the Afghanistan mission, the contract was not renewed.[37] The Joint Unmanned Surveillance Target Acquisition System (JUSTAS) program was initiated in 2000 with the intent to acquire a Medium or Heavy UAV system for domestic and international missions.[38] However, in the 14+ years since then, the RCAF has yet to move past the Options Analysis (OA) stage. This is in part due to changing requirements, shifting priorities (both the RCAF and GoC) and fiscal realities. If the JUSTAS program ever comes to fruition, one of its stated area of domestic operations is "Mainland Canada to 85 degrees north, at ranges up to 1500 nm from the operating location"[39] Through experiments like ALIX (Atlantic Littoral ISR Experiment), which saw a Predator type UAV being flown over the Canadian east coast and a combined Northrop Grumman and NASA experiment to fly a Global Hawk UAV across the Arctic, experience is being gained and limitations are learned.[40] For example, during the ALIX experiment, it was determined "that BLOS command (and telemetry) were not practical when using geosynchronous satellites" in the Arctic due to poor "look" angle of the satellites and antenna.[41] Issues such as this will require significant investment of time and research to solve before UAVs can be fully utilized in the

[37] Kyle Welsh, "Task Force Erebus – Providing Essential Support to Canada's Mission in Afghanistan," The Canadian Air Force Journal, Vol 3, No 2 (2010), 19.

[38] Levon Bond, "JUSTAS and Project Epsilon: Integrated Intelligence, Surveillance, and Reconnaissance of the Canadian Arctic," Canadian Military Journal, Vol 11, No4, (2011), 25.

[39]Department of National Defence, "Statement of Operating Intent - Joint UAS Surveillance Target and Acquisition System (JUSTAS) " (Ottawa: Department of National Defence, 2011), 13.

[40] Northrop Grumman, "Northrop Grumman, NASA Fly Global Hawk in Canadian Airspace for First Time to Study Canadian Arctic," Last Accessed 12 May 2015, http://investor.northropgrumman.com/phoenix.zhtml?c=112386&p=irol-newsArticle&ID=1886166&highlight.

[41]Canadian American Strategic Review, "JUSTAS Project Candidates: General Atomics CU-163 Altair/Mariner," Last Accessed 12 May 2015, http://www.casr.ca/bg-uav-justas-altair.htm.

Arctic environment, even if the JUSTAS program ever progresses past the OA stage and the RCAF finally acquires a long range UAV system.

In the future, a mixture of UAV and CP-140 patrols in the Arctic, along with CCG and RCN surface ships could provide an expansive and comprehensive operating picture of the Canadian Arctic and its approaches. The RCAF can provide the elevation, speed, reach and stealth to detect targets at long range and then monitor as they are intercepted by surface forces.

In order to support either CA or RCN deployments to the Arctic, Air Mobility will be called upon to bear the brunt of the logistical requirements. The mission to transport required equipment and personnel to the Arctic and then distribute to austere locations will be challenging for the RCAF. In his recent paper, LCol Darwin Ziprick, addresses many of these issues, demonstrating that the RCAF has the experience and equipment to succeed at this challenge.[42] He discusses how the spoke and hub technique can be used, allowing the CC-177 Globemaster aircraft to carry large loads (up to 72000 kg) to the few major airports in the Arctic. From there, the CC-130J Hercules (payload up to 21,772 kg) and CC-138 Twin Otter (payload up to 2,999 kg) aircraft can distribute the equipment to smaller airports, or austere landing sites.[43] Using these airframes (along with rotary wing aircraft discussed later in this paper), vehicles, personnel and equipment can be relatively quickly dispersed around the Arctic, where there are few roads and overland (or over-ice) travel is extremely difficult throughout the year.

One aspect that LCol Ziprick does not address fully is the challenge presented by a limited number of airframes and crews. The RCAF air mobility fleet is small in comparison to the number of missions it is expected to support worldwide. Currently the RCAF operates 5 CC-

[42] Darwin Ziprick, "Leveraging Air Mobility to Support Canadian Arctic Sovereignty" (Masters of Defence Research Project, Canadian Forces College, 2014),81.

[43] Ibid.,62-69.

177, 17 CC-130J and 4 CC-138, supporting GoC and CAF missions throughout the domestic and international spheres. These commitments often stretch the available resources to the limits. For example, during the CAFs response to Op Renaissance (GoC response to the 2013 Hurricane Haiyan disaster in the Philippines), the RCAF "rented" IL-76s to augment the airlift requirements since insufficient CC-177 assets were available to support both Op Renaissance and ongoing support to the CAF in Afghanistan.[44] This will remain a reality for the foreseeable future as the air mobility forces are constantly under strain to support all assigned GoC missions.

Another issue with supporting Arctic operations is the small number of RCAF aircraft permanently stationed in the Arctic. 440 Squadron operates four 1970s vintage CC-138 Twin Otter aircraft from Yellowknife, NT. These aircraft are tasked with many diverse support missions throughout the Arctic; however with limited range (1400 km) and only four aircraft available, there is limit to how much they can support. These Canadian built aircraft bring exceptional flexibility to the Arctic environment, with the ability to operate with skis, pontoons or "Tundra" tires. This gives the RCAF the ability to land on snow, lakes and tundra which is an essential force multiplier in the Arctic; allowing deployed troops to be supported almost anywhere. Having just undergone a mid-life upgrade (Twin Otter Life Extension Program), these aircraft are expected to operate until at least 2025.[45] After that, a Utility Transport Aircraft (UTA) project is in motion to determine how to replace this versatile aircraft.[46] However there

[44] This fact is not formally published on Government of Canada Op Renaissance websites, however LCol Chuck Mathe, J4 at CJOC presented the PowerPoint presentation acknowledging the IL-76 participation, Last Accessed 12 May 2015, https://ottawaloggies.files.wordpress.com/2013/11/log-ops-update-18-feb-2014.pps

[45] Government of Canada, "National Defence and the Canadian Armed Forces – Aerospace Systems," Last Accessed 12 May 2015, http://www.forces.gc.ca/en/business-defence-acquisition-guide/aerospace-systems.page.

[46] ibid

are some fears the UTA may be a more generic airlifter, with less capabilities in the challenging arctic environment.[47]

Another recent addition to the RCAF fleet are the 15 Ch-147F Chinook helicopters with the last one being delivered in the summer of 2014. The CAF had a small fleet of CH-147s that were sold in 1991[48], thus RCAF is still re-introducing this helicopter to CAF missions, however it will undoubtedly have a role in the Arctic. With a range in excess of 1100 km and able to carry 11340 kg of payload; these aircraft are "particularly good at moving things, especially into places a Hercules or some other fixed-wing airlifter can't go."[49] In preparation for future Arctic missions, personnel from the Aerospace Engineering Test Establishment (AETE) accompanied two CH-147F Chinooks on a mission from Petawawa, ON to Alert, NU to test the navigational equipment of the helicopter. "In proving the integrity of the aircraft's navigational systems in extreme high latitudes, this testing was a key gateway for the Chinook to operate in Canada's North."[50] As well as contributing to the air mobility mission in the Arctic, the CH-147Fs chin mounted Wescam MX-15, which will allow the pilots increased capability in operating in snow conditions, could also contribute to ISR or SAR missions in the Arctic.[51] These aircraft will provide further reach and flexibility when it comes to supporting diverse missions in the Arctic.

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[47] Canadian American Strategic Review, "Twin Option for the Twin Otters: Simple Solutions are often the Best," Last Accessed 12 May 2015, http://www.casr.ca/ft-opinion-twin-otter-options-daly.htm .

[48] Defense Industry Daily, "On The Verge: $4B+ for Canada's Medium-Heavy CH-147 Transport Helicopters," Last Accessed 12 May 2015, http://www.defenseindustrydaily.com/on-the-verge-canadas-47b-program-for-mediumheavy-transport-helicopters-02390/ .

[49] Skies Magazine, "Not Your Grandfathers' Chinook," Last Accessed 12 May 2015, http://skiesmag.com/news/article/21501.

[50] Government of Canada, "Royal Canadian Air Force – AETE Team Tests Chinooks in Canada's North," Last Accessed 12 May 2015, http://www.rcaf-arc.forces.gc.ca/en/article-template-standard.page?doc=aete-team-tests-chinooks-in-canada-s-north/i251tjxk .

[51] Wescam.com, "Rise of the Battalion – Chinook Helps Transform Tactical Aviation," Last Accessed 12 May 2015, http://www.wescam.com/wp-content/uploads/VG-AugSep-LCol-Chris-McKenna.pdf.

The RCAF fighter community also has familiarity with the Arctic region, having spent decades operating in the area with the NORAD mission of intercepting any intrusions of aircraft into the North American Air Defence Identification Zone (ADIZ). Operated out of Bagotville and Cold Lake, the CF-188s deploy to forward operating locations (FOL) located at Iqaluit, NU, Rankin Inlet, NU and Inuvik, NT. Not many statistics are available for these deployments as they are not recorded in public documentation, however, according to Ernie Regehr of the Simons Foundation, a study from US Elmendorf-Richardson joint base in Alaska released in 2012; "shows that from 2006, when Russian patrol flights resumed after a long post-Cold War absence, to the end of 2011, there was an average of 9 NORAD intercepts annually."[52] However, the study does not state how many were intercepted by RCAF aircraft. As well, Regehr points out that, in 2006, the RCAF deployed 2 CF-188s to Cambridge Bay for an Arctic presence demonstration. In order to complete the 2,400 km round trip, two CC-130 Hercules air-to-air re-fueler aircraft were required along with about 80 personnel.[53] This demonstrates the enormity of the effort required for CF-188s to operate in the expansive Arctic. In order to alleviate this, proposals have been made to improve infrastructure at selected Arctic airfields. According to LCol Dittman, "to facilitate this capability the Air Force is examining lengthening FOL runways by 3,000 ft to support Globemaster operations in addition to installing a de-icing capability to expand the operations envelope."[54] This would also aid in CF-188 operations, as the current length of the runways often requires heavily loaded aircraft to engage arrestor cables in order to ensure they do not run off the end of the runway during landing. There have also been

[52] The Simons Foundation, "Disarming Arctic Security – Fighter Aircraft and Arctic Sovereignty," Last Accessed 12 May 2015, http://www.thesimonsfoundation.ca/sites/all/files/Fighter%20aircraft%20and%20Arctic%20sovereignty%20-%20DAS%2C%20May%2014%202013_0.pdf., 5.

[53] Ibid., 1.

[54] Paul Dittman, "In Defence of Defence: Canadian Arctic Sovereignty and Security," (Master of Defence Research Project, Canadian Forces College, 2008), 48.

indications that the RCAF is interested in increasing the infrastructure at Resolute Bay airport. In 2011, the National Post reported that, "the construction of a 3,000-metre paved runway, hangars, fuel installations and other infrastructure has been proposed for the future as part of an effort to support government and military operations in the North."[55] With central location of Resolute Bay within the Arctic and the fact that the CA already operates the CF ATC there, upgrades to the airport that would allow CF-188 and expanded CC-177 operations make sense. Further to this, LCol Ziprick explains in his paper that, "the challenge for the CAF lies in the paradox of the requirement for a small force to project a footprint to cover an enormous area. The task is exacerbated by harsh climate, sparse population and extremely limited infrastructure."[56] He proposes the use of deployable support hubs, again using Resolute Bay as one of the support airports to support the demand of quick response times but limited infrastructure.

CONCLUSION

There is no question that the Canadian Arctic will remain at the forefront of the of the current Canadian Government's stated mandate and the CAF will be involved in supporting the WoG response to this region. The Prime Minister has visited the Arctic many times, often in conjunction with exercises, such as Op Nanook, to impress upon the Canadian population the importance his government places on Arctic sovereignty issues. Although the CAF is only one of many government departments involved, it is unique in that it has high visibility when

[55]National Post, "Royal Canadian Air Force Mulling Major Nunavut Base Expansion, documents show," Last Accessed 12 May 2015, http://news.nationalpost.com/news/canada/royal-canadian-air-force-mulling-major-nunavut-base-expansion-documents-show.

[56] Darwin Ziprick, "Leaveraging Air Mobility to Support Canadian Arctic Sovereignty" (Masters of Defence Research Project, Canadian Forces College, 2014), 69.

deployed to the Arctic and it has the equipment that allows it to operate in the harsh environment.

The RCN has not had a major ice breaking ship since the 1950s and the current fleet of frigates and MCDVs cannot operate in the Arctic, except for in summer months and often only with the assistance of CCG ships for support. The RCN will be receiving AOPS in the near future that will give it some ice breaking capabilities and increase its ability to operate in the Arctic waters during the summer months. These ships will require the RCN to re-learn much of its Arctic seamanship and determine how best to employ these new capabilities. Included in this is a promise of an Arctic sustainment port at Nanisivik, although it has been much delayed and downsized since first announced. However, in order to fully operate in the Arctic, the RCN will still require RCAF aircraft for assistance with logistics, support and surveillance missions.

The CA relies on the Rangers, local Inuit reservists, to support the majority of its Arctic security role. Although highly capable, the Rangers have limited equipment and mobility to provide services throughout the vast Arctic. With a reserve unit stationed in Yellowknife, and four ARCGs based in the south, the CA completes deployments to exercises and operations each year in the Arctic; however they have neither the transport nor logistics to support long term deployments in support of sovereignty operations. With a lack of vehicles capable of providing reliable transport in the rugged Arctic terrain, the CA will be reliant on the RCAF for transport, both to the Arctic and again to disperse forces rapidly throughout the Arctic.

In line with the mandate of the CFDS, all three elements of the CAF must actively pursue challenging missions in the Canadian Arctic. Leading the way, the RCAF is the only element that is uniquely capable to support diverse sovereignty missions throughout the Arctic. With a

robust fleet of aircraft providing the elevation, payload, precision, reach, speed and stealth necessary, all of the other services require the RCAFs capabilities to operate in conjunction with other OGDs in completing GoC objectives in the Arctic strategy. However, further investment in aircraft (UAVs and CC-138 replacement) and infrastructure (FOL upgrades and deployable support hubs) by both the RCAF and GoC is necessary to ensure that future missions can be completed successfully.

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