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RCAF AIR MOBILITY: READY FOR THE ARCTIC?

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Solo Flight

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RCAF AIR MOBILITY: READY FOR THE ARCTIC?

The Canadian Arctic presents an interesting dilemma to the Government of Canada (GoC). On one hand, it contains an abundance of natural resources, sure to provide economic benefits for the foreseeable future. The United States Geological Survey department has suggested that up to 13% of the world's oil reserves, as well as 30% of the world's natural gas reserves, are located in the Arctic.¹ On the other hand, the Arctic contains over 70% of Canada's 200,000 kilometres of coastline, and 40% of Canada's landmass.² Although rich in resources, the sheer size and unpredictable climate provides the GoC with challenges surrounding its ability to both maintain and exercise its sovereignty in the Arctic. As climate change rapidly increases accessibility to the Arctic, the GoC must ensure its various departments have the policies, infrastructure and equipment in place to carry out the tasks assigned by the GoC to ensure security so that Canada's North remains strong and free.

The Canadian Border Services Agency, Canadian Coast Guard, Royal Canadian Mounted Police and the Canadian Armed Forces (CAF) work together to assist the GoC in securing the Arctic.³ These partnerships ensure that the GoC has representation at multiple levels, and benefits from the collective efforts and expertise that each organization contributes. Within the CAF, the Royal Canadian Navy, Canadian Army, Royal Canadian Air Force as well as the Canadian Rangers assist the GoC with carrying

¹ Kenneth J. Bird, Ronald R. Charpentier, Donald L. Gautier, Houseknecht, David W., Klett, Timothy R., Pitman, Janet K., Moore, Thomas E., Schenk, Christopher J., Tennyson, Marilyn E. and Wandrey, Craig J., 2008, Circum-Arctic resource appraisal; estimates of undiscovered oil and gas north of the Arctic Circle: U.S. Geological Survey Fact Sheet 2008-3049, 4 p. <http://pubs.usgs.gov/fs/2008/3049/>.

² The Arctic Institute. "Canada." last accessed January 22, 2021. <https://www.thearcticinstitute.org/countries/canada/>.

³ Canada. Crown-Indigenous Relations and Northern Affairs. Northern Affairs. *Canada's Arctic and Northern Policy*. Ottawa: Canada, 2019.

out its efforts. The RCAF is often called upon to support operations in the North due to its remoteness, the large distances between populaces located in the North, and climate which prohibits movement through its waterways for a majority of the year. It is the purpose of this paper to demonstrate that the RCAF does not possess all the required capabilities required to assist the CAF and Government of Canada in maintaining security in the Arctic. This will be accomplished in three segments. First, this paper will examine the GoC's Arctic and Northern Policies as well Canada's Defence Policy: *Strong, Secure, Engaged* (SSE) to define the RCAF's mandate in the Arctic. Secondly, the paper will examine the RCAF's current infrastructure to determine if it is adequate to enable the RCAF to carry out its missions in the Arctic. Finally, this paper will examine the RCAF's current fleet of aircraft to demonstrate that they do not fully enable the RCAF to meet the requirements listed in SSE.

Policy

In 2008, the Conservative government, led by Prime Minister Stephen Harper, released the Canada First Defence Strategy (CFDS). This document would serve as the blueprint for how the CAF would be utilized to provide security in the North as well as to continue to defend Canada's national sovereignty. Prime Minister Stephen Harper recognized that new capabilities were needed to defend the North, and this would require new equipment and infrastructure.⁴ Recognizing that the Arctic is a resource rich environment, and that the activity in the northern region is increasing as climate change increases the accessibility to the region, CFDS was set to put the CAF in a position that it would be able to assist other Canadian government agencies with providing security in

⁴ Department of National Defence, Canada First Defence Strategy (Ottawa: Canada Communications Group, 2008), 8.

the North, as well as effectively contributing to assist the United States with defending North America from threats in the North.

Directed by the Department of Northern Affairs, the Arctic and Northern framework for safety, security, and defence outlines the GoC's objectives and activities that will be pursued over the next ten years.⁵ This policy identifies many objectives in which the CAF is instrumental in achieving success. The first objective focusses on the relationships with domestic and international partners to overcome the Arctic's complex security challenges. To achieve this, the Canadian government recognizes that the Arctic is a dynamic environment that requires the cooperation of many different organizations at all levels of government to protect. This objective requires a holistic approach requiring many different government departments and agencies to work together in order to achieve success, it is also dependent on our allies (North American Aerospace Defense Command) and the eight permanent members of the Arctic States whose interests are aligned through the Arctic Council (Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden, United States).⁶ The second and third objectives in this policy focus on the requirement for Canada to maintain a military presence in the Arctic in order to respond to safety and security situations in the North, as well as increasing the fidelity of our Canada's Arctic surveillance and control capabilities.⁷ These objectives stipulate that CAF has the "mobility, reach, and footprint required to project force in the region in ways that defend our national interests and sovereignty, and better respond to the needs

⁵ Canada. Crown-Indigenous Relations and Northern Affairs. Northern Affairs. *Canada's Arctic and Northern Policy*. Ottawa: Canada, 2019.

⁶ Arctic Council, "The Arctic Council: A backgrounder." Arctic Council, Last Accessed 20 April 2021. <https://arctic-council.org/index.php/en/about-us>

⁷ Canada. Crown-Indigenous Relations and Northern Affairs. Northern Affairs. *Canada's Arctic and Northern Policy*. Ottawa: Canada, 2019.

of those residing in Arctic and Northern communities”.⁸ The CAF’s contribution to these objectives is further amplified in Canada’s defence policy.

Canada’s current defence policy: *Strong, Secure, Engaged: Canada’s Defence Policy* provides guidance to the CAF on how it will continue to support the Canadian Government in achieving its strategic objectives. Maintaining a multi-faceted approach, balancing the requirements to be *Strong at Home* and *Secure in North America*, SSE directs that the CAF provides support to other government organizations to not only assist with law enforcement and national security matters, but also to maintain public safety through search and rescue operations.⁹ SSE also directs that the CAF “will have improved mobility and reach in Canada’s northernmost territories, and pursue a greater presence in the Arctic over the longer-term”.¹⁰

Mobility and reach are two areas where the RCAF component of the CAF can greatly assist the Canadian government to achieve its safe and secure objectives. RCAF doctrine identifies several air power characteristics that apply to these scenarios. First, *Reach* is a characteristic of air power that can be described as its ability to access areas unhindered by geologic features.¹¹ This characteristic contributes greatly to operations which require mobility around the North. The importance of mobility in the Arctic was highlighted by Colonel Poirier in an Arctic exercise after-action-report where he stated

⁸ *Ibid.*

⁹ Canada. Department of National Defence. *Strong, Secure, Engaged: Canada’s Defence Policy*. Ottawa: DND Canada, 2017, 60.

¹⁰ Canada. Department of National Defence. *Strong, Secure, Engaged: Canada’s Defence Policy*. Ottawa: DND Canada, 2017, 60.

¹¹ Department of National Defence, B-GA-400-000/FP-001, Royal Canadian Air Force Doctrine (Trenton, ON: Canadian Forces Aerospace Warfare Centre, 2016): 14.

that “mobility is Life and Death”.¹² This has been the case on many Arctic exercises where equipment to travel to the Arctic, as well as ground transportation within the Arctic has been insufficient in quantity and quality, thereby jeopardizing the ability to execute the mission at hand. The second characteristic of air power that the RCAF uses to assist the Canadian government in maintaining the safety and security of the Arctic is *Speed*. RCAF air assets have the ability to travel long distances in short order.¹³ This characteristic is particularly useful in the Arctic, where distances between remote locations are vast, and survivability can be dependent on the limited response times which can be projected with air power.

Understanding the policies that direct the CAF and other government organizations enables the RCAF to determine which capabilities are required to fulfill the directed objectives. With this understanding, the RCAF’s access to infrastructure as well as its current equipment can be evaluated to demonstrate that there are gaps which much be filled in order to maintain the capabilities required to secure the Arctic.

Infrastructure

As previously discussed, speed and reach are both characteristics of airpower that enable the RCAF to assist the GoC in accomplishing its northern objectives as laid out in its Arctic and Northern policy framework. However, while speed and reach are both enablers, to achieve these effects, other characteristics must be considered. One characteristic of air power that can limit its effectiveness in the Arctic is that aircraft are

¹² Adam Lajeunesse, Whitney Lackenbauer, and Gregg Centre for the Study of War and Society. *Canadian Armed Forces Arctic Operations, 1941-2015: Lessons Learned, Lost, and Relearned*. Vol. no.1. Fredericton, N.B: The Gregg Centre for the Study of War & Society, 2017, 338.

¹³ Department of National Defence, B-GA-400-000/FP-001, *Royal Canadian Air Force Doctrine* (Trenton, ON: Canadian Forces Aerospace Warfare Centre, 2016): 14.

very sensitive to environmental conditions such as weather, which can have a direct impact on an aircraft's ability to take-off, land, or navigate within a region.¹⁴ The speed and reach advantages are further limited by the large support dependency that air power requires. This section will demonstrate that Canada's Arctic region does not have the required infrastructure to fully capitalize on the benefits of speed and reach which RCAF airpower can project.

Supporting operations in the Arctic relies heavily on RCAF air mobility assets as the remote areas contained within this vast region are often only accessible by air for the majority of the year. Support to the region is further complicated given the distances between these remote areas which must be serviced. There are different methodologies which can be utilized to support these areas. One methodology is to use a hub and spoke system where larger air assets such as the CC-177 or CC-150 aircraft service an Arctic hub location, then a smaller aircraft such as the CC-130J or even smaller CC-138 aircraft transport troops and equipment forward. These Arctic hubs require significant levels of infrastructure to be able to support these operations. For example, these hubs require a runway which is suitable in length, width and has the weight bearing capacity for larger aircraft. Although some runways lengths are suitable under normal, dry circumstances, ice and snow accumulation on the runway surface makes these locations unsuitable for larger aircraft for most of the year. For example, Inuvik airport is currently used as a forward operating location for fighter aircraft in support of NORAD operations.¹⁵ Although the airport is able to support the CF-188 fighter aircraft, the runway is not able

¹⁴ *Ibid.*, 15.

¹⁵ Canada. Department of National Defence. *North American Aerospace Defense Command (NORAD)*. Ottawa: DND Canada, Last modified 11 March 2021.

to support the CC-150T aircraft which would provide air-to-air refueling support to the NORAD mission. As a result of the lack of appropriate infrastructure, the NORAD mission must be supported by Canadian CC-150T tankers based in Yellowknife or US tankers based in Alaska.

Another infrastructure gap for Arctic operations is the lack of hangar facilities capable of housing larger aircraft such as the CC-130J or CC-177, and the lack of de-ice/anti-ice services in the North. RCAF aircraft are not permitted to takeoff from a location if critical aircraft surfaces are contaminated from snow or ice accumulation.¹⁶ If an aircraft lands with ice accumulation, or if ice and snow accumulation occurs while the aircraft is parked, it must have the critical flight surface cleaned of the frozen contaminates prior to flight. This can be accomplished by placing the aircraft in a heated hangar to allow contaminates to melt and the surfaces to dry, or through a chemical de-icing system. There are currently no hangars in the Canadian Arctic suitable to house the CC-177 aircraft. Therefore, chemical de-icing procedures must be used. The CC-177 aircraft further complicates this requirement given the 55 foot height of the tail requiring specialized de-ice equipment to be present during de-icing operations.¹⁷ Operations in the Arctic are further limited by the lack of anti-icing services offered at northern airports. While de-icing operations enables an aircraft to have its critical surfaces cleaned of contaminates prior to flight, the further application of an anti-ice treatment allows the aircraft to depart during active precipitation (snow). Canadian Forces Station (CFS) Alert

¹⁶ Canada. Department of National Defence. *Royal Canadian Air Force National Flying Orders B-GA-100-001/AA-000*. Aircraft De-icing. Ottawa: DND Canada, 2021.

¹⁷ Boeing Canada. Products and Services: C-17 Globemaster III. Last accessed 15 April 2021. <https://www.boeing.ca/products-and-services/defense-space-security/c-17-globemaster-iii.page>

is affected by this limitation.¹⁸ Although this facility is capable of providing de-ice services to aircraft which have landed to support its operations, it is not equipped to spray anti-ice chemicals on the aircraft enabling them to depart when snow is actively falling. This limits when aircraft are able to operate into and/or out of CFS Alert's facility. Although Iqaluit is able to provide anti-ice services to RCAF aircraft, other airports frequented in the Arctic such as Inuvik and Resolute Bay do not have the infrastructure required to enable aircraft to operate during active weather events.¹⁹

While improving infrastructure in the Arctic may be construed as an attempt to militarize the North, Canadian Foreign and Defence Policy expert Adam Macdonald argues that the GoC will continue to rely on the CAF as they are "the only organization with the capability to operate in the harsh regional environment and to provide services such as search and rescue and human and natural disaster assistance".²⁰ CAF investment in Arctic infrastructure not only improves the usability of the facilities for military organizations, but it also demonstrates CAF commitment to northern communities as it enhances the region's logistical and transportation infrastructure which can be used to improve the human security of local indigenous members.

To capitalize on the speed and reach characteristics of air power, significant infrastructure requirements are necessary. The scale of aircraft required to transport and sustain personnel and their equipment are grand, and require runways that are long enough to support these air assets during unfavorable conditions. Unfavorable winter conditions also direct that airports possess the ability to provide de-ice and anti-ice

¹⁸ Nav Canada, "Canada Flight Supplement." Nav Canada, 2021

¹⁹ *Ibid.*

²⁰ Adam MacDonald, "The Militarization of the Arctic: Emerging Reality, Exaggeration, and Distraction." *Canadian Military Journal* (Ottawa) 15, no. 3 (2015) 27.

services if all-weather operations are to be conducted. As demonstrated, Canadian Arctic airports do not have the required infrastructure to enable RCAF assets to provide sustained all-weather operations from these facilities.

Air Assets

The fleet composition of RCAF aircraft is designed to enable operators to provide a vast set of capabilities to support the CAF and GoC organizations. Considering the RCAF's air mobility assets, the organization is well positioned to conduct traditional hub and spoke operations utilizing a mix of its fixed wing assets. However, as previously discussed, the Arctic provides numerous challenges to a hub and spoke model given the large distances between airfields. In order to overcome these challenges, the RCAF must add additional capabilities to its fleets in order to be able to better support GoC objectives.

The RCAF has limited runway options for its larger fixed wing aircraft in the Arctic. During a Joint Task Force (North) brief, it was noted that the CC-177 aircraft currently utilize four locations in the Arctic while the CC-130J aircraft can operate out of 17 locations.²¹ This presents a challenge given the large distances between the airfields. If a commander needs to support an operation that is not at or adjacent to one of the airfields noted above, additional resources must be utilized to facilitate movement. From a land force perspective, snowmobiles or other tracked vehicles capable of operating in the snow can be used to accomplish this task. However, if the advantages of the air power characteristics of speed and reach are to be capitalized on, then a multi-aircraft option must be considered. One example is using a C130 tanker aircraft such as the KC130J and

²¹ M. Cromwell, Joint Task Force (North) Brief to ACCE WG (Yellowknife, NWT: Joint Task Force (North), 2011).

a helicopter capable of receiving fuel while airborne such as the Boeing CH-147. This combination of aircraft would enable the RCAF to provide airlift capability throughout the Arctic capitalizing on both speed and reach characteristics. The ability to conduct aerial refuelling operations for helicopters offers many different benefits. Perhaps the largest benefit is that it minimizes the amount of time the helicopter is not performing its mission. This is a result of the helicopter not having to deviate off-track to a location with fuel on site, as well as the time it takes to shut down and refuel the aircraft. Shutting down and the subsequent re-start of the helicopter also imposes additional maintenance risks for the helicopter. To fully capitalize on the speed and reach benefits of RCAF air assets operating in the Arctic, aerial refuelling is essential.

The RCAF currently has one aircraft capable of operating as a helicopter air-to-air-refueling (HAAR) tanker; the Hercules CC-130T. While the CC-130T is capable of HAAR, it's at the end of its service life and the RCAF would have to replace it with a newer variant such as the Hercules KC130J. This aircraft could be included as part of a multi-aircraft replacement for the *next generation strategic air-to-air tanker-transport capability project* identified and funded in SSE.²² The KC130J is similar to the CC-130J-30 that the RCAF currently operates therefore resulting in reduced training costs for flight crew and maintenance personnel. While the RCAF does not currently possess HAAR capability, crews can be trained through partnerships/exchanges with the United States Marine Corps (USMC) to capitalize on best training practices and experience levels within the USMC. Similarly, the Chinook helicopter will require the airframe to be modified to receive the refueling probe, as well as the requirement for aircrew to receive

²² Canada. Department of National Defence. *Strong, Secure, Engaged: Canada's Defence Policy*. Ottawa: DND Canada, 2017, 39.

training in aerial refueling procedures. Utilizing the CH-147 platform will allow the RCAF to utilize the training simulator currently being used by 450 Tactical Helicopter Squadron as well as maintain the experience already acquired by the maintenance team members.

Investment in a helicopter air-to-air refueling capability is expensive. The initial acquisition contract for 17 CC-130J aircraft was just over three billion dollars.²³ Although the RCAF would only require a few KC130J aircraft, the expense to acquire these aircraft and retrofit the CH-147 helicopter to be able to capable of receiving fuel while airborne is significant and unfunded in SSE. However, the costs are outweighed by the capability acquired. “Exercise Northern Bison revealed that most soldiers would be a liability if sent north – meaning that keeping them alive would consume all their energy, plus that of others”.²⁴ To enable soldiers sent to the Arctic to be effective when supporting a security operation, they require support from the RCAF to enable movement and sustainability. Providing aerial refueling capability to the CH-147 will enable it to support remote locations in the Arctic without requiring a reliance on prepositioned fuel caches.

Conclusion

The Government of Canada uses many different organizations to provide a holistic approach for maintaining the Arctic’s security. Understanding that climate change is rapidly increasing the accessibility of the North, the Canadian Border Services Agency, Canadian Coast Guard, Royal Canadian Mounted Police and the Canadian

²³ Canada. National Security and Defence. *CC-130J Hercules tactical airlift procurement project*. Ottawa: DND Canada, Last modified 13 Dec 2018.

²⁴ Adam, Lajeunesse,. *The Canadian Armed Forces in the Arctic: Purpose, Capabilities, and Requirements*. Ottawa: Canadian Defence and Foreign Affairs Institute, 2015, 8.

Armed Forces each have their role in achieving this objective. By understanding the objectives of the GoC through its Northern and Arctic policies, it can be determined that the RCAF plays an integral role in enabling the CAF to support this mission due to its remoteness, the large distances between populaces located in the North, and climate which prohibits movement through its waterways for a majority of the year. Capitalizing on the air power characteristics of speed and reach, RCAF aircraft are able to swiftly respond to remote areas of the Arctic if required. However, these RCAF aircraft are limited by the infrastructure available in the Arctic. Air-mobility aircraft require runways dispersed throughout the Arctic that are sufficient in length and weight bearing ratios to fully capitalize on these air power characteristics. Furthermore, these facilities require both de-ice and anti-ice capabilities to enable RCAF aircraft to operate in adverse-weather conditions. This paper has identified that there are not sufficient runways available throughout the Arctic, nor adequate anti-ice capabilities in the Arctic to fully capitalize on the speed and reach of RCAF aircraft. Additional aircraft capabilities must be developed within the RCAF to enable it to contribute in the North. Adding helicopter air-to-air refueling capability will allow the RCAF to expand its hub and spoke model beyond the traditional range of fixed wing assets. Inflight refueling of the CH-147F helicopter would enable it to reach remote destinations within the Arctic, enabling the CAF writ large to operate safely and effectively in the North.

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